

Y 4
. L 11/2
N 21 dia/
973

1043

93y4
L 11/2
N 21 dia/973

GOVERNMENT

Storage

DOCUMENTS

DEC 3 1973

HEARING

BEFORE THE

SUBCOMMITTEE ON HEALTH

OF THE

COMMITTEE ON

LABOR AND PUBLIC WELFARE

UNITED STATES SENATE

NINETY-THIRD CONGRESS

FIRST SESSION

ON

S. 17

TO AMEND THE PUBLIC HEALTH SERVICE ACT TO PROVIDE
FOR GREATER AND MORE EFFECTIVE EFFORTS IN RESEARCH
AND PUBLIC EDUCATION WITH REGARD TO DIABETES
MELLITUS

S. 648

TO AMEND THE PUBLIC HEALTH SERVICE ACT TO EXPAND
THE AUTHORITY OF THE NATIONAL INSTITUTE OF ARTHRI-
TIS, METABOLISM, AND DIGESTIVE DISEASES IN ORDER TO
ADVANCE THE NATIONAL ATTACK ON DIABETES

FEBRUARY 26, 1973



Printed for the use of the Committee on Labor and Public Welfare

U.S. GOVERNMENT PRINTING OFFICE

WASHINGTON : 1973

98-093 O

COMMITTEE ON LABOR AND PUBLIC WELFARE

HARRISON A. WILLIAMS, Jr., New Jersey, *Chairman*

JENNINGS RANDOLPH, West Virginia
CLAIBORNE PELL, Rhode Island
EDWARD M. KENNEDY, Massachusetts
GAYLORD NELSON, Wisconsin
WALTER F. MONDALE, Minnesota
THOMAS F. EAGLETON, Missouri
ALAN CRANSTON, California
HAROLD E. HUGHES, Iowa
WILLIAM D. HATHAWAY, Maine

JACOB K. JAVITS, New York
PETER H. DOMINICK, Colorado
RICHARD S. SCHWEIKER, Pennsylvania
ROBERT TAFT, Jr., Ohio
J. GLENN BEALL, Jr., Maryland
ROBERT T. STAFFORD, Vermont

STEWART E. MCCLURE, *Chief Clerk*
ROBERT E. NAGLE, *General Counsel*
ROY H. MILLENSON, *Minority Chief Clerk*
EUGENE MITTELMAN, *Minority Counsel*

SUBCOMMITTEE ON HEALTH

EDWARD M. KENNEDY, Massachusetts, *Chairman*

HARRISON A. WILLIAMS, Jr., New Jersey
GAYLORD NELSON, Wisconsin
THOMAS F. EAGLETON, Missouri
ALAN CRANSTON, California
HAROLD E. HUGHES, Iowa
CLAIBORNE PELL, Rhode Island
WALTER F. MONDALE, Minnesota

RICHARD S. SCHWEIKER, Pennsylvania
JACOB K. JAVITS, New York
PETER H. DOMINICK, Colorado
J. GLENN BEALL, Jr., Maryland
ROBERT TAFT, Jr., Ohio

LeROY G. GOLDMAN, *Professional Staff Member*
JAY B. CUTLER, *Minority Counsel*

CONTENTS

Text of:	Page
S. 17-----	3
S. 648-----	14

CHRONOLOGICAL LIST OF WITNESSES

MONDAY, FEBRUARY 26, 1973

McGee, Hon. Gale, a U.S. Senator from the State of Wyoming-----	24
Zapp, John, D.D.S., Deputy Assistant Secretary for Legislation, accompanied by G. Donald Whedon, M.D., Director, National Institute of Arthritis, Metabolism, and Digestive Diseases; R. W. Lamont-Heavers, M.D., Deputy Director; and Benjamin Burton, M.D., Associate Director, Department of Health, Education, and Welfare-----	33
Davidson, John K., M.D., Ph. D., chairman, public affairs committee, member, board of directors, professor of medicine, and director of diabetes unit, Emory University School of Medicine, representing the American Diabetes Association, and J. Richard Connelly, executive director-----	44
Grishaw, William H., M.D., president, American Diabetes Association-----	48
Sprague, Randall G., M.D., endocrinology and internal medicine (emeritus), Mayo Clinic-----	52
Crofford, Oscar B., M.D., head of division of diabetes and metabolism, Vanderbilt University School of Medicine-----	54
Field, James B., M.D., professor of medicine, University of Pittsburgh School of Medicine-----	60
Etzwiler, Donnell D., M.D., director, Diabetes Education Center, Minneapolis, Minn-----	64
Marble, Alexander, M.D., Joslin Clinic and New England Deaconess Hospital, Boston, Mass., accompanied by George F. Cahill, M.D., director of the Joslin Research Laboratory and professor of medicine, Harvard University, and two patients representing the area of juvenile diabetes; Edward C. Ferguson, school teacher, and Frank F. Sears, student-----	71
Ferguson, Edward C., vice chairman, youth committee, Joslin Diabetes Foundation-----	80
Sears, Frederick F., member, youth committee, Joslin Diabetes Foundation, Inc-----	82
Cahill, George F., Jr., M.D., professor of medicine, Harvard Medical School-----	82
Blizzard, Robert, M.D., Eudowood professor of pediatrics, Johns Hopkins University Hospital, representing the Endocrine Society-----	85
Ducat, Mrs. Edwin M., founder and president, Juvenile Diabetes Foundation, accompanied by Robert Kaye, M.D., deputy physician in chief, Children's Hospital, Philadelphia; Lester Baker, M.D., director of clinical research center, Children's Hospital, Philadelphia; and Allen Rogers, Ph. D., University City Science Center, Philadelphia-----	92
Field, Dr. Richard, senior scientist, Retina Foundation, Boston, and associate clinical professor, Harvard Medical School; Carl Stenzler, chairman, Governor's committee concerned with diabetes and blindness; Dr. Arnall Patz, seeing eye professor, Johns Hopkins University, and the Society for the Prevention of Blindness; Dr. Robert Bradley, medical director, Joslin Medical Clinic, Boston; and Dr. Christian Klimt, professor and director, clinical investigation, University of Maryland School of Medicine-----	158
Stone, Morton B., president, Disease Detection Information Bureau-----	173
Duncan, Theodore G., M.D., president, the Garfield G. Duncan Research Foundation, Inc-----	177
Nagle, John, Chief, Washington officer, National Federation of the Blind-----	180

IV

STATEMENTS

Blizzard, Robert, M.D., Eudowood professor of pediatrics, Johns Hopkins University Hospital, representing the Endocrine Society.....	Page 85
Cahill, George F., Jr., M.D., professor of medicine, Harvard Medical School.....	82
Crofford, Oscar B., M.D., head of division of diabetes and metabolism, Vanderbilt University School of Medicine.....	54
Davidson, John K., M.D., Ph. D., chairman, public affairs committee, member, board of directors, professor of medicine and director of diabetes unit, Emory University School of Medicine, representing the American Diabetes Association, and J. Richard Connelly, executive director.....	44
Ducat, Mrs. Edwin M., founder and president, Juvenile Diabetes Foundation, accompanied by Robert Kaye, M.D., deputy physician in chief, Children's Hospital, Philadelphia; Lester Baker, M.D., director of clinical research center, Children's Hospital, Philadelphia; and Allen Rogers, Ph. D., University City Science Center, Philadelphia.....	92
Prepared statement.....	102
Duncan, Theodore G., M.D., president, the Garfield G. Duncan Research Foundation, Inc.....	177
Etzwiler, Donnell D., M.D., director, Diabetes Education Center, Minneapolis, Minn.....	64
Ferguson, Edward C., vice chairman, youth committee, Joslin Diabetes Foundation.....	80
Field, James B., M.D., professor of medicine, University of Pittsburgh School of Medicine.....	60
Field, Dr. Richard, senior scientist, Retina Foundation, Boston, and associate clinical professor, Harvard Medical School; Carl Stenzler, chairman, Governor's committee concerned with diabetes and blindness; Dr. Arnall Patz, seeing eye professor, Johns Hopkins University, and the Society for the Prevention of Blindness; Dr. Robert Bradley, medical director, Joslin Medical Clinic, Boston; and Dr. Christian Klimt, professor and director, clinical investigation, University of Maryland School of Medicine.....	158
Grishaw, William H., M.D., president, American Diabetes Association.....	48
McGee, Hon. Gale, a U.S. Senator from the State of Wyoming.....	24
Marble, Alexander, M.D., Joslin Clinic and New England Deaconess Hospital, Boston, Mass., accompanied by George F. Cahill, M.D., director of the Joslin Research Laboratory and professor of medicine, Harvard University, and two patients representing the area of juvenile diabetes; Edward C. Ferguson, schoolteacher, and Frank F. Sears, student.....	71
Nagle, John, Chief, Washington Office, National Federation of the Blind.....	180
Prepared statement.....	183
Sears, Frederick F., member, youth committee, Joslin Diabetes Foundation, Inc.....	82
Sprague, Randall G., M.D., endocrinology and internal medicine (emeritus), Mayo Clinic.....	52
Stone, Morton B., president, Disease Detection Information Bureau.....	173
Vander Jagt, Hon. Guy, a Representative in Congress from the State of Michigan, prepared statement.....	185
Zapp, John, D.D.S., Deputy Assistant Secretary for Legislation, accompanied by G. Donald Whedon, M.D., director, National Institute of Arthritis, Metabolism, and Digestive Diseases; R. W. Lamont-Heavers, M.D., Deputy Director, and Benjamin Burton, M.D., Associate Director, Department of Health, Education, and Welfare.....	33

ADDITIONAL INFORMATION

Articles, publications, et cetera:

"A Proposal for Regional Clinical Research Centers for Diabetes," by Dr. Lester Baker, director of clinical research center, Children's Hospital, Philadelphia, Pa.....	Page 113
"Diabetes Is Called Basic Cause of Robinsons' Death," by Lawrence K. Altman (from the New York Times, Oct. 29, 1972).....	72
"Current Status of Juvenile Diabetes," by Dr. Robert Kaye, Deputy physician in chief, Children's Hospital, Philadelphia, Pa.....	120
Juvenile and adult-onset diabetes.....	39
"Juvenile Diabetes—A Dread Disease," a report prepared by V. A. Rogers Ph. D., and M. B. Flanagan, M.S., University City Science Center, Philadelphia, Pa.....	125
Regional medical programs with operational diabetes projects (as of December 1972).....	42

Communications to:

Committee on Labor and Public Welfare, U.S. Senate, Washington, D.C., from Shirley Sorenson, chairman, Central Virginia Chapter, American Diabetes Association.....	186
---	-----

Charts:

Life after onset of diabetes, average duration.....	76
---	----

Selected tables:

Death in 5,009 diabetics, causes of.....	77
Diabetes, cases (in thousands), fiscal fact sheet.....	42
Mortality in diabetes versus general population.....	78
Vascular disease in diabetes.....	78

The first part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present. The second part of the paper discusses the importance of the study of the history of the world. It is argued that a knowledge of the past is essential for a full understanding of the present. The third part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present. The fourth part of the paper discusses the importance of the study of the history of the world. It is argued that a knowledge of the past is essential for a full understanding of the present. The fifth part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present. The sixth part of the paper discusses the importance of the study of the history of the world. It is argued that a knowledge of the past is essential for a full understanding of the present. The seventh part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present. The eighth part of the paper discusses the importance of the study of the history of the world. It is argued that a knowledge of the past is essential for a full understanding of the present. The ninth part of the paper discusses the importance of the study of the history of the United States. It is argued that a knowledge of the past is essential for a full understanding of the present. The tenth part of the paper discusses the importance of the study of the history of the world. It is argued that a knowledge of the past is essential for a full understanding of the present.

NATIONAL DIABETES RESEARCH AND EDUCATION ACT, 1973

MONDAY, FEBRUARY 26, 1973

U.S. SENATE,
SUBCOMMITTEE ON HEALTH
OF THE COMMITTEE ON LABOR AND PUBLIC WELFARE,
Washington, D.C.

The committee met, pursuant to notice, in room G-308, New Senate Office Building, Senator Richard Schweiker, presiding pro tempore.

Present: Senator Schweiker.

Senator SCHWEIKER. The Senate Subcommittee on Health will please come to order.

I am delighted to have the opportunity and privilege today to convene the Senate Health Subcommittee for a hearing on the problem of diabetes, a national health problem. I particularly want to thank Senator Kennedy for scheduling these hearings. We will be giving particular attention to two legislative proposals dealing with diabetes, which are currently pending before this subcommittee.

I am confident this hearing signals the beginning of a major national assault against diabetes. Whatever legislative measure emerges as a result of these hearings and the deliberations of the subcommittee, will provide the blueprint for finding a way to more effectively deal with this problem.

In my judgment, the Nation's diabetics, who up to now may have felt neglected by their government, are entitled to a commitment to increase the effort against this disease and thus increase the chances for making some real progress in the detection and treatment of diabetes and, hopefully, at some point, its control and cure.

We shall hear from Senator Gale McGee, the Department of Health, Education, and Welfare, the American Diabetes Association, the Joslin Diabetes Foundation, the Endocrine Society, the Juvenile Diabetes Foundation, the Disease Detection Information Bureau, the Retina Foundation, the National Federation for the Blind, the Garfield G. Duncan Research Foundation, and the Governor of Pennsylvania's Committee Concerned With Diabetes and Blindness. In addition, the record of this hearing will remain open for several weeks and we look forward to receiving the testimony of those persons and organizations unable to be scheduled for today's hearing.

In my judgment, the problem of the incidence of diabetes is one to which we have not addressed much attention. Studies show that there is a 9-percent increase each year in the diabetic population. An important factor are diabetic children. Until 1921, diabetic children died. There was no chance for them. After the discovery of insulin by Drs. Banting and Best in 1921, children and young adults survived, grew to

maturity, and have been producing children with diabetes or with a strong inherited factor for diabetes. There are now about 8 million diabetics with a 50-percent chance of producing diabetic children.

If we are to face the facts squarely, we must realize that the discovery of insulin was not a cure as was felt originally, but only one step in the battle against diabetes, "The Invisible Disease." Is it because it is "invisible" that we, as a Nation, have not come to grips with the problem? It is ironic that diabetes now dominates the medical scene yet so little is being done to solve the mysteries of this illness.

Paradoxically, the increasing prevalence of diabetes is itself a product of medical progress. For insulin first used in the 1920's has enabled patients to survive the years necessary for the development of the complications associated with diabetes.

Diabetic retinopathy, a striking example of one of the complications of diabetes, is one of the leading causes of blindness in the United States. It is expected in the near future to become the No. 1 cause of blindness. Based on current data, by the year 2000 the number of persons blind or severely visually impaired by this disease will be greater than the number blind from all causes today.

As I have indicated, the complication of blindness in diabetes is a function of the duration of diabetes. The longer the diabetic lives, the greater the chance that he will develop diabetic retinopathy. At present, we can anticipate a growing number of diabetics and thus an increase in the blind population.

Current figures show that the prevalence of diabetic retinopathy has increased tenfold since 1942, as insulin, good metabolic care, and antibiotics have prolonged the diabetic's life.

I have introduced S. 17, the National Diabetes Research and Education Act, a followup to a bill I offered during the last session of Congress, which was the first legislative proposal in recent history to address itself to the problem of diabetes. Its purpose is to expand and coordinate the research effort against diabetes and to advance patient, professional and public education activities to alert Americans to early indications of diabetes and to emphasize the significance of early detection, proper control, and the complications which evolve from the disease. Under this proposal, a national task force on diabetes, to include lay persons, would be established to formulate a long-range plan to combat diabetes.

Also, the feasibility of operating model diabetes research, treatment and education clinics for detection, intervention and development of manpower would be tested.

Senator Gale McGee has introduced the National Diabetes Act of 1973, S. 648, which expands the authority of the National Institute of Arthritis, Metabolism and digestive diseases to develop a plan for a national diabetic program and to establish centers for basic and clinical research into diabetes and the development of advanced diagnostic, prevention, and treatment methods for diabetes.

The two proposals form the basis upon which this subcommittee will recommend an appropriate measure to be passed by the Senate.

At this point I order a copy of S. 17 and S. 648 be entered in the record.

[The information referred to follows:]

93D CONGRESS
1ST SESSION

S. 17

IN THE SENATE OF THE UNITED STATES

JANUARY 4, 1973

Mr. SCHWEIKER introduced the following bill; which was read twice and referred to the Committee on Labor and Public Welfare

A BILL

To amend the Public Health Service Act to provide for greater and more effective efforts in research and public education with regard to diabetes mellitus.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That this Act may be cited as the "National Diabetes Re-
4 search and Education Act".

5 FINDINGS AND DECLARATION OF PURPOSE

6 SEC. 2. (a) The Congress hereby finds and declares—

7 (1) that diabetes mellitus is a major health problem
8 in the United States;

9 (2) that diabetes mellitus contributes to many other

1 health problems, and may significantly decrease life
2 expectancy;

3 (3) that the citizens of the United States should
4 have a full understanding of the nature and impact of
5 diabetes mellitus;

6 (4) that there is striking evidence that the known
7 prevalence of diabetes mellitus has increased dramati-
8 cally in the past decade;

9 (5) that the severity of diabetes mellitus in chil-
10 dren and most adolescents is greater than in adults,
11 which in most cases involves greater problems in the
12 management of diabetes mellitus;

13 (6) that the attainment of better methods of early
14 diagnosis and treatment of diabetes mellitus deserves the
15 highest priority;

16 (7) that the determination of the most effective pro-
17 gram for discovering the magnitude of the disease, its
18 causes, cures, and treatments must be given immediate
19 attention; and

20 (8) that in order to provide for the most effective
21 program in diabetes mellitus it is important to mobilize
22 the resources of the National Institutes of Health as well
23 as the public and private organizations capable of the
24 necessary research and public education in diabetes
25 mellitus.

1 (b) It is the purpose of this Act to establish a national
2 program to—

3 (1) expand and coordinate the national effort
4 against diabetes mellitus;

5 (2) advance activities of patient education, pro-
6 fessional education, and public education which will alert
7 the citizens of the United States to the early indications
8 of diabetes mellitus; and

9 (3) to emphasize the significance of early detection,
10 proper control, and complications which may evolve
11 from the disease.

12 DIABETES PROGRAM

13 SEC. 3. Part D of title IV of the Public Health Service
14 Act is amended by adding at the end thereof the following
15 new sections:

16 “NATIONAL TASK FORCE ON DIABETES

17 “SEC. 435. (a) The Director of the National Institute
18 of Arthritis, Metabolism, and Digestive Diseases shall estab-
19 lish a National Task Force on Diabetes to formulate a long-
20 range plan to combat diabetes with specific recommendations
21 concerning the utilization and organization of national re-
22 sources for that purpose after conducting a comprehensive
23 study and survey investigating the magnitude of diabetes
24 mellitus, its epidemiology, its economic and social conse-
25 quences, and an evaluation of available scientific information

1 and the national resources capable of dealing with the
2 problem.

3 “(b) The program to be recommended by the Task
4 Force shall include but not be limited to:

5 “(1) a coordinated research program encompassing
6 the programs of the National Institute of Arthritis,
7 Metabolism, and Digestive Diseases, related programs
8 of the other research institutes, and other Federal and
9 non-Federal programs;

10 “(2) the utilization of existing research facilities
11 and personnel of the National Institutes of Health for
12 accelerated exploration of opportunities of special prom-
13 ise in scientific areas related to the known complications
14 of diabetes mellitus;

15 “(3) a system for the collection, analysis, and dis-
16 semination of all data useful in the prevention, diag-
17 nosis, and treatment of diabetes mellitus, including the
18 establishment of a diabetes research data bank to collect,
19 catalog, store, and disseminate insofar as is practicable
20 the results of diabetes research undertaken for the use
21 of any person involved in diabetes research.

22 “(4) support of manpower programs of training in
23 fundamental sciences and clinical disciplines to provide
24 an expanded and continuing manpower base from which
25 to select investigators, physicians, and allied health pro-

1 fessions personnel, for participation in clinical and basic
2 research and treatment programs relating to diabetes
3 including, where appropriate, the use of training stipends,
4 fellowships, and career awards.

5 “(5) budget estimates and projections reflecting
6 the funds required to fully implement the recommended
7 plan;

8 “(6) methods of education for persons having dia-
9 betes, the general public and for the professions, de-
10 signed to increase the national awareness of diabetes
11 and the nutritional, genetic, environmental, and social
12 factors, which bear on it; and

13 “(7) an emphasis on the counseling to persons, es-
14 pecially children, having diabetes and to their families
15 with regard to adjustments and medical regimen re-
16 quired of such persons.

17 “(c) The Task Force shall be composed of fifteen mem-
18 bers who are eminently qualified to serve on such task
19 force and who have demonstrated an interest in achieving
20 through research and clinical experience, practical means for
21 preventing and treating diabetes, with a knowledge of the
22 requirements for productive research, and education, and
23 with an understanding of the need for and disciplines in-
24 volved in such research and education, as follows:

25 “(1) ten members shall be scientists or physicians

1 representing the various specialties and disciplines in-
2 volving diabetes mellitus and related endocrine and meta-
3 bolic diseases;

4 “(2) five members from the general public.

5 “(d) (1) The Task Force shall publish and transmit to
6 the Congress a final report within eighteen months after the
7 enactment of this Act. Such report shall recommend a de-
8 tailed national program as required in subsection (a).

9 “(2) The Task Force may hold such hearings, take
10 such testimony, and sit and act at such times and places as
11 the Task Force deems advisable to develop a national
12 program on diabetes.

13 “(e) The Director shall—

14 “(1) designate a member of the staff of the Insti-
15 tute to act as Executive Secretary of the Task Force;

16 “(2) make available to the Task Force such staff,
17 information, and other assistance as it may require;

18 “(3) designate one of the appointed members of
19 the Task Force to serve as chairman.

20 “(f) Members of the Task Force who are officers or
21 employees of the Federal Government shall serve as mem-
22 bers of the Commission without compensation in addition
23 to that received in their regular public employment. Mem-
24 bers of the Task Force who are not officers or employees
25 of the Federal Government shall each receive compensation

1 at the rate of \$100 per day for each day they are engaged
2 in the performance of their duties as members of the Task
3 Force. All members of the Task Force shall be entitled to
4 reimbursement for travel, subsistence, and other necessary
5 expenses incurred by them in the performance of their duties
6 as members of the Task Force.

7 “(g) There are authorized to be appropriated to carry
8 out the purposes of this section \$1,000,000.

9 “IMPLEMENTATION OF DIABETES PROGRAM

10 “SEC. 436. (a) As soon as practicable after the Task
11 Force submits its report and recommendations to the Con-
12 gress, the Director shall submit to the President for trans-
13 mittal to the Congress a report outlining the actions required
14 as well as the Institute’s staff requirements to carry out the
15 program and a request for such additional appropriations
16 (including increased authorizations) as required to pursue
17 immediately the full implementation of the program rec-
18 ommended by the Task Force for which regularly appro-
19 priated funds are not available.

20 “DIABETES CONTROL PROGRAMS

21 “SEC. 437. (a) The Director shall establish programs
22 for cooperation with State and other health agencies in the
23 early diagnosis and treatment of diabetes as well as programs
24 of public, professional, and patient education.

25 “(b) There are authorized to be appropriated to carry

1 out the purpose of this section \$5,000,000 for the fiscal year
2 ending June 30, 1973, and a like sum for each of the next
3 two succeeding fiscal years, and such sums as may be nec-
4 essary thereafter.

5 "PROJECTS AND PROGRAMS FOR THE DETECTION AND EDU-
6 CATION OF DIABETES MELLITUS

7 "SEC. 438. (a) (1) The Director is authorized to make
8 grants to, or contract with States, political subdivisions,
9 universities, hospitals, and other public or nonprofit private
10 institutions, agencies, institutions, or organizations, which
11 are community oriented, for projects and programs for the
12 conduct of any or all of the following: research, demonstra-
13 tion, training in and utilization of allied health personnel, or
14 public and professional education for the early diagnosis and
15 treatment of diabetes mellitus, or counseling and assistance in
16 self-management.

17 "(2) In making such grants the Director shall give a
18 priority to those applicants which emphasize the use of allied
19 health personnel.

20 "(b) A grant (not to exceed 75 per centum of the cost)
21 under this section may be made upon application to the
22 Director at such time, in such manner, containing and ac-
23 companied by such information as the Director deems neces-
24 sary. Each applicant shall—

1 “(1) provide that the programs and activities for
2 which assistance is sought will be administered by or
3 under the supervision of the applicant;

4 “(2) describe with particularity the programs and
5 activities for which assistance is sought;

6 “(3) provide for strict confidentiality of test re-
7 sults, medical records, and other information regarding
8 screening, counseling, or treatment of any person treated
9 except for (A) such information as the patient (or his
10 guardian) consents to be released; or (B) statistical data
11 compiled without reference to the identity of any such
12 patient;

13 “(4) set forth such fiscal control and fund account-
14 ing procedures as may be necessary to assure proper
15 disbursement of and accounting for Federal funds paid
16 to the applicant under this title;

17 “(5) provide for such reports in such form and con-
18 taining such information as the Director may reasonably
19 require.

20 “(c) There are authorized to be appropriated to carry
21 out the purposes of this section \$25,000,000 for the fiscal
22 year ending June 30, 1973, and a like sum for each of the
23 next two succeeding fiscal years, and such sums as may be
24 necessary thereafter.

1 "DIABETES RESEARCH, TREATMENT, AND EDUCATION
2 CLINICS

3 "SEC. 439. (a) The Director is authorized to establish
4 not more than six model diabetes research, treatment, and
5 education clinics throughout the United States within the
6 framework of existing programs. The purpose of such clinics
7 shall be to test the feasibility of such clinics with regard to—

8 "(1) the development of improved methods of
9 detecting diabetics;

10 "(2) the development of improved methods of
11 intervention against high-risk factors which cause
12 diabetes; and

13 "(3) the development of highly skilled manpower
14 in diabetes diagnosis, prevention, and treatment.

15 "(b) Such clinics shall be served by a central co-
16 ordinating unit that shall be responsible for the development
17 of standardized procedures for diagnosis, treatment, and data
18 collection in relation to diabetes mellitus. Such clinics are to
19 be located at or in affiliation with a major medical center as
20 determined by the Director.

21 "(c) (1) There are authorized to be appropriated for
22 the establishment of the clinics authorized under this section
23 \$6,000,000 for the fiscal year ending June 30, 1973, and a
24 like sum for each of the next two succeeding fiscal years and
25 such sums as are necessary thereafter.

1 “(2) In no case shall more than \$1,000,000 be ex-
2 pended on any one clinic in a fiscal year.

3 “(d) The Director, under existing National Institutes
4 of Health policy, may enter into cooperative agreements with
5 public or nonprofit private agencies or institutions to pay all
6 or part of the cost of planning or establishing, and providing
7 basic operating support for these clinics. Federal payments
8 in support of such agreements may be used for—

9 “(1) construction;

10 “(2) staffing and other operating costs;

11 “(3) training with emphasis on allied health per-
12 sonnel; and

13 “(4) demonstration purposes.

14 “(e) As soon as practicable the Director shall evaluate
15 the performance and effect of such clinics, and determine
16 the necessity and utility of expanding such clinics on a con-
17 tinuing basis and submit a report thereon with recommenda-
18 tions, if any, for legislation required to implement such a
19 program.

20 “DEFINITIONS

21 “SEC. 440. For the purposes of this part the term—

22 “(1) ‘Director’ means the Director of the National
23 Institute of Arthritis, Metabolism, and Digestive Dis-
24 eases; and

25 “(2) ‘Task Force’ means the National Task Force
26 on Diabetes.”

93^d CONGRESS
1ST SESSION

S. 648

IN THE SENATE OF THE UNITED STATES

JANUARY 31, 1973

Mr. MCGEE (for himself, Mr. WILLIAMS, Mr. EASTLAND, and Mr. MONDALE) introduced the following bill; which was read twice and referred to the Committee on Labor and Public Welfare

A BILL

To amend the Public Health Service Act to expand the authority of the National Institute of Arthritis, Metabolism, and Digestive Diseases in order to advance the national attack on diabetes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That this Act may be cited as the "National Diabetes Act
4 of 1973".

5 FINDINGS AND DECLARATION OF PURPOSE

6 SEC. 2. (a) The Congress hereby finds and declares—
7 (1) that diabetes mellitus is a major health problem
8 in the United States in that it afflicts approximately
9 5 million Americans;

1 (2) that it is the fifth leading cause of death from
2 disease, and that it is the second leading cause of new
3 cases of blindness;

4 (3) that the complications of diabetes mellitus lead
5 to many other serious health problems;

6 (4) that uncontrolled diabetes significantly de-
7 creases life expectancy;

8 (5) that the citizens of the United States should
9 have a full understanding of the nature of the impact of
10 diabetes mellitus;

11 (6) that there is convincing evidence that the
12 known prevalence of diabetes mellitus has increased dra-
13 matically in the past decade;

14 (7) that the present level of knowledge of therapy
15 of diabetes mellitus has not provided solutions to many
16 difficult problems and especially in the delivery of health
17 care to those who are economically and educationally
18 deprived;

19 (8) that the severity of diabetes mellitus in chil-
20 dren and most adolescents is greater than in adults,
21 which in most cases involves greater problems in the
22 management of diabetes mellitus;

23 (9) that the attainment of better methods of diag-
24 nosis and treatment of diabetes mellitus deserves the
25 highest priority; and

(10) that the greatest potential for advancement against diabetes lies in the National Institute of Arthritis, Metabolism, and Digestive Diseases, but advancement against this and related diseases depends not only on the research program of that Institute but also on the research programs of the other research institutes of the National Institutes of Health.

(b) It is the purpose of this Act to expand the authority of the National Institute of Arthritis, Metabolism, and Digestive Diseases in order to advance the national attack on diabetes.

DIABETES PROGRAMS

SEC. 3. Part D of title IV of the Public Health Service Act is amended by adding after section 434 of such title the following new sections:

"NATIONAL DIABETES PROGRAM

"SEC. 435. (a) (1) The Director of the National Institute of Arthritis, Metabolism, and Digestive Diseases, with the advice of the National Advisory Council of the Institute (hereinafter referred to as the 'Council'), shall develop a plan for a national diabetes program (hereinafter in this part referred to as the 'program'). For the purpose of this part the program will include and be aided by similar efforts with regard to related endocrine and metabolic diseases and to basic biologic processes and mechanisms, the better under-

1 standing of which is essential to solution of the problem of
2 diabetes.

3 “(2) It is the purpose of the program to expand,
4 intensify, and coordinate the activities of the Institute respect-
5 ing diabetes and related endocrine and metabolic diseases.
6 The program shall be coordinated with the other programs
7 conducted or administered by the research institutes of the
8 National Institutes of Health to the extent that such institutes
9 have responsibility respecting such diseases. The program
10 shall provide for—

11 “(A) investigation into the epidemiology, etiology,
12 prevention and control of diabetes, including investiga-
13 tion into the social, environmental, behavioral, nutri-
14 tional, biological, and genetic determinants and influences
15 involved in the epidemiology, etiology, prevention and
16 control of diabetes;

17 “(B) studies and research into the basic biological
18 processes and mechanisms involved in the underlying
19 normal and abnormal phenomena associated with dia-
20 betes including abnormalities of the skin, gastrointestinal
21 tract, kidneys, eyes, and nervous system. The studies and
22 research shall also include evaluation of influences of
23 other endocrine hormones on the etiology, treatment, and
24 complications of diabetes.

25 “(C) research into the development, trial, and

1 evaluation of techniques and drugs used in, and ap-
2 proaches to, the diagnosis, treatment and prevention of
3 diabetes;

4 “(D) establishment of programs that will focus and
5 apply scientific and technological efforts involving bio-
6 logical, physical and engineering science to all facets
7 of diabetes;

8 “(E) establishment of programs for the conduct and
9 direction of field studies, large-scale testing and evalua-
10 tion and demonstration of preventive, diagnostic, ther-
11 apeutic, rehabilitative and control approaches to diabetes;

12 “(F) the education and training of scientists, clini-
13 cians, and educators in the fields and specialties requisite
14 to the conduct of programs respecting diabetes; and

15 “(G) patient, public and professional education
16 relating to all aspects of diabetes.

17 “(b) (1) The plan required by subsection (a) of this
18 section shall be developed within two hundred and seventy
19 days after the effective date of this section, and be trans-
20 mitted promptly to the Congress. Such plan shall set out
21 the staff requirements and resources necessary for the Na-
22 tional Institute of Arthritis, Metabolism, and Digestive Dis-
23 eases to carry out the program and recommendations for
24 adequate funding levels for the program.

1 “(2) In the development of the plan, attention will be
2 given to means to assure continued production of funda-
3 mental new knowledge which would form the basis of future
4 advances in the understanding, treatment, and control of
5 diabetes. Specific recommendations will be made on the
6 proportion of the effort devoted to the production of new
7 knowledge which would be expected to occur as the result
8 of individual projects undertaken in the Nation's and the
9 world's biomedical research laboratories generally and that
10 which would be anticipated as arising from the research
11 conducted in the centers under section 437.

12 “(3) The Director of that Institute shall as soon as
13 practicable after the end of each calendar year prepare in
14 consultation with the Council and submit to the President
15 for transmittal to the Congress a report on the activities,
16 progress and accomplishments under the program during
17 the preceding year and a plan for the program for the
18 succeeding five-year period.

19 “(c) In carrying out the program, the Director of the
20 National Institute of Arthritis, Metabolism, and Digestive
21 Diseases, under policies established by the Director of the
22 National Institutes of Health and after consultation with the
23 Council and without regard to any other provisions of this
24 Act may, if authorized by the Council, obtain (in accord-
25 ance with section 3109 of title 5, United States Code, but
26 without regard to the limitation in such section on the num-

ber of days or the period of such service) the services of not more than ten experts or consultants who have scientific or professional qualifications.

“DIABETES PREVENTION AND CONTROL PROGRAM

“SEC. 436. (a) The Director of the National Institute of Arthritis, Metabolism, and Digestive Diseases, under policies established by the Director of the National Institutes of Health, and after consultation with the Council, shall establish programs as necessary for cooperation with other Federal health agencies, State, local, and regional public health agencies, and nonprofit private health agencies, in the prevention, control, and evaluation of diagnosis and treatment of diabetes, appropriately emphasizing the prevention, control, diagnosis and treatment of such diseases in children.

“(b) There is authorized to be appropriated to carry out this section \$25,000,000 for the fiscal year ending June 30, 1974, \$35,000,000 for the fiscal year ending June 30, 1975, and \$45,000,000 for the fiscal year ending June 30, 1976.

“NATIONAL RESEARCH AND DEMONSTRATION CENTERS
FOR DIABETES

“SEC. 437. (a) (1) The Director of the National Institute of Arthritis, Metabolism, and Digestive Diseases may provide for the development of not less than fifteen centers

1 for basic and clinical research into, training in, and demon-
2 stration of advanced diagnostic, prevention, and treatment
3 methods for diabetes.

4 “(2) The centers developed under paragraph (1) of
5 this subsection shall, in addition to being used for research,
6 training, and demonstration projects, be available for the
7 following prevention program for diabetes:

8 “(A) programs to develop improved methods of
9 detecting individuals with a risk of developing diabetes;

10 “(B) programs to develop improved methods of
11 intervention against those factors which cause individ-
12 uals to have a high risk of developing diabetes; and

13 “(C) programs to develop health professions and
14 allied health professions personnel highly skilled in the
15 prevention and control of diabetes.

16 “(3) (a) Centers developed under this subsection may
17 be supported under subsection (b) or under any other
18 applicable provision of law.

19 “(b) The Director of the National Institute of Arthritis,
20 Metabolism, and Digestive Diseases, under policies estab-
21 lished by the Director of the National Institutes of Health
22 and after consultation with the Council, may enter into co-
23 operative agreements with public or nonprofit private agen-
24 cies or institutions to pay all or part of the cost of planning,
25 establishing, or strengthening, and providing basic operating

1 support for, existing or new centers (including centers
2 established under subsection (a)) for basic or clinical re-
3 search into, training in, and demonstration of, advanced
4 diagnostic, prevention, treatment and control methods for
5 diabetes. Funds paid to centers under cooperative agree-
6 ments under this subsection may be used for—

7 “(1) construction, notwithstanding section 405;

8 “(2) staffing and other basic operating costs, in-
9 cluding such patient care costs as are required for
10 research;

11 “(3) training, including training for allied health
12 professions personnel; and

13 “(4) demonstration purposes.

14 Support of a center under this subsection may be for a period
15 of not to exceed five years and may be extended by the Di-
16 rector of the National Institute of Arthritis, Metabolism, and
17 Digestive Diseases for additional periods of not more than
18 five years each, after review of the operations of the center
19 by a scientific review group established by the Director. As
20 used in this section, the term ‘construction’ does not include
21 the acquisition of land.

22 “INTERAGENCY TECHNICAL COMMITTEE

23 “SEC. 438. (a) The Secretary shall establish an Inter-
24 agency Technical Committee on Diabetes which shall be re-
25 sponsible for coordinating those aspects of all Federal health

1 programs and activities relating to diabetes to assure the
2 adequacy and technical soundness of such programs and ac-
3 tivities and to provide for the full communication and ex-
4 change of information necessary to maintain adequate co-
5 ordination of such programs and activities.

6 “(b) The Director of the Institute shall serve as Chair-
7 man of the Committee and the Committee shall include
8 representation from all Federal departments and agencies
9 whose programs involve health functions or responsibilities
10 as determined by the Secretary.”

11 CONFORMING AMENDMENTS TO THE PUBLIC HEALTH

12 SERVICE ACT

13 SEC. 4. Section 431 (a) of the Public Health Service
14 Act is amended by striking out “and metabolism” and
15 inserting in lieu thereof “diabetes and metabolic diseases”.

Senator SCHWEIKER. The customary method in recent years to create an affirmative program involving a greater national commitment has been to allocate more money to the task. In the case of specific health problems, the recommendation is often "more money for research."

In this instance, it will be necessary to examine the "state of science" with respect to diabetes to see if a "breakthrough" is possibly at hand. Are we simply to add large sums of money into research and can such sums be spent productively? Since adequate funds have not been available, research in diabetes has been neglected.

Consequently, our knowledge of the causes or origins of diabetes and its long term effects on the human body is deficient. How must we proceed? Certainly the Federal role and responsibility must be determined and very clearly defined.

Diabetes, unlike many other diseases, requires that the patient comprehensively understands how to manage his disease. It has been pointed out that "the treatment of very few illnesses requires so much cooperation from the patient and support from the doctor." In addition to treating the disease, the doctor is called upon to deal with the problems and anxieties of the patient, and to help motivate him.

Indeed, in the case of children, especially, the problems can be so complex and difficult that it demands more time than the physician can possibly devote to it. Thus, we will want to examine whether the counseling and support are adequate for the Nation's diabetics. Are diabetics receiving the kind of help they need? And, are physicians equipped to do it—do they have the time?

It is obvious that the needs and demands of the patient must be recognized and included in any plan or program designed to attack this problem.

We cannot legislate a cure for diabetes, but we can certainly establish a framework for a more effective diabetes program and provide the support necessary to carry out such a program.

I am very pleased to have as the first witness today a very outstanding Senator, a sponsor of one of the bills.

I would like to ask Senator Gale McGee if he will come forward and proceed to be our first witness.

STATEMENT OF HON. GALE MCGEE, A U.S. SENATOR FROM THE STATE OF WYOMING

Senator MCGEE. Thank you, Mr. Chairman.

First I want to express my very deep personal appreciation to you for your initiative and leadership in this matter.

I have a formal and stuffy statement here that I would like to make a part of the record because it might look good for history, but I will not refer to it in any specific terms at all, if we can include that in the record as though eloquently read.

Senator SCHWEIKER. Without objection, it is so ordered. We will be glad to include it.

Senator MCGEE. Mr. Chairman, first I want to thank you and the members of your committee not only for scheduling these hearings on diabetes but also for giving me an opportunity to testify this morning.

As you know, Senator Williams and I, together with several of our colleagues, introduced S. 648, the proposed National Diabetes Act of 1973, on January 31. I am very pleased and encouraged to note that our colleague and the ranking minority member of this subcommittee, Senator Schweiker, has also taken a lead by introducing S. 17, the proposed National Diabetes Research and Education Act.

The presence today of both eminent members of the medical profession and lay persons with deep insight, knowledge, and personal experience in the field of diabetes is a true testimonial to the importance and urgency of this legislation. Since introducing this legislation, I have learned that there is broad grassroots support for a constructive and meaningful program which would ultimately result in a cure and methods to prevent diabetes.

The objective of the proposed National Diabetes Act of 1973 is to amend the Public Health Service Act in order to expand the authority of the National Institute of Arthritis, Metabolism, and Digestive Diseases so that a national attack on diabetes mellitus may be undertaken.

Approximately 5 million Americans now have diabetes. Its known prevalence has doubled in the past decade. It is the fifth leading cause of death from disease. It is the second and most common cause of new cases of blindness. Complications of diabetes frequently lead to other serious health problems including heart attacks, strokes, gangrene of the extremities, kidney failure, and impaired nerve function. Uncontrolled diabetes significantly decreases life expectancy, and limits the ability of the afflicted individuals to work and earn wages. It has been particularly difficult to manage the disease satisfactorily in many children and adolescents. High quality health care has usually not been available to those who have diabetes and who are economically or educationally deprived.

Mr. Chairman, as I view it, our attack against diabetes must be made on four fronts—research, professional education, patient education, and public education and detection.

Patient education is important—to keep diabetics fully informed on the need for and the methods of proper management of the disease.

Professional education is important—to keep physicians and allied health personnel abreast of the latest developments in order to assure continuing improvement in the care and treatment of patients with diabetes.

Public education and detection are important—to increase public understanding and awareness of the problem, and to discover the unknown diabetic and alert him to the need for proper treatment.

Research is important—to learn more about the nature and causes of diabetes, and its care and treatment; to understand better the factors leading to complications; and, ultimately, to discover the cure and prevention of this major health problem.

The legislation which Senator Williams and I have introduced is designed to accomplish these four objectives and the ultimate conquest of this costly disease.

The citizens of the United States are entitled to a full understanding of the nature and impact of diabetes. They should know that present methods of treating diabetes are associated with many difficult and unsolved problems that occur during the course of the

disease. The attainment of better methods of diagnosis and treatment of diabetes mellitus deserves the highest priority. The greatest potential for advancement against diabetes lies in the National Institute of Arthritis, Metabolism, and Digestive Diseases, and in the coordination of its research programs and those related to diabetes of other institutes of the National Institutes of Health. Thus the National Diabetes Act of 1973 would expand the authority of the National Institute of Arthritis, Metabolism, and Digestive Diseases (NIAMDD) by adding four new sections to section 3, part D of title IV of the Public Health Service Act.

The first section would set up an ambitious national diabetes program under the Director of NIAMDD with the advice of that Institute's National Advisory Council. The program would expand, intensify, and coordinate the activities of the Institute respecting diabetes and related endocrine and metabolic diseases, and would coordinate with other research institutes of NIH to the extent that they had responsibilities respecting such diseases. This coordination would involve investigations into the causes, pathologic physiology, prevention, and control of diabetes, including investigations into the social, environmental, behavioral, nutritional, and genetic determinants that are involved.

Research into the basic biological mechanisms underlying the abnormal phenomena associated with diabetes would be undertaken. Research into all aspects of the various therapeutic methods and drugs used in the diagnosis, treatment and prevention of diabetes would be carried out. Programs that would focus and apply technological efforts involving the biological, physical, and engineering sciences in all facets of diabetes would be established. Field studies including large-scale testing, evaluation, and demonstration of preventive, diagnostic, therapeutic, rehabilitative and control approaches to diabetes would be established.

Scientists, including clinicians and educators in the fields and specialties related to diabetes, would be trained so that they may provide leadership in establishing and supervising the previously noted programs. Those so trained would provide in turn professional, public, and patient education related to all aspects of diabetes for the Nation at large.

The plan required by this section would be developed and transmitted to the Congress within 270 days after the effective date. It would set out NIAMDD staff requirements to carry out the program, and it would make recommendations for appropriations for the program.

After the end of each calendar year, the Director of the Institute would prepare in consultation with the Council for submission to the President and transmittal to the Congress a report of the activities, progress, and accomplishments under the program during the preceding year and plans for the program during the next 5 years.

The Director of the Institute under policies established by the Director of NIH and after consultation with the Council, might, if approved by the Council, obtain the services of not more than 10 experts or consultants who have scientific or professional qualifications in the field of diabetes.

The second section would establish a diabetes prevention and control program which would cooperate with other Federal health agencies,

State, local and regional public health agencies, and nonprofit private health agencies so that diabetes could be diagnosed as soon as possible, prevented when possible, and controlled or treated appropriately in as many patients as possible. The prevention, diagnosis, control, and treatment of the disease in children would be appropriately emphasized.

The third section would provide for the establishment of a minimum of 15 national research and demonstration centers for diabetes. Eventually we envision as many as 50 such centers located geographically across the Nation so as to equally serve and reach all people and areas. These centers would engage in basic and clinical research in the prevention, diagnosis, control, and treatment of diabetes, in the training of individuals to carry out such activities, and in the demonstration of modern methods of preventing, diagnosing, controlling, and treating diabetes to both professional and lay individuals. The centers would be utilized for research, training, and demonstration programs to develop improved methods of detecting individuals with a risk of developing diabetes, and to develop improved methods of intervention against those factors which cause individuals to have a risk of developing diabetes. Also the centers would develop programs to train highly skilled physicians and allied health professionals in the prevention and control of diabetes.

The Director of NIAMDD under policies established by the Director of NIH and after consultation with the Council would be authorized to enter into cooperative agreements with public and nonprofit private agencies or institutions. These agreements would include commitments to pay all or part of the cost of planning, establishing, or strengthening and providing basic operating support for existing or new centers, and to pay for basic or clinical research into, training in, and demonstration of advanced diagnostic, prevention, treatment, and control methods of diabetes. These funds may be used for construction, staffing, and other basic operating costs including such patient care costs as are required for research, training, and demonstration purposes. The support for each center may be for a period not to exceed 5 years. The support, however, may be extended by the Director of NIAMDD for additional periods of not more than 5 years each after review by an appropriate scientific review group established by the Director.

It has been estimated that diabetes-related sickness absenteeism, disability, and lifetime productivity losses due to premature death result in the loss of about \$2 billion in earnings each year. When the National Diabetes Act of 1973 is enacted into law, it will be possible for the first time to develop rational medical care systems of high quality for all patients in the United States with diabetes. New knowledge that will be accumulated by research and investigation will make it possible to control the disease more satisfactorily, and may lead to the development of methods that can prevent or cure diabetes. There is every reason to believe that there will be significant decrease in sickness absenteeism, disability, and premature death from diabetes once the National Diabetes Act of 1973 is implemented.

Mr. Chairman, I have tried to outline in very general terms not only the provisions of the proposed National Diabetes Act of 1973 but also the urgent need for a concentrated program on diabetes. My statement is necessarily short because I want to reserve time for the re-

maining witnesses who are far more qualified than I to testify on this subject.

I am hopeful that your committee, with the assistance of the testimony to be presented here today on both of the bills under consideration, will report a measure providing for a comprehensive diabetes program to the floor of the Senate for our final consideration very soon.

Again, thank you for the opportunity to appear here today.

Your interest in this matter is more significant than my own. I can be accused of having a conflict of interest in urging this stepping up of our efforts to come to grips with diabetes as a national health problem because I happen to be a diabetic.

All you have is dedication, and dedication and crusading zeal is really what we need a great deal of at this time, and I want to express my personal thanks to you for what you have initiated on this, Senator.

I want to stress also at the outset though we have two bills in, there is no pride in authorship, there is no competition for who gets his name on what. The real point is to get the job moving ahead, and you have outlined some of the dimensions on the question.

I will leave the names of the cosponsors who are associated: Senator Williams, your colleague on the committee; Senator Mondale; Senator Eastland; Senator Pastore; Senator Curtis; Senator Ervin; Senator Bible; Senator Moss; and Senator Humphrey—so far all anxious to join in this mutual endeavor.

I wanted to take an informal moment to underscore the complacency with which the country as a whole looks upon our efforts in the field of diabetes. The reason I say that is that people are so much more conscious now than they used to be that there is insulin, and that we have made great inroads, and people are not quite as hopelessly beset with the disease as was case just a very few years ago.

I just mention here at this particular moment how it struck me when the general practitioner, an M.D., not a diabetic specialist, solemnly declared that if I would live up to the rules, my life expectancy would be around 11 to 12 years.

The reading that I did on it at the time—even though that was frightening enough—did suggest if I were really lucky, I would have 16 years. Well, I ran for the Senate at the age of 43, with 2 years hopefully of life expectancy left, and so I have a double stake in seniority as accumulated in the Senate since arriving here and still going strong at the age of 58.

The point of it is that within this time we have been making new breakthroughs. The result is that the numbers of diabetics that are living a full lifespan and probably living it better than many of their contemporaries is really what we are able to recognize now.

But when it first hits, those who are struck by it have to have an even opportunity for the best of diagnosis, the best of care, and this is what is so lacking now. There are so many areas where, let us say, a general practitioner can identify diabetes and put you on insulin, but all of the complicated fallout attributes of the disease are not attended with the high level of sophistication or understanding under that method.

In the areas where I have visited diabetic laboratories, the special centers for the treating of diabetics, serve to remind us in a very stark way how uneven the opportunity is to avail oneself of that.

In the many areas of the country where those do not exist, it means that a new diabetic may indeed run headlong into the most fearful of the consequences of the disease, because he was not under the care of the specialists who are now available and know so much more than we had any reason to hope might be known just a very few years ago.

The hopelessness that strikes some still comes home to me in the mail that I get. People read that I am a very severe diabetic, and they read that I show up somewhere around the world in an investigation, and they wonder how that is possible, and so they write to me to ask.

Particularly I hear from parents asking whether I could write their 16-year-old daughter or 12-year-old son and tell them something about my experience, so that they can understand that they really do have a chance to move into a very fruitful future, rather than staring in uncertainty at what the days ahead may in fact hold for them.

I could not stress strongly enough here this morning, as we look at the uncertainties of the disease, even as it stands now, that I was launched on a program of living almost as a recluse when the general practitioner had me set up in this business.

I was weighing food, I was buying special foods, and not straying very far from the hearth, although I was a professor and could get to the classroom. I did not go much further than the classroom.

The psychology of that circumstance soon became a rather self-defeating one, that is, ultimately depression overtakes one, and you wonder whether it is all worth it or not.

It was only by chance—because those were primitive days—that I was thrown in the care of a clinic of diabetic specialists in Denver, Colo. It was after I developed some rather more severe complications that needed treatment that my eyes were opened, my confidence was restored, and my mode of life was immeasurably liberalized.

Where the great stress was placed on living as normal a life as possible, rather than trying to hedge and curb and retract on the amount of insulin one might take, for example, take what is necessary to lead a normal life.

Fortunately in that day—I say fortunately because I have encountered a few cases where people had such a fixation on the fact that they could go on pills, they were in better shape than if they were on the needle, and I did not have to fight that question.

The only thing I had to fight was the length of time it took me to insert the first needle. After the first one it was much easier, but the first one took 30 minutes, I do not mind confessing. It is a state of mind, but I was determined I was not going to have a nurse, not even the greatest nurse in the world—my wife—or anyone have to be responsible for that little chore as we undertook this.

So what I am really saying is that the state of mind, the psychology of this affliction, is a serious aspect, maybe even one of the most serious aspects, of the problem.

If all who are discovered to have diabetes, particularly the young do not have quick access to the expertise of the diabetic specialists and

the clinics, they may well have their whole lives turned around the wrong way, and their chances of a constructive normal life seriously inhibited, and this is one of the aspects of it that I feel the most strongly about.

This is why it is so important we get with it, why it is urgent that we move quickly without delay to make sure that across our country there is a reasonable equal access without the penalty of excessive cost and that sort of thing to these kinds of special clinics wherein does repose the know-how in this mysterious field.

The hope that we someday may find a cure or a preventative for diabetes lurks eternally in the breast of all of us, and it is likewise important that we assist at this highest level in the Federal Government in those efforts.

We have made great strides in many other diseases. I think this is one of the more challenging ones. Its complications for the future need to be understood better than we now understand them.

I notice, Mr. Chairman, that you mentioned the problems of children diabetics, the concern over that. That was a problem that we addressed ourselves to after we had one child—we already had one when I was discovered to be a diabetic.

It was only in this new discovery of the new world for diabetics, I might say, that we proceeded to have a normal family, and we now have four, the youngest of whom is 14, and they are all going great guns.

So far none of them is diabetic, and if I were begged I could produce a picture from my pocket of my first grandson who just arrived a week or two ago.

That is the kind of confidence that reflects the cumulative breakthroughs in this great field of still some mystery that needs to be resolved.

I want to leave my final word with you of moving rapidly. The public still needs to know a lot about it. I can remember the primitive approach some people had when I would travel on the road and I was riding on the train—that was in the day when they had trains—and I had gone to the restroom on the train in order to take my insulin so I could go to the diner and have breakfast.

For whatever reason I did not happen to lock the door, the conductor came in, saw me with a needle, and injecting it, and it was a great scene about who was taking dope and all that kind of business.

This is where we have come from. People now understand—almost—unless you are checked at the airport now; it happened to me in Chicago this past week when I was speaking up there.

The needles in my carrying kit, in my valise, did show up. It was opened, and I had a collection of needles—disposable needles that I travel with all the time—and this induced a series of interrogations, for understandable reasons I am sure.

Finally when I dug around deeply enough and found a bottle of insulin, that got me off the hook. So we are not through with all this, but we are now at the point where—with a massive program—all of America is going to understand the urgency of this question.

Those who are afflicted with diabetes are going to be able to cope with it and live a normal life, and those of us who are involved in other ways will be able to say hopefully that some little thing we did may have helped somebody along that long road toward the cure, or at

least survivability that gave them new courage and new chance and at the same time confidence that down the road ahead is a final cure so that it will no longer be the serious disease that it still is for a great many millions of our fellow citizens.

I want to thank you very much, Mr. Chairman, for the courtesy of permitting me to testify.

Senator SCHWEIKER. Thank you, Senator.

Let me ask just one question on something you touched that I think is very important, and that is the mental outlook of diabetics with this ongoing problem.

You say a number of your constituents would write to you, and have you write to one of their loved ones, or someone they are associated with.

Do you have any advice here that you might pass on for the record to people who get into this kind of psychological situation that might be helpful?

Senator McGEE. I would have to say, one, to make sure that they do go to a diabetic specialist who understands the complications of the depressive state of mind that quickly overtakes one in this business, the diabetic victim.

The reason I say that is that the numbers of cases that are still treated by general practitioners without a full grasp of these complications is rather appalling, and I think it is a matter of real concern for getting the kind of approach you are suggesting earlier underway.

But what I think they need to hear is that your own case is probably as acute as theirs, in many instances worse in terms of how much insulin you take, and under what circumstances and that sort of thing, but by living up to it, with a liberal approach instead of trying to achieve honor—that you can do as I do, you can travel everywhere in the world without trouble in regard to diet—and I am a rigorous hunter and fisherman—not a great getter but I do a lot of doing in both of those things—that means miles and miles every day of extreme vigorous exercise.

But because you become your own best doctor by necessity, you yourself call the tune as to whether you live the good life or not, and my advice always, particularly to the teenagers who write these searching questions, because they feel so hopeless, is that you are in control, and you are in command, and if you cheat, you cheat only you; you do not cheat anybody else.

It is possible to live the best life of all. You probably will live a longer life than most of your cronies who do not have the disease because you will not be eating the same horrible food that they live on from banquet to banquet.

You will take good care of your innards as you go along, and that in itself contributes to the longevity of a diabetic's life span.

So that would be the general tone of it in terms of advice. If you just understand the disease and play the roles straight, you can live normally without having to take odd and unusual things, or to live in a peculiar way in order to protect your base of operation as a diabetic.

Senator SCHWEIKER. What would be your reaction to the question, Senator, as to whether you feel the government has paid rightful atten-

tion and made a proper resource commitment to the diabetic? What is your response to that?

Senator McGEE. I think this has been shoved back because of the great attention that has been given to cancer and heart disease, all of which is understandable, but what I am saying now is that lurking there in the background is diabetes which because of the neglect federally we have such a loss, in terms of human resources, not to mention the morale of individuals, that is directly traceable to the unevenness and the inadequacy of available centers of expertise to which a diabetic in a slum area, let us say, could repair very quickly.

They do not have that chance in many parts of the country, unless it is going to take a more substantive onslaught, and I think through the Federal Government, because of the unevenness of capabilities and resources on the State level.

I do not think we can leave it to that any more. The mobility of people argues against a well-balanced state initiative. So the Federal Government I think has been guilty of neglecting this.

You cannot do all things, but I think what we are coming to recognize is that this is one that offers the greatest prospect for showing the consequences of a substantial input in research as well as in administering the knowhow of what we have available at this stage.

It is important that we get it spread to more areas where that knowhow can then be utilized.

Thus with the transfusion of new bases of expertise to all parts of the country, which our bills recommend, and the transfusion in the research area, so that the base of the research and the options that are explorable in research can be expanded.

As you and I know best in our business up here, research is one of the toughest ones to sustain appropriations for because research is some mysterious place down the road in the future, and we are always trying to vote something that will show results by the next fiscal year.

That is why whenever we begin to pare and cut back, the research effort is one of the first to suffer from this false economy.

Is it \$2 billion a year in terms of the work productivity capability that is lost by diabetics being hospitalized, recluses or being physically impaired through some of the other fallout consequences of diabetes? That in itself is substantial enough to be concerned about, but I do not think this ought be to left on a monetary basis.

Senator SCHWEIKER. Senator, we certainly appreciate your time and contribution. I think coming from someone who has successfully been an outstanding public leader in the Senate and in private life as well, it means doubly much.

I would like to invite you—I know you have a Senate Foreign Relations Committee meeting which may pull you away—but if you have a few minutes please sit up here with the committee while we have a few witnesses.

Senator McGEE. I am committed here, but I am trying to save the United Nations, and that is my baby, so I have to get over there.

Senator SCHWEIKER. Thank you very much.

Our next witness this morning is Dr. John S. Zapp, Deputy Assistant Secretary for Legislation for the Department of Health, Education, and Welfare.

Dr. Zapp, would you come forward with your associates, and please identify them for the record.

STATEMENT OF JOHN S. ZAPP, D.D.S., DEPUTY ASSISTANT SECRETARY FOR LEGISLATION, ACCOMPANIED BY G. DONALD WHEDON, M.D., DIRECTOR, NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES; R. W. LAMONT-HEAVERS, M.D., DEPUTY DIRECTOR; AND BENJAMIN BURTON, M.D., ASSOCIATE DIRECTOR, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Dr. ZAPP. Mr. Chairman and members of the subcommittee, it is a pleasure for me to be here today to present the views of the Department on legislative proposals S. 17 and S. 648; bills to amend the Public Health Service Act, and to expand efforts in research, control, treatment, and education with regard to diabetes mellitus. While your interest in this specific disease is commendable, Mr. Chairman, we question the advisability of the enactment of categorical legislation to conduct research and control activities as a means of expressing that concern.

As you know, the National Institute of Arthritis, Metabolism, and Digestive Diseases (NIAMDD) is the Institute at the National Institutes of Health which bears responsibility for research and research training support in diabetes. In addition, studies in diabetes with particular reference to ocular complications are supported by the National Eye Institute.

DESCRIPTION OF THE PROPOSED LEGISLATION

S. 17 would, through the Director of the National Institute of Arthritis, Metabolism, and Digestive Diseases, establish:

One, a national task force on diabetes to conduct a study and formulate a long-range plan to combat this disease,

Two, diabetes control, detection, and education programs through categorical Federal grants, and

Three, up to six model diabetes research, treatment, and education clinics.

S. 648 would authorize the Director of the National Institute of Arthritis, Metabolism, and Digestive Diseases to:

One, develop a plan for a national diabetes program designed to expand, intensify, and coordinate the activities of the Institute and other NIH Institutes respecting diabetes and related endocrine and metabolic diseases,

Two, establish diabetes prevention and control programs in cooperation with various health agencies funded at \$25, \$35, and \$45 million for the next 3 fiscal years,

Three, require development of not less than 15 national research and demonstration centers for basic and clinical research into training in, and demonstration of, advanced diagnostic, prevention, and treatment methods for diabetes and, in addition,

Four, establish an interagency technical committee on diabetes to coordinate all Federal health programs and activities relating to diabetes.

DEPARTMENT POSITION

We strongly recommend against enactment of either S. 17 or S. 648. In spite of the laudable intent of the sponsors of the proposed bills, adequate legislative authority already exists to support a multifaceted attack on diabetes, and such an attack is now being mounted effectively by the NIAMDD.

Both S. 17 and S. 648 are wholly duplicative of authority already vested in the Secretary of HEW. While we share with you and many others a concern for diabetes, we strongly disagree that either S. 17 or S. 648 would contribute to a scientific advance in dealing with the problem.

A large coordinated research effort is already mounted in the field of diabetes as well as in the closely related fields of metabolism and endocrinology from which much of the newer knowledge concerning the mechanisms underlying the disease is expected to evolve. We believe that research in diabetes and related areas is already being given priority consistent with research opportunities available and their relationship with other Federal research priorities.

A new categorical disease control program is not warranted. As Secretary Richardson said in his January report on the "HEW Potential for the Seventies," there is "the implicit suggestion that legislative action will effect a cure," but we have "a virtually limitless shopping list" of disease problems to choose from. It would unnecessarily add another program to the labyrinth of existing programs, each of which is capable of stirring emotions and creating unfulfilled expectations.

Moreover, the need for either a national task force on diabetes or an interagency technical committee on diabetes is unclear.

I wish to thank you, Mr. Chairman, for the opportunity to appear before you to testify on the proposed legislation. Appended to my statement is a description of the disease, diabetes mellitus, and a brief survey of current NIH activities with respect to this disease, which I will be glad to read.

We have not incorporated a description of diabetes mellitus in the statement as we found it would be redundant, because you may have many other descriptions that will come before your committee today.

I would be pleased, if you would like me to, to go through the current activities or, as a matter of fact, to go through the description of the disease, but I could submit that for the purposes of your printed hearing record.

Senator SCHWEIKER. Yes, I think it might be helpful if you would.

Dr. ZAPP. I will start at page 5 of the statement. A major reason for the establishment in 1950 of the National Institute of Arthritis, Metabolism, and Digestive Diseases (NIAMDD) was to focus the national research effort on the problem of metabolic diseases, among which diabetes is the most widespread and important. Since its establishment, the Institute has underwritten a major effort in research related to diabetes. The current effort directly related to diabetes exceeds \$8 million annually, the overwhelming majority of which is used to fund diabetes research at university centers, medical schools, and hospitals throughout the country.

In addition, it is important to point out that the Institute expends fiscal year 1972 in a similar fashion even larger sums in support of fundamental research in endocrinology (\$19.5 million) and metabo-

lism (\$32.4 million) which are the basic research bases from which diabetes is likely to be understood and conquered. Without the breakthroughs in these areas, the final solution to the problem of diabetes will not be possible.

In an effort to facilitate rapid communication of research efforts to researcher and practitioner alike, to assist ongoing research, and to avoid possible duplication of effort, the NIAMDD is publishing monthly a one-of-its-kind "current awareness" index—The Diabetes Literature Index—which is distributed widely to diabetologists and provides references to the latest publications of research results in diabetes originating anywhere in the world. One may liken this effort in coordination of the latest knowledge about the disease to constant communications from a central data bank on diabetes. In addition, the Institute, through its Information Office, provides the lay public with brochures and information on the disease and, with the aid of radio spot announcements, informs the public of their availability.

Because of the special nature of diabetic retinopathy, a progressive disorder of the blood vessels of the retina stemming from diabetes, and the second leading cause of blindness in this country, research on this particular complication of diabetes is supported by the National Eye Institute, NEI. Among these studies, the NEI is currently supporting a 10-year, \$5 to \$7 million study which will eventually involve over 1,800 patients at 16 clinical centers across the country, current annual cost \$1.2 million. The primary objective of this cooperative study is to determine whether photocoagulation helps preserve vision in patients with diabetic retinopathy, and which type of instrument—the xenon arc photocoagulator or the argon laser—provides the greatest beneficial effect.

In addition to this special cooperative study, the NEI supports a number of other studies related to more fundamental aspects of diabetic retinopathy.

Mr. Chairman, the experts with me this morning and I will be pleased to go into any other parts of the activities that we currently have underway which may be of interest to the committee.

Senator SCHWEIKER. Thank you very much.

In your statement on page 3 you say: "We believe that research in diabetes and related areas is already being given priority consistent with research opportunities available and their relationship with other Federal research priorities."

Now, on the basis of that statement, how do you reconcile—and I address this to any one of you on the panel—the fact there are \$7,416,000 in approved but unfunded diabetes related research grants? This seems to be somewhat inconsistent, that we have approved grants, yet no funds for them.

Dr. ZAPP. May I take a first cut at that, and then pass it on to Dr. Whedon.

I would think this is a situation that is not uncommon and inconsistent with other research priorities. There is, I would say, across the board, always a rather even percentage throughout the Institutes based on the number of individuals trained and the particular state of a disease at a particular time.

There is always a certain percentage of approved grants that are not funded. I would imagine if we were to fund all of the approved

grants that come into the National Institutes of Health, that budget would be near double what it is today.

It was in the context of the entire biomedical research effort that the particular comment in this statement was included.

Dr. Whedon may wish to add to that, Mr. Chairman.

Senator SCHWEIKER. Yes, Doctor, if you care to comment on that.

Dr. WHEDON. Senator, I think what I can add is that in the context of the budgets which are available to us at the National Institutes of Health we have to make certain decisions as to what particular disorders seem to have greatest importance at a particular time, and what the opportunities are for moving ahead more rapidly.

It is the feeling at the present time that, considering the situation across the whole array of disease and disorders for which we are responsible through out the NIH, that appropriate funding level is being given to diabetes, consistent with what our opportunities are.

Now, we would be hopeful that in the future, opportunities would appear that are greater than they are today, and we would eventually move more forward more successfully on diabetes.

Senator SCHWEIKER. Doctor, following up that question, what is the priority of diabetes research in your Institute?

Dr. WHEDON. Diabetes is one of the principal areas of importance for us. There are really four main areas of importance: arthritis, kidney disease, digestive diseases, and diabetes and its related studies in endocrinology and metabolism.

So we give it a very considerable importance. We have within the intramural research programs of our Institute a special section on diabetes research headed by a world authority in that field. He has been given a great deal of support in our intramural efforts.

Of course, we provide support for more than 100 research grants throughout the country, and in the past we have provided trained diabetic experts, young men and women who are to become teachers and investigators in this field.

Senator SCHWEIKER. When was that special section set up? I think that is very commendable, and I am glad to see it. When was it organized?

Dr. WHEDON. I am not certain of the exact date, but it was I should say, Senator, 12 years ago. In fact—I am sorry; I would say 15 years ago.

The first head of this section was Dr. James Field of the University of Pittsburgh, in your State, Senator, and I note that he is here this morning.

[Dr. Field came to NIH in June 1954.]

Senator SCHWEIKER. Has there been any change in your National Advisory Committee in recent years?

Dr. WHEDON. Yes. We have attempted to take cognizance of the growing importance of various problems, including diabetes. We have added individuals too—first of all, we expanded the size of our council.

The council used to be 12 in number, and it is now 18. Part of the reason for expanding the size of our council was to include more individuals who are knowledgeable of diabetes.

The principal expert is Dr. Harvey Knowles from the University of Cincinnati in Ohio. We also have two public members of the council who have a special interest and knowledge about the disease, Mrs. Gail

Patrick Jackson, who is Chairman of the Board of Directors of the American Diabetes Association, and Joyce Kortman, from the State of Michigan, who is very active in that State in public affairs in relation to diabetes.

Senator SCHWEIKER. Do you think the fiscal 1974 budget for diabetes is adequate?

Dr. WHEDON. The fiscal 1974 budget was arrived at through considerations across the government for the appropriate funding level for medical research in general. Under the current level recommended for 1974 we will be able to fund approximately 20 percent of the applications coming into NIH which are regarded as meritorious by the study sections, and then recommended on to the Institute for review by the National Advisory Council.

Senator SCHWEIKER. The figures that I have for the budget in your Institute, which of course includes arthritis and other areas, indicates \$145 million in 1972.

The original budgetary request was \$156 million in fiscal 1973. This was amended downward to \$139 million, and now for 1974 has been amended downward again to \$133 million.

So from an original high request of \$156 million, the fiscal 1974 request will be \$23 million under that, and will be about \$12 million below what we actually gave in fiscal 1972.

I have a hard time reconciling that. Are we doing all we can in diabetes research in light of these figures?

Dr. ZAPP. Mr. Chairman, I think I should take a first answer to that.

As I am sure you realize, this is certainly not directly related to the interest that the National Institutes of Health has in diabetes or in any of their other particular disease activities.

This is part of an overall budget review that was requested by the President to keep our expenditures at a certain level for reasons that affect not just the biomedical health of the country, but relate more specifically to the economic health of the country.

The amended 1973 budget as submitted by the President last month, was based on the overall expenditure ceiling of \$250 billion.

The President has signed, and the Congress has concurred in, a very large mandatory increase for the department. Even though it may appear that we do have, in some areas, to cut back, we are expending some \$10 billion more in the department this coming fiscal year, and a very high percentage of that is in the health area. As we do that we simply have to make choices amongst the discretionary dollars that we have.

Senator SCHWEIKER. Of course, most of the increase in the Department of Health, Education, and Welfare is really medicare, medicaid which is uncontrollable I assume, and the directly controllable items would show a corresponding decrease, which is exactly what is happening here with diabetic research.

Dr. ZAPP. Mr. Chairman, that of course is very valid, but medicaid, medicare dollars are probably the most directly related health service the Government could expend. I am sure in many cases diabetics are realizing the value of that sizable increase for their eligibility for medicaid programs or for medicare. In many cases mature diabetics are probably eligible for a combination of the two programs.

But from our standpoint it has to be viewed in the overall context of expenditure ceilings for the Federal Government.

Senator SCHWEIKER. It was mentioned that the research program of the section for diabetes has been going on for 10 or possibly 15 years. I wonder if someone on your panel, maybe Dr. Whedon, could comment on what specific therapeutic or other medical improvements have accrued from that research over the last 10 or 15 years.

What can we say we have accomplished in 10 or 15 years in that section of research in terms of specific health benefits for diabetics? Can we cite any specifics?

Dr. WHEDON. The emphasis of the work by our research section has been in the field of fundamental research on diabetes, but it has very practical aspects, at least for the future.

The section has in the past been particularly interested in the factors which affect the transport of glucose to cells and which is essential for understanding and bringing about not only steady, but improved, treatment.

More recently, the section studies have resulted in finding that insulin is formed and carried in the blood in two different forms. We had always thought in the past that insulin was a single molecule, but now we find that it is produced in a form known as a big insulin, and is later converted to another form which is called, colloquially, little insulin. The section is also concerned with the aspects in which insulin is carried and bound in various protein fractions in the blood.

This research does not have a practical payoff this week. But it is the sort of strong solid basic work on the improved understanding of the disease that is going to mean a real payoff in improved treatment and care within the next few years.

I think that if we did not have this strong attention to basic research we would be stuck at a particular level of treatment and would never improve. Doctors would not be able to enhance the quality of care they bring to individual patients.

Senator SCHWEIKER. How much are we proposing to cut back the fellowship and training grants for diabetes in this fiscal budget compared to 1972?

What cutbacks—or increases, if you can give me some good news—are envisioned in fellowships and training grants for fiscal 1974 over actual 1972?

Dr. WHEDON. In 1972, Mr. Chairman, the training grant funding in the Institute of Arthritis, Metabolism, and Digestive diseases was \$15 million.

In the revised 1973 budget the figure is \$11,750,000, and it is proposed in 1974 that this figure be \$9,550,000.

The change in these figures is the result of an administration decision to cut back gradually on the training grants program, under the philosophy that adequate numbers of individuals have been trained in this field—particularly in the field of medicine where there is an opportunity for high remuneration for services. We believe that it is not the role of the Federal Government to be engaged in supplementation of this educational process, and that the individuals going into this field should find ways of borrowing and supporting their own education.

The same situation is taking place with respect to fellowships. The figure in 1972 was \$5,740,000. The figure for 1973, the revision of the

original President's budget, is \$4,900,000, and the figure in 1974 is proposed as \$3,851,000.

Senator SCHWEIKER. Dr. Zapp, in your statement you have two statements, they seem somewhat contradictory, and maybe they are not. So I would just like to ask one of your people to comment on them.

You say with proper treatment most diabetics can lead a more normal life. Later on in your statement you say:

Patients in whom the disease developed in early life usually have an abbreviated lifespan and suffer progressive disability from the complications of the disease, usually beginning in early middle age.

I wonder if someone could explain the inconsistency in what you are saying.

Dr. ZAPP. I will take a crack at that first, Mr. Chairman. We spent a great deal of time on our briefing discussions discussing those very lines, and so I am familiar with them.

There is the obvious distinction of juvenile diabetes which is much more serious regarding complications that victims have in their lifetime; and the possibility of shortened lifespan is much greater as a group.

With the individuals who have matured with diabetes, the percentages of those who would not live a normal or near normal lifetime is much smaller. I think that the example we have with the opening witness you called, Senator McGee, is a prime example of, in many cases, what people are able to do with a severe case of diabetes, as compared with what they were able to do a few years ago.

This is like many other diseases, but probably more pronounced in this particular disease than any other, that the individual's responsibility for the care of himself in diabetes probably has a very significant relationship to his lifespan.

It is very difficult for an individual to live the active but yet fully controlled, life that Senator McGee described to all of us today.

If you would like some further enumeration on the particular breakdowns between the juvenile and the mature diabetics, I am sure Dr. Whedon or one of his colleagues would be glad to discuss this.

Senator SCHWEIKER. I think maybe if they submit them for the record that will be fine.

Dr. ZAPP. Thank you.

[The information referred to follows:]

JUVENILE AND ADULT-ONSET DIABETES

Diabetes can be divided into two clinical types with different prognosis, some differences in treatment, and possibly related but dissimilar causative mechanisms. The two types are so-called "juvenile" and "adult-onset" diabetes.

Juvenile diabetes usually begins in early life—up to age 40—but it is better characterized by a rapid progression to a requirement for insulin injections. Unless insulin is provided to "juvenile" diabetics, they will eventually develop ketoacidosis with a fatal outcome. Juvenile diabetics commonly experience greatly accelerated degeneration of blood vessels in many organs, which can lead to kidney failure, gangrene in the extremities, heart attacks, and blindness. The use of oral antidiabetic drugs has proved no more successful in the management of juvenile diabetics than appears to be so for adult-onset diabetes and currently treatment depends primarily on insulin therapy. Even with insulin and specific supportive therapy, their life expectancy is greatly shortened.

So called "adult- or maturity-onset" diabetes usually begins after age 40, but it is better characterized by a slower progression of the disease and its complications. Such patients usually do not develop ketoacidosis, they usually do

not require insulin at least for a number of years, and they usually can maintain relatively normal blood glucose levels by diet and control of their body weight. Adult-onset diabetics also have a decreased life expectancy due to vascular complications. About 75 percent of all diabetics have the less severe, adult-onset type of the disease.

A measured restricted diet together with efficient use of insulin is the generally accepted method of managing juvenile diabetes. A 25-year study now has revealed, however, that the vascular changes characteristic of long-term diabetes develop relentlessly whether juvenile diabetics are maintained on a measured or unmeasured diet. Moreover, mortality rates also are essentially the same in the two groups of patients.

Plasma levels of human growth hormone (HGH) have been found to be abnormally elevated in prediabetic and juvenile diabetic subjects. Data obtained by Institute grantees suggest that diabetes, even in its earliest clinically apparent stages, may be associated with a defect in the clearance mechanisms for HGH in the liver. Pursuit of this hypothesis may be very important to future treatment of diabetics.

Senator SCHWEIKER. Dr. Whedon, I gather—and maybe this is not a fair conclusion; correct me if it is not—that in view of the cutbacks we probably could, if more money were available, use it to good purpose, not only in the whole health field but specifically in the area of diabetes.

Maybe I should not put the statement that way, but I will ask you that question.

Dr. WHEDON. Senator Schweiker, I think your assumption is valid. It is true I think in many of the fields of research for which the NIH is responsible.

I do believe that our study sections do review very carefully the applications that come before them, and when they stamp an application as approved, we have no doubt that useful information, helpful in advancing our work against diabetes, will result if those applications are funded.

So that it is merely a matter of balance in relation to the total funds available. But if more funds were available, profitable research could be conducted.

Senator SCHWEIKER. What mechanism, if any, is there in NIH in research of diabetes which involves and links the other disciplines, and other interrelated body functions involved in diabetes?

Dr. WHEDON. There is no normal interrelationship board as such, but it is part of the almost daily life at NIH for each institute, when it recognizes that there may be an interlocking interest with that of another institute, to coordinate activities.

The contact is made, review is made of how we can best work together. I think one of the best examples of that is when the national institutes began their collaborative study among several clinics of the present treatment of diabetic retinopathy.

The officials of the National Eye Institute conferred with us for our suggestions as to the best way of setting up this procedure, how to get the appropriate statistical analysis and conformation into the study that would make its results valid.

This stemmed in part from our own experience in a large multi-clinic study called the university group diabetes program in which we attempted to find out the effects of the oral antidiabetic drugs and of insulin in conjunction with diet in hopefully stemming the develop-

ment of the very serious complications of diabetes. So there is close coordination. In fact, some of the advisors on our executive committee of the university group diabetes program served as advisors to the National Eye Institute in the formation of its multiclinic study on diabetic retinopathy.

Senator SCHWEIKER. What is the anticipated outcome of the study underway at the Fogarty International Center? How will it affect the efforts of NIH in diabetes?

Dr. WHEDON. I think the effort the Fogarty is putting out now began about a year ago and is a further example of the conscious efforts which the NIH makes to coordinate the interests of different institutes and different parts of institutes in furthering its efforts in medical research, particularly in relation to medical usefulness to patients.

That is actually the thrust of the Fogarty International Center's groups of panels and workshops which they are holding.

They are focusing on what is called preventive medicine. The effort is to get consultants to the various institutes to join with our staff in workshops which will bring out and call attention to the ways in which the medical knowledge which we have available at the present time can be molded and shaped and fitted to produce a better payoff for the patient this year and next.

This is in contrast to efforts which the institutes make all the time in planning the general direction of their programs in research over many future years.

Senator SCHWEIKER. Are you familiar, doctor, with any general programs for diabetes which have evolved from the regional medical programs?

Would you be able to give a synopsis of that?

Dr. WHEDON. The regional medical programs are administered under the Health Services and Mental Health Administration, which is another major part of the Department of Health, Education, and Welfare. It is not part of NIH.

Senator SCHWEIKER. I recognize that.

Dr. WHEDON. I would be glad to go on and tell what I know of their work.

At the present time 11 of the 56 regional medical programs have operational diabetes projects. These deal particularly with education and screening. The projects are located in many States across the country.

For example, in Connecticut, the RMP (which is our abbreviation for regional medical programs) at Yale has a diabetic teaching and consultation program. In Tennessee, there is the Tennessee RMP diabetes education program, and in North Carolina, there is a diabetic consultation educational service.

I could read on, but perhaps I could supply for the record the titles of 11 different programs scattered throughout the country whose purpose is to improve the education of physicians and patients in diabetes and related endocrine diseases, as well as to step up the accuracy and output in screening new patients, and to improve the techniques of diagnosis of diabetes.

[The information referred to follows:]

REGIONAL MEDICAL PROGRAMS WITH OPERATIONAL DIABETES PROJECTS (AS OF
DECEMBER 1972)

Connecticut RMP: Yale—Connecticut Diabetes Teaching and Consultation Program.

Georgia RMP: Educating Health Professionals in Optimal Diabetes Care.

Intermountain RMP (Utah): Diabetes Education.

Mississippi RMP: Patient and Staff Education in Selected Chronic Diseases.

Missouri RMP: Early Diagnosis of Children with Diabetes.

North Carolina RMP: Diabetes Consultation and Education Services.

Puerto Rico RMP: Education Program—Diabetes Mellitus.

Rochester RMP: Diabetes Mellitus, Program for Education.

South Carolina RMP: Diabetic Training.

Tennessee Mid-South RMP: Diabetes Education Program.

Western Pennsylvania RMP: Regional Program for Patients with Diabetes Mellitus.

Senator SCHWEIKER. I think it is commendable, that 11 of 56 regional programs do have some effort in diabetes education or screening. Of course, as you know, the problem is that the administration is going to zap the regional medical programs.

I did not mean to use that as a figure of speech. [Laughter.] That was a colloquial use of the word; no personal reference.

The obvious question comes up: Who picks up the effort there, and I realize that is not in your province, but I think it does illustrate what I find is a rather disturbing picture.

One other set of figures that I would like for the record, Dr. Whedon, is whether you could give us the updated fiscal 1974 budgetary breakdown for diabetes from the National Institutes of Arthritis, Metabolism and Digestive Diseases? I believe the fact sheet we have takes us up to fiscal 1973, but it is not broken down for diabetes in the coming budget year. Could you give us that?

Dr. WHEDON. I would be glad to do that, and, if I may, would like to call attention on the record to the interrelationship of our programs in endocrinology and metabolism with those of diabetes. I think one should consider the whole span of effort in these three areas as being closely related and focusing on the improved management and treatment of diabetes.

[The following was subsequently supplied for the record appears on facing page.]

Senator SCHWEIKER. I thank all of you very much for being here, and thank you for your testimony.

Dr. ZAPP. Thank you very much, Mr. Chairman.

Senator SCHWEIKER. Our next set of witnesses is the panel from the American Diabetes Association, and I will ask the panel if they will come up and if the executive director, Mr. Connelly, will introduce the members of the panel for the record.

Mr. CONNELLY. It gives me a great deal of pleasure to introduce John K. Davidson, M.D., Ph. D., Professor of Medicine, director of diabetes unit, Emory University School of Medicine; William H. Grishaw, M.D., medical director, Hospital of the Good Samaritan Medical Center, president; Gail Patrick Jackson, chairman; Randall G. Sprague, M.D., endocrinology and internal medicine, Mayo Clinic; Oscar B. Crofford, M.D., head of division of diabetes and metabolism, Vanderbilt University School of Medicine; James B. Field, M.D., professor of medicine, University of Pittsburgh School of Medicine; and Don-

FISCAL FACT SHEET
NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

DIABETES
(in thousands)

Year	Research Grants	Fellow- ships	Trainee- ships	Training Grants	Total Extramural	Intramural	Biometry &Fld. Studies	Research & Development Contracts	Total Institute
1951 1/	30	-	-	-	30	19	-	-	49
1952	125	-	-	-	125	32	-	-	157
1953	110	25	-	-	135	48	-	-	183
1954	349	25	-	40	414	60	-	-	474
1955	609	25	-	30	664	115	-	-	779
1956	1,248	25	-	335	1,608	325	-	-	1,933
1957	2,218	25	36	678	2,957	515	-	-	3,472
1958	3,057	37	49	730	3,873	600	-	-	4,473
1959	4,205	39	14	1,008	5,266	700	-	-	5,966
1960	6,709	17	49	1,576	8,351	740	-	-	9,091
1961	8,443	28	36	1,729	10,236	800	-	-	11,036
1962	8,831	76	-	2,771	11,678	800	-	-	12,478
1963	7,986	190	-	3,948	12,124	800	-	-	12,924
1964	7,980	150	-	4,313	12,443	800	-	-	13,243
1965 1/	8,369	219	-	4,146	12,434	800	-	-	13,234
1966	4,822	240	-	637	5,699	728	200	-	6,627
1967	4,728	301	-	633	5,662	744	200	69	6,675
1968	5,240	383	-	747	6,370	864	230	78	7,542
1969	6,213	554	-	906	7,673	1,096	199	72	9,040
1970	5,366	457	-	843	6,666	1,094	217	75	8,052
1971	4,982	484	-	828	6,294	1,244	239	79	7,856
1972	5,664	457	-	568	6,689	1,086	246	161	8,182
1973 Est	5,129	387	-	443	5,959	1,124	250	83	7,416
1974 Est	4,942	297	-	360	5,599	1,166	250	85	7,100

1/ 1951 - 1965 figures include "Related Area".

nell D. Etzwiler, M.D., director, Minneapolis Diabetes Education Center.

Senator SCHWEIKER. That is a very impressive list. You may proceed.

Mr. CONNELLY. I think Dr. Davidson will present the first testimony.

STATEMENT OF THE AMERICAN DIABETES ASSOCIATION BY JOHN K. DAVIDSON, M.D., PH. D., CHAIRMAN, PUBLIC AFFAIRS COMMITTEE, MEMBER, BOARD OF DIRECTORS, PROFESSOR OF MEDICINE, AND DIRECTOR OF DIABETES UNIT, EMORY UNIVERSITY SCHOOL OF MEDICINE, AND J. RICHARD CONNELLY, EXECUTIVE DIRECTOR

Dr. JOHN K. DAVIDSON. Mr. Chairman and members of the Subcommittee:

It is a pleasure for me to be here today, and I thank the Chairman for the opportunity to appear before the subcommittee and to submit testimony approved by the board of directors of the American Diabetes Association at its interim meeting in San Francisco, Calif. on January 24, 1973, concerning two legislative proposals related to diabetes mellitus: One, S. 17, cited as the "National Diabetes Research and Education Act," and two, S. 648, cited as the "National Diabetes Act of 1973."

The needs of patients with diabetes in the United States are not being met at the present time. These needs cannot be met in the future unless the Federal Government expands its leadership role in this area and provides the financial support that is essential to implement effective legislation aimed at problems related to diabetes. The American Diabetes Association and other groups interested in diabetes can provide material assistance to the Federal Government in its efforts to cope effectively with these problems.

The American Diabetes Association is a voluntary health agency with a national professional membership of 3,000 members. An estimated 15,000 volunteers work with its affiliates, which serve 41 States. It was organized as a professional society in 1940 and became a voluntary health agency with both professional and lay members a few years ago. It has published the journal diabetes with a circulation of 6,500, which is the leading professional journal consisting entirely of papers devoted to diabetes research or clinical activities, for the last 21 years.

It has published the ADA Forecast with a circulation of 85,000 for laymen for the last 25 years. It has published the Affiliate Builder which contains news of its national activities and of its affiliates for 15 years. It carries out a fourfold program of diabetes detection, patient education, professional education, and research on a continuing basis. Annually it sponsors a general meeting, a professional education course, an allied health education course, and a research symposium. It also supports research into the nature and treatment of diabetes, and it supports the training of physicians preparing for a career in research or clinical practice related to diabetes. Despite the most diligent efforts of its professional and lay members, the limited financial resources of the ADA have restricted its services to a small

fraction of the services that are needed by the diabetic population of the United States.

It is now apparent that diabetes mellitus is a major health problem in the United States since the disease afflicts approximately 5 million Americans and there are about 325,000 new cases of diabetes diagnosed each year. It is the fifth leading cause of death from disease, and 35,000 deaths are attributed to it annually. Diabetes is the real underlying cause of many thousands of deaths that are officially counted under the heading of "Heart Disease," "Stroke," and "Kidney Disease." It is the second leading cause of new cases of blindness, and it produces blindness almost 20 years earlier than the leading cause of blindness.

The complications of diabetes mellitus lead to many other serious health problems, including abnormalities of the skin, gastrointestinal tract, kidneys, eyes, nervous system, and blood vessels with resultant heart attacks, stroke, and gangrene of the extremities. Uncontrolled diabetes significantly shortens life expectancy.

It is also clear that the severity of diabetes mellitus in children frequently involves greater problems in management than does diabetes mellitus in adults, although the present level of knowledge of therapy of diabetes mellitus has not provided solutions to many difficult problems in both children and adults. The magnitude of these problems is particularly obvious when one considers the delivery of health care to those who are either economically or educationally deprived. At the present time, premature death, disability, and sickness absenteeism due to diabetes, much of which could be prevented, costs the American economy at least \$2 billion annually. It is my understanding that these costs do not include the costs of medical care that are directly related to the consequences of diabetes.

It is the opinion of the American Diabetes Association that the citizens of the United States should have a full understanding of the nature of the impact of diabetes mellitus, and that the attainment of better methods of diagnosis and treatment of the disease deserves the highest priority. Specific attention should be directed toward the continued production of fundamental new knowledge which would form the basis of future advances in the understanding, prevention, control, treatment, and, hopefully, eventually the cure of the disease.

The American Diabetes Association approves the intent of both S. 17 and S. 648. The association hopes that the bills can be combined so that maximally effective legislation can be developed.

In S. 17, under section 435(d) (1) a period of 18 months is suggested for publication and transmission to the Congress of the final report of the national task force on diabetes. The urgency of the problems being considered suggests that it would be preferable to shorten this period to 9 months. Under section 438(b) the Federal funding of a research grant could not exceed 75 percent of the cost. Biomedical research grants have not been restricted in this fashion in the past, and such a provision would make it impossible for many qualified medical schools and hospitals to obtain such grants in the future. Under section 439(a), we would like to see the legislation authorize the establishment of more than six diabetes research, treatment, and education clinics, since six such clinics would be an inadequate beginning.

It would be preferable not to restrict the clinics to any specific number since the director of NIAMDD with the advice of the National

Advisory Council could establish an appropriate number of clinics that seemed feasible and wise after the task force study was completed. We do not feel that it would be ideal to restrict these clinics to the framework of existing programs since to do so would stifle the development of excellent centers in sections of the country which now have no existing programs. We feel that it would be more appropriate to distribute geographically according to population density high quality clinic operations throughout the country rather than to expand a few existing clinics, some of which are already well financed.

In S. 648, under section 435(b)(1), the period of 9 months for development of the plan seems appropriate. Under section 437(a)(1), the initially authorized number of centers for basic and clinical research would be at least 15, and an appropriate eventual number of centers could be determined by the director of NIAMDD after the plan to develop the national diabetes program (section 435) had been completed.

The national research and demonstration centers for diabetes would provide facilities geographically distributed according to population density so that satisfactory diabetes teaching for both professional and lay personnel would be available throughout the Nation. These centers would conduct basic and clinical research into, training in, and demonstration of advanced diagnostic, prevention, detection, and treatment methods for diabetes. S. 648 provides for a comprehensive approach to research that must be done in the diabetes area if our understanding and treatment of the disease are to be improved. It also provides for the needs of basic research and the production of fundamental new knowledge which must form the basis of any techniques which may be developed to prevent or to cure the disease in the future.

The American Diabetes Association applauds this manifestation of interest of the Congress in one of the most important chronic diseases that afflicts mankind.

I wish to thank you, Mr. Chairman and members of this committee, for the opportunity to appear before you to testify on behalf of the American Diabetes Association on a subject that is of grave concern to our association and to many millions of people in this country.

Senator SCHWEIKER. Thank you very much, Dr. Davidson. I would like to ask a few questions, and then hear from some of the other members of the panel.

You say in your second paragraph: "the needs of patients with diabetes in the United States are not being met at the present time. These needs cannot be met in the future unless the Federal Government expands its leadership role in this area and provides the financial support that is essential to implement effective legislation aimed at problems related to diabetes."

I suppose you were here for the preceding panel of witnesses where, quite to the contrary of expanding Federal commitment, it seems to me they are retrenching rather severely.

I wonder if you would like to comment generally on some of the observations that the preceding witnesses made in terms of your association and your own personal view.

Dr. DAVIDSON. Yes, Mr. Chairman, I am quite concerned about that retrenchment, and I feel it will be a serious blow to the efforts of groups like the American Diabetes Association to take care of the

problems that are quite obvious to those of us who have been working with the association and working in the area of diabetes.

We had some discussions about how many physicians are needed in the area. It is quite obvious that there are far too few to meet the needs of even contemporary medical schools who are searching for faculty members who are trained in this effort.

It is also obvious that there are inadequate numbers of dietitians, nurses, and others who are highly qualified in these areas.

I think the loss from disability and premature death and sickness in the diabetic population, which conservative estimates list at least \$2 billion a year, much of which could be prevented in terms of dollars is an example of how much needs to be done.

Senator SCHWEIKER. Yes. I think the figure of \$2 billion is quite startling. When you consider that we are cutting back it seems that it is penny wise and pound foolish.

Dr. Davidson, why is it, in your judgment, that we have so much trouble convincing the Federal Government to make a commitment here?

What is some of the underlying psychology? What are the reasons that we cannot seem to stir up the Federal Government to make a commitment in this area which afflicts so many Americans?

What rationale do you think fits the situation?

Dr. DAVIDSON. I am not sure that I can answer that question. I am aware of the problem, and I think it may relate to the fact that when insulin was discovered for a few years we felt that we had the answer to the problem. It has now become obvious to all of us we do not have the answer, because in the wake of insulin, as has already been mentioned by several witnesses, there are many problems such as diabetic retinopathy, heart disease, kidney disease, et cetera, that come in the wake of diabetes, and have become increasingly prominent.

I think it is just within the last 10 or 15 years that we have started recognizing the importance of these other aspects of diabetes, and we have become aware of the fact that we have to make a much greater effort to learn how to cope with them.

I think also in a way we have had to compete with heart disease and cancer, and diabetes has been pretty well inundated in these activities, and has not gotten the attention that it rightfully deserves.

Senator SCHWEIKER. Does any other member of the panel want to comment on that question?

Dr. GRISHAW. Senator, I think possibly a good deal of blame should be laid on the profession itself, the medical profession. In other words, when insulin was discovered we did have a feeling that this was the final answer, and we have been loath to get away from the philosophy that if a person is a good boy, he grows up to be a fine man with no problems.

It has just been in the last several years that we have come to realize that this is not true; it is very difficult to change, and it is very difficult to change that philosophy.

Senator SCHWEIKER. Do you want to comment?

Mrs. JACKSON. I will comment later, Senator.

Senator SCHWEIKER. Why do we not go ahead? I know we have some other statements from the panel. I will hold up my question until we finish the other statements. That might be a better way to proceed.

**STATEMENT OF WILLIAM H. GRISHAW, M.D., PRESIDENT,
AMERICAN DIABETES ASSOCIATION**

Dr. GRISHAW. Mr. Chairman and members of the committee, as president of the American Diabetes Association, I count it a privilege and a most gratifying experience to be invited to testify at what, to the best of my knowledge, are the first Senate hearings ever held to consider legislation specifically concerning diabetes.

As a practicing physician with diabetic patients, I can assure you the very fact that Senator Schweiker and Senator McGee and his cosponsors have introduced the National Diabetes Research and Education Act and the National Diabetes Act of 1973 is a source of great comfort and hope to the millions of diabetics throughout the country who are afflicted with this disease.

Most of them can only look forward to tragic complications—blindness, amputation of limbs because of gangrene, and even heart and kidney failure. Birth defects—Mongolian idiocy, feeble-mindedness, dwarfism, club foot, claw hand and many others—are far more frequent among infants of diabetic mothers.

These are people, not statistics. It is their dread disease that S. 17 and S. 648 are designed to attack. I salute the Senators from Pennsylvania and Wyoming for firing the opening guns in what must be an unrelenting campaign—a campaign that must continue until diabetes is finally conquered.

This is the campaign the American Diabetes Association has been aiming for, over the past three decades. During that time—despite severely limited funds—it has worked to make certain that diabetics are kept fully informed on the need for, and the methods, of proper management of the disease. It has encouraged physicians to make their careers in the treatment of diabetes and it has kept both physicians and allied health personnel abreast of the latest advances to assure continuing improvement in the care and treatment of diabetes. It has fostered research into the nature and causes of diabetes with the objectives of improving control of the disease and of discovering its cure and prevention.

Depending as it must on contributions, grants, bequests, and memorial gifts, the American Diabetes Association has been able to devote only a little over a million dollars to its research programs.

In comparison, the National Institute of Arthritis, Metabolism and Digestive Diseases of the National Institutes of Health in 1972 alone invested approximately \$8 million in diabetes research. While this investment is far greater than the American Diabetes Association's, it is still grossly inadequate in terms of the magnitude of the problem.

It is dismaying to note that based on a figure of \$5 million known and unknown diabetics in the United States, this \$8 million appropriation amounts to an expenditure of only \$1.60 per diabetic American per year. Is \$1.60 per diabetic the extent of our concern? I think not.

It cannot be if we recognize diabetes is not only a major health problem, but contributes to many other major health problems, and may significantly decrease life expectancy.

In "Diabetes Mellitus: Diagnosis and Treatment," volume II, published by the American Diabetes Association, Dr. Frederick C. Goetz

states that the person with insulin-dependent diabetes diagnosed before 15 years of age can be told that his life span will be shorter than that of his nondiabetic contemporaries and that his death will most probably be due to some form of blood vessel disease. "It is highly likely," Dr. Goetz says, "that he will live at least into his thirties, and that there is a good chance that he may survive into his forties or early fifties."

I am sure you gentlemen can appreciate as well as I can the feelings of parents whose children in their adolescence are faced with such drastic curtailment of their lifespans. This I know through 27 years of experience in conducting camps for diabetic children, and following the course of their disease in subsequent years.

Moreover, as serious as the problem is now there is every indication that it will become even more so in the years ahead. In the 15 years between 1950 and 1965, it has been estimated that the number of diabetics in this country very nearly doubled. The prevalence of diabetes is still increasing dramatically. One reason is that insulin therapy has prolonged the lives of juvenile diabetics into their reproductive years; since there is strong evidence that diabetes runs in families, there is a greater chance of its being transmitted. Another reason is that Americans are living longer and those of us over 45 are particularly prone to diabetes.

It was in recognition of this growing problem and the increasing need to combat it effectively that the American Diabetes Association has reorganized from a professional society to a voluntary health agency—so that it can attract far greater financial support from the private sector for its programs. Nevertheless, even with the most dedicated army of citizen volunteers working in its behalf, the association cannot cope effectively with a problem of this magnitude.

We will grow in organizational strength, in fund-raising capability and, most important, in capacity for service to diabetics. But realistically we recognize, as have other health agencies which have been raising far more extensive funds for their health causes, that we can only achieve our goals working in partnership with the Federal Government.

The American Diabetes Association is committed to do its utmost in mobilizing public concern and support in behalf of the cause of diabetes. But it recognizes that because of the enormity of the problem it must necessarily be a junior partner to government. Only with the partnership of the Federal Government and with its full-scale commitment, however, can the kind of attack be launched on diabetes which has a chance of succeeding in our lifetime. For this reason, we urge you to give favorable consideration to this legislation.

Thank you.

Senator SCHWEIKER. Thank you, Dr. Grishaw. I am very interested in your figures. You estimate about \$1.60. The Federal Government spends \$1.60 per diabetic American per year.

I do not have the other figures in what we spend per person per disease in the country, but I have to believe that it is one of the lowest, if not the lowest, in the country. Is that your evaluation?

Dr. GRISHAW. That is certainly my impression.

Senator SCHWEIKER. I think out of this hearing so far a couple of significant figures have emerged. One is that diabetes costs us \$2 billion annually in terms of its impact on society. We are not spending more

than \$8 million presently at the Institute, so that here is a \$2 billion impact on society, and we are hardly spending \$8 million. However, we are going to cut that back next year, so the figure of \$1.60 per diabetic American will probably go down to \$1.25 or maybe even \$1, which I think is pretty tragic. This is the frame of reference within which we are dealing.

Before we go on with questions, maybe we could continue with your panel presentation.

Mrs. JACKSON. Thank you, Senator Schweiker. After some of the things I have heard this morning I would rather talk a little informally about the situation.

Senator SCHWEIKER. You just proceed informally.

Mrs. JACKSON. I must say the eloquent way in which you, Senator, and Senator McGee have addressed yourselves to these problems has given me, as a diabetic, new hope.

I can understand why all branches of the government in reevaluation processes are on the defensive, and I can readily see how the National Institutes of Health would be one of those to be on the defensive.

As a member of the NIAMDD I too might have a conflict of interest here. I am new, as I said, on the committee, but I have not been impressed with the efforts that were directed toward the study of diabetes.

I might also say here parenthetically as a diabetic it is a good thing I am not a hypochondriac because after many of these meetings you go home almost as a basket case when you find out all the things that can happen and probably will happen to you.

I, along with Senator McGee, do not have a great deal of hope for taking advantage of new discoveries in the field of diabetic treatment in my lifetime, but I have a son who is a potential diabetic, and my main interest for years has been in the children who are affected with diabetes.

We do have to have more specialists in diabetes. The first doctor I went to—and it was when I was first in a coma—was a great doctor but apparently had lost touch. I was told the usual things, if you do not eat sugar, you will have no problem. I did not eat sugar, but it did not go away.

Fortunately for me when I again returned to coma I landed in the hands of my good doctor to my left who has taught me to adjust the disease to my life, and who has helped me to live a more productive life.

In my business, show business, many of us are seemingly flaunting the fact that we are victims who are learning to live with diabetes. I had the dubious honor of being diabetic of the year. Mary Tyler Moore, Dan Rowan, Jack Benny, and a number of people in our business, have come forward to be counted because we feel if one person might be motivated to be tested for diabetes, learn that he is diabetic and receive the proper treatment, we might have helped to save a life.

In so doing we might motivate them to save another life, and this could become a chain of helping our fellow men and this is what it is all about.

The American Diabetes Association, of which I am fortunate enough to be the chairman of the board, has been in operation for 30 years. There have been great steps forward. They have accomplished many things.

We feel we can accomplish even more, but still we cannot do it alone. Many voluntary health organizations have functioned well, but have had to reach out a hand to the Government when their problems became bigger than they could handle, particularly the financial end of it.

This is happening to us. We feel if there is a way your bills can be enacted, and the number of people who will benefit from that can be helped, the \$2 billion figure might be lowered, and the money saved from that might be expended on other health services.

When we think of a figure like \$2 billion, which is hard for the average person to live with or understand, with all those zeros and the two in front, they seem to go on forever, but when I listened to the requests for grants in the NIAMDD committee, I must say that \$2 billion could go a very long way; in fact, it could restore so many people to constructive usefulness.

Our biggest problem today is taking advantage of human resources, and there seems to be a way that we can help that situation by a more thorough study of diabetes, more research on diabetes, more public education and more patient education, which is vitally important.

Too many of us have hidden behind the door with things of this sort. We are now coming out saying, gee, look at me. I, with hundreds of thousands of others, take shots—in my case at least two a day—and I have had very similar experiences to those Senator McGee told us.

There was another woman in the motion picture business—for whom I was often mistaken—who was an alcoholic, and I can understand; our ages, and coloring were similar, but I saw people suddenly pointing to me, and I was saying, oh, no, it isn't I. Then if I were seen using a needle, people could say, not only is she an alcoholic; she is a hop-head. [Laughter.] So I have a dual purpose here.

But I do not look forward to having my son take shots. I must say after 20 years of taking shots, I am a little chicken about it, but I know that without it I would not be alive very long.

Some individuals say, I could never give myself a shot, but when you realize you will be dead in a short while without it, you are happy to take it.

But I do hope funds can be expended for research and education that will help us reach a point where our children of today and our children of the future will not have to take shots every day, and hopefully can be cured of this disease.

Senator SCHWEIKER. We certainly appreciate your remarks. I would not worry too much about a hypochondriac complex. One cannot sit on the Health Subcommittee and hear of heart, cancer, and diabetes without becoming half a hypochondriac.

I also want to comment on your reference to the diabetics who are testifying who have a conflict of interest which Senator McGee referred to as the leadoff witness. All I can say is we wrote the heart bill and the cancer bill in this committee, and I suspect, unfortunately, there is an awful lot of conflict of interest in terms of who is going to have some heart attacks and cancer.

So I suspect every time the Health Subcommittee writes a bill, we have an awful lot of hidden conflict of interest, so I would not be too concerned about that.

In fact, it impresses me that people are willing to make a commitment here to testify, and also to fight for higher national priority on diabetes. I think that is to be commended, and I feel it is very important. Obviously, if people who are afflicted do not have that commitment and do not prod a government to do more, it is a little harder for a legislator like me, who at this point is not directly involved in the disease, to feel he has support and backing.

So we are very glad you are here and that your testimony is what it is as a lay person who has a direct personal interest.

We will go ahead then with the next member of the panel, if we may.

**STATEMENT OF RANDALL G. SPRAGUE, M.D., ENDOCRINOLOGY AND
INTERNAL MEDICINE (EMERITUS), MAYO CLINIC**

Dr. SPRAGUE. I too appreciate the opportunity to appear before the subcommittee and present a statement which I believe will be helpful in the consideration of two legislative proposals concerning diabetes mellitus: S. 17, cited as the "National Diabetes Research and Education Act," and S. 648, cited as the "National Diabetes Act of 1973."

With the discovery of insulin by Banting and Best at the University of Toronto in 1921, the serious health problems posed by uncontrolled diabetes mellitus appeared to be reaching solution. Injections of insulin provided what was lacking in the diabetic, and with careful use of this new hormone, plus diet, he could achieve normal health. Since then research on insulin and the effects of insulin lack has added immeasurably to the understanding of diabetes in the scientific sense, while in the human sense insulin has given literally millions of years of life to countless diabetics around the world.

Please permit me a short digression here to tell you that I have a special interest in these matters, for I have had diabetes for almost 52 years, ever since the summer of 1921 when Banting and Best were doing their historic experiments, and I am able, thankfully, to appear before you now as a living example of what insulin can do. For me, insulin was lifesaving. I had starved down to a weight of 78 pounds when I first received insulin. I was a tall, gangly, teenage boy. It restored my health as well as saved my life, as it has for many young diabetics whose days without insulin would have been numbered but who are alive and active today because of it. Up to the present time I would estimate that I have taken about 38,000 injections of insulin at the rate of two a day and with continued good health I will be pleased to take a few thousand more.

My real purpose in this personal digression is to emphasize the unfortunate fact that there are very few diabetics who have been as fortunate as I, and few who have been as fortunate as Senator McGee and Mrs. Jackson in terms of ability to withstand the disease for many years.

It is true that the ability of insulin to keep the diabetic individual metabolically healthy has resulted in a dramatic increase in the life expectancy of diabetics, particularly the young. Thus, the diabetic child of 10 years may expect 44 more years of life, representing about a 20-fold increase in duration of life with diabetes. With onset of diabetes after age 40, duration of life has increased two and one-half times. With insulin, diabetic ketoacidosis with coma has been changed

from a major cause of death to a very minor one in terms of frequency. Insulin must be credited with most of this dramatic improvement in survival.

But let me say again that there are very few diabetics who enjoy the long survival in vigorous health on insulin that has been my good fortune. The hard cold fact is that life expectancy of diabetics, regardless of attained age, is still only about two-thirds that of the general population of the same age. The principal reasons for the shortened survival of diabetics became clearly evident less than 20 years after the discovery of insulin when it was appreciated for the first time that many patients with long-term diabetes were developing certain complications of the large and small blood vessels, with a variety of serious consequences and sooner or later a fatal termination. Thus, it has become painfully clear that insulin, at least as we have used it, does not prevent or solve all problems of the diabetic or insure normal survival.

The present state of knowledge of the vascular complications of diabetes can only be described as very inadequate. Involvement of the larger vessels takes the form of cerebral, coronary and peripheral arteriosclerosis leading to strokes, heart attacks, and gangrene. In diabetics these changes occur at a much earlier age and in more severe degree than in nondiabetics. Fully as important as such disease of the larger vessels is disease of the small vessels, known as microangiopathy, which takes the vision and then the life of many young diabetics. This small vessel disease is specifically related to diabetes and eventually occurs in almost all the tissues of the body of virtually all diabetics if they live long enough. It manifests itself most destructively in the eyes and in the kidneys.

It is clear that much remains to be done. We do not yet know enough about diabetic vascular disease to apply scientific knowledge to its prevention and treatment. Acquisition of knowledge of biological phenomena, such as the blood vessel disease that we are concerned with which shortens the life of so many diabetics, usually goes through three phases: first, discovery or recognition; second, description, and finally, precise definition of the mechanisms involved. In the case of the diabetic vascular complications, medical science has toiled through the phases of recognition and description, but has made only a start on the difficult research task of defining the biochemical mechanisms by which these changes in the blood vessel walls come about. Research in this area, as well as in many other areas of diabetes, must be encouraged and supported if we are ever to have effective preventive measures and treatment.

Diabetes is indeed a major health problem in our country. Its seriousness to the individual diabetic and to the Nation is not yet widely appreciated, partly because it has relatively low visibility. Diabetes which is, in effect, "hidden" by being either undetected or well controlled does not convey an impression of seriousness, which it truly should. In this country diabetes is ranked as the fifth leading cause of death by disease and the second leading cause of new cases of blindness. Heart attacks are at least $2\frac{1}{2}$ times more frequent in diabetics than in nondiabetics of the same age. The overall magnitude of diabetes and its complications can be better appreciated when one recognizes that there are close to 5 million diabetics in the United States, and survey data indicate that the prevalence of the disease is steadily increasing.

Certainly the establishment of a national diabetes program merits very high priority and is indeed urgent in view of the large number of people affected by diabetes, their need for care and instruction in self-care, and the overriding need for more research to enhance knowledge of the basic biological mechanisms of diabetes and its life-threatening complications.

Senator SCHWEIKER. Thank you very much, Dr. Sprague.
Dr. Crofford is next.

STATEMENT OF OSCAR B. CROFFORD, M.D., HEAD OF DIVISION OF DIABETES AND METABOLISM, VANDERBILT UNIVERSITY SCHOOL OF MEDICINE

Dr. CROFFORD. Thank you, Mr. Chairman and members of the subcommittee. I have submitted a written testimony which I would like to incorporate in the record and summarize it for you.

Senator SCHWEIKER. Go right ahead. We will be pleased to include it in its entirety.

Dr. CROFFORD. Mr. Chairman and members of the subcommittee, my comments today are intended to be representative of those that might be made by any one of a large number of physician-scientists who share with all of society the responsibility of providing in 1973 the best health care that is available for the 5 million Americans afflicted with diabetes mellitus. In addition, medical research scientists have the special responsibility of developing new and better means of caring for the patients with diabetes today and of preventing the unremitting expansion of diabetes as a public health problem for future generations.

I cannot appear before you and promise that an all-out attack on diabetes will produce in our lifetimes a permanent cure or prevention of this disease. I am confident, however, that society cannot afford the loss of human resources and the health care costs for the ever-increasing numbers of patients with diabetes if the presently available methods of treatment are simply continued and expanded.

Thus, research, when defined in its broadest sense, is the logical means of making a significant reduction in the cost of health care for patients with diabetes and for alleviating the human suffering caused by this disease. Stated in another way, research in the field of diabetes is not expensive in comparison to the eventual consequence of inadequate research.

I cannot proceed to detail the inadequacies of our present research effort without acknowledging the historic accomplishments of our predecessors. Thus, the discovery of insulin has undoubtedly saved the lives of millions of diabetics. It is truly one of our first and most effective wonder drugs. In these days of rising health care costs, insulin is a fantastic bargain. The cost to the average patient of a life-sustaining dose of insulin is about 10 cents a day.

On the other hand, the discovery of insulin transformed the character of the disease, diabetes, from an acute condition leading to early death from diabetic coma, to a chronic disease that far too often results in blindness, kidney failure, or in an acceleration of the blood vessel disease that leads to heart attack, stroke, or gangrene. Thus, despite the great discoveries of the past, the fundamental cause of diabetes

remains unknown, no permanent cure of diabetes has been achieved, and no means for the prevention of diabetes is yet available.

MAGNITUDE OF THE DIABETIC PROBLEM

Given the statistics presented in previous testimony, why is the public so unaware of the scope and magnitude of the diabetic problem? Following the discovery of insulin, virtually everyone believed that a cure for diabetes has been discovered and that diabetes had been eliminated as a significant medical problem. Indeed, the physicians of the 1920's were unaware that many of the patients whose lives were saved by insulin would develop the serious complications involving the eyes, kidneys, heart, nervous system, skin, and blood vessels that we now recognize.

The medical community adopted an unrealistically optimistic point of view. "Follow your diet and take your insulin every day, and you will lead a normal life." Even after the long-term complications of diabetes were recognized, and even today, there is a tendency to present an overly optimistic picture of the problems facing the patient with diabetes. Although this is understandable from the standpoint of the doctor relating to the individual patient, it has not moved diabetes into its proper place in the public eye in comparison to some of the more dramatic, though far less prevalent, diseases.

RESEARCH NEEDS IN THE FIELD OF DIABETES

Next, I would like to address the question: What are the research needs in the field of diabetes? Time will permit only a few examples. The first relates to research into better methods of caring for the millions of patients that already have diabetes. Many clinics are investigating the efficacy of the "team approach" to the management of diabetes. With this approach, the patient is educated in the techniques of self-care, and he himself becomes a key member of his own health-care team. Such a program involves the establishment of education centers for patients and their families, and suitable training programs for nurse specialists, nutritionists, social workers, and physicians—all members of the health-care team.

In theory, such an approach amplifies the effectiveness of each physician. It utilizes the principles of preventive medicine to avoid unnecessary admissions to the hospital, and provides better quality health care at lower cost. The effectiveness of such programs is as yet unproven, and additional research into models of improved health care systems for patients with diabetes is urgently needed.

This type of health care research—and it is research—is very difficult to fund through the regular research grant mechanisms of the National Institutes of Health. Several such programs were initiated through grants from various regional medical programs, an organization whose own future now appears in jeopardy. In my judgment, the types of centers proposed in the legislation under consideration today would be an ideal means of providing the long-term support needed to evaluate these and other models of improved health care delivery systems.

Mrs. Jackson mentioned this morning the Tennessee midsouth regional medical program. I am from Nashville, Tenn., and that pro-

gram is under the direction of Dr. Alan Graber, one of my associates; and it has recently received instructions to close, along with some of the other regional medical programs.

You asked, Senator, who is going to pick up this kind of research, and in my judgment, the types of diabetes centers that are proposed in the legislation that we are considering today would be a good means of providing the kind of stable and long-term support needed to develop and evaluate these and other models for improved health care.

Senator SCHWEIKER. So you are saying if we don't pass one of the bills before us, probably nobody will pick up the work that the regional medical programs have done, since they are being phased out.

Dr. CROFFORD. Yes, Senator. Turning to the more traditional areas of research, I have suggested that the acute complications of diabetes—the example given previously was ketoacidosis or “diabetic coma”—have been eliminated as significant medical problems. This is somewhat of an exaggeration. The Los Angeles County Hospital alone continues to treat about 300 cases of ketoacidosis per year, and about 11 percent of these die. Under the best of circumstances, ketoacidosis carries a mortality of about 3 percent. Although it is true that ketoacidosis is a preventable disease, given ideal medical care, with a well-informed patient taking the proper dose of insulin, many patients do not receive such ideal care, and we must not lessen our efforts to develop more effective means of treating ketoacidosis in those instances where it is not prevented, particularly in children.

Other acute complications of diabetes require even more intense research. In the past few years, we have come to recognize a complication of diabetes that goes by the extraordinary name of hyperosmolar nonketotic nonacidotic diabetic coma. In simpler terms, this is a type of unconsciousness or coma seen in diabetics—usually elderly diabetics—that is caused by an extremely high level of sugar in the blood. About 50 percent of the patients with this complication die, and it is not a rare complication. The Los Angeles County Hospital treated about 100 cases of hyperosmolar coma last year. Yet the basic cause of this complication, though probably related to insulin insufficiency, is still not established.

Beyond these life-threatening acute complications, there are the numerous nonfatal complications that are less dramatic but that produce much suffering and many days of illness in the lives of diabetics. I am referring particularly to boils and other skin infections, bladder and kidney infections, vaginal infections in women, and the many other acute complications that occur in diabetics with increased frequency but that require extensive research to develop more effective means of prevention and treatment.

As a final example of research needs, let me mention the recent progress made in the area of pancreas transplantation and the artificial pancreas. Surely one of the most vital medical questions of our day deals with prevention of the long-term vascular complications of diabetes. The question is this: In patients with diabetes, can some of these complications be prevented or at least improved by good “metabolic control”?

We use the expression “metabolic control” to include not only the elevated blood sugar, but also the other biochemical derangements that are associated with diabetes. I must confess that despite the im-

portance of this question, it cannot be answered with certainty today, and, furthermore, experiments are not yet in progress that are likely to answer this question. What this means is that millions of patients are being treated in an effort to control their blood sugar levels without absolute proof that even if the blood sugar level is controlled, the incidence or severity of the long-term vascular complications of their diabetes will be favorably affected.

There are two principal reasons why this vital question cannot be answered. The first is that it is not yet possible to achieve "good metabolic control" in most cases of severe diabetes. The administration of our most modern insulin preparations once, twice, or even three or more times daily, while it will prevent the acute complications of diabetes, will not achieve the almost perfect "metabolic control" that is produced by a normal pancreas that secretes exactly the right amount of insulin on a minute-by-minute basis.

The goal of trying to achieve perfect metabolic control in diabetics has led several teams of investigators to attempt pancreatic transplantation in animals made diabetic with special drugs or in a few instances of human diabetes. It appears that the transplanted pancreas survives and functions unless it is interrupted by the same type of immune rejection process that plagues other types of transplantation procedures. This is an exceptionally active and interesting field in diabetes research. A modification of this approach is to use an automated and fully artificial pancreas. Thus, the blood sugar level in the patient would be monitored continuously by a tiny chemical sensor. The data would be fed into a miniature computer that would activate a pump to inject into the patient precisely the correct amount of insulin.

Such an artificial pancreas is already under development in at least two laboratories and can probably be miniaturized to the size of a pocket watch and implanted beneath the skin of a patient. Although both of these approaches to the achievement of ideal metabolic control are still in the developmental stage, and may themselves not be the final answer, they are at least illustrative of the innovative type of research that must still be done before this question can be answered: "Does good metabolic control prevent the long-term vascular manifestations of diabetes?"

A second obstacle to the answer of this question arises from the fact that these complications develop over the course of 20 or more years, and the crucial experiments must be performed over a prolonged period of time. Support for long-term experiments cannot be obtained easily through the regular research grant mechanisms of the National Institutes of Health that are of 3 to 5 years' duration.

Few physician-scientists would embark on an experiment that would take 20 years to complete if his research support was only committed for 3 years. In my opinion, the type of diabetes centers described in both of the legislative proposals being considered today (93d Cong., 1st sess., S. 17 and S. 648) would lead to the type of stable research support needed to carry out long-term studies pertaining to the vascular complications of diabetes.

RESEARCH SUPPORT FOR DIABETES

Research support for diabetes is derived largely from the Federal Government. In a recent survey at the Vanderbilt Medical School, 71

percent of the research support directed toward diabetes was derived from the National Institutes of Health, 13 percent from all other Federal sources, and only 16 percent from all non-Federal sources combined. Thus, the National Institutes of Health provides the major share of research support for this disease. The American Diabetes Association is trying, but their entire research budget for the coming year (\$171,000) is less than 1 percent of that devoted by the National Institutes of Health to research in diabetes.

At the January 1973 meeting of the Research Committee of the American Diabetes Association, we reviewed the applications of 15 young physicians who were seeking 1 year of salary support that would enable them to pursue a research career in the field of diabetes. Of these 15 applications, 14 were determined by a peer review mechanism to be of high scientific quality, and funding was recommended. Unfortunately, our budget will permit the funding of only seven of these applications.

To me this means that there are seven highly trained young medical scientists who may of necessity turn away from their career goal of devoting their lives to research in diabetes unless alternate salary support is somehow generated. Such a potential loss of scientific talent is saddening at a time when so much research is needed.

Although the American Diabetes Association is committed to a continuation of its efforts to support research in diabetes, it must compete with other voluntary health agencies for the "donation dollar," and it is unrealistic to think that the cost of the quantity of research needed in the field of diabetes can be borne by any agency other than the National Institutes of Health.

At the present time, most NIH support in the field of diabetes is administered through the National Institute of Arthritis, Metabolism, and Digestive Diseases (NIAMDD) via the regular research grant mechanism. I cannot overemphasize my enthusiasm for this method of supporting research. It is research support based on the scientific merit of the proposal as determined by the well-established peer review system. I would not endorse the legislative proposals that we are considering today if it appeared that their funding was to be at the expense of the regular research grant mechanism.

But, regular research grants dealing with diabetes are already supported in inadequate and steadily decreasing numbers. Approximately 60 percent of the research grants recommended for support do not get paid due to lack of money available to the NIAMDD.

If I understood previous testimony correctly, 75 to 80 percent of the research grants recommended for funding would not be paid according to the fiscal year 1974 budget.

Senator SCHWEIKER. Unfortunately I am afraid you did understand it correctly.

Dr. CROFFORD. This classical means of support must be continued and should be funded at an increased level. I can assure you that the scientific community is not deficient in sound research ideas related to diabetes. The problem is that far too many of these research proposals are currently not being supported.

WHY DO WE NEED NEW PROGRAMS?

A natural question is "If regular research grants are so good, why do we need the new programs as described in bills S.17 and S. 648?"

My answer is that regular research grants were not intended and are not flexible enough to accommodate the type of research needed to cope with major national health problems like diabetes. Both of these bills have the potential of providing the stable, long-term research support that is vital to research in the area of chronic diseases like diabetes.

Stated in another way, if the long-term vascular complications of diabetes evolve over the course of 20 years, then you will never get scientists to embark on a 20-year research program as long as their research support is subject to the uncertainties of yearly renewal. Scientists will continue to conduct short-term experiments and the problems of chronic disease will not be investigated.

The architects of these bills should be commended in that both bills provide flexibility in the design of the final plan for implementing the diabetes program and a means for obtaining up-to-date scientific input through the use of outside consultants. Today, more than ever, we are anxious that new health care programs be carefully designed at the outset so that once begun they can be carried through to fruition.

In conclusion, Mr. Chairman, I am pleased to have had the opportunity of providing testimony in support of this proposed legislation.

Senator SCHWEIKER. Thank you, Dr. Crofford. I just want to go back to one or two points you made.

Earlier in the testimony, and later too for that matter, you refer to the fact that with diabetes the kind of experiments of a long-term nature, which might be needed to see this disease through to a successful conclusion, are not available under the present mechanism.

So one of the arguments you are making here today is we need a mechanism which provides for a much longer term research than we are operating under now; is that correct?

Dr. CROFFORD. That is correct. I think that there are no regulations stating that the National Institutes of Health cannot fund long-term projects, and in some instances they do, but the fact of the matter is that most regular research grants are committed for fairly short periods of time, 3 to 5 years.

With the center concept it is implicit that if you are going to the trouble of setting up a diabetes center, you plan to continue its support for 5, 10, 15 years, or as many years as necessary to answer the research question that you have set out to answer.

Senator SCHWEIKER. You also express a little bit of hope on research on an artificial pancreas. I realize that you are just citing that not from the standpoint of solving the problem but as an example of the kind of thing that money for research can exploit—leading hopefully to a breakthrough.

Dr. CROFFORD. Yes. In the complete testimony I gave several examples. I would not say that we are right on the threshold of a major breakthrough that is going to eliminate this disease.

Senator SCHWEIKER. In fact we probably are not.

Dr. CROFFORD. That is true. But, on the other hand, if we just continue to expand the present way that we are taking care of diabetics, that is certainly not going to be satisfactory for the future. We must do research into better methods of taking care of the diabetics and make the discoveries that will lead to the cure—hopefully the prevention—of the disease.

Senator SCHWEIKER. Thank you very much, Dr. Crofford.

We will continue now with Dr. James B. Field of the American Diabetes Association's presentation. Dr. Field is professor of medicine at the University of Pittsburgh School of Medicine.

**STATEMENT BY JAMES B. FIELD, M.D., PROFESSOR OF MEDICINE,
UNIVERSITY OF PITTSBURGH SCHOOL OF MEDICINE**

Dr. FIELD. Mr. Chairman and members of the Subcommittee:

I want to express my appreciation for the opportunity to testify before you concerning the important and fundamental role that research must and can play in helping the diabetic patient and achieve the laudable goals of both legislative proposals S. 17 and S. 648.

I request that my submitted testimony be incorporated in the record and I will abridge my remarks in consideration of time.

Senator SCHWEIKER. Without objection, it is so ordered.

Dr. FIELD. The momentous discovery of insulin by Drs. Banting and Best in 1921 raised expectations that the problem of diabetes mellitus would soon be solved. Insulin was life-saving for the juvenile diabetic patient whose life expectancy, before insulin was available, was approximately 2 years after the diagnosis was established. Furthermore, before insulin, diabetic coma caused about 50 percent of the deaths in diabetic patients, but now accounts for less than 5 percent of diabetic deaths.

In contrast to this impressive reduction in deaths due to diabetic coma, there has been a progressive increase in disability and deaths due to the vascular complications of diabetes. Today about 70 percent of diabetic patients die from the degenerative vascular complications which affect the blood vessels of the heart, brain, extremities, eyes, kidneys, and nerves. It is these changes which are responsible for the striking increased incidence of heart attacks, strokes, blindness, kidney failure, amputations, and obstetrical mishaps in the diabetic. Before insulin, diabetic patients usually did not survive long enough to develop these vascular complications. In the 1950's the average life expectancy of a teenager who developed diabetes was about 22 years.

Today we have extended life expectancy for this type of patient only 5 years. Our lack of knowledge and our inability to prevent or satisfactorily treat these degenerative complications of diabetes emphatically underscores the crucial importance for an expanded research program in and related to diabetes. Permit me to cite one example which is fundamental to our approach to these diabetic complications. We do not know today whether the vascular changes in the heart, kidneys, eyes, and nerves of the diabetic are due to inadequate control of his blood sugar or whether they are a basic component of the disease and uninfluenced by rigid control of the blood sugar and fats in the blood.

The medical literature contains reports on both sides of the issue, but for various reasons none of these have been definitive. We must undertake a long-term, well-controlled study to determine whether a relationship exists between control of diabetes as exemplified by blood sugar and the degenerative complications. Because of our current inability to provide optimal blood sugar control and even evaluate whether we are doing this or not, such a project requires intensive and

comprehensive study of a large number of diabetic patients over a 15- to 20-year period. I am sure you are aware of the difficulty of obtaining daily blood sugar determinations on each of these diabetic patients, but even this might not be indicative of the control of the blood sugar during the rest of the day.

Although we measure blood and urine sugar to evaluate diabetic control, measuring cholesterol, other lipids or other blood components might be more appropriate. Since the onset of diabetic degenerative complications is slow and insidious, the study must be long term and certainly substantiates the importance of long-range, stable support of diabetes research as emphasized by Dr. Crofford. Our present ability to control the blood sugar in diabetics is far from optimal, and Dr. Crofford has clearly outlined to you some of the new, exciting, and hopeful approaches in this area which necessitates greatly expanded research support which will facilitate better control of diabetes.

It is imperative for the welfare of the diabetic patient that we know whether rigid control of diabetes will prevent the degenerative complications which account for over 70 percent of diabetic deaths. To obtain this answer will be expensive and require 15 to 20 years.

Although this kind of study is fundamental in the long-range control of diabetes and its complications, it does little for the large numbers of diabetic patients who already have or will develop these complications or will develop them while the study is in progress. For these patients there is an urgent need to markedly increase our knowledge concerning the cause of these degenerative complications and discover successful therapeutic approaches to diabetic retinopathy, diabetic, involvement of the kidney and the blood vessels which account for the increased incidence of heart attacks, strokes, and leg amputations.

It is not as widely appreciated as it should be that undiagnosed diabetes may be an important and significant contributing cause to the heart attacks and strokes which occur in patients not known to have diabetes. It is obvious that knowledge concerning the cause and treatment of these complications in the diabetic will have important benefits for patients with arteriosclerosis and vascular disease, but who may not have diabetes.

Evidence indicates that the basic underlying process leading to vascular changes in the heart, brain, kidney, eyes, nerves, and extremities may be similar and therefore research effort to elucidate the underlying mechanism will produce maximum benefits although increased effort related to specific organs involved, such as the eyes and kidneys, should also be pursued.

One of the exciting and promising areas of current research indicates that the higher blood sugar levels in the diabetic cause alterations in one of the pathways by which sugar is metabolized. The consequences of this may cause biochemical changes in the cells of the blood vessels, retina, kidney, and nerves which could be important in causing arteriosclerosis, blindness, and kidney failure. If this relationship can be unequivocally established, it substantiates the concept that control of the blood sugar is important in preventing or delaying the degenerative complications of diabetes. We must extend, expand, and accelerate this type of research as well as other promising approaches concerned with elucidating differences in essential tissue

components in the diabetic and nondiabetic kidney. Although increased support for research does not guarantee answers to all the current problems facing the diabetic, it is manifestly clear that without such research support on a long-term, sound, and dependable basis, we will not make much progress in providing the diabetic with a normal life expectancy and alleviating the suffering of himself and his family.

One can draw an analogy between diabetes and poliomyelitis. Without the support for fundamental research which made development of the polio vaccine possible, we might have better iron lungs and better hotpacks, but we would still have the very large health, emotional, and economic burdens associated with polio before the mid-1950's. It has been estimated that control of polio has saved over \$1 billion per year, representing a tremendous return on the research dollars expended. We have heard that diabetes costs the United States over \$2 billion per year, yet the National Institutes of Health spent less than \$10 million in 1972 in support of all aspects of research in diabetes.

In addition to understanding the cause of the blood vessel, eye, kidney, and nerve complications of diabetes, we must increase our research efforts toward successful treatment of these complications. Removal or destruction of the pituitary gland has benefited some but not all patients with diabetic retinopathy. This approach has certain risks to the patients and creates certain additional medical problems. Such patients have diminished function of the glands controlled by the pituitary and must take hormone replacement medication. Laser beam photocoagulation is being used in treatment of diabetic retinopathy and carefully controlled, long-term studies are being initiated to assess its value. These studies require large numbers of patients and very specialized equipment and personnel. They cannot be done without some guarantee of long-term stable research support. The diabetic's vascular disease in his heart and brain have markedly reduced his life expectancy and make him a poor candidate for kidney transplant or chronic hemodialysis as a solution to his kidney failure. Our inadequate knowledge and absence today of sufficiently promising approaches to the treatment of the kidney failure and the other degenerative complications of diabetes underscores the urgent need for expanded research support for diabetes.

The ultimate goal in the control of diabetes is its prevention. Because of past and current research we have extended our knowledge concerning the etiology of diabetes and some of the factors which are important, but the most important questions are still unanswered. The initial concept that diabetes is due to inadequate insulin secretion by the pancreas is an oversimplification. Insulin secretion still assumes a pivotal role in the development of diabetes, but the etiologic defect may be different in the childhood diabetic and the obese person who develops the disease in later life. We must know more about the way insulin is synthesized, released, and how it works at the cellular level, as defects in any of these could be responsible for inadequate sugar utilization by the diabetic.

Recent animal experiments have suggested that certain virus infections of the pancreas may cause diabetes. These experiments must be vigorously pursued and applied to human diabetes. Patients with excess function of the pituitary and adrenal gland have a markedly increased incidence of diabetes indicating the importance of other hor-

mones in the genesis of diabetes. We must unravel these relationships and their role in all diabetic patients. Thus, increased research into the broader area of endocrinology and metabolism will provide new information and insights which will directly benefit the diabetic.

Heredity and obesity are two very important components in the development of diabetes, yet we don't understand the mechanisms nor can we satisfactorily mitigate their influence. Certain drugs, especially those used in the treatment of hypertension and excess fluid accumulation, exert a deleterious effect on diabetes. These are only examples of the unsolved problems in diabetes. Promising approaches are being made in these areas, but they will not be exploited unless there is adequate research support for them and scientists trained to pursue them.

The Federal Government has played an important role in supporting research in diabetes which has made possible our better understanding of the disease diabetes and its complications. However that support, as you have already emphasized, instead of being expanded, is now being reduced. Although I am sure these figures are well known to you, I want to summarize for you the research support for diabetes provided through the NIAMD since 1968.

In that year \$7.54 million were spent. \$5.24 million supported research grants and 82 percent (50) of the 61 research grants approved by the NIAMD council were funded. \$0.38 million supported fellowship and \$0.75 million were for training grants, \$1.17 million was for intramural research at NIH, field studies and contract research. In 1969, support for diabetes research reached its maximum at \$9.04 million. However, because of limited funds, only 58 of the 94 or 62 percent of research grants approved by the NIAMD council were funded. \$6.21 million was spent for research grants and \$0.55 million for fellowship and \$0.91 million for training grants. \$1.37 million was spent for research at NIH, field studies and contracts. Funds for diabetes research declined in both 1970 and 1971. \$7.85 million was spent in 1971. Research grant support fell to \$4.98 million so that only 37 percent (25) of the 67 grants approved by the NIAMD council could be funded. Funds for fellowship—\$0.48 million—and training grants—\$0.83 million—were less in 1971 than in 1969. Although funds for diabetic research increased to \$8.41 million in 1972, because of inflation, this did not really represent any real increase in the amount of research supported. \$5.6 million for research grants allowed funding of only 33 of the 57 grants approved by the NIAMD council. Funds for fellowship were further reduced to \$0.45 million and those for training grants were unchanged at \$0.83 million.

As you know, both the fellowship and training programs are to be discontinued. This action has serious long-term implications in terms of providing scientists to obtain new information needed to prevent and treat diabetes and its complications as well as those physicians to effectively apply this knowledge to the diabetic patient. It has become increasingly clear that support for diabetes research is not commensurate with the needs of the diabetic patient and the impact of this disease on our population and economy. I am certain that you will agree that an investment in diabetes research which would make significant inroads into the \$2 billion annual economic loss due to this disease would be money well spent.

Although it is important to detect diabetes early and educate both the physician and the patient for the optimal care of his diabetes, it is only as the consequence of expanded research in diabetes and related diseases that we can hope to avoid the ever-increasing economic and emotional toll which the diabetic and the Nation are bearing.

I wish to thank you, Mr. Chairman, and the members of this committee for the opportunity to convey to you the urgency and importance of expanded research support for diabetes and the potential benefits such support can produce.

Senator SCHWEIKER. Thank you very much, Dr. Field. I think particularly your statistics and figures will help to define the problem of declining Federal commitment that all of us on the committee are concerned about, and I think citing it specifically for the record is helpful.

Last but not least I believe we have Dr. Donnell D. Etzwiler, director of the Minneapolis Diabetes Education Center.

STATEMENT OF DONNELL D. ETZWILER, M.D., DIRECTOR, DIABETES EDUCATION CENTER, MINNEAPOLIS, MINN.

Dr. ETZWILER. Thank you, Mr. Chairman. I would like to very briefly summarize some of the written remarks that I have submitted to you.

Mr. Chairman, one of the things I brought to you is a grouping of insulin syringes and bottles of insulin, as well as some pictures of children taking insulin or it being administered to them.

I do this because these needles and the bottles represent the difference between life and death in the lives of thousands of children in the United States today.

Diabetes as it appears in general is a deadly serious disease. The exact frequency of diabetes cannot be determined at present because it is not a reportable disease.

It has been stated the incidence of frequency of this disease is about 1 in every 2,000 children. More recently a doctor in Michigan who surveyed about 60 percent of the schools in that State to determine the frequency of diabetes, and in schools with populations between the ages of 5 to 18 years, it has been found that frequency of diabetes is 1 in every 587 children.

Diabetes in children differs greatly from the diabetes found in older age groups. It is different in its onset, treatment, and its course. Many of these children experience a loss of 10 to 20 pounds in a period of 2 to 3 days, going from a perfectly well child to a child in a severe diabetic state, near collapse in a matter of 2 or 3 days.

Once treated for this acute attack these children then again have to go under a prolonged treatment for their diabetes.

In adults 25 percent of these are being treated by diet, 50 percent by diet and medication, and only 25 percent of adults were requiring injections of insulin.

In the juvenile diabetic, almost 100 percent are insulin dependent and require one or two injections each day.

The course of this disease is very unusual among children. It is very unstable. Juveniles are susceptible to various complications. Among some of these are the acute complications of the disease, lowering of blood sugar, insulin reactions or shock.

If there is an insufficient amount of sugar reaching the brain, the child may experience tremor; he may be perspiring; he may become unconscious or disoriented, possibly going on to have seizures.

If this is sustained for a long enough period, it is possible he may undergo a permanent central nervous system or brain damage.

Another serious consequence that may suddenly come on these children is a complication called acidosis which again has a significant mortality rate of those patients hospitalized in that condition.

Not only are there acute problems, but there are also intermediate problems that face these children. These include things such as failure to grow, failure to develop.

The young pregnant diabetic faces an increased maternal and fetal mortality rate. The babies are usually born in a premature condition, and not infrequently these children have associated congenital abnormalities or deformities to the extent of about three times the incidence of these abnormalities seen in children of diabetic mothers as in nondiabetic mothers.

The chronic problems facing them have been mentioned: Heart condition, stroke, amputation, small blood vessels, kidney failure, and blindness.

It has been alluded in 1921 we thought we had the cure for diabetes. We know this is not true, and at the present time in a recent study the average life expectancy of a young diabetic after onset of diabetes is markedly reduced.

It has been estimated the financial loss runs somewhere around \$2 billion a year. For the diabetic to even obtain work many times it is difficult because of the nature of his disease and because of discrimination in employment.

Gentlemen, the public and the Federal Government has long ignored diabetes. For too long a time it has been lulled into complacency by the chronic and really undramatic nature of the disease.

We essentially have let diabetes become the fifth leading cause of death by disease in the United States while cursorily lifting a finger.

Legislation in the form of S. 17 and S. 648 have now been introduced in the Congress and represent the most significant efforts to date. Both these bills stress the importance of research and finding a cure for diabetes.

This we all believe is imperative and must be supported. Diabetes, however, is not a simple disease. A cure is not just around the corner, and both of these bills have also called for support in training of health professionals, preparing them to better service and share with the patient the responsibilities for the treatment and control of diabetes.

I must also briefly comment on the need to develop and implement new systems of health care for the chronic diseases which have been initiated in many areas by the studies and work in the area of diabetes.

In summary, diabetes is a deadly disease, particularly among the hundreds of thousands of affected children. The victims are threatened by limited life expectancy.

During the latter years of that time they are frequently plagued by kidney failure and blindness. Legislation in the form of S.17 and S. 648 has been introduced, and can have an impact on this disease and its outcome.

Today in 1973 we must all examine our values, our priorities, our very reason for being. The passage of this legislation in this session of Congress must include some genuine effort to help those diabetics.

Senator SCHWEIKER. Thank you very much, Doctor. Inasmuch as you also have a statement you submitted for the record, I would just like to ask you about the education portion of it.

In your statement you refer to the fact that studies have shown that the patients' and their families, knowledge of the maintenance and care of diabetes has been minimal. I wonder if you would just comment briefly on that, and also on lack of patient knowledge and understanding of the disease because I think this is a very important part of the hearing.

Dr. ETZWILER. Responsibility for the care of the diabetics, as you have heard today, and in the chronic diseases involves the patient himself. For instance, in diabetes the patient not only has to inject insulin but he also has to do urine testing, watch his diet, moderate his exercise.

In essence what are we really saying is the most important person in the management of diabetes is really the patient himself.

Today's health care needs demand we recognize that the patient must assume most of the medical responsibility. In my own practice, for instance, if things are going well, we usually see our patients every 3 months, and I see them for a half hour, and my dietician does. This means we provide them with 4 hours of direct medical care every year. The other 364 days and 20 hours are depend upon the patient and his family to assume most of the responsibility and carry out the medical management.

The concept of teaching patients, defining their roles and responsibilities to take care of themselves is not part of our current health care system, and is one that must be incorporated, and included in these bills.

Senator SCHWEICKER. I think it is very significant when you come up with these studies to show that we do have an ability to help people with this disease and we are not doing so because of the lack of resources, the lack of funding, the lack of motivation, on the part of the Federal Government.

I think here is an area where just a little investment of money per patient on the part of the Federal Government would play a significant role in helping to solve this problem.

I think in many cases of the different diseases that come before our committee for consideration one sees the problem of not really knowing where to spend money wisely because we are looking for a breakthrough in research.

Here, on the other hand, is an area where we obviously know there are certain specific guidelines, advice, and medical help we can give to our patients, and they are not getting it because of lack of Federal commitment.

I think this is one of the important aspects of the hearing, that we have enough knowledge now to help a patient solve some of the problems, but without education, without a commitment from the Federal Government, without proper instructional material, we do not even do that minimal amount. I think this is very significant.

I would just like to ask a few questions of different members of the panel, and I will direct them to one or two people, but if anybody

else wants to comment on them, we will be very glad to have anyone add or chime in.

Mrs. Jackson, you refer in your statement to the need for specialists in diabetes. I wonder if you want to comment further or defer to one of your medical associates about what changes or adjustments might be needed in medical education, if any, to provide these specialists.

Mrs. JACKSON. I think it ties in with Dr. Etzwiler's statement that the patient must be instructed in such a way. As I said, Dr. Grishaw not only saved my life; he taught me to live, which is equally important.

A doctor can be highly qualified in his knowledge of something, and yet he must have a further development in his relationship with a human being, the animal with whom he is dealing.

I think one of the doctors could probably answer this better. I am only answering it from my own experience.

Senator SCHWEIKER. Do you want to comment on that?

Dr. ETZWILER. I think many times we professional people have a false idea of patient compliance or how much they really understand, or how they are able to take care of their disease.

In the area of diabetes it was found that 77 percent of all diabetics across the country were placed on diet as a part of their care.

When they went back and evaluated certain items which would indicate how much patients knew about diet, it was found that only about 10 percent had enough knowledge to put into practice the meal prescriptions they had received.

Dieticians from all over the Nation coming to our center will frequently say the patient sees them on the last day of hospitalization, after the doctor has written a note: "Patient to be discharged; instruct in diet"; now in 10 minutes the dietitian is expected to change a lifelong feeding pattern.

We find that probably it takes 6 to 10 hours of patient education to teach what they need to know to be able to adhere to a diet.

Senator SCHWEIKER. Is this something that should be done at a medical school level or just how might we approach this practically?

Dr. ETZWILER. What we have done is establish a Diabetes Education Center in Minneapolis geared to take a limited number of patients, which we use as a nucleus for our training of nurses, physicians, pharmacy students, and other allied health personnel so that they can go back to their varied institutions and incorporate this kind of patient education.

Several centers that we mentioned today associated with the regional medical program have been modeled after our program, and we have received letters similar to what Dr. Crofford has received—there is no longer any support, and they are going to have to close their doors. It means virtually eliminating the concept of patient training.

Senator SCHWEIKER. Dr. Davidson, why do we have different figures describing the prevalence of the disease? What are these differences based on, and why have we not come up with an agreeable figure in terms of this problem?

Dr. DAVIDSON. The figures we have are based on the national health interview survey that was carried out in 1964 and 1965, so the figures we are dealing with now are almost 8 years old.

We know that diabetes has been increasing at a dramatic rate, and, to be perfectly honest, we really do not know how many diabetics there are in this country. I am inclined to think that the figure of 5 million, which we use and which is based on the best hard scientific data that we have, is too low.

Any other figure that we could get would be a guess.

This is one of the problems that could be solved by the centers that are contemplated in the legislation. We could collect good hard prevalence data, and would know the magnitude of the problem in contemporary terms.

Senator SCHWEIKER. So one of the real needs is first of all to define the problem in terms of its magnitude. I think that is a very important to note that our present figure concerning the magnitude of diabetes is probably too modest.

Dr. DAVIDSON. Yes.

Senator SCHWEIKER. Diabetes is one of the major causes of death, depending again on statistics. We now say it is the fifth leading cause of death, but from what has been stated here today about complications, it is also an important factor in other disabilities.

Do we have any evidence of the effect of diabetes on the other human disabilities? Doctor, I will let you answer, or you may refer this to one of your colleagues.

Dr. DAVIDSON. We do have some figures on that. The amount of money that is lost from premature disability again has been estimated to be about \$600 million a year, and it is estimated that diabetes in some way limits the activities of at least 562,000 persons per year in this country. Again, these figures are now approximately 7 or 9 years old.

Senator SCHWEIKER. I wonder if one of the members of your group could just answer the general question of whether diabetes is a major factor in many deaths that are officially listed under another cause, such as heart disease, stroke, and kidney disease.

Here again is an accounting problem which indicates that the problem is far more widespread than we have imagined. I wonder if somebody would just respond to the relationship between causes of death in heart disease, stroke, and kidney disease to diabetes.

Dr. DAVIDSON. Dr. Sprague referred to some of those figures. Here again we do not have nearly as much data as we would like to have, but the data that he referred to indicated that heart attacks occur four to six times as frequently in the diabetic as in a nondiabetic population.

Studies that have been done seem to indicate that 60 to 75 percent of individuals who have heart attacks under the age of 45 probably have diabetes. This is another area that needs a great deal of expanded research so that we can learn the true state of affairs.

Mrs. JACKSON. In today's climate one of the doctors discussed last night something that I wish he would repeat today, about the number of men at the age of 45 who have heart attacks as compared with the number of women who have heart attacks who are diabetics.

Dr. CROFFORD. The point that Mrs. Jackson is making is that of course women seem to have a protection against the development of arterio-

sclerosis that leads to heart attack, but if women are diabetic, they seem to lose this protection, so that men and women have equal likelihood—in other words, a woman with diabetes has just great a chance of developing a heart attack as the man does, and this protection is lost.

A man under age 45 who is a diabetic—the figures are his chances of having a heart attack are four times as great as they would be if he were a nondiabetic.

If it is a woman under the age of 45, her chances of having a heart attack are six times as great if she is a diabetic than if she were not.

Senator SCHWEIKER. Back around I believe 1948 the Government changed its definition of classification of deaths relating to diabetes, and that change, as I understand it, resulted in about a 43 percent reduction in deaths which at that point were being attributed to diabetes.

I wonder in retrospect whether that was a valid change. Have we learned more since 1948 to know whether this is an accurate or an inaccurate classification, and what do we now know about that change that was made back in 1948?

Who might comment on that?

Dr. GRISHAW. It is a very difficult question to answer, but in the increase in our knowledge of diabetes we are finding that the heart attack, for instance, the coronaries, the kidney failure, the stroke, the hypertension and so forth, in very high percentage is due to diabetes.

Now, a person may have a heart attack, and that would be the immediate cause of death, but the actual cause of the heart attack is diabetes.

This is classic example of the late Jackie Robinson who was a long-standing diabetic—almost blind from diabetes—hypertensive, kidney failure, and he died of a coronary.

In that respect he actually died of diabetes, but he is listed as coronary artery disease.

Senator SCHWEIKER. I realize it is very difficult—and I think that is again one of the purposes of the legislation—to clarify as sophisticatedly as we know how today within the limits of knowledge what these figures and what the interrelationships are.

Dr. Field, you might want to comment on how you feel about these cutbacks in training grants, what they are going to do to programs in terms of the work you have done in this regard.

Dr. FIELD. These cutbacks are going to have broad implications in that people who are actually required to accumulate the knowledge which we hope will answer the questions as to what is the cause of the complications and how to prevent the disease will not be trained anymore.

The Federal Government has said that we already have sufficient personnel, and it does not make sense to pay for the training of people who are going to go out and increase their income in practice.

I think that there is some fallacy to this argument because the people that we are relying on to accumulate the knowledge that we need to treat the complications and the cause of diabetes are not necessarily those people who are going to go out into practice and make a large income.

The salary in academic medicine is different from that in practice, so we are cutting off the source of the very people we need to answer the questions that we are asking.

In addition, there is a second group of people who will be trained to utilize the knowledge and to bring the knowledge to the diabetic patient in practice who would benefit and has benefited in the past from the training grants and fellowship programs, and that kind of person will no longer be trained.

Senator SCHWEIKER. Dr. Crofford, I wonder if you would just elaborate a little bit on whether you have any specific suggestions for this committee in writing the legislation on your concept of establishing a longer term funding apparatus.

This I think is a very constructive suggestion, one which seems to not be covered by the *modus operandi* of the President.

Do you have any specifics that we might incorporate in the legislation that would give us a longer look at the problems?

Dr. CROFFORD. Both of these bills propose the establishment of an organization usually called a diabetes center. These would be funded initially for 5 years subject to periods of 5 year renewal, so that the total period of support might be a minimum of 15 or 20 years, and they would be assessed at 5-year intervals.

They need to be located first geographically. There should be some geographic dispersion of these centers. The idea is not to put one in every State for two reasons: First, population density is another factor that has to be taken into consideration; and, second, they need to be located in the areas which have the staff available to staff them.

I would think that the minimum number of research physicians needed to staff one of these centers would be about 10.

If you just have one or two research physicians, they do not really have the intellectual exchange with each other to form an effective center. My thought would be that diabetes centers would need to be associated with our existing universities, and perhaps with a few very large clinics which specialize in diabetes.

So that geography, population density, and the availability of other organizations would be factors that should go into establishing these centers.

The cost is hard to estimate. Probably a minimum figure just for operational expenses would be about \$500,000 per year per center as a minimum cost, and up to about \$1 million a year.

I think a figure in that range, excluding construction—perhaps in many instances there would be additional costs for construction—but for operational cost, \$500,000 to \$1 million a year would be a rough estimate of what I think it would require to operate a center.

Senator SCHWEIKER. I think this pretty well completes our questioning of the panel, and I want to express my thanks for the excellent cooperation that the American Diabetes Association has given this committee, and I want to say that your expert testimony will certainly be given a great deal of consideration in marking up legislation in this area.

Thank you all very much for being here, for taking time from your busy schedules. We appreciate it.

Our next panel of witnesses is from the Joslin Foundation. If they would come up to the table, we will be ready to proceed with them in a few minutes.

I would like to put in the record at this point a statement from Senator Javits who is the ranking member of the Labor and Public Wel-

fare Committee. Many of you know of Senator Javits' interest in diabetes and his sponsorship of S. 17 and S. 648.

Dr. Marble, we welcome you to the committee hearing today, and would like you to introduce your colleagues and proceed.

STATEMENT OF ALEXANDER MARBLE, M.D., JOSLIN CLINIC AND NEW ENGLAND DEACONESS HOSPITAL, BOSTON, MASS., ACCOMPANIED BY GEORGE F. CAHILL, M.D., DIRECTOR OF THE JOSLIN RESEARCH LABORATORY AND PROFESSOR OF MEDICINE, HARVARD UNIVERSITY, AND TWO PATIENTS REPRESENTING THE AREA OF JUVENILE DIABETES: EDWARD C. FERGUSON, SCHOOLTEACHER, AND FRANK F. SEARS, STUDENT

Dr. MARBLE. Mr. Chairman, I wish to thank you very much for this opportunity of speaking before you, and in an indirect way to other Members of the Senate and House. I think that the size of the audience here today gives testimony to the interest that the public has in this pressing problem.

Senator SCHWEIKER. It certainly does, and I see a good many of my Pennsylvania constituents here. I am delighted at their efforts in coming down, which I know was a very long bus trip this morning.

You have made a very salient point.

Dr. MARBLE. I am Alexander Marble of Boston, Mass. I was graduated from Harvard Medical School in 1927. For 40 years I have practiced internal medicine—with special reference to diabetes—in the Joslin Clinic and New England Deaconess Hospital in Boston. For 5 years I have been president of the Joslin Diabetes Foundation of Boston.

To my left is Dr. George F. Cahill, Jr., who is the director of the Joslin Research Laboratory and professor of medicine at Harvard Medical School.

I think we were all much impressed a few moments ago with the testimony of Dr. Sprague and Mrs. Jackson. Along the same line, we will have with us today two patients who represent the area of juvenile diabetes.

To my right is Mr. Edward C. Ferguson, now a schoolteacher; and to my far right is Mr. Frederick F. Sears, a student.

They will give very brief testimony during the course of our presentation.

Speaking of the bills, I am informed that Representative Steiger of Wisconsin and Representative Vander Jagt of Michigan are introducing today a bill in the House which is similar to one of the bills we are now discussing, and they have obtained commitment for holding hearings in the House and will be looking for cosponsors for this legislation.

Senator SCHWEIKER. I am delighted to know that. I think it is very important that we get commensurate action by the House, and that certainly is a very healthy indication of interest.

Dr. MARBLE. My complete testimony, which I would like to have published if possible, contains a figure and tables, a letter which is a very poignant one, from a 7-year-old diabetic boy, and also a photocopy of a feature article which appeared in the New York Times on

October 29, 1972 entitle "Diabetes is called basic cause of Robinson's death."

In this article Lawrence R. Altman writes about Jackie Robinson, who has been mentioned in the presentation of the American Diabetes Association.

This article is worth reprinting for the information of those who do not appreciate the facts about diabetes and its complications.

[The information referred to follows:]

[From the New York Times, Oct. 29, 1972]

DIABETES IS CALLED BASIC CAUSE OF ROBINSON'S DEATH

(By Lawrence K. Altman)

The immediate cause of Jackie Robinson's death last week at age 53 was apparently a heart attack. But to many doctors a more fundamental process was involved: diabetes and its complications.

The former Brooklyn Dodger's heart attack, which came after a decade of failing health, was his third since 1968, two of the Manhattan specialists who cared for him said in interviews. These two previous attacks had left him with need for cardiology care to treat his congestive heart failure.

The Dodger second baseman had also consulted several other kinds of specialists in the 20 years he knew he had diabetes because during this interval Mr. Robinson had developed most of the conditions that can complicate the endocrine disease.

The first black major leaguer lost the sight of one eye and was becoming progressively blind in the other despite treatments with a laser beam. A week ago today, he suddenly lost even more sight from a hemorrhage in his "good" eye.

In 1961, his knee, already damaged by arthritis caused by the trauma of sliding around the bases on the playing field, was further injured by a serious infection. The staphylococcal bacteria that caused the knee infection also poisoned his blood system with a near fatal case of septicemia and temporarily threw his diabetes out of control until antibiotics and more insulin helped him recover.

DISCOMFORTING SYMPTOMS

Mr. Robinson also suffered from burning sensations and other pains in his legs that had resulted from a combination of diabetic damage to the nerves and arteries in his legs. So discomforting were these symptoms, his doctor said, that Mr. Robinson had to give up golf.

Also, his blood pressure was abnormally high for many years. Though hypertension can be another complication of diabetes, Mr. Robinson's physician said they considered it an unassociated problem in his case. Cardiologists have reported that hypertension is found with unusually high frequency among blacks.

Endocrinologists say they believe that diabetes is the result of inadequate production of insulin by the pancreas gland, which is situated deep in the abdomen. Insulin controls the amount of sugar in the blood. But because the body's chemical pathways are so complex and intertwined, diabetes affects protein and fat metabolism as well as that of sugar and other carbohydrates.

Other doctors said that Mr. Robinson's case vividly illustrates the types of medical problems with which many of the 200 million diabetics in the world must live.

Diabetes knows no geographic borders as it affects people of all races around the globe. In the United States, 2 percent of the population, or four million people, are said to have diabetes. Its symptoms can include fatigue, unusually frequent urination, excessive thirst and increased appetite in the face of weight loss.

VALUE OF INSULIN

For more than 50 years, insulin injections have staved off early death for millions of diabetics. As a result, many diabetics live for decades, whereas those born before insulin's discovery survived just months.

Nevertheless, a diabetic's life expectancy is about two-thirds that of a non-diabetic at any age. Doctors at the Joslin Clinic in Boston reported recently, for example, that a 30-year-old diabetic could expect to live another 30 years, whereas a 30-year-old nondiabetic could expect to die in 42 years.

The price from the complications made possible by the advance of insulin therapy is vast. Economists say that each year diabetics spend \$2 billion for such items as physician fees to regulate the insulin doses, hospital beds to care for diabetic coma and insulin shock, nursing care to help skin ulcers, heal and prevent gangrene of the toes and legs, pills, seeing-eye dogs and live-in help to care for blind diabetics. Diabetes ranks behind cataracts and glaucoma as the third leading cause of blindness in Americans.

SMALL EXPENDITURES CITED

Yet Americans do not view diabetes with the same degree of concern that they do diseases like cancer for which Congress appropriated \$377.5 million in this fiscal year.

The National Center for Health Statistics lists diabetes as the seventh leading cause of death among Americans. It is also a major contributor to cardiovascular disease (heart attacks and strokes), the nation's leading killer.

Despite these staggering statistics, diabetes experts point to the relatively small Federal expenditures to find better treatments. The main Federal basic research program in diabetes at the National Institutes of Health in Bethesda, totalled \$8.2-million last year.

Diabetes specialists say they are still mystified about the disease, which has been known since ancient times. Among the myriad unanswered questions scientists hope to resolve are:

Why does arteriosclerosis occur so much earlier in life among diabetics, making heart attacks and strokes so much more common than among nondiabetics?

Precisely how is diabetes inherited?

What causes the bodies of some diabetics like Jackie Robinson to become so severely ravaged within 20 years whereas other diabetics who have had the disease for twice as long escape the severity of many of the same complications?

Why does diabetes—in a pattern distinct from arteriosclerosis—selectively damage the smallest arteries, particularly those in the eye, kidney, nerves and skin? After 20 years, only one diabetic in 10 is said to escape such damage to the retina in the back of the eye. Yet why can some see well and others go blind? Electron microscopists suspect that the clues lie in the portion of the arteries called the basement membrane, which becomes unusually thick as a result of deposits of substances called collagen and mucoproteins. Why does this pathological process often begin before blood and urine tests disclose that a patient has diabetes?

Why do diabetics have more difficulty combating bacteria—like Jackie Robinson's staph knee infection—than nondiabetics?

Why do cells of diabetics age much faster than those of other people? Researchers at the University of Washington at Seattle, one of the leading centers of diabetes investigation, discovered recently that cells taken from diabetics, when made to grow artificially in test tubes in laboratories, age much faster than do those from nondiabetics. Precisely how these cell changes produce diabetic damage is what teams of researchers elsewhere in the world are trying to learn.

When basic and clinical researchers find the answers to these and other questions, they say scientific information ultimately will be valuable not only to the families of diabetics like Jackie Robinson, but also to tens of millions of nondiabetics who suffer from arteriosclerosis. And because so much is unknown in medicine, these doctors also say that that such scientific knowledge perhaps will influence treatment of other diseases.

Dear sirs,

My name is Ronnie
Johnson. I am 7 Yrs

o/d. Here is one
dollar for you. Please
use it to help find a
cure for diabetes.

My brother has it.
He has had it for
six years. That is a
long time.

Thank you. Love,
Ronnie

Senator SCHWEIKER. Doctor, I wonder if I could interrupt just a moment. Under the schedule that we had laid out we were going to take a luncheon recess at 12:30 to 1 p.m. I understand there are some diabetics here who are on a rigid schedule, and I would just as a courtesy like to tell them we are running about one-half an hour behind in our hearings, so we probably will not recess formally for lunch until 1 o'clock.

Any of you who are on a rigid schedule, please feel free at this point to leave, and we will certainly understand. Probably we will continue here until 1 o'clock, and then break until 1:30 p.m., so we can adjust to our schedule.

Dr. MARBLE. I call attention to this article because in contrast to many of those which are published in newspapers regarding medical matters, this one is quite accurate and is well worth reading if one has not done so thus far.

As pointed out, insulin became available for the treatment of diabetes to a limited extent in 1922 and on a larger scale in 1923. In the 50 years since then, we have learned that with early detection of the disease and prompt treatment, the acute complications of diabetes, notably diabetic coma (ketoacidosis), can usually be prevented or if they occur, can be treated successfully. Prior to insulin, 40 to 60 percent of all deaths in diabetics were due to ketoacidosis and coma—with or without infection.

These data and others which I will give in my very brief presentation are based on the experience of the Joslin Clinic and are available today because the late Dr. E. P. Joslin when he started practicing in 1897 began keeping records and compiling statistics, publishing them from time to time.

Prior to 1914, which was the time of the introduction of the so-called fasting or starvation treatment of diabetes, almost two-thirds of all his diabetics who died, died in coma—a startling figure.

At the present time only about 1 percent of diabetics die for this reason.

The ability to prevent and treat the acute complications has resulted in a longer duration of life. Prior to insulin, the average duration of diabetes after onset was only 6.1 years, and it was the unusual diabetic child who lived longer than 2 years. In contrast, in 1970 the average patient had had diabetes for 18.1 years at the time of his death, and for those with onset of the disease under the age of 20 years, the value for 1970 stood at 27.8 years and the curve is still pointed upward for this group (see fig. 1).

AVERAGE DURATION OF LIFE AFTER ONSET OF DIABETES

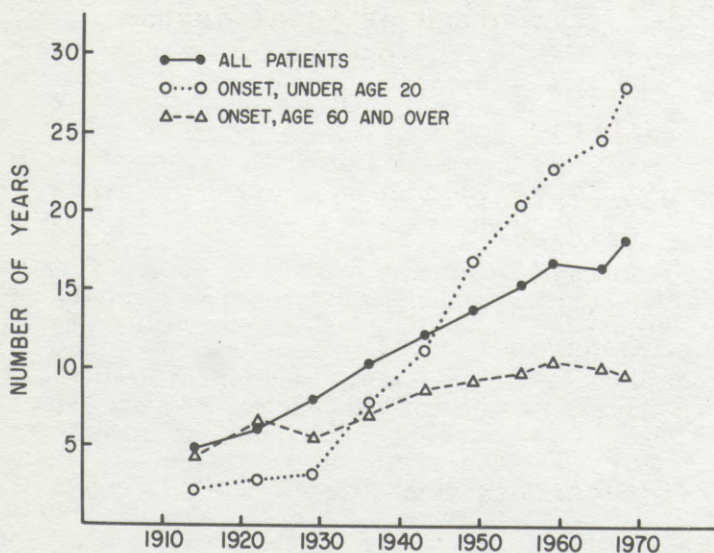


FIGURE 1

I would point out here, Mr. Chairman, that these figures should not be taken by anyone who is a diabetic as expectation of life. These are simply figures for the average duration of life thus far of those who have died.

Senator SCHWEIKER. In other words, they are figures of the past as opposed to figures of the present.

Dr. MARBLE. That is right. The figures are those for average duration of life after onset of diabetes as calculated for fatal cases in 1970. They do not refer to expectation of life for persons now living.

This increased duration of life and apparent health have often given rise to complacency and to a widespread belief that now that insulin is available, the diabetic problem has been solved and that one may turn to other issues. Nothing could be farther from the truth. The fact is that with increasing duration of life after onset, diabetes has been allowed to exert its true and unique impact upon the body. This impact presently takes an extraordinary large toll in terms of morbidity and mortality, particularly as regards vascular (blood vessel) and nervous system complications.

Before insulin, patients did not live long enough with diabetes for this effect to be seen. However, in the period of 1960-68—those are the latest figures I can give you—76.7 percent of 5,009 deaths were due to blood vessel disease. Of this total, heart disease accounted for 53.2 percent, kidney disease for 8.9 percent, cerebrovascular disease for 12 percent, and gangrene of the lower extremities for 1 percent (see table I).

CAUSES OF DEATH IN 5,009 DIABETICS
Percentage of total deaths
1960-68

Diabetic coma	1.0
Vascular disease, total	76.7
Cardiac	53.2
Renal	8.9
Cerebro-vascular	12.0
Gangrene	1.0
Cancer	10.8
Infections, non-tbc	5.4
Tuberculosis	0.1

TABLE I

To be sure, heart disease, kidney disease, and stroke are common among persons in the general population. However, studies have shown that blood vessel disease of all types is $2\frac{1}{2}$ times as common among diabetic males and $3\frac{1}{2}$ times as common among diabetic females as in their counterparts in the general population. Furthermore, stroke and related conditions are twice as common, and kidney disease accounts for 17 times as many deaths among diabetics as in the general population (see table II).

MORTALITY IN DIABETES vs GENERAL POPULATION

All vascular disease	Males	2½	Times
	Females	3½	"
Cerebro-vascular		2	"
Renal		17	"

TABLE II

The above statistics apply to mortality and do not take into account the very high percentage of living diabetic patients who, particularly after 10 or more years of the disease, have serious but as yet nonfatal complications. These affect not only the large blood vessels in the areas just mentioned for mortality, but also the small blood vessels with resulting changes in the eyes and kidneys (see table III).

VASCULAR DISEASE IN DIABETES

Large Vessels

Arteriosclerosis
Intimal
(atherosclerosis)
Medial sclerosis

Small Vessels

Retinopathy
Nephropathy
Other

TABLE III

As a result, an extraordinarily high percentage of persons with diabetes living today have complications related specifically to their basic disease.

I will not go into the fact that the disease is now the second leading cause of new blindness since this has been mentioned already. Also the fact that there are probably about 5 million persons with diabetes in the United States. But I will bring out the fact that probably another 5 million, or even more, will develop diabetes some time in their lives.

One can project this because of its hereditary character. The astonishing fact is that probably one-fourth of the population, some 50 million people, are carriers of the disease. Although most of them will never develop it themselves, they are capable of passing the tendency along to their children and grandchildren.

Thus, the problem becomes an enormous and formidable one about which vastly more needs to be done than is now being carried out.

As the result of a huge amount of laboratory and clinical investigation, especially since the discovery of insulin, many facts are known about the origin, course, and proper treatment of diabetes. However, since Nature guards her secrets jealously, we still do not know with accuracy what is inherited by the person destined to become diabetic. We do not know why it is that at a certain time in his life, varying from infancy to old age, the disease actually asserts itself. We know a great deal regarding how insulin works, but there are many gaps in knowledge. Above all, we have no very good idea as to what it is about diabetes that causes the greatly increased frequency of serious vascular disease in vital organs which, in turn, leads to death or substantial handicaps such as blindness, paralysis from a stroke, disability from heart and kidney disease, and affection of the lower extremities leading to amputation of a toe, foot, or leg.

These are health problems of the highest priority, affecting a large segment of the population. Illness, disability, and death will continue in those living and in their children and grandchildren, unless efforts to solve some of the riddles are increased. I believe that the time for action is now and with great force.

I would like now to speak a little more specifically regarding these excellent bills which have been proposed. I wish to state at the outset that I am delighted at the upsurge of interest in diabetes, and would welcome any legislation which would facilitate and expedite work designed to increase knowledge regarding diabetes and its complications which affect so many of our citizens.

I am pleased that, if either of these bills becomes law, more money will be made available for both basic and applied research in diabetes, and for the training of physicians, both in the laboratory and clinic, so that they may be well qualified to direct treatment of this important and widespread disease.

Without detracting from the high purpose of the proposed legislation, I would like to present a personal view or two.

First, I am in favor of channeling funds through the National Institutes of Health where over the years fair and workable procedures have been developed for granting of funds to highly qualified workers.

Second, although there may be some merit in such, in general, I would not favor the establishment of a task force as has been suggested. Many surveys of the diabetes problem have been carried out in the last 25 years, so we already have an excellent idea as to the frequency and distribution of the disease and its complications.

Thirdly, it is my considered belief that the conquest of diabetes will not be made through a crash program or on a contract basis. This approach often is effective in the area of applied research in which one takes basic information and then applies it to immediate need.

In the case of diabetes, however, we lack basic knowledge as to the exact defect, including what it is that the diabetic inherits and why

the disease becomes manifest at various times in life. Without such knowledge, it will be difficult or impossible to reach the cherished goal; namely, a means for the prevention or cure of diabetes.

Knowledge is lacking also as to what it is about diabetes that produces such a deleterious effect on blood vessels throughout the body. If one knew this, one might well be able to prevent serious eye disease with consequent loss of vision, prevent or minimize serious kidney disease, and lessen the contribution of diabetes to blood vessel disease; namely arteriosclerosis which affects organs and the tissues throughout the body.

I might digress to state that if these facts were learned about arteriosclerosis in diabetics we could reasonably suppose that they might well apply at least in part to hardening of the arteries in general, and thus help solve some of our major disease difficulties.

My plea then is for increased and continued support of laboratory research because it is here that the true advances will come. One needs to keep in mind that advances in science come about by basic research carried out by experienced workers with active creative minds.

I wish to make a special plea for the preservation of so-called traineeships, both research and clinical, which in recent years have done so much to train young physicians to understand diabetes and be prepared to treat patients with diabetes and its complications.

Experience has shown that these trainees later become leaders in medicine, teachers of medical students, and house staff, and so contribute greatly to the quality of medical care received by persons throughout the United States.

If money for traineeships is wiped out, there will develop a generation gap which will be felt not only now but in the years to come.

In summary, I appeal for continued interest in diabetes and its important complications. I plead for increased and continuing funds for diabetes research, channeled through the NIH.

I plead for support in retaining traineeship programs. I plead that interest in diabetes be a sustained one so that the heavy toll in illness from this disease, heart disease, kidney failure, and stroke, may be lessened, and that the disabilities from these complications and from visual loss be contained insofar as possible, looking forward to the day when basic research will point the way to prevention or cure.

Senator SCHWEIKER. I suppose you realize that many of these things you are asking us to do have already been curtailed.

Dr. MARBLE. I do. Unfortunately so, yes, sir. I am hoping what we say here today may have some influence in reversing that trend.

Senator SCHWEIKER. Of course the trend did not begin here, as you know.

Dr. MARBLE. Yes, sir, I appreciate that.

Senator SCHWEIKER. I agree with you.

Do you want to have your associates proceed? I think I will call next on Mr. Ferguson, if I may.

STATEMENT OF EDWARD C. FERGUSON, VICE CHAIRMAN, YOUTH COMMITTEE, JOSLIN DIABETES FOUNDATION

Mr. FERGUSON. I am Edward C. Ferguson. I am 25 years old and live in Malden, Mass. I was diagnosed as a diabetic when I was 13 years old, and I am now taking insulin twice daily, totaling 56 units

in all. I am a professional educator, teaching grades 5 and 6 in the public schools of Melrose, Mass. I am vice chairman of the Youth Committee of the Joslin Diabetes Foundation and have been working with diabetic children since I was 16 years of age.

As I give my statement today, I cannot help thinking of Jay, a young man, my own age, who at this moment is undergoing renal dialysis therapy. Jay asked me to send this message to you today: "I don't want to die!" Jay is a candidate for a kidney transplant, and his mother has offered to donate one of her kidneys, if necessary. She is now being tested to see if she is a suitable donor.

I think also of a young married woman, Chris, who is legally blind as a result of diabetic retinopathy, and who also has kidney disease. Betty is the proud mother of a 2-year-old son. She comes to the Youth Committee meetings with her seeing-eye dog, and her enthusiasm and her just plain joy in living are an inspiration to us all.

In my role as vice chairman of the Youth Committee of the Joslin Diabetes Foundation, I have spent many hours talking with young diabetics and I have found we share many common desires. All of us are very grateful to be alive, for we know what the outlook was for patients diagnosed 60 years ago, before the discovery of insulin in 1921. Most patients I have talked to are as healthy looking as I am and I hope they feel as well as I do right now.

I enjoy skiing and sailing as well as scuba diving and mountain climbing, as many people do. I have been fortunate enough to have visited different parts of our country and I look forward to more traveling in the years ahead. Maybe I will even be able to visit the Moon when that becomes a routine trip.

I must, however, face the very real possibility that all diabetics face; and that is the challenge of complications arising due to my condition. The young diabetics I have talked with are very much aware of the reality of these complications. As Dr. Priscilla White, an adviser, has expressed it, "We live with the sword of Damocles hanging over our heads." We understand the need for good control and how this may save us from the tragedy of blindness, kidney disorders, or heart problems. One fact that weighs heaviest on all of us is that even with the best control possible with present therapy, complications are still difficult to avoid.

Since the 1920's when insulin became available for treatment of diabetes, our life has become a reality. But we, impatient youth that we are, wonder why basic treatment has been essentially the same for over 50 years. Yes, there have been changes, modifications and improvements in treatment, but basically treatment is unchanged. Today, the scientific capability exists to reduce, and ultimately prevent complications. The foundation's artificial pancreas project is a good example of this.

Senator SCHWEIKER. I think that is a very moving and very important statement, and I think it is a rightful question that we all ask ourselves about our Government.

Coming from you, I think it has a special meaning, and certainly we will consider your words, as well as those of some of your young contemporaries, in asking that question when we decide what action the legislative branch is going to take in this area.

Dr. MARBLE. Next is Frederick Sears.

**STATEMENT OF FREDERICK F. SEARS, MEMBER, YOUTH
COMMITTEE, JOSLIN DIABETES FOUNDATION, INC.**

Mr. SEARS. My name is Frederick Sears. I come from Boston, Mass. I have had diabetes since I have been 4 years of age, and I am now 14. I'm presently using U-80 insulin daily.

As a member of the Youth Committee of the Joslin Diabetes Foundation, I'm here basically for one purpose, which is to get funds for continued research in the field of diabetes. The Youth Committee is ever-growing, and reaching out to other people with this condition. Our goals are educating the general public, trying to help other diabetics, and fund-raising in the hope of either a cure or prevention of diabetes. I am interested in medicine myself, and hope to become a doctor.

As you know, diabetes is becoming more and more common. In 20 years, far more people will be diabetic than is true today. Thousands of people have it now and are not aware of it. The word "diabetes" stands for the "wasting" disease. This meant that people used to die of diabetes because they did not have insulin which burns up the sugar you eat and enables you to live.

There are certain problems with diabetes such as loss of eyesight and loss of limb. With your help I hope that this disease will either be cured or prevented.

Senator SCHWEIKER. Fred, that also is a very impressive statement, coming from a person like yourself who has had diabetes since the age of 4 and are now 14. I might say that in looking at you I can understand why they call diabetes the silent disease, because you are a good looking young man. I think this pretty much points up the problem as well as the definition.

I heard you are going to become a doctor. Is that what you want to do?

Mr. SEARS. Hopefully.

Senator SCHWEIKER. Are you going to specialize, or do you not yet know?

Mr. SEARS. I would probably like to be a surgeon.

Senator SCHWEIKER. We appreciate your coming today because by coming today both you and Ed are helping your peers and your contemporaries by in essence testifying for them, so we certainly are going to put a great deal of weight on what you have told us today.

Dr. Marble, do you have any other statement from the panel?

Dr. MARBLE. Yes, finally, Dr. Cahill.

**STATEMENT OF GEORGE F. CAHILL, JR., M.D., PROFESSOR OF
MEDICINE, HARVARD MEDICAL SCHOOL**

Dr. CAHILL. Mr. Chairman, I submitted a brief text, but I would like to make a few extemporaneous comments, if I may.

Senator SCHWEIKER. Yes.

Dr. CAHILL. We have a little high school biology. I brought along a picture of the beta cell. The small dots that you see are granules of insulin which in the normal individual are released when the blood sugar gets too high. This is blown up about 100,000 fold. In other words, a dime would be the size of a total city block in relation to this picture.

The question of course is why Freddy and Ed here to my right have their cells, these beta cells, located in the pancreas which have stopped functioning. As a matter of fact, we do not even know about your beta cells and my beta cells, how quickly they replace themselves, like the cells of the skin, where we are always making new ones to replace old ones.

In the past 2 years we have just developed techniques to be able to study the natural history of this cell in the experimental animal, let alone man. When the HEW and NIAMDD people were here this morning you asked Dr. Whedon what has gone on in the past 8 to 10 years.

Well, it has only been in the past 2 years that we have been able to successfully grow these cells to study their normal life expectancy. So things are moving right along.

The question is why did Freddy and Ed's cells stop putting out insulin, and why have they not made new cells to replace those that have apparently become defective.

We are moving along, and this is a function really of basic research. There are areas now both in Chicago, Pennsylvania, Johns Hopkins, Boston, also Geneva, Switzerland, and Toronto, where these cells are being grown in tissue culture cells derived from man.

There is some very early evidence, experimental evidence, that these cells can be put back into the diabetic, and the diabetic situation will be reversed, at least in experimental animals.

So I am a little more optimistic than have been several of the other speakers.

Basic research, perhaps being right in the field at the cutting edge, enables one to be a little bit of an optimist, but there is an exuberance in the field that we may not be as far off as some of the other speakers have suggested.

Dr. Crofford mentioned the mechanical pancreas. When glucose gets too high, this detects this increase and puts insulin into the blood to tell the cells in the body, so this is both a detector and a responder built into one piece of apparatus.

The real hangup that we have had with the mechanical pancreas is being able to devise a glucose receptor that is as receptive as the good Lord made for us.

I have here in my pocket a very simple little piece of metal with wires attached, and this is the first glucose monitor that has been successfully placed in an animal for 3 months. This little bit of metal and wire continues to record the concentration of glucose that this animal has in his circulation.

It is a very small step leaping from this [indicating metal apparatus] to devising a mechanical mechanism that will return insulin into the bloodstream proportional to the electrical signal that this glucose electrode emits, but we are not too far off.

As a physician I have looked at the mechanical pacemaker at a time when that was really on the drawingboard so to speak. There are now 100,000 Americans whose hearts are being paced by mechanical pacemakers, and I do not know whether this will be feasible within a year or 2 years or 5 years, but experimentally it is within reason now to envision a mechanical pancreas devised that will maintain the blood glucose constantly within the normal range.

I would like to summarize by saying these programs are working very closely together, that they really keep well in mind that research is moving along. True, we cannot say that today we are doing anything of major difference from 10 years ago, but basic research has come to that point where it is getting there.

Until you get there you do not know how soon you are going to arrive, but there are some activities in basic research that strongly need support, and I am afraid are very severely jeopardized by the cutback in Federal funding.

Finally I should point out the development of this [demonstrating], was made by a research trainee who, according to the current thinking in Washington, is going to be cut off the next year or two.

I just again would like to tell you that the research focus is most important.

Senator SCHWEIKER. Doctor, I gather the gadget you are holding up is the first step in the development of the artificial pancreas.

Dr. CAHILL. Yes.

Senator SCHWEIKER. You say this was done by a trainee?

Dr. CAHILL. The work in the development of this was by trainees on an NIH training grant, working in our laboratories.

Senator SCHWEIKER. At your foundations?

Dr. CAHILL. Yes, sir; and in others too we are doing similar type work.

Senator SCHWEIKER. And now it is in danger of being cut off?

Dr. CAHILL. Because the training programs we were told are being phased out.

I was very glad to hear this morning the comments made by Dr. Whedon. At least there will be some trade-off money so that the commitments we made may be partially met.

Senator SCHWEIKER. We appreciate your comments. Dr. Whedon was kind enough to stay on and listen in the audience, so you are making a very good point right now, I am sure. I am very impressed with that.

My mother has used a pacemaker for 3 years, and there is no doubt in my mind it has prolonged her life by 3 years. When you see what research and investment in medical technology can do—and here again it is a very promising one, although you admit the time limits and liabilities are still to be outlined and defined—I think certainly this is a kind of thing that the Federal Government ought to be doing and ought to make a commitment to.

We appreciate your bringing it along as well as Dr. Marble bringing the other members of the panel. I think it always helps to personalize a problem.

I think too often we in Washington get a little bit removed from grassroots problems. We only see the statistics, and we see so many statistics, and such encumbering statistics, that we sometimes get a little devoid of the human, personal aspects of the situation. I think to bring Fred and Ed today and have them testify is very helpful to us.

I can recall sitting in this room several years ago—this very same room—at which time the subcommittee was involved with the problems of black lung. At that point in time we had not made a Federal commitment to black lung.

We had asked our miners to give us coal and to make electricity, but we took the human wastage that went with it as something that happened to everybody, and nobody cared about it.

I hope these hearings today will be the beginning of the Federal commitment to diabetes, just as we made a Federal commitment to black lung.

I think the fact the hearings are being held in the same auditorium hopefully will be significant.

Witnesses with black lung came up to that very table and testified about the impact of the disease on them and their families and their personal lives. I think this is why it is so important that you have brought some of your younger people along to outline what the Congress and the President and our Government ought to be doing in terms of making a commitment to them. So we thank you very much for being here today.

At this point we still have a number of witnesses who are scheduled for the afternoon session. We will recess now for about a half-hour lunch break until 1:30, and if any of you have trouble in terms of luncheon arrangements, the staff will try to work something out with the cafeteria in the Senate Office Building.

The meeting is in recess until one-half hour from now.

[At 1:10 p.m. the committee recessed for luncheon.]

AFTERNOON SESSION

Senator SCHWEIKER. The next witness on our agenda is Dr. Robert Blizzard, representing the Endocrine Society.

Dr. Blizzard, would you please come forward? We want to welcome you to this afternoon session of the Senate Health Subcommittee hearings.

STATEMENT OF ROBERT BLIZZARD, M.D., EUDOWOOD PROFESSOR OF PEDIATRICS, JOHNS HOPKINS UNIVERSITY HOSPITAL, REPRESENTING THE ENDOCRINE SOCIETY

Dr. BLIZZARD. Thank you, Senator Schweiker.

On behalf of my constituency, I would like to thank you and I would like to thank Senator McGee for the attempts of the Senate and the Congress to conduct these hearings.

Mr. Chairman, members of the Senate Health Subcommittee:

I am Dr. Robert T. Blizzard, professor of pediatrics, a teacher of specialists in glandular disorders including diabetes, a researcher who has published over 100 original papers pertaining to research done in glandular disorders and, most importantly, a physician interested in relieving the afflictions of diseases on children.

The organizations which I represent, or from which I am a representative are (1) Lawson Wilkins Pediatric Endocrine—glandular—Society, which is an organization of professors and investigators into glandular diseases of children, including diabetes; (2) the American Endocrine Society, which is an organization of physicians, chemists, physiologists, and investigators who do research in and care for patients who have diabetes and related endocrine—glandular—diseases;

(3) Human Growth Foundation which is a volunteer health organization with 14 chapters throughout the United States and which is concerned with growth retardation that occurs from glandular diseases; and (4) hundreds of thousands of individuals—actually, over 4 million—in this country alone—and over 26 million in the world—who have diabetes.

This represents 1 in 50 people.

The assignments I gave myself after being requested to testify before this committee are as follows:

(a) To bring to the attention of the members of this committee and their colleagues the potential significance of the act which they are proposing, and to urge that the content of this bill maximally benefit the constituencies of each of you—specifically, the constituency of the world numbering over 26 million people born, and millions more to be born, who have either what we term “diabetes mellitus” or a related glandular disease;

(b) To bring to your attention that the way this constituency can best be helped is not by setting up centers that are created primarily for treatment;

(c) To bring to your attention that the way this constituency can best be helped is in two ways: First, by answering through research the multiple questions about the causes of endocrine diseases, including diabetes, the genetics of these diseases, the complications of diabetes, and the prevention of the multiple types of diabetes and related glandular disorders.

These questions can, and must, be answered through research carried out in the centers that are being proposed.

The second way you can best help this constituency of over 26 million people is by supporting training; to support primarily the training of research scientists so they can continue, even 10 years from now, to pursue solutions to the questions that must be answered, but also to support the training of nurses, nurse practitioners, and paramedical personnel so that those who have or may develop diabetes related entitles and/or complications can be detected and preventive measures instituted.

This is not to say that patients and patient care are not important considerations in our goal. This is to say that we cannot realistically treat a significant proportion of the 4 million plus diabetic patients in the United States by creating bills of this type and in centers of this type being considered. In such centers financial support for patient care should be limited to those patients participating in research and training projects. Again, therefore, my assignment today is to provide you with the information and data that will encourage you to write and support the National Diabetic Act in the way our constituency will be helped most.

Diabetes mellitus, or “sugar” diabetes, is not one entity, just as cancer is not one entity and heart disease is not one entity. Most people are unaware of this fact. Although most individuals who have sugar in their urine and high blood sugar levels are called diabetics, the causes, the genetics, the treatment, and the complications will vary in accord with the type of diabetes that an individual has.

We are not even aware of all the types of diabetes mellitus that exist or of their causes. The 4 million plus people in this country

who are stated to have diabetes mellitus actually have different types of diabetes.

For example, there is an entity called juvenile diabetes mellitus in which the individual produces little insulin and the treatment usually must be given by injections of insulin.

Also, there is diabetes which usually develops in people who are over the age of 40 and which is called "adult onset diabetes."

In this entity, individuals often make excessive insulin in contrast to what one would expect. Many individuals in this group can be treated with oral "hypoglycemic" agents and do not require insulin injections. There also is a type of diabetes which occurs in newborns and is poorly understood.

Even within the first two groups mentioned in this paragraph, there are probably multiple causes and, as cancer and heart disease are general terms, diabetes is also a general term as exemplified by the previous statements.

Through research, which is being markedly curtailed at the instruction of our national administration, we have begun to answer a few of the questions and develop some techniques which permit us to begin to understand some of the variants of diabetes.

We have recently learned that insulin occurs in more than one form in the blood and there is a "big" insulin in addition to the usual "small" insulin. We do not know what the significance of the "big" insulin is and how this may relate to some cases of so-called diabetes mellitus.

In addition, we have recently learned there are hormones not previously known which contribute to the secretion of insulin. We have learned, and I personally have published, about the probability that some individuals develop diabetes because they develop an allergy to their own cells which secrete insulin.

We also have learned that certain patients with diabetes develop an allergy to their thyroid tissue and other tissues and actually destroy themselves organ by organ, but we have not learned about why and, therefore, how to prevent this form of the disease.

We have learned that the younger patients who develop diabetes are those who are most apt to develop complications of the kidneys and the eyes. In the latter instance the patient with diabetes often proceeds to complete kidney failure and will die at an early age if transplant is not possible.

In respect to complications of the eye, many patients with diabetes with an onset in childhood will end up blind. However, we have not learned to prevent these complications. Recently, it has been determined that some of these patients can be treated by taking out the pituitary or master gland of the body and that treatment can also be directed at the eye itself, using laser beams.

These are only a few of the facets learned by research sponsored through this committee and directed by the National Institute of Arthritis, Metabolism, and Digestive Diseases over the past few years. Although better methods of treatment have been found, through research we have only begun to answer the problems that will clarify the types of diabetes and related glandular diseases and their causes, genetics, and treatment.

A few of the research problems that need immediate attention are listed subsequently.

Research problems that need immediate attention :

Studies by cell biologists, biochemists, immunologists, and basic science investigators are essential. The role of both types of insulin, the role of glucagon which is an insulin antagonist secreted by the pancreas, the role of growth hormone secreted by the pituitary, and the role of many enzymes found only within the cells themselves need to be elucidated.

Attention to the action and interaction of insulin and all of these hormones, along with others at the cell level, is essential not only to understanding how best to treat, but how to avoid complications that we see in many patients with diabetes mellitus.

Genetic studies must be done utilizing each subcategory of diabetes mellitus. We now know essentially nothing about the genetics of diabetes because we have not been able to identify the subcategories until relatively recently and still are not able to identify all. Genetic studies will have to be carried out as the subcategories are further elucidated.

The actual amount of insulin produced over a 24-hour period in relation to the amount of glucagon, growth hormone, and other hormones must be measured. The techniques for measuring the 24-hour production of such hormones has only been established in the last 2 years. Elucidation of the interrelationship of production rates of these various hormones will undoubtedly tremendously advance our understanding of the causes of glandular diseases, and indicate better forms of therapy than those currently available.

These are only a few of the problems that deserve and require immediate action. Dr. James Field has submitted testimony concerning other problems.

THE TRAINING THAT NEEDS TO BE ACCOMPLISHED

Training must be directed toward research fellows whose goals and interests are to pursue research and who have made a commitment to basic investigation for at least 5 years.

These research scientists may either be Ph. D.'s, M.D.'s, or both. The history of trainees in research is that they contribute significantly in the thought processes and in the accomplishments of their preceptors, while developing the full qualifications for performing independent research investigation.

Exemplary are the 20 scientists who have become independent investigators in my laboratory while spending 3 years in training. Research productivity would have been cut at least 50 percent if these individuals had not participated in obtaining the answers we were seeking.

There also needs to be training of medical and nursing teachers. Such training programs require much less investment of time than that required of individuals in research training. Such teachers should be trained not only in diabetes but in the related fields of endocrinology. Because of the monetary considerations—that is, that individuals so trained would increase their ultimate wages through this system as partial support—a partial loan system could be utilized to accomplish their training.

The training of paramedical personnel is essential, also. This includes nurse practitioners, technicians, et cetera. The training of such individuals could, in general, be accomplished in a year, and 1-year fellowships should or could be given.

GOAL OF PATIENT PARTICIPATION

In the opinion of those whom I represent and for whom I am speaking today, patient participation should be voluntary. The programs proposed should use patients and encourage their participation primarily as individuals willing to participate in research and training projects. The establishment of diabetic centers should not be primarily directed toward treatment.

Patient care should be a byproduct of the investigation carried out. It is the opinion of those that I represent that funds can be much better utilized to help the constituency of diabetic and potential diabetics by elucidating the causes; the payment for treatment should be through other mechanisms such as private, third-party payment, national health insurance, medicare or medicaid.

We urge that in writing such legislation emphasis be placed on the support of research and training and not on treatment per se, although we do realize that patients will be treated as part of the research.

EVIDENCE THAT THE GOALS CANNOT BE OBTAINED AT THE CURRENT LEVEL OF FUNDING

The National Institute of Arthritis, Metabolism, and Digestive Diseases is the Institute through which funds for most research in this Institute in 1969 was \$82.3 million. Approximately 40 percent of these funds were directed toward research to solve the problems related to diabetes, glandular, and metabolic diseases. The proposed research budget by the administration for fiscal year 1974 is \$88.7 million, with the same percentage for research.

Research inflation during the past 4 years has been 8 to 10 percent and, therefore, only 32 to 40 percent of the funds available in 1969 are proposed to solve these problems.

The total number of research scientists sponsored by NIAMDD in 1969 was 459—only 180 will be sponsored in 1974.

The average training period is 5 years and, therefore, at this rate, only 36 per year complete this training.

Training grants sponsored by NIAMDD in universities throughout the country in 1969 numbered 302. By 1975 they are projected to be less than 100 and nearly completely phased out the subsequent year.

For completing research grants themselves, \$33.4 million was available in 1969, but only \$20 million is proposed for 1974. Considering inflation, we immediately realize that only one-third of the funds available for this purpose in 1969 will be available in 1974.

Obviously, any funds made available to the NIAMDD to establish diabetic centers must be in addition to those currently budgeted and not a reallocation of funds within that budget.

SPECIFIC PROPOSALS REGARDING PROPOSED BILLS

To those whom I represent, S. 648 is a much more satisfactory bill than S. 17. Even this bill does not adequately emphasize that the constituency of diabetics, and those interested in diabetics, will be best served by assuring that at least 50 percent of all funds designated

must be used for basic and clinical investigation and/or training of research scientists.

I reemphasize that all funds appropriated and authorized for the establishment of diabetic centers must be beyond those that would otherwise be appropriated for NIAMDD.

Reallocation of funds would be to the detriment of not only the scientific community but to the diabetic constituency. The more than 4 million diabetics cannot possibly benefit from the \$40 million allocation per year for treatment. These 4 million diabetics, plus those unborn, will benefit significantly from \$40 million per year allocation for research and training.

Those whom I represent do not support the concept of centers, but insist that if such bills are written that they be directed primarily to supporting research and training, and not primarily for treatment. Those whom I represent also support the concept of diabetic centers only if it is realized that diabetes is not just one disease, and support; therefore, must extend to related glandular, metabolic, and chemical fields. The secret to better treatment and to prevention lies in the test tube of the chemist or endocrinologist.

Therefore to get the job done, it will take 5 times \$8 million necessary per year, and I hope that you gentlemen will keep this in mind when the bills are written.

The last page of my testimony has some errors in it, and I will submit a new page, a corrected new page.

Thank you, Mr. Chairman.

Senator SCHWELKER. Thank you, Doctor.

You are going to resubmit your last page, your final page?

Dr. BLIZZARD. Yes, sir.

Senator SCHWEIKER. Do I understand that you are recommending that whatever legislative action is taken, the program for diabetes should be directed through the National Institutes of Health? Is that correct?

Dr. BLIZZARD. Yes, sir. We think that is essential.

Senator SCHWEIKER. And do you want to comment at all on Dr. Zapp's testimony this morning in any particular way?

Dr. BLIZZARD. Yes. I would like to point out, I believe I am in sympathy with Dr. Zapp's testimony; it was real frank.

I do agree with Dr. Zapp's statement, on page 6 of his testimony, and I quote it: "Without a breakthrough in these areas, the final solution of the problem of diabetes will not be possible." I believe that Dr. Zapp's statement is to the point.

Senator SCHWEIKER. And would you care to comment on the testimony of the ADA?

Dr. BLIZZARD. Yes. This testimony is certainly in agreement with that from the organizations which I represent; we do believe, as I said earlier, that you and Senator McGee can together put together an excellent bill; and we do believe that the broadest base should be utilized for this purpose; and that the endocrine should be included.

Senator SCHWEIKER. Do you believe that the present research, in terms of human resources, can handle the needs of biomedical research at the moment, as the administration has indicated?

Or do you think we have a shortage or a need in this area of biomedical research?

Dr. BLIZZARD. I believe that this year, we probably have an adequate number of individuals in biomedical research. But the administration is not taking into account what is going to be the case 5 years or 10 years from now.

The administration would have us believe that the individuals who have been trained is an adequate number; that these individuals are going to continue to be an adequate number to solve the problems in the future.

We all know from past experience that is untrue—we will have a generation of absent scientists to solve the problems of this country, the medical problems, unless we continue to train our best young men to pursue an academic and a scientific career.

Senator SCHWEIKER. You haven't expressed so far your formula on the educational aspects of this problem.

Would you care to comment on that?

Dr. BLIZZARD. Well, there are two aspects concerning training and education. One deals with research projects per se, and that has been very adequately covered this morning—the research scientists such as those spoken of by Dr. Cahill who had individuals in research training.

As to special and paramedical personnel, as pointed out by Mrs. Johnson and pointed out by others, we do need to educate the public concerning the implications of diabetes, the complications, the sort of complications to be avoided; and we agree that there need to be funds made available through this bill for such education.

Senator SCHWEIKER. Well, we thank you very much, Dr. Blizzard, for your testimony and we will keep the text open until you give us the last page of your transcript. We appreciate very much your participation, and we would like to thank you again.

Dr. BLIZZARD. Thank you.

Senator SCHWEIKER. At this point, we would interrupt the normal proceedings—and we want to make it clear this is not part of the regular hearing; it will be just a brief, informal recess—there are some people who traveled a long way to be here today, some 4 hours on a bus trip, who have done a lot of work in this area; and we are going to call someone to come up here to present some of the results of their labor.

[Short recess.]

Senator SCHWEIKER. We resume our afternoon hearings of the Senate Subcommittee on Health, and we will call on our next panel of witnesses—the Juvenile Diabetes Foundation.

Will they please come forward and sit at the witness table?

Mrs. Ducat—

Mrs. DUCAT. Yes.

Senator SCHWEIKER (continuing). Would you go ahead and proceed? First introduce your associates, and then proceed in whatever manner you prefer.

STATEMENT OF MRS. EDWIN M. DUCAT, FOUNDER AND PRESIDENT, JUVENILE DIABETES FOUNDATION; ACCOMPANIED BY ROBERT KAYE, M.D., DEPUTY PHYSICIAN IN CHIEF, CHILDREN'S HOSPITAL, PHILADELPHIA; LESTER BAKER, M.D., DIRECTOR OF CLINICAL RESEARCH CENTER, CHILDREN'S HOSPITAL, PHILADELPHIA; AND ALLEN ROGERS, PH. D., UNIVERSITY CITY SCIENCE CENTER, PHILADELPHIA

Mrs. DUCAT. With me today is Dr. Robert Kaye, a board member of our group and deputy physician in chief of Children's Hospital, designated chief, pediatrics, Hahnemann Hospital in Philadelphia, professor of pediatrics, specialist in metabolic diseases, University of Pennsylvania School of Medicine in Philadelphia.

On my right is Dr. Aileen Rogers, Ph. D. in biomedical engineering and director of the Statistical Survey of Juvenile Diabetes in the Population of the United States, done by the University City Science Center and contracted by Juvenile Diabetes Foundation.

At the end of the table is Dr. Lester Baker, director of the clinical research center, Children's Hospital in Philadelphia, specialist in metabolic diseases, clinicist in diabetic research, Children's Hospital in Philadelphia, associate professor of pediatrics, University of Pennsylvania School of Medicine in Philadelphia.

In addition, we have prepared a book for you, included are our latest surveys, just hot off the wire. Dr. Rogers has just finished the University City Science Center survey on juvenile diabetes. You are going to be the first one to read it besides Dr. Rogers and myself.

Also, we have included a statement by Dr. Robert Kaye. In this book is a proposal for a juvenile diabetes education, research and treatment center, designed by Dr. Lester Baker. We have plans for this center in the book and a visual which we have brought for you today.

Included are various articles on juvenile diabetes by noted authorities, including one on a virus which has been found to cause diabetes.

In addition, we were to have one of our young people with us today; but unfortunately, his doctor advised against it. The son of one of our members in Miami has just been declared totally blind, and due to his very precarious physical state, the doctor wouldn't allow his flight up from Miami today.

However, there is a very interesting article about Gary Kleinman included in this book, which I will turn over to you.

Senator SCHWEIKER. Let me say that I am delighted on behalf of the committee to have this material, particularly the new study material; and we would like your permission to quote selected portions of it in the hearing.

Mrs. DUCAT. Fine. You can put all of it in. [Laughter.]

Senator SCHWEIKER. We get the message. [Laughter.]

Mrs. DUCAT. I would like to start off by saying that we are really honored to be here today. We are really encouraged that you have called this hearing, and we are glad for the opportunity to speak about a subject that is so close to our hearts, because as you know, the members of the Juvenile Foundation are mostly parents of diabetic children and juvenile diabetics.

In the United States every day, hundreds of thousands of children and young adults inject themselves with one, two, or sometimes three needles a day. These syringes are full of insulin. Without insulin, they could not live, for they are juvenile diabetics.

The Juvenile Diabetes Foundation was established as a nonprofit corporation 2½ years ago by parents of children with diabetes. Goals of the foundation are to administer to the special and specific needs of the diabetic child and his parents, to further educational services, and to raise moneys to support and initiate research projects so that someday we may find the cause and ultimately the cure for juvenile diabetes.

Juvenile diabetes is the third major chronic ailment of all children. It is a serious disease; symptoms are severe and onset is swift. The Juvenile Diabetes Foundation is the first organization to formulate services specifically for juvenile diabetics and their families.

In early 1970, when we began, the picture seemed bleak. We found a sad situation. Death statistics on diabetes were misleading. There were no up-to-date statistics on incidence.

We found few books and teaching materials. It seemed that many doctors were inadequately trained to deal with the phenomena of control and stabilization of the diabetic child. Many juvenile diabetics were inadequately treated.

Nurses seemed unfamiliar with care of the child with diabetes. Teachers were unfamiliar and uninstructed in the problems of diabetics. School nurses were well-meaning, but uninformed.

There was an apathy and lack of interest and concern among people generally about the plight of the diabetic child. There was an unbelievable lack of funds available for diabetes research. There was no major fundraising drive to raise funds for juvenile diabetes research.

Three years later, nothing has changed. We have established educational services, raised and given funds to research, conducted public relations campaigns—but basically, the situation as it existed in 1970 still exists, with one big difference—the numbers of diabetics have increased dramatically.

Three years later, even though very little has changed, our own organization has grown. Our services to our members are many and varied.

We are proud of our parent counseling services. Trained parents visit new diabetic children and their parents in the hospital. They maintain contact as long as necessary during the crucial adjustment period of the diabetic child to his new condition and the stunned parents to the changes in life and household routine.

Our parents are seeing to the fact that parents of juvenile diabetics do have someone to turn to for information, sympathy, and supportive services.

We mail hundreds of booklets and pamphlets monthly, free of charge.

Our committees are busy working on problems of nutrition, insurance for diabetics, employment discrimination, diabetic recipe books, scholarships for juvenile diabetics who cannot afford college, a speaker's bureau, exchange booklets, foundation grants, discussion groups called "Diabetes Anonymous," for diabetics of every age group, service to hospitals, education groups, and social agencies.

Our education committee this fall distributed information on symptoms and care of juvenile diabetics to school districts in eight counties

in Philadelphia, New Jersey, Delaware, Maryland, and Florida, reaching well over 1 million students, teachers, school nurses, and administrative personnel.

We have developed a book especially for the school nurse on care and treatment of the diabetic child in school. Many seminars have been held for children and parents. Seminars are now being planned for physicians and nurses in the care of the diabetic child.

On May 6, we will hold our third annual all-day conference for juvenile diabetics and their families. Our offices have become clearing-houses of information as we have expanded from State to State; we have filled a gaping need in the field of juvenile diabetes.

Our major objective from the very beginning of the Juvenile Diabetes Foundation has been to stimulate funds for research so that we may find the cause and the cure of juvenile diabetes. In 1971, we gave our first grant to Children's Hospital—\$10,000 to support a research project which is investigating the fat metabolism which leads to arteriosclerosis in juvenile diabetics. Our Miami chapter, after 1 year in operation, gave \$10,000 to support research in transplantation of the Islets of Langerhans in laboratory animals. Our goal this year is to raise \$200,000 for research.

A major thrust in the past 2 years has been to frame and finance a public relations campaign to bring the real story of juvenile diabetes to public attention. Billboards, railroad signs, ads in the newspapers, spots on radio and on television have announced, "For some, diabetes is just a word. To others, it is a way of life."

"Diabetes is kid's stuff," that children of all ages do get diabetes, that they must take injections every day, that there is no known cause and no cure.

Another area of concern, from the beginning, has been the problem of obtaining accurate statistics.

To further scientific knowledge, and our own, we contracted with the University City Science Center to investigate available statistics and to survey the field of juvenile diabetes as regards research and funding.

Preliminary findings are that there seems to be confusion in the literature as to the definition of juvenile diabetes. Juvenile diabetes is a disease, not an age, yet most statistics label diabetes as juvenile by age of the child.

For instance, the 1968 Federal survey defined a juvenile diabetic as a child 15 years or under. My son is now 17—he is as much a juvenile diabetic as he was at 15 or at 9 years. Bill Talbert, the tennis champion, is as much a juvenile diabetic at 50 years as he was when he was 8.

The juvenile diabetic is wholly dependent on insulin because his pancreas ceases to operate shortly after onset. The juvenile diabetic is an insulin-dependent diabetic and should be noted as such in the statistics. It is important to survey the incidence and geographical location of insulin dependent or juvenile diabetics if we are to service this serious disease medically and trace inherited factors and extent of incidence in our population.

Results of our survey indicate that a major survey needs to be done, that juvenile diabetics must be identified separately, that the numbers of juvenile diabetics are far greater than any of the surveys to date indicate. The University City Science Center survey reports that the statistics for juvenile diabetics is not, as reported in other surveys,

1 in 2,500, or 1 in 1,500, or 1 in 800, but actually 1 in 300, which brings the total number of insulin users in the United States to 1 million.

We suspect the number is even greater. We would like to suggest that diabetes be made a reportable disease so that a registry, such as the one set up in London, may be set up in order that we may find the numbers and geographical locations of the diabetic population and keep a running count of the incidence of new cases.

A new statistical survey which would define terms properly must be undertaken. The last Federal survey was finished in 1968. It reported 4.8 million diabetics. Numbers from other surveys since range from 4 to 12 million. They also note three or four people undiagnosed for each case of diabetes. It is predicted by 1980, one in five people will have diabetes.

Federal concern and action must come because the increasing geometric progression of new diabetics per year presents a public health problem already monumental and growing each year.

At the turn of the century, diabetes was the 27th cause of death. Now, it is the fifth leading cause, but probably the second or third if death certificates could be analyzed and noted properly.

The man who dies of a heart attack is listed in the death statistics as a victim of heart disease, but many times he has actually died of diabetes which caused the vascular disease and heart attack.

A glaring example of this is the recent death of Jackie Robinson, whose death was listed as heart failure; yet he died from a serious, ravaging case of diabetic complications. Death statistics which do not list secondary or underlying causes are misleading and inaccurate. Physicians should be required to list secondary and underlying causes of death.

At the turn of the century, diabetic retinopathy was rare, unheard of. Today, there are 155,000 diabetics blind from retinopathy. It is the second leading cause of blindness in the United States, rapidly becoming the first, and the first cause of blindness in Great Britain. It is predicted that by the year 2000, 550,000 will be blind from diabetic retinopathy.

The total numbers of diabetics and the projections of numbers are startling. Add to these numbers the fact that the incidence of juvenile diabetes is increasing dramatically. Studies by scientists in Israel show that the incidence of diabetes is increasing. Other studies show that there is a 9-percent to 11-percent increase, or 325,000 new cases each year in the United States.

An important factor in the increasing incidence of diabetes seems to be our own diabetic children. In 1921, there was no problem. Diabetic children and young adults died shortly after onset. The discovery of insulin by Dr. Banting and Dr. Best, in 1921, allowed our children to survive, grow to maturity, marry and produce children either with the disease or a strong inherited tendency for juvenile diabetes.

Theories that juvenile diabetes may be caused by a virus, already pinpointed by researchers in England and at Tulane University in the United States cause us deep concern. Our own office has noted evidence of new diabetic case reports tending to be cyclical and geographical.

If a virus is indeed causing juvenile diabetes, this could be another reason for an increasing incidence. Certainly, this area needs a lot more looking into.

The members of the board of the Juvenile Diabetes Foundation have recognized a major public relations phenomenon. The public is apathetic and generally unaware of the problems of diabetes. It is not well known that children do get diabetes, that they must take insulin injections, that there is no known cause and no cure.

The accepted story is that the discovery of insulin in 1921 was a cure for diabetes. If you are a diabetic, take your insulin, watch your diet, get plenty of exercise; you will be just fine.

Not so.

The discovery of insulin, if we are to face facts squarely, was not a cure but only one step in the battle against diabetes, "the invisible disease." It is because it is "invisible" that we, as a nation, have not come to grips with a serious public health problem. It is ironic that 50 years since the discovery of insulin, there have been almost no major changes in the treatment of juvenile diabetes. In a time when man went from single-engine flying machines to the Moon, little light has been shed on the mysteries of this disease.

In past years, the major thrust of ongoing diabetes groups to combat diabetes has been thousands of dollars spent on mass screenings to detect diabetes. We are told that early detection assures better control and less serious complications.

Not so.

There seems to be no correlation between early detection and the seriousness of the disease and its complications.

Are the thousands of dollars a year spent on screenings really justified? European countries have stopped the screenings and detection drives. The onset of juvenile diabetes is swift and serious. The symptoms show themselves loud and clear. We believe that moneys now being spent on detection should be appropriated to the research laboratory. Here we might find some preventative measure with further investigation into inherited factors, genetic counseling, proper nutrition, chemical diabetes, and the virus theory.

It is obvious to anyone who cares about diabetes that it is a serious, complex disease, a syndrome which affects the entire body. It is not simply a disease of the pancreas as was once thought.

A prominent Philadelphia researcher in the cardiovascular area has told us, "If we find the answers to the mysteries of diabetes, we will automatically make great strides in other areas such as heart disease, blindness, hypertension, stroke, arteriosclerosis, neurological problems, kidney disease, and, interestingly enough, the whole problem of aging; because diabetes is a disease of premature aging. We would like to emphasize the fact that research in diabetes will probably affect breakthroughs in many other major areas of concern.

It seems inconceivable to parents of diabetic children that there has never been a major fund-raising campaign: That there has been no organization empowered to work as one major decisionmaking body in the field of diabetes.

This is an important reason why Federal funding to diabetes research is so critical.

The diabetes researcher has few places to turn for money when Federal funds are cut because there has been no major fund-raising

organization as there has been for other diseases which are given Federal attention, such as the Heart Fund, the Cancer Fund, et cetera.

A diabetes researcher must close up shop when Federal funds dry up because he has few other sources of funding besides the Federal Government. Researchers have told us that diabetes research will be set back 5 to 10 years if research allocations are cut this year.

This is an area, gentlemen, for immediate action.

Ongoing Federal allocations to diabetes research must not be cut this year. In fact, there must be a broad attack launched to appropriate funds which are more in keeping with this serious threat to our Nation's health.

Last year the National Institutes at Bethesda allocated \$8 million for diabetes research. At least \$200 million needs to be appropriated to diabetes research and a substantial proportion specifically to juvenile diabetes research.

Of first priority to us and to the Nation is that the Government must raise the research allocations to find the cause of diabetes, provide new methods of treatment to stem the tide of complications, and to investigate possible cures.

A second major priority should be the establishment of a Central Administrative Diabetes Agency to coordinate all education, research, and treatment of diabetes.

This central agency would be responsible for the coordination of all research in the field of diabetes and the initiation and evaluation of new research projects.

The central agency would be responsible for the setting up of regional education, research, and treatment centers established strategically and geographically to service the Nation's diabetic population.

These regional centers would be under the control and direction of the Central Diabetes Agency, but might function as an integral part of an established, ongoing medical center.

They would, however, be a separate entity budgeted by the Central Agency and reportable to the Central Agency.

Dr. Lester Baker, of the Clinical Research Center at Children's Hospital, has cooperated with us in drawing up a plan for a regional education, research, and treatment center.

This center would divide into patient care areas, consultation rooms for allied medical personnel such as ophthalmologists, psychiatrists, cardiovascular specialists, nutritionists, dermatologists, et cetera.

Areas would be provided for outpatient care, for instruction to juvenile diabetics and their families, for counseling purposes, for reeducation of doctors, nurses, dieticians, teachers and community personnel.

The RERT center should have a "revolving program" so that juvenile diabetics and medical personnel trained in the center would then be returned to their communities and their own sphere of influence. Training grants for specialists and clinicians, and grants for the development of educational materials should be distributed through these regional centers which would service a large geographical area.

Psychological counseling of diabetics and their families has got to be an important part of an established center. Dr. Zvi Laron, director

of the Juvenile Diabetes Counseling Center in Tel Aviv, Israel, told us that "Diabetes, unlike many other chronic conditions, presents such complex adjustment difficulties that it is unlikely that any family with a diabetic youngster could navigate its way harmoniously without trained professional help.

No family should be expected to cope alone with all the consequences of diabetes with the variety of threat-to-life situations, insulin shock, acidosis, the consistent demands of routine, daily insulin intake, urine examinations, blood tests, diet and serious concern of averting the complications of eyes, kidney, blood vessels, et cetera."

Special attention needs to be given to parents of very young diabetics—birth to 5 years. We have found this group to be extremely vulnerable and in need of greater support.

Juvenile diabetes present in a baby has even more of a complex and serious prognosis. We are seeing more and more very young diabetics. We are seeing more of our diabetic mothers producing diabetic children and more families with multiple cases of diabetes. I recently spoke with a mother of nine children, four of whom have diabetes; and it is not uncommon to find a family with two diabetic children.

The Juvenile Diabetes Foundation would like to be put on record as stating we do not want grants in aid from the Federal Government. We do not see that the role of Government is to apportion large grants to volunteer agencies. JDF was established to serve free of charge, to organize volunteers, and to solicit funds for research. We would be delighted if we could reach the 12 million Americans who have diabetes and solicit from each a contribution. A \$20 contribution from each one would give us \$240 million that we need for research. That would be a good start.

Dr. Charles Best, the discoverer of insulin, noted in a letter to me that it must fall to the hands of the parents of diabetic children to finally bring the story of diabetes to the Government and to be the impetus to great changes in the area of funding to research; and that is why we are here today.

Our children who have diabetes must be given a chance for a better future. As things are now, they have an incurable disease. There is no known cause.

They are dependent on an alcohol swab, a syringe, and a bottle of insulin for life. They face sporadic incidence of acidosis and insulin shock. Every illness or surgical procedure becomes a major problem. Ordinary life situations such as adolescence, dating, driving, marriage, husband-wife relationships, are emotionally complicated for them. In fact, they face a shortened life expectancy and a grab bag of major, serious complications.

Diabetes, if we are to be courageously frank, is a serious debilitating chronic disease. It is invisible, yet accelerating in its complications and incidence. Fifty years have gone by since the discovery of insulin and we are no closer to uncovering the mysteries of cause and cure than we were then.

We, parents of diabetic children, cannot wait. We don't know what tomorrow or the next doctor's examination has in store for our children. The Federal Government must take action now if we are to even catch up with the seeds of the problems which diabetes has already sown into the population of our country.

Senator SCHWEIKER. Well, I think that is a very fine statement and a very excellent summary of the problems and the challenges which we view ahead of us. I was particularly interested in your statement that 50 years after the discovery of insulin there have been no major changes in the treatment of juvenile diabetes. And I think the tragedy of it is the tragedy we heard this morning of the administration cutting down in nearly all the significant research, training, and fellowship programs. And we are increasing our military budget by \$5 billion; we are increasing our foreign aid budget by \$1½ billion before we figure what multibillion-dollar aid program we will give to Vietnam. And here we are now talking about cutting down these programs.

At the time the hearings in this matter were scheduled, we didn't have the detailed breakdown of what the budget specifically would be for these areas of activity. It was set up before we knew there would be this major crisis brought on by this kind of a serious cutback. So I think it is even more important and more critical that we conduct the hearings to show the fallacy of retrenching and cutting back in these areas at a time when we have the opportunity to move ahead.

Why don't you go ahead with your other statements?

Mrs. DUCAT. We brought this visual with us.

Actually the regional center concept, including the research area.

Lester, would you want to say a word about this?

Dr. BAKER. It's really in the direction of what was stated very eloquently this morning about the center concept in line with the regional type of program in the areas of specialized care. Specialized care can be delivered in these centers. It will contain areas for research, patient care, and education. A very important part of this center will be research, basic research, where we could have a coming together of many forms of help for diabetic children.

Senator SCHWEIKER. Do you have some other presentations?

Mrs. DUCAT. Dr. Kaye.

Senator SCHWEIKER. Well, Dr. Kaye, if you would like to summarize or highlight or add to, at this point.

Dr. KAYE. Well, Senator, I want to be very brief. I want first to commend you for your efforts, of course, in the area and say how grateful we are that you have taken the leadership.

Most of the things that I summarized have been mentioned earlier. I just want to emphasize that in the interval from 1956 to 1959, compared to 1960 to 1966, there has been no improvement in survival for juvenile diabetics. So that in a period of about 17 years, we have really made no progress in advancing the conditions for survival and relief of complication of our patients, which tends to kind of emphasize that it is standing still, which it has been doing for 17 years. It requires some major breakthrough in treatment, or we will fail to show further improvement in providing for diabetic children.

I think one other area which I would like to also emphasize as a consequence of the administration's cutback is that there is currently a shortage of competent physicians to care for diabetic children and adults throughout the Nation. This is a serious shortage of competent physicians to care for diabetic patients. With the cutting off of training grants, the replenishment will no longer be available. I would like to emphasize the importance of the teaching role that a fellowship

takes in relation to the education of medical students and health officers in the area of adequate diabetic treatment. So that it looks like, for the next 6 to 10 years, we will fail to replenish and develop competent people to care for our diabetic patients, much less move off dead center for the diabetes research effort.

Senator SCHWEIKER. I wonder if you would explain—are all physicians capable of caring for a patient with diabetes, or is specialized training required?

Dr. KAYE. I don't think it is terribly difficult, to treat diabetes. But I think it takes some weeks or months of concentrated experience in this area. All physicians are capable, with the proper education; but I don't think they have been exposed to the proper teaching or had the experience in dealing with patients. I don't think there is anything terribly complicated about it. Much more than anything else, there is a certain rulebook and a certain experience necessary in utilizing these rules. The exposure of most medical students and doctors to diabetic patients, and the basic information about diabetes is very insufficient.

Senator SCHWEIKER. And this training grant program is giving them a head start or a step up the ladder at a very critical time.

Dr. KAYE. It is not only the individuals being trained by the training grants, but the potential he has to become a teacher of medical students; these people have gained contact with contemporaries and this is very important for the education of medical students.

Senator SCHWEIKER. In your mind, is there a distinction between the research that is needed for juvenile diabetes as opposed to research in the general category of diabetes?

Dr. KAYE. Well, I think that we are interested in improving the day-to-day job, which I think is one area in which I think generally we have the tools to at least greater expand our opportunities for teaching, to upgrade the quality of day-to-day medical care, which the diabetic patient receives.

On the other hand, it is only through research that we are going to address ourselves to the unsolved problems of diabetic complication, which still lurks in wait for the child with diabetes.

Senator SCHWEIKER. All right.

Do you want to proceed with—who else have you today?

Mrs. DUCAT. That's about it. All of our testimony has been given.

Senator SCHWEIKER. Well, now, you did say, I believe, in your earlier statements that one of your panel, I believe it was Dr. Rogers, had done a survey or study recently?

Mrs. DUCAT. That's right. That's the Science Center survey that we included in our total report.

Senator SCHWEIKER. That's in here.

I wonder if maybe she could just verbally highlight a little bit of that for us at this point without going into the depth and detail, which we will not only read, but put on the record. But I think it would be helpful to summarize a little bit what your work is.

Dr. ROGERS. Well, I can only repeat what other people have already said and that is that the data on prevalence and incidence is old—like 1964 and 1965, and there are all kinds of contradictions. And I think this problem seems to be in significant magnitude that it needs an update of the state of the art.

Senator SCHWEIKER. And your latest study helps to update this somewhat?

Dr. ROGERS. No, it does not. The statistical nomenclature may be little bit misleading. This is primarily a literature search on available statistics.

Senator SCHWEIKER. I see.

Well, we want to thank the panel very much for their contributions. I know that you came from all over the different parts of the country to be here today, and we appreciate your participation and help very much. Thank you.

[The information referred to previously and subsequently supplied for the record follows:]

DELEGATION FROM THE JUVENILE DIABETES FOUNDATION

TO THE DIABETES HEARINGS

CALLED BY THE SENATE HEALTH COMMITTEE

- DR. ROBERT KAYE : Deputy Physician-in Chief, Children's Hospital,
Philadelphia, Pennsylvania
- : Designated Chief of Pediatrics, Hahnemann Hospital,
Philadelphia, Pennsylvania
- : Professor of Pediatrics, Specialist in Metabolic
Diseases, University of Pennsylvania School of
Medicine, Philadelphia, Pennsylvania
- Dr. LESTER BAKER : Director of the Clinical Research Center, Children's
Hospital, Philadelphia, Pennsylvania
- : Specialist in Metabolic Diseases
- : Clinicist in Diabetic Research, Children's Hospital,
Philadelphia, Pennsylvania
- : Associate Professor of Pediatrics, University of
Pennsylvania School of Medicine, Philadelphia,
Pennsylvania
- DR. AILEEN ROGERS : Ph. D. in Bio-Medical Engineering
- : Director, Statistical Survey of Juvenile Diabetes
in the population of the United States, University
City Science Center, Philadelphia, Pennsylvania
- MRS. EDWIN M. DUCAT: Founder and President of the Juvenile Diabetes
Foundation

Gentlemen, the members of the Juvenile Diabetes Foundation are honored to be here today. We are encouraged that you have called this hearing, and we are glad for the opportunity to speak about a subject so close to our hearts.

In the United States every day, hundreds of thousands of children and young adults inject themselves with one, two, and sometimes, three needles a day. These syringes are full of Insulin. Without Insulin, they could not live. They are Juvenile Diabetics.

The Juvenile Diabetes Foundation was established as a non-profit corporation two and one-half years ago by parents of children with Diabetes. Goals of the Foundation are to administer to the special and specific needs of the diabetic child and his parents, to further educational services, and to raise monies to support and initiate research projects so that some day we may find the cause and, ultimately, the cure of Juvenile Diabetes.

Juvenile Diabetes is the third major chronic ailment of all children. It is a serious condition, symptoms are severe and onset is swift. The Juvenile Diabetes Foundation is the first organization to formulate services specifically for Juvenile Diabetics and their families.

In early 1970 when we began, the picture seemed bleak. We found a sad situation. Death statistics on Diabetes were misleading. There were no up-to-date statistics on incidence. We found few books and teaching materials. It seemed that many doctors were inadequately trained to deal with the phenomena of control and stabilization of the diabetic child. Many Juvenile Diabetics were inadequately treated. Nurses seemed unfamiliar with care of the child with Diabetes. Teachers were unfamiliar and uninstructed in the problems of Diabetes. School nurses were well meaning, but uninformed. There was an apathy and lack of interest and concern among people generally about the plight

of the diabetic child. There was an unbelievable lack of funds available for Diabetes research. There was no major fund-raising drive to raise funds for Juvenile Diabetes Research.

Three years later, nothing has changed. We have established educational services, raised and given funds to research, conducted public relations campaigns---but, basically, the situation as it existed in 1970 still exists, with one big difference---the numbers of Diabetics have increased dramatically.

Three years later, even though very little has changed, our own organization has grown. Our services to our members are many and varied. We are proud of our parent counseling services. Trained parents visit new diabetic children and their parents in the hospital. They maintain contact as long as necessary during the crucial adjustment period of the diabetic child to his new condition and the stunned parents to the changes in life and household routine. Our parents are seeing to the fact that parents of Juvenile Diabetics do have someone to turn to for information, sympathy, and supportive services. We mail hundreds of booklets and pamphlets monthly, free of charge. Our committees are busy working on problems of nutrition, insurance for diabetics, employment discrimination, diabetic recipe books, scholarships for Juvenile Diabetics who cannot afford college, a speaker's bureau, exchange booklets, foundation grants, discussion groups called "Diabetics Anonymous" for Diabetics of every age group, service to hospitals, education groups and social agencies. Our education committee this fall distributed information on symptoms and care of Juvenile Diabetes to school districts in eight counties in Philadelphia, New Jersey, Delaware, Maryland, and Florida, reaching well over a million students, teachers, school nurses, and administrative personnel. We have developed a book especially for the school nurse on care and treatment of the diabetic child in school. Many seminars have been held for children and parents. Seminars are now being planned

for physicians and nurses in the care of the diabetic child. On May 6 we will hold our third annual all day conference for Juvenile Diabetics and their families. Our offices have become clearing houses of information as we have expanded from state to state; we have filled a gaping need in the field of Juvenile Diabetes.

Our major objective from the very beginning of the Juvenile Diabetes Foundation has been to stimulate funds for research so that we may find the cause and the cure of Juvenile Diabetes. In 1971, we gave our first grant to Children's Hospital---\$10,000 to support a research project which is investigating the fat metabolism which leads to arteriosclerosis in Juvenile Diabetics. Our Miami chapter, after one year in operation, gave \$10,000 to support research in transplantation of the Isles of Langerhans in laboratory animals. Our goal this year is to raise \$100,000 for research.

A major thrust in the past two years has been to frame and finance a public relations campaign to bring the real story of Juvenile Diabetes to public attention. Billboards, railroad signs, ads in the newspapers, spots on radio and on television have announced, "For some, Diabetes is just a word. To others, it is a way of life." "Diabetes is kid's stuff", that children of all ages do get Diabetes, that they must take injections every day, that there is no known cause and no cure.

Another area of concern, from the beginning, has been the problem of obtaining accurate statistics. To further scientific knowledge, and our own, we contracted with the University City Science Center to investigate available statistics and to survey the field of Juvenile Diabetes as regards research and funding. Preliminary findings are that there seems to be confusion in the literature as to the definition of Juvenile Diabetes. Juvenile Diabetes is a disease, not an age, yet most statistics label Diabetes as juvenile by age of the child. For instance, the 1968 federal survey defined a Juvenile Diabetic as

a child fifteen years or under. My son is now seventeen---he is as much a Juvenile Diabetic as he was at fifteen or at nine years. Bill Talbert, the tennis champion, is as much a Juvenile Diabetic at fifty years as he was when he was eight. The Juvenile Diabetic is wholly dependent on insulin because his pancreas ceases to operate shortly after onset. The Juvenile Diabetic is an Insulin Dependent Diabetic and should be noted as such in the statistics. It is important to survey the incidence and geographical location of insulin dependent or Juvenile Diabetics if we are to service this serious disease medically and trace inherited factors and extent of incidence in our population.

Results of our survey indicate that a major survey needs to be done, that Juvenile Diabetics must be identified separately, that the numbers of Juvenile Diabetics are far greater than any of the surveys to date indicate. The University City Science Center Survey reports that the statistic for Juvenile Diabetes is not, as reported in other surveys, one in 2500, or one in 1500, or 1 in 800, but one in 300, which brings the total number of insulin users in the United States to one million.

We suspect the number is even greater. We would like to suggest that Diabetes be made a reportable disease so that a registry may be set up in order that we may find the numbers and geographical locations of the diabetic population and keep a running count of the incidence of new cases.

A new statistical survey which would define terms properly must be undertaken. The last federal survey was finished in 1968. It reported 4.8 million Diabetics. Numbers from other surveys since range from four to twelve million. They also note three or four people undiagnosed for each case of Diabetes. Will there be thirty-six million Diabetics soon? It is predicted by 1980, one in five people will have Diabetes.

Federal concern and action must come because the increasing geometric progression of new Diabetics per year presents a public health problem already monumental and growing each year. At the turn of the century Diabetes was the twenty-seventh cause of death. Now it is the fifth leading cause, but probably the second or third if death certificates could be analyzed and noted properly. The man who dies of a heart attack is listed in the death statistics as a victim of heart disease, but many times he has actually died of Diabetes which caused the vascular disease and heart attack. A glaring example of this is the recent death of Jackie Robinson whose death was listed as heart failure, yet he died from a serious, ravaging case of diabetic complications. Death statistics which do not list secondary or underlying causes are misleading and inaccurate. Physicians should be required to list secondary and underlying causes of death.

At the turn of the century, Diabetic Retinopathy was rare, unheard of. Today, there are 155,000 diabetics blind from retinopathy. It is the second leading cause of blindness in the United States, rapidly becoming the first, and the first cause of blindness in Great Britain. It is predicted that by the year 2000, 550,000 will be blind from Diabetic Retinopathy.

Theories that Juvenile Diabetes may be caused by a virus, already pinpointed by researchers in England and at Tulane University in the United States cause us deep concern. Our own office has noted evidence of new diabetic case reports tending to be cyclical and geographical. If a virus is indeed causing Juvenile Diabetes, this could be another reason for an increasing incidence. Certainly this area needs a lot more looking into.

The members of the Board of the Juvenile Diabetes Foundation have recognized a major public relations phenomenon. The public is apathetic and generally unaware of the problems of Diabetes. It is not well known that children do get

Diabetes, that they must take insulin injections, that there is no known cause and no cure. The accepted story is that the discovery of insulin in 1921 was a cure for Diabetes. If you are a diabetic, take your insulin, watch your diet, get plenty of exercise, you will be just fine. Not so! The discovery of insulin, if we are to face facts squarely, was not a cure but only one step in the battle against Diabetes, "the invisible disease." Is it because it is "invisible" that we, as a nation, have not come to grips with a serious public health problem? It is ironic that fifty years since the discovery of insulin there have been almost no major changes in the treatment of Juvenile Diabetes. In a time when man went from single engine flying machines to the moon, little light has been shed on the mysteries of this disease.

In past years the major thrust of ongoing diabetes groups to combat Diabetes has been thousands of dollars spent on mass screenings to detect Diabetes. We are told that early detection assures better control and less serious complications. Not so! There seems to be no correlation between early detection and the seriousness of the disease and its complications. Are the thousands of dollars a year spent on screening really justified? European countries have stopped the screenings and detection drives. The onset of Juvenile Diabetes is swift and serious. The symptoms show themselves loud and clear. We believe that monies now being spent on detection drives should be appropriated to the research laboratory. Here we might find some preventative measure with further investigation into inherited factors, genetic counseling, proper nutrition, chemical diabetes, and the virus theory.

It is obvious to anyone who cares about Diabetes that it is a serious, complex disease, a syndrome which affects the entire body. It is not simply a disease of the pancreas as was once thought. A prominent Philadelphia researcher

in the cardiovascular area has told us, "If we find the answers to the mysteries of Diabetes, we will automatically make great strides in other areas such as heart disease, blindness, hypertension, stroke, arteriosclerosis, neurological problems, kidney disease, and on the whole problem of aging because Diabetes is a disease of premature aging." We would like to emphasize the fact that research in Diabetes will probably effect breakthroughs in many other major areas of concern.

It seems inconceivable to parents of diabetic children that there has never been a major fund raising campaign. That there has been no organization empowered to work as one major decision-making body in the field of Diabetes. This is an important reason why federal funding to Diabetes research is so critical. The Diabetes researcher has few places to turn for money when federal funds are cut because there has been no major fund raising organization as there has been for other diseases which are given federal attention (The Heart Fund, The Cancer Fund, etc.). A Diabetes researcher must close up shop when federal funds dry up because he has few other sources of funding besides the Federal Government. Researchers have told us that Diabetes Research will be set back five to ten years if research allocations are cut this year. This is an area for immediate attention! Ongoing federal allocations to Diabetes research must not be cut this year. In fact, there must be a broad attack launched to appropriate funds which are more in keeping with this serious threat to our nation's health. Last year the National Institute at Bethesda allocated \$8 million to Diabetes Research. At least \$200 million needs to be appropriated to Diabetes Research and a substantial proportion specifically to Juvenile Diabetes. Of first priority to us and to the nation is that the government must raise the research allocations to find the cause of Diabetes, provide new methods of treatment, to stem the tide of complications, and to investigate possible cures.

A second major priority should be the establishment of a Central Administrative Diabetes Agency to coordinate all education, research and treatment of Diabetes. This central agency would be responsible for the coordination of all research in the field of Diabetes and the initiation and evaluation of new research projects. The Central Agency would be responsible for the setting up of Regional Education, Research and Treatment Centers established strategically and geographically to service the nation's diabetic population. These regional centers would be under the control and direction of the Central Diabetes Agency, but might function as an integral part of an established, ongoing medical center. They would, however, be a separate entity budgeted by the Central Agency and reportable to the Central Agency. Dr. Lester Baker of the Clinical Research Center at Children's Hospital has cooperated with us in drawing up a plan for a Regional Education, Research and Treatment Center. This center would divide into patient care areas, consultation rooms for allied medical personnel such as ophthalmologists, psychiatrists, cardiovascular specialists, nutritionists, dermatologists, etc. Areas would be provided for outpatient care, for instruction to Juvenile Diabetics and their families, for counseling purposes, for re-education of doctors, nurses, dieticians, teachers and community personnel.

The RERT Center should have a "revolving program" so that Juvenile Diabetics and medical personnel trained in the Center would then be returned to their community and their own sphere of influence. Training grants for specialists and clinicians, and grants for the development of educational materials should be distributed through these regional centers which would service a large geographical area. Psychological counseling of Diabetics and their families has got to be an important part of an established center. Dr. Zvi Laron, Director

of the Juvenile Diabetes Counseling Center in Tel Aviv, Israel, told us that "Diabetes, unlike many other chronic conditions, presents such complex adjustment difficulties that it is unlikely that any family with a diabetic youngster could navigate its way harmoniously without trained professional help. No family should be expected to cope alone with all the consequences of Diabetes with the variety of threat to life situations, insulin shock, acidosis, the consistent demands of routine, daily insulin intake, urine examinations, blood tests, diet and the serious concern of averting the complications of eyes, kidney, blood vessels, etc."

Special attention needs to be given to parents of very young Diabetics-- birth to five years. We have found this group to be extremely vulnerable and in need of greater support. Juvenile Diabetes present in a baby has an even more complex and serious prognosis. We are seeing more and more very young Diabetics. We are seeing more of our diabetic mothers producing diabetic children and more families with multiple cases of Diabetes. I recently spoke with a mother of nine children, four of whom have Diabetes. It is not uncommon to find a family with two diabetic children.

The Juvenile Diabetes Foundation would like to be put on record as stating we do not want grants in aid from the federal government. We do not see that the role of government is to apportion large grants to volunteer agencies. J.D.F. was established to serve free of charge, to organize volunteers, and to solicit funds for research, We would be delighted if we could reach the twelve million Americans who have Diabetes and solicit from each a contribution. A twenty dollar contribution from each one would give us \$240 million to distribute for research. That would be a good start.

Br. Charles Best, the discoverer of insulin, noted in a letter to me that it must fall to the hands of the parents of diabetic children to finally bring the story of Diabetes to the government and to be the impetus to great changes in the area of funding to research, and that is why we are here today.

Our children who have Diabetes must be given a chance for a better future. As things are now, they have an incurable disease. There is no known cause. They are dependent on an alcohol swab, a syringe and a bottle of insulin for life. They face sporadic incidence of acidosis and insulin shock. Every illness or surgical procedure becomes a major problem. Ordinary life situations such as adolescence, dating, driving, marriage, husband-wife relationships, are emotionally complicated for them. In fact, they face a shortened life expectancy and a grab bag of major, serious, debilitating chronic disease. It is invisible, yet accelerating in its complications and incidence. Fifty years have gone by since the discovery of insulin and we are no closer to uncovering the mysteries of cause and cure than we were then. We, parents of diabetic children, cannot wait. We don't know what tomorrow or the next doctor's examination has in store for our children. The federal government must take action now if we are to even catch up with the seeds of the problems which Diabetes has already sown into the population of our country.

A PROPOSAL FOR REGIONAL CLINICAL RESEARCH

CENTERS FOR DIABETES

DR. LESTER BAKER

Aims

A. High quality patient care.

1. To bring to the bedside and to the outpatient clinic the skill of multiple specialists from many disciplines with special expertise in the application of those disciplines to the diabetic. These would include primary care physicians, such as pediatricians and internists, and supporting help from ophthalmologists, neurologists, psychiatrists and sub-experts in the areas of renal disease, peripheral vascular disease, infectious disease, genetics and surgery.
2. To facilitate the translation of advances in laboratory understanding of diabetes into viable clinical programs.

B. Teaching.

1. The patient: The Center could provide for the comprehensive education necessary for the newly diagnosed diabetic, and would provide for continuing education. This would help make the diabetic a true partner in his own care.
2. The community: It could provide for the ongoing education of community physicians, so that the primary care provided by these individuals would continue to be the best available.
3. The diabetic patients and their families could provide mutual support and instruction in conjunction with community groups and professional help.

4. The training of important medical and paramedical personnel: Dietitians, teachers, social workers, medical students, interns and residents.
5. The development of special programs in diabetes, such as physician's assistants and/or nurse specialists or nurse practitioners specifically trained to work in the diabetic area.
6. The training of researchers in diabetes will be covered under Section C.

C. Research.

1. Basic research: This could include essential investigations into diabetes on multiple levels, such as biochemical, metabolic, immunologic, electron microscopic and so on.
2. Applied and clinical research:
 - a. The testing of clinical hypotheses relative to diabetes and its complications.
 - b. The studies of "experiments of nature" and other related metabolic disorders of carbohydrate and lipid metabolism for the information which it might shed on diabetes.
 - c. The evaluation of new drugs and/or new treatment programs in a prospective and scientific manner, perhaps with several of the diabetes regional centers collaborating and pooling results.
 - d. Training of researchers in diabetes.

The Regional Centers can functionally be considered as interlocking areas covering patient care (both inpatient and outpatient), research, and administrative and clinical laboratory support. The Center should be located in a university complex. Its exact size and location may vary, but the functional integrity of the unit could easily be preserved. This would allow the Center to make use of, and contribute to, the scientific pool within the university in terms of focusing on diabetes and diabetes-related problems. It also would mean that much of the ancillary laboratory support could be derived from the university hospital, and need not be set up in a physically distinct manner¹ within the Center itself.

I. Patient Care.

The Center should have facilities for both inpatient and outpatient care. The outpatient area would see Center patients on a regular basis. It could also be used for certain referred ambulatory patients, who might require special studies and/or special education, but who do not need hospitalization, and who could be maintained in a motel-like arrangement within the university complex. The inpatient area would serve all those patients with newly diagnosed diabetes, all patients whose evaluations might require hospitalization, and patients with intercurrent problems whose diabetic management needs supervision.

To get some idea of what this would mean, the experiences of the Children's Hospital of Pittsburgh might be cited. In the mid-1930's, Emily Renziehausen left three sizable trusts to the Children's Hospital of Pittsburgh. One trust provided money for inpatient care of diabetic children, a second for the outpatient care for these children, and a third was devoted to the support of research in diabetes mellitus and related diseases in children. Thus, in the Pittsburgh area, physicians automatically refer children to the Children's Hospital of Pittsburgh since their medical care will be free. According to Dr. Drash, the current figures go somewhat as follows:

- a. Admissions for newly diagnosed diabetes: approximately 80 per year.
- b. Readmissions of known diabetics: about 80 to 100 per year, a few for problems of diabetic management, but most for other reasons (orthopedic problems, surgical problems and so on).
- c. Outpatient visits: approximately 1200 to 1500 per year. Those children from the immediate Pittsburgh area are seen on a regular basis (approximately every 3 months), and this group numbers approximately 400 to 500. In addition, the total clinic census is in the neighborhood of 800 children, some of whom come only rarely, since they live some distance out of Pittsburgh, and their routine management is done by the community physicians, often with consultation from the Pittsburgh Children's.

Page 5

To handle this load, plus allow a suitable number of beds for clinical research purposes, Pittsburgh Children's has a 16 to 20 bed diabetic-metabolic ward. This is staffed by an appropriate number of nurses, house staff physicians, and supporting dietary and paramedical personnel. Many of these same personnel can also be used to staff the outpatient wing of the patient care area. Certainly, the professional staff including physicians, nurses and dietary personnel could be the same. The same teaching functions which they subserve in the inpatient unit could also be performed as part of the continuing education of the outpatient population.

II. The research wing of the Regional Center would have the following missions:

- a. To serve as the administrative structure which would provide an enhancing and stimulating atmosphere for many scientists of different specialities to react about the problems of diabetes.
- b. To provide laboratory space, salaries and support for several key people whose presence in such a center could have an "amplifying" effect on the talent and expertise already present in that university complex.
- c. To provide the support and atmosphere for the training of future researchers in diabetes.
- d. To provide "seed" money so that studies relating to diabetes could be initiated. Preliminary data obtained in

Page 6

this manner could then qualify the investigator to apply through the regular research grant or contract mechanism.

III. Costs.

- a. Start up costs for construction and/or renovation:
these would be unique for each Center.
- b. Staffing costs for the inpatient and outpatient areas.
- c. Hospitalization costs.
- d. Administrative costs.

Current Status of Juvenile Diabetes

by Dr. Robert Kaye

The discovery of insulin and its clinical use resulted in a dramatic increase in the life expectancy of children with diabetes. Prior to the use of insulin, the child with diabetes was doomed to die in one to two years. In spite of this change, the outlook for life expectancy of the 150,000 diabetic children in our country is still disheartening as it remains approximately two-thirds of the general population.⁽¹⁾ A child who becomes diabetic at the age of ten may expect only 44 more years of life in contrast to the 62 years anticipated by his non-diabetic peers. It is discouraging to note that survival for juvenile diabetics has shown no improvement based on a comparison of data for the periods of 1960-1966 with those of 1956-1959.⁽¹⁾ This indicates that unless there is developed some major advance in methods of treatment no further improvement in survival of diabetic children will occur.

Diabetes is ranked as the 8th leading cause of death in the U. S. and the proportion of the population dying from this cause is increasing.⁽²⁾

In 1966, 38,000 deaths were certified as due to diabetes and in 35,000 the disease was listed as a contributory cause. An additional 37,000 deaths were estimated to be the result of this disease as deaths in patients with cardio-vascular-renal disease may fail to note the contributory role of diabetes.⁽¹⁾

Deaths from ketoacidosis and infection have decreased in diabetes with an increase in mortality from cardio-vascular-renal disease.⁽³⁾ These angio-pathic deaths occur mainly in subjects with a duration

of diabetes of 15-25 years⁽⁴⁾ following which there is some improvement in survival. The mortality from vascular disease has risen from 46.8% in 1922-1929 to 76.6% in 1956-1962.⁽⁵⁾ During this interval coronary artery disease as a cause of death has increased fourfold and renal disease threefold.

Even more disturbing than mortality statistics are morbidity and disability data attributable to long term complications. Data from Sweden indicate that 40% of long term survivors of juvenile diabetes are wholly or partially disabled.⁽⁴⁾

Priscilla White of the Joslin Clinic has reported the status of 478 juvenile diabetics surviving 30 years after onset.⁽⁶⁾

- 48% had peripheral neuropathy
- 26% had urinary tract infections
- 90% had retinopathy
- 30% had proliferating retinopathy
- 8% were blind
- 34% had kidney disease
- 37% had hypertension
- 50% had peripheral vascular disease

The incidence of vascular disease increases with the age of the patient and the duration of diabetes.

Incidence of vascular disease (%)	Duration of Diabetes (yrs)
1	5
2.5	10
20	15
60	20
90	30

By age 30 63% of juvenile diabetics have vascular disease. (3)

Diabetes is the third leading cause of blindness in our population. The 44,660 blind diabetics constitute 11.2% of the blind of this country. Blindness in diabetics is 13 times as frequent as in the population as a whole. (1)

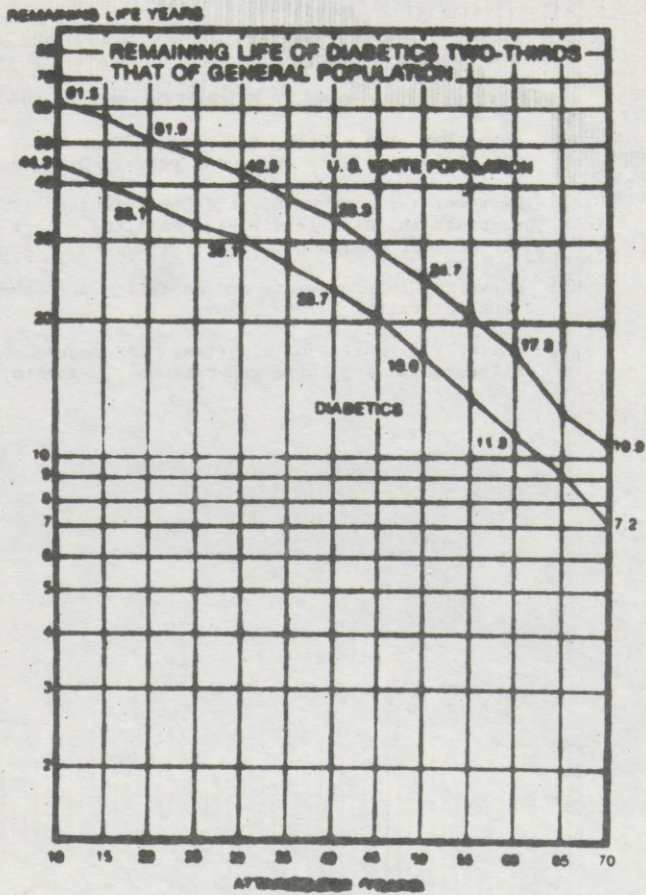
According to the National Health Interview Survey, diabetes disables more than 562,000 persons. Among diabetics, there is three times the rate of sickness and absenteeism of the general population. (1) Hope for the future may come from transplantation of pancreatic tissue or from the development of an artificial pancreas.

Heart and kidney transplants and advances in vascular surgery may improve our ability to deal with the toll of diabetic complications.

There is need for research in developing means of preventing or delaying the onset of clinical diabetes, and improving our capabilities of treating the disease and its complications.

References

- (1) Diabetic Source Book, Washington, U.S. Dept. of Health, Education and Welfare, 1968
- (2) Statist Bull Metrop Life Insur Co, 51:14, 1970
- (3) Entmacher, P.S.; Root, H.F., and Marks, H.F.: Longevity of diabetic patients in recent years. Diabetes, 13:373, 1964.
- (4) Larsson, Y.; Sterky, G., and Christiansson, G.: Long-term prognosis in juvenile diabetes mellitus. Acta Paediat (Stockholm), 51 (Suppl 130): 5, 1962
- (5) Marks, H.H.: Longevity and mortality of diabetes. Amer. J Public Health, 55:416, 1965
- (6) White, P.: Childhood diabetes. Its course and influence on the second and third generations. Diabetes, 9:345, 1960

Juvenile-Type Diabetes and Its Complications

JUVENILE DIABETES

A DREAD DISEASE



University
City
Science Center
Philadelphia
Pennsylvania

JUVENILE DIABETES
A DREAD DISEASE

A Report Prepared By:

V. A. Rogers, Ph.D. and M. B. Flanagan, M.S.
University City Science Center
3508 Science Center
Philadelphia, Pennsylvania 19104

Submitted To:

The Juvenile Diabetes Foundation
3701 Conshohocken Avenue
Philadelphia, Pennsylvania 19131

February, 1973

CONTENTS

	PAGE
INTRODUCTION	1
CHARACTERISTICS OF DIABETES	2
The Importance of Insulin	2
Classification of Diabetes	3
Juvenile Diabetes	4
Complications in Diabetes	4
Cost of Diabetes	5
PREVALENCE AND INCIDENCE	9
The National Health Survey Act of 1956	9
Prevalence of Diabetes	10
Prevalence of Juvenile Diabetes	13
Incidence of Diabetes	13
RESEARCH CONSIDERATIONS	16
Genetic Factors	16
Environmental Factors	17
Viral Factors	18
RECOMMENDATIONS	20
Federal Funding for Health Research	20
Diabetes - A Reportable Disease	22
Funding Priorities	26

INTRODUCTION

Since 1955 when oral medication for diabetes mellitus was introduced, it has been generally believed that diabetes has been controlled and poses no more of a problem than the inconvenience of daily pill taking. It is the purpose of this report to dispell this myth and to show that diabetes is still a major health problem for nearly a million juvenile diabetic Americans who require daily injections of insulin, experience significant reduction in life span, and suffer from complications of blindness, heart, nerve and kidney disease.

This report follows the World Health Organization classification of juvenile-type diabetes which is independent of age of onset and characterized by the need for daily injection of insulin. It is shown in this report that juvenile-type diabetes should be designated as a reportable disease in order to investigate the possible role of viral infections and hereditary mechanisms which may lead to identification of its cause and cure. It is also shown that there is a great need for increased funding of basic research to eliminate this major cause of morbidity and mortality in the American population.

CHARACTERISTICS OF DIABETES MELLITUS

Diabetes Mellitus has been defined as a chronic disorder of energy utilization. It is characterized both by an inability to use and to store glucose derived from food intake and by alterations in protein and lipid metabolism. Glucose is the substance which supplies the body with the continual energy source required to sustain life; the body may use it immediately or store it for later use. However, in diabetes glucose accumulates in the blood stream and excess amounts are filtered by the kidneys into the urine. This disease state is characterized by an imbalance in the relationship between glucose in the blood and the hormone insulin which is stored in and secreted by the beta cells in the islets of Langerhans located in the pancreas.

The Importance of Insulin

The hormone insulin has several functions¹

- it acts to increase the permeability of cell membrane to glucose
- it acts to inhibit the release of glucose from the liver following food intake
- it directs lipogenesis from excess dietary carbohydrate and inhibits lipolysis
- it stimulates both amino acid transport into muscle tissue and protein synthesis

Under normal circumstances the secretion of insulin is stimulated by elevated blood glucose and amino acids. Additional stimulants to insulin secretion may be ketones and long-chain fatty acids, glucagon secreted by the alpha cells of the pancreas, growth hormone, ACTH, and cortisones.² It is known that insulin is stored in the pancreas in granular form, possibly in combination with zinc.

Recent information from research at the Joslin Diabetes Foundation³ indicates that a defect both in the manufacture and in the storage of insulin leads to the

development of diabetes. Investigations in their research laboratories have shown that diabetics have relatively fewer beta cells in the islets of Langerhans than do non-diabetics. A decreased number of beta cells would explain a decreased capability to make or to store insulin. This problem, as well as the varying degrees of diabetes, is well illustrated by the following breakdown:

- in the non-diabetic 100% of the islets function properly
- in a person with moderate diabetes about 50% function
- in a person with severe diabetes of several years duration few or no islets can function making such persons completely dependent upon insulin injections for life

Drs. Chick and Like of the Joslin Research Laboratories are studying the possibility that the decreased number of beta cells in the diabetic is due to a defect in these cells which in turn causes an impaired ability to form new cells. They hope to learn the nature of this defect and eventually to devise a treatment for the stimulation of new beta cells, thereby increasing the capacity of the diabetic to produce and to store his own insulin.

Additional research in these laboratories, performed under the direction of Dr. Steinke, has shown that the beta cells of the human fetus do not secrete insulin in response to glucose stimulation. Nevertheless, the fetus will produce insulin in response to protein stimulus. The unborn baby is thus, in effect, a "diabetic". However, a biochemical change occurs at birth permitting the cells to respond normally to glucose stimulation. Dr. Steinke poses the question, "Can this mean that if a person has diabetes, his pancreas is in truth reverting to the fetal state"? Through further research he hopes to unmask the process which "turns on" the beta cells at birth, and thus reveal a way in which they can be "turned on" in later life.

The identification of the cause of and the development of a cure for diabetes are dependent upon this type of research in progress at the Joslin Research Laboratories and at other laboratories throughout the world. The hopes of all present and future

diabetics rest with individuals engaged in such research, for diabetes can be treated, but cannot be cured. In fact the most substantial contributions of diabetes research over the past 50 years have been in the treatment of this disease. In the words of Dr. Priscilla White, "the etiology of diabetes remains mysterious and the prevention elusive."

Classification of Diabetes

As noted previously, there are varying degrees of intensity of diabetes which tend to complicate both accurate discussion and statistical analysis of this disease. In an effort to rectify this situation the World Health Organization (WHO) in 1965 issued a report⁵ recommending a classification of diabetes based upon age of recognized onset. In this classification scheme four groups are identified:

infantile or childhood diabetics: 0-14 years of age at onset, characterized by rapid onset of the disease severe initial symptoms, eventually insulin dependent for life

young diabetics: 15-24 years of age at onset, usually characterized by acute onset, most insulin dependent for life

adult diabetics: 25-64 years of age at onset, characterized by mild symptoms, less insulin dependent, frequently controlled by dietary regiment and oral drugs

elderly diabetics: 65 years of age at onset and older, mild symptoms, usually not insulin dependent, controlled by careful dietary regime

This classification illustrates the fact that the earlier the onset of diabetes the more severe the symptoms and the greater the tendency to be totally dependent upon insulin injections. In fact one source notes that 94% of juvenile patients show a progression to the total (insulin dependent) diabetic state.⁶ This group suffers the greatest disability from diabetes and is most prone to develop the incapacitating complications associated with this disease: atherosclerosis, retinopathy, neuropathies, and nephropathies.

There are severe limitations to this classification scheme, however. For example, use of the term "young diabetics" has created the general misunderstanding that a "young diabetic"

automatically becomes an "adult diabetic" when he grows older regardless of the severity of his disease.

Juvenile Diabetes

The World Health Organization report recognizes other types of diabetes mellitus in addition to the above outlined classification by age at onset. Among these other types, "juvenile-type diabetes" is defined as that referring to "cases in any age group that require insulin and are prone to attacks of ketosis." This additional class is necessary for a clarification of the fact that some individuals, whose diabetes is diagnosed later in life, may indeed acquire the most severe type of the disease usually associated with the group whose onset is earlier in life. Thus the vast majority of individuals diagnosed with diabetes before age 25 and some individuals diagnosed later in life are prone to the severe "juvenile-type diabetes." This type of diabetes is not limited to the childhood years, in other words, these persons will always have "juvenile-type diabetes", for the terminology reflects not the age of the patient, but rather that the disease is manifest in its most severe aspect.

This juvenile-type subset of the total diabetic population is only vaguely recognized in the general literature on diabetes. Usually a distinction is made, at best between juvenile diabetics (referring to the pediatric age group or to those who acquired the disease in childhood) and maturity-onset diabetics. Furthermore, juvenile-type diabetics are inadequately reflected in and reported upon by epidemiological studies. New methodologies for reporting this group by such studies could and should be developed. Lack of proper recognition for this severe type of diabetes obscures some of the most vital public health problems posed by this disease.

Complications in Diabetes

In a review of juvenile diabetes Knowles notes that⁷:

"The juvenile diabetic patient is prone to develop incapacitating complications after fifteen years of known diabetes and his life expectancy is decreased. He is subject to vascular diseases of both small and large vessels and a wide spectrum of neuropathies. The cause of the complications is unknown. Many physicians...feel that careful chemical control will slow their progress. Conclusive evidence for this relation is not at hand, however..."

In addition to the physiological complications of diabetes, there are also psychological problems. Laron (1972) reports the observation, made over 13 years of clinical experience, that a number of juvenile diabetics undergo a gradual deterioration in personality with a tendency to surrender to the line of least resistance. Accumulating disinterest and deterioration in scholastic performance, increasing irritation and conflict at home and difficulties in entering and/or continuing in the job market are often found. The family, friends and school teachers are all obligated in the proper management of the juvenile diabetic. Emotional stress is particularly acute in juvenile diabetes where children are involved and daily injections must be performed. The emotional complications, stresses and sufferings cannot be measured.

In the 1964-65 National Health Survey it was reported that 21% of diabetics have heart conditions, 17% have hypertension and 10% have impaired vision. This indicates that the diabetic population inflates the statistics and distorts the data on the magnitude of the heart disease problem in the United States. In 1964-65, 485 thousand diabetics had heart disease, 387 thousand suffered from hypertension, and 151 thousand were totally blind. The morbidity from this disease is staggering.

The life expectancy of the diabetic is still only two-thirds that of the general population and is a function of age at onset as shown in Figure 1. Improvements in prognosis have occurred through:

- introduction of insulin therapy
- more effective management of infections
- advances in dealing with surgical complications

At present diabetes is the 7th leading cause of death in the U.S. according to the single-cause-reporting system. Diabetes accounts for approximately 38,000 deaths annually⁹ and it is estimated that an additional 40,000 diabetics die annually without diabetes recorded as the cause of death on the death certificates.¹⁰ In a study at the Joslin Clinic (1964) 78% of deaths among diabetic patients was due to cardiovascular-renal diseases."

Cost of Diabetes

The cost of diabetes can be estimated by determining the potential earnings loss due to work disabilities and premature

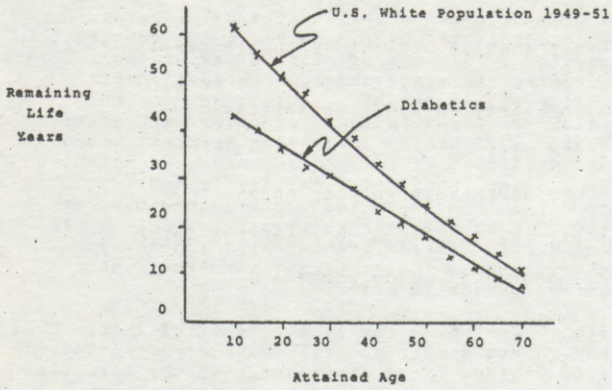


Figure 1 - Expected remaining years of life at selected ages of diabetics and non-diabetics.¹

¹ Tokuhata, G. K., "A special report to the governor's committee concerned with Diabetes", Commonwealth of Pennsylvania, Pennsylvania Dept. of Health, Harrisburg, Pennsylvania, 1972, p.44.

death and the actual cost of medical and health care. These include costs due to:

- inability to carry on usual activities
- inability to work
- inability of homemakers to keep house
- lifetime earnings lost due to premature death
- sickness absenteeism among workers
- hospitalization
- surgical fees
- laboratory tests
- drugs and insulin
- needles and syringes
- physician visits
- nursing home care

This cost was estimated at almost \$1.9 billion in 1968 by the Public Health Service.¹²

PREVALENCE AND INCIDENCE

The purpose of this discussion is to illustrate the fact that, while diabetes is shown to be widespread in the American population, the severe juvenile-type diabetes is poorly identified therein, and consequently, the justification for its being a high-priority health research target is seriously jeopardized. Health statistics are applied to the design of health manpower programs, facilities planning, the understanding of the impact of disease upon a nation's economy, and most importantly, the establishment of priorities for medical research. In order to plan wisely and place emphasis properly such statistics must reflect the true nature and extent of a disease in any given population. The following discussion will examine first the major source of health statistics for the American population and secondly the latest findings from such statistics for the disease diabetes mellitus and juvenile diabetes.

The National Health Survey Act of 1956

Prior to the enactment of the National Health Survey Act (PL 84-652) of 1956, nationwide data on the extent and character of disease in the American population was of a varied and ad hoc character derived chiefly from specialized local health studies, reports of selected communicable diseases, and from studies of mortality statistics.

A nationwide health survey conducted in 1935-36 had been the last previous attempt to collect comprehensive illness statistics for the general population.

The purpose of the National Health Survey Act was to provide for a continuing survey and special studies to secure accurate and current statistical information on:

- the amount, distribution, and effects of illness and disability in the U.S.
- the services rendered for or because of such condition

The National Health Survey Act also provides for studying methods and survey techniques for securing such statistical information.

The National Health Survey has a threefold design which it has basically retained since its inception:

- Health Interview Survey - data obtained by household interviews of a sample of the civilian, non-institutionalized population are weighted for age, sex, color and residence
- Health Examination Survey - the prevalence of chronic disease in the non-institutionalized population is measured by age group
- Health Records Survey - statistics on the character of health services received and characteristics of those receiving such services are collected from admission and discharge records

The National Health Survey is administered by the Public Health Service (PHS) and is the only comprehensive, continuous attempt to determine the scope of health problems for the American population. Other agencies in the Federal government do tabulate data of this sort, but not in such a broad or continuous fashion. Interagency cooperation in such activities is guaranteed by the National Health Survey Act.

Health statistics gathered by the PHS fall chiefly into two categories: vital statistics concerned with natality and mortality data; and morbidity statistics concerned with the frequency of distribution of a disease within a given population. These statistics are used extensively in epidemiological studies.

Epidemiological studies were initially developed for the purpose of controlling and identifying causes of acute communicable diseases. Today such studies are recognized for their important application to the problems of chronic disease in public health. Discussion of disease frequency based upon data from epidemiological studies focuses upon two distinct types of information, namely prevalence and incidence. Prevalence defines the total frequency of a disease, both diagnosed and estimated undiagnosed, at a specific time; incidence concerns the number of new cases occurring within a specified time period, usually on an annual basis for chronic disease.

Prevalence of Diabetes

The most comprehensive and current statistics for the prevalence of diabetes mellitus in the U.S. come from the National Health

Interview Survey (NHIS) from the years 1964-65¹³ and 1965-66.¹⁴

The report for the period July 1965 through June 1966 estimates that the total civilian, non-institutional diabetic population is 4.4 million; of this group, 2.8 million are diagnosed and 1.6 million undiagnosed. From its inception the NHIS has reported a steady increase in the diabetic population. Dr. P. Lawrence, who directed the program believes that a number of factors are responsible for this trend:¹⁵

- the increase in population
- longer life-span of diabetics
- increased effort at detection of this disease.
- greater awareness about diabetes on the part of the general public
- improvements in the NHIS questionnaire

The incidence rate of newly diagnosed diabetes will vary considerably with diagnostic criteria, screening procedures and laboratory methods. The dramatic increase in this disease is illustrated in Figure 2. The absolute number of diabetics in our society is increasing for several reasons:

- population growth
- higher survival rates from improved therapy
- increased infant survival rates for children of diabetic parents
- improved infection control through antibiotics
- hereditary factors applied to population growth

A report on the prevalence of selected chronic diseases for the months July through December 1968,¹⁶ prepared by the NHIS, estimates the total number of diagnosed cases of diabetes to be 3.2 million which represents an increase of 400,000 cases in a two year period. Using prevalence rates based on the 1965-66 NHIS and the base population as reported by the 1970 census of population, a report issued to the Governor's Committee Concerned with Diabetes, Commonwealth of Pennsylvania, estimates the prevalence of diabetes in 1970 to be 4.8 million; of this

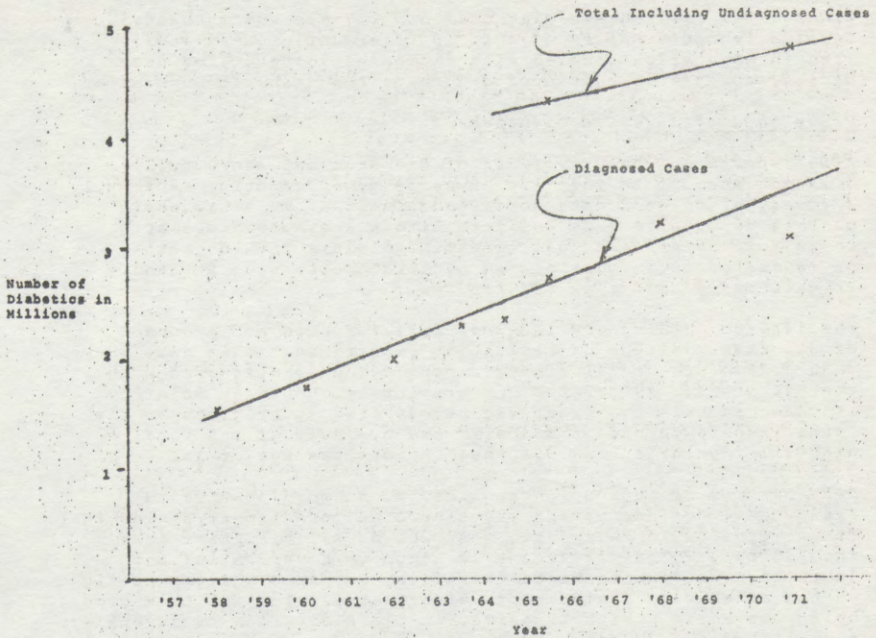


Figure 2 - Estimated number of diabetes cases in the United States in various periods, 1957 to 1971.^{1,2}

1. Munke, A., White, P., Bradley, R. F., and Krall, L. P.; Joslin's Diabetes Mellitus, 11th Ed. Lea and Febiger, Philadelphia, 1971.
2. Tokuhata, G. K., Special Report to the Governor's Committee Concerned with Diabetes, Commonwealth of Pennsylvania, 1972.

figure, 3.1 million are diagnosed and 1.7 are undiagnosed.¹⁷ Despite inconsistencies of this sort, an anticipated steady rise in population coupled with increased longevity of diabetics, point to a continued growth of the diabetic population.

Prevalence of Juvenile Diabetes

NHIS reports on the prevalence of diabetes but regrettably does not attempt to identify juvenile-type diabetics separately. However, since NHIS data does recognize that when diagnosis of this disease is made early in life the symptoms are apt to be more severe and that treatment differs with degrees of severity, it is possible to ascertain estimates for the prevalence of this type of diabetes.

The 1964-65 NHIS report includes data for both age at onset of diabetes and type of medication prescribed. This data shows that 7.7% of the total diabetic population is diagnosed before the age of 25. As pointed out previously, the vast majority of cases in this age group can be expected to progress to the total insulin-dependent diabetic state. 4.1% of the total diabetic population was diagnosed before the age of 15.

Data on type of medication required by known diabetics is also useful for estimating prevalence of juvenile-type diabetes. It is reported in this data, that 26% of all diabetics take insulin only. This treatment is known to be essential for juvenile-type diabetes and, therefore, may shed additional light on the attempt to estimate prevalence statistics for this group. Using the World Health Organization classification of juvenile-type diabetes, referring to "cases in any age group that require insulin and are prone to attacks of ketosis", it can be assumed that 26% of the total diabetic population or 800,000 diabetics suffered from the severe juvenile form of the disease in 1964. If the percentage of insulin users remains the same today, it can be assumed that there are now nearly a million juvenile-type diabetics. The juvenile diabetic population compared with the total diabetic population is shown in Figure 3.

Incidence of Diabetes

Reported estimates of the annual incidence for diabetes mellitus are inconsistent. The PHS estimated in 1968 that approximately 325,000 cases of diabetes are newly diagnosed each year.¹⁸ Marks, Krall, and White note that an accurate incidence rate "for diabetes, based upon onset, is wholly lacking, and, in view of the difficulty of determining the time of onset, cannot be estimated with any accuracy."¹⁹ Data on the annual number of newly diagnosed cases are scanty.... They summarize their discussion by saying that "perhaps about 200,000 would represent

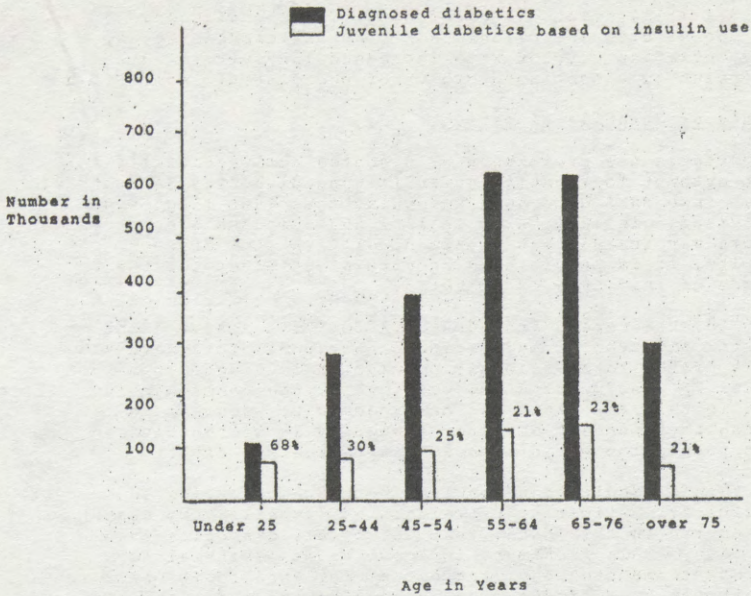


Figure 3 - Juvenile diabetic population compared to total diabetic population, July 1964 - June 1965.¹

¹ Characteristics of persons with diabetes, U.S., July 1964 - June 1965. U.S. Dept. HEW, PHS Pub. 1000-Series 10-No. 40, October 1967, Washington, U.S. Govt. printing office, p10 and 14.

a reasonable estimate of the number of new cases diagnosed annually in the U.S. at the present time."

Current incidence reportage assimilates juvenile-type diabetes with all cases of newly occurring diabetes. However, due to the severe and rapid onset of juvenile-type diabetes, incidence rates based upon onset time of diagnosis need not be difficult to determine. In fact, if a concerted effort were made to enlist the support of physicians treating such cases, these figures could be obtained on an on-going basis and a rate for incidence calculated with a fair degree of accuracy. Over a period of time exact prevalence rates could likewise be calculated for this severe type of diabetes. Since this disease is said to be the most common endocrine disorder of childhood, and in later life continues to be serious with many complications, knowledge of its exact magnitude is essential.

RESEARCH CONSIDERATIONS

The exact cause of diabetes mellitus is unknown, despite years of investigation and volumes of written reports. Studies of familial aggregation of this disease, reveal the existence of genetic factors in the etiology of diabetes. However, pre-disposition to diabetes is influenced by environmental factors as well. Neel discusses the use of a heritability index, to assess the interplay between genetic and environmental factors.²⁰ A disease whose etiology is entirely genetic has a heritability index of 100%; a disease whose etiology is entirely environmental has a heritability index of 0%, although such an extreme is never realized.

Genetic Factors

The heritability index of diabetes is found to be 70-80% in youth and 30-40% in cases where onset occurs after age 55. The overall heritability index of diabetes has been estimated at 35% by one study and 50% by another.²¹ Nonetheless, the evidence points to the fact that genetic factors play a greater role in diabetes diagnosed in youth. Since most cases diagnosed in youth constitute the juvenile-type subset of the total diabetic population, the heritability index for juvenile diabetes may be said to be 70-80%.

While the evidence strongly supports the thesis that diabetes, especially the juvenile-type, is inherited, the exact mode of genetic transmission is disputed. Rimoin has summarized the various hypotheses which have been suggested as explanations for the nature of the genetic factors involved, and he notes that "... nothing can be said with certainty about the mode of genetic transmission in diabetes." ²²

In 1933, Pincus and White demonstrated that frequency of diabetes among relatives was significantly increased.²³ Simpson reported that diabetes was two and one-half times more frequent among blood relatives as compared with the general public.²⁴ Fisher and Vavra also indicated a higher incidence of diabetes among those with a family history of diabetes.²⁵ Simpson has suggested that juvenile and maturity onset diabetes are different genetically with juvenile diabetes more likely to be inherited.²⁶ There is little agreement, however, on the specific genetic mechanism of transmission from one generation to another.

Rimoin's thesis describes diabetes as a heterogeneous group of disorders.. "a number of distinct disorders due to different genemutations at different loci, each of which results in carbohydrate intolerance."²⁷ The well-recognized clinical, physiological, and biochemical variabilities of this disease, which environmental factors alone do not explain, give credence to his theory. Some of these clinical variabilities are:

- rapid, acute onset in juvenile-type diabetes compared to the slow-to-develop, mild maturity onset diabetes
- the thin, insulin-dependent, ketosis-prone juvenile-type diabetic contrasted with the obese, insulin resistant, nonketotic maturity onset diabetic
- the juvenile-type diabetic found to have decreased plasma immunoreactive insulin to a variety of stimuli compared to the maturity onset diabetic who often has hyperinsulinism

Thus one can see that the mode of genetic transmission may vary, and that the juvenile-type of diabetes may have not only distinct clinical symptoms, but a distinct mode of inheritance as well. Many investigators agree that the greatest obstacle to full understanding of the genetic factors involved in diabetes is the lack of knowledge about the basic defect in diabetes--in other words, what is it that is inherited? Numerous possibilities have been suggested: an error in DNA coding, deficiency in production of enzyme or enzymes, and atypical insulin.²⁸ Rimoin has stated, and others concur, that "until a reliable marker for prediabetes is obtained, conclusive genetic studies will not be possible." White has indicated that chromosome-21 has been suggested by some investigators because of the frequent association of diabetes and mongolism and the occurrence of diabetes in the parents of mongoloid children. Basic research is needed to clarify the apparent inconsistencies in the genetic studies of this disease.

Environmental Factors

In addition to the observed probability of a genetic origin of the disease diabetes, it has been noted that there exist certain environmental factors as well. In maturity onset diabetes factors such as overweight and high dietary intake of refined glucose are believed to be the responsible precipitants of this disease. However, in juvenile-type diabetes such environmental factors are rarely implicated as primary causes.

Batchelor and Campbel have implicated heightened food intake, especially refined sugar consumption, as a possible etiological factor.²⁹ Miller and Klimt have also suggested that nutritional characteristics are important in etiology.^{30,31} West showed a positive correlation between prevalence of diabetes, obesity and dietary intake of fat and sugar.³² Prevalence of diabetes also correlated well with serum cholesterol levels. Trace elements, such as chromium, in the diet have been suggested as significant in diabetes prevalence.³³

Other factors have been suggested as factors responsible for the onset of diabetes mellitus.³⁴ Growth hormone has been reported by some investigators as a possibility. So too has prenatal environment, but this thesis has lost favor in the light of further studies which found that the incidence of diabetes is independent of which parent is diabetic. Others have suggested the possibility of an imbalance between the beta and alpha cells in the pancreas--one study found that the normal individual has 8 times as many beta as alpha cells, but that the diabetic has less than twice as many beta as alpha cells. According to White, trauma does not appear to play a significant role in the onset of juvenile diabetes.

Viral Factors

A possible viral etiology has been proposed as contributing to development of diabetes.³⁵ In support of this proposal is the finding of inflammatory processes in the pancreas shortly after the onset of overt insulin failure.³⁶ A workshop on viral infection and diabetes mellitus was conducted at the National Institutes of Health in May of 1971. A review of this workshop appeared a year later and noted the following cautious possibilities:

"Mumps virus has long been recognized as a cause of pancreatitis and scattered reports suggest that diabetes mellitus may be a sequela of mumps. Concrete epidemiologic or pathologic evidence to support this possibility is lacking. Coxsackie virus also attack the pancreas in man...the occurrence in acute diabetic syndrome has not been documented. Recently an unusually high incidence of diabetes mellitus was observed in children with the congenital rubella syndrome."³⁷

Group B coxsackie virus, virus of foot-and-mouth disease, and the encephalomyocarditis virus have all been observed in relation to diabetes in animals. Inquiries at this workshop into the possibilities of studying viral infection and diabetes in man concluded that "the most fruitful syndrome to study initially would appear to be juvenile diabetes with acute onset."

Traisman has reported that the majority of patients admitted to Children's Memorial Hospital for the treatment of diabetic acidosis entered during the autumn and winter months. Approximately one third of these patients had an associated respiratory infection. White has also reported on the seasonal onset of diabetes and the possible role that infections may play in precipitating the disease.

"The most common months for the onset of diabetes in the children of the Joslin Clinic series were January and July; infection preceded the onset in 10% of the series. Danowski reports acute infections prior to onset of diabetes in 42% of his patients. John, Lande and Brown report the frequent occurrence of infections preceding the onset of juvenile diabetes. Knowles and coworkers report an incidence of 27%; Grishaw, West and Smith, of 20%".⁶

No conclusive statements can be made at this time about the possibility of viral infection in the etiology of diabetes. It may be that viral interaction with cellular hereditary mechanisms produce the varied syndrome termed diabetes. The concept, while most intriguing, requires a great deal more research.

RECOMMENDATIONS

In view of the magnitude of suffering, the early mortality and the great cost of this disease, it is unfortunate that more funding is not available to search for a cause and cure for juvenile and maturity onset diabetes. The President's fiscal 1974 budget for the Department of Health, Education and Welfare (HEW) reduces federal support for health delivery or service programs and cuts basic research funds as well.

Federal Funding for Health Research

The Presidential impounding of funds appropriated by Congress makes it difficult to compare one years budgets with another. The fiscal 1973 budget would normally be a reference against which to measure the upward or downward trends in the 1974 HEW money bill; however, actual spending for 1973 was held more or less to 1972 levels by the Administration. This is discussed by Culliton in Science:

"As a result of this unusual and highly confusing situation, there are three different sets of 1973 figures one can use as a yardstick for measuring the 1974 budget. There are the figures in the original 1973 budget, the one Nixon sent to Congress last January just as he is sending the 1974 budget to the Hill now. There is the "revised" 1973 budget which is listed in the 1974 budget and which the Administration now considers the one that counts. It's figures are consistently lower than those originally presented for 1973. And, there is the 1973 budget according to the Congress of the United States. It's figures are consistently higher than either of the other two." ³⁸

The budget comparisons for fiscal year 1973 and 1974 for the National Institutes of Health (NIH), the health research arm of HEW, are shown in Table 1. It is obvious from Table 1 that federal spending for biomedical research is declining and to make matters worse the figures do not include inflationary effects. These budget allocations may have an irreparable and adverse affect on the progress of biomedical research and the quality of medicine in the United States.

NIH BUDGET SUMMARY

1973	Submitted to Congress	\$1.57 billion
1973	Revised estimate according to expenditures	1.48 billion
1974	Submitted to Congress	1.53 billion

Table 1 - National Institutes of Health budgets compared to revised estimates of expenditures.¹

¹. Culliton, B. "Health", Science, February, 1973.

NIH will receive increased funding for cancer and heart research, but decreased support for all other health research, as shown in Table 2. Most of the Federal support for diabetes research is provided by the National Institute of Arthritis and Metabolic Diseases (NIAMD). In 1972 NIAMD designated \$6 million for diabetes research. A breakdown of 1972 NIAMD funding is given in Table 3 and a decrease in allocation is shown for 1974 in Table 2. Some additional research funding for diabetes; therefore more money is actually available for diabetes research. However, if all the money available to NIAMD were spent on diabetes, it would still amount to only half that spent for heart disease. It is recommended that more funds be made available for basic research on the cause and cure of diabetes - a disease that now affects 5 million Americans.

Diabetes - A Reportable Disease

Information regarding the prevalence and incidence of maturity onset diabetes is outdated and reliable data on juvenile-type diabetes is practically non-existent. In order to overcome the shortcomings in the existing epidemiological data, it is recommended that a register of newly diagnosed juvenile-type diabetics be established. Such a register could provide a means for gathering data not only on the numbers of persons with juvenile-type diabetes, but also on certain types of variations in the occurrence of this disease which could eventually prove valuable for research into its cause and cure. This register should include all newly diagnosed cases of juvenile-type diabetes regardless of the patient's age at onset. As discussed earlier in this report, the majority of such cases will fall into the 0-24 years of age group, though some cases may occur later in life.

The World Health Organization notes the following requirements for an authoritative disease register:³⁹

- establishment of a permanent file of records
- registration of each case in a standard fashion
- follow-up of cases registered
- regular checks to ascertain completeness of registration

Furthermore, it is noted that the epidemiological usefulness of a register increases the longer it has been in existence. It may therefore be necessary to continue careful documentation and quality-control procedures for a number of years before a

THE NIH BUDGET ¹

(The 1973 figures are from the "revised" budget for that year.)
The figures given are in thousands of dollars

Institute	1973	1974	Change
National Cancer Institute	426,093	500,000	73,907
National Heart and Lung Institute	247,074	265,000	17,925
National Institute of Dental Research	40,333	38,452	-1,881
National Institute of Arthritis and Metabolic Diseases	139,806	133,608	-6,198
National Institute of Neurological Diseases and Stroke	105,539	101,198	-4,341
National Institute of Allergy and Infectious Diseases	100,726	98,693	-2,033
National Institute of General Medical Sciences	151,587	138,573	-13,014
National Institute of Child Health and Human Development	109,551	106,679	-2,872
National Eye Institute	33,797	32,092	-1,705
National Institute of Environmental Health Sciences	25,889	25,263	-626

Table 2 - Federal funding for health research by the National Institutes of Health

1. Culliton, B. "Health", Science, February, 1973.

NIAMD RESEARCH FUNDING

Medical Specialty	Estimated Fiscal Year 1973 Funding in Millions
Metabolism	\$24
Gastroenterology	13
Endocrinology	13
Urology and Kidney Disease	10
Arthritis	10
General Research	8
Hematology	8
Nutrition	6
<u>Diabetes</u>	6
Orthopedics	5
Dermatology	3

Table 3 - NIAMD research grants program analysis¹

1. Whedon, D. Testimony before the House of Representatives Subcommittee on Appropriations, 92nd Congress Second Session, Dept. of Labor and HEW Appropriations for 1973, Part II NIH, U.S., GPO Washington, D.C. 1972, p.1284.

register becomes fully productive for epidemiological purposes.

Juvenile-type diabetes is particularly well suited for disease registry, for the patient requires medical treatment and the diagnosis is specific. The patient's dependence upon medical treatment assures that, given the cooperation of the attending physician, all such cases can be recognized and hopefully reported.

One observes that the key to a successful register of this sort lies with the medical profession, without whose support all attempts would prove futile. Their support will inevitably be dependent upon their recognition that an increased understanding of diabetes mellitus and its severe juvenile-type will be promoted by both identification and comparison of certain genetic, seasonal, and geographic factors within a large population which such a register makes possible.

Therefore, it is believed that this is the most feasible approach to obtaining accurate, current, on-going epidemiological data for first the incidence, and eventually the prevalence, of juvenile-type diabetes within the American population.

A precedent for this type of effort has been established as recently as December, 1972, in Great Britain by the British Diabetic Association (BDA).⁴⁰

To our knowledge this is the first such attempt made anywhere in the world to collect systematically statistics on the occurrence of juvenile-type diabetes. The BDA's register will attempt to identify all newly diagnosed diabetics under age 16 in Great Britain and Ireland. Their purpose in establishing this register is "...to promote research into... the known geographical and seasonal variations in incidence of this disease... and allied fields." ⁴¹

The BDA hopes to enlist the support of all hospital physicians and pediatricians; all correspondence will be with the attending physician, not with the patient or the family. In order to compensate for time spent in completing the necessary notification forms, a fee is available for all cooperating physicians. All costs will be underwritten by the BDA.

Funding Priorities

In 1970 the American Diabetes Association, supported partially by the United Fund, spent more for management and general supporting services than for research. From a total expenditure of \$2,222,443, over 70% was spent for education and community services while only 9% was spent for research.⁴² The Joslin Diabetes Foundation by contrast spends 32% of its \$2,271,563 for research.⁴³

Diabetes in children and adolescents is rarely recognizable in its early stage because the first symptoms are often sudden and dramatic (White, 1956). The acute symptoms of polydipsia, polyuria, weight loss and acidosis appear early and the course of the disease is usually characterized by a rapid and progressive decrease in insulin reserve. For these reasons screening programs for asymptomatic cases in this age group are ineffective and funds could be better spent in finding a cause and cure. In addition, recent studies sponsored by the National Institutes of Health have cast doubt on the efficacy of strict control of blood sugar and certain oral medications. Whedon reports that,⁴⁵

"Recent research findings as well as reviews of longterm ongoing clinical studies have cast increasing doubt on the conventional assumption that strict regulation of blood glucose levels in diabetes is an absolute essential for longevity and avoidance of complications. The 10-year university group diabetes study of the Institute has shown little correlation between strict regulation of blood glucose levels and longevity or onset of long-term complications in the so-called "adult-onset diabetes" (the most prevalent type of diabetes which emerges during the latter years of life in predisposed individuals). Along similar lines, a 25-year study now has shown that the vascular changes characteristic of long-term diabetes develop relentlessly whether juvenile diabetics are maintained on a strictly measured or unmeasured diet with regard to the intake of carbohydrates."

It therefore may be pointless to continue expenditures for screening and education when efficacy is doubtful. The same investment allocated for research could conceivably produce a cure which would eliminate this suffering and save nearly \$2 billion annually in health care and disability costs. It is therefore recommended that, where applicable, funding priorities be shifted from screening and education to greater emphasis on basic research into cause and cure.

Of all the etiological factors that have been implicated in diabetes mellitus, the genetic consideration needs special attention. In view of the large number of presumed "genetic carriers" in our population, some observers have expressed concern over a potentially explosive increase in the number of diabetic offspring produced by those who carry "defective" genes. At a time when viral affects on genetic material at the cellular level are receiving research attention in other diseases, it seems appropriate to investigate this phenomenon in diabetes. It is recommended that research into cellular engineering, hereditary mechanisms and viral influences be given priority in diabetes research. In 1928, Congress appropriated \$5 million to eradicate tuberculosis in animals,⁴⁴ surely, forty-four years later we can afford to spend \$6 million and more on a disease that affects more than 5 million Americans, many of whom are children.

REFERENCES

1. Drash, A. "Diabetes Mellitus in Childhood: A Review", JOURNAL OF PEDIATRICS, vol. 78, June 1971, p. 919.
2. Ibid., p. 922.
3. THE JOSLIN DIABETES FOUNDATION BULLETIN, Spring 1972.
4. White, P. "Life Cycle of Diabetes in Youth", JOURNAL OF THE AMERICAN MEDICAL WOMEN'S ASSOCIATION, vol. 27, June 1972, p.294.
5. World Health Organization. DIABETES MELLITUS: REPORT OF A WHO EXPERT COMMITTEE. Technical Report Series #310, Geneva, 1965.
6. White, P. "The Child with Diabetes", in Munke, A., et al. JOSLIN'S DIABETES MELLITUS, 11th ed., and Ferbigier, Philadelphia, 1971, p.343.
7. Knowles, H. "Diabetes in Childhood and Adolescence", MEDICAL CLINICS OF NORTH AMERICA, vol. 55, July 1971, 986.
8. Whedon, D., Testimony before the House Subcommittee on Appropriations, 92nd Congress, Dept. of Labor and HEW appropriations for 1973, U.S., GPO Washington, D.C., 1972 p.1228.
9. U.S. Bureau of the Census. STATISTICAL ABSTRACT OF THE UNITED STATES: 1972, 93rd ed., GPO, Washington, D.C., 1972, p. 59.
10. Tokuhata, G., A SPECIAL REPORT TO THE GOVERNOR'S COMMITTEE CONCERNED WITH DIABETES; COMMONWEALTH OF PENNSYLVANIA. Pennsylvania Department of Health, Harrisburg, 1972.
11. Causes of death among diabetic patients. Experience of the Joslin Clinic. N.Y. Metropolitan Life Ins. Co., 1964.
12. DIABETES SOURCE BOOK, Public Health Service, Publication #1168, Washington, D.C., 1968.
13. CHARACTERISTICS OF PERSON WITH DIABETES: UNITED STATES JULY 1964-JUNE 1965, National Center for Health Statistics, Series 10, No. 40, Washington, D.C. 1967.
14. DIABETES SOURCE BOOK, op. cit.

15. Munke, A., et al. JOSLIN' S DIABETES MELLITUS, 11th ed., Lea and Ferbiger, Philadelphia, 1971.
16. SELECTED CHARACTERISTICS OF PERSONS WITH CHRONIC DISEASES; UNITED STATES July-December 1968, National Center for Health Statistics, Washington, D.C. 1969.
17. Tokuhata, op.cit., p. 121.
18. Munke, A., et al., op. cit., p. 12,13.
19. Ibid., p. 212.
20. Neel, J. "The Genetics of Diabetes Mellitus", ADVANCES IN METABOLIC DISEASES, vol. 1 (Supp), no. 3, 1970, p. 4-5.
21. Rimoin, D. "Inheritance in Diabetes Mellitus", MEDICAL CLINICS OF NORTH AMERICA, vol. 55, July 1971, p. 808-809.
22. Ibid., p. 812.
23. Princus, G. and White, P. "On the inheritance of diabetes mellitus" AMERI. J. MED. SCIENCE, 198: 1, 1933.
24. Simpson, N.E. "Diabetes in the families of diabetics", J. OF CANAD. MED. ASSN, 98:427, 1968.
25. Fisher, G., and Vavra, H. "Screening high-yield group for diabetes" PUBLIC HEALTH REPORTS, 80:961, 1965.
26. Simpson, N.E., "Heritabilities of liability to diabetes when sex and age of onset are considered. ANN. HUM. GENET. 32:283, 1969.
27. Rimoin, op. cit., p. 813.
28. c.f. White, P. "Life Cycle...", op. cit. p. 294-295.
29. Batchelor, E. L., and Campbell, G.D. "Diabetes in the Natal Indians", EXCERPTA MEDICA, Congress series 74, 5th Congress on the International Diabetes Foundation, 1964
30. Miller, M., et. al., "Prevalence of diabetes mellitus in the American Indians", DIABETES, 14:439, 1965.
31. Klimpt, C.R., et. al., "Study of familial patterns of reported diabetes", DIABETES, 16:40, 1967.

Senator SCHWEIKER. Our next witness would be Dr. Richard Field, on behalf of the Retina Foundation.

Dr. FIELD. Senator Schweiker, since we are running a little behind time, I wonder if you would be willing to make an exception?

I am also a member of the Governor's Committee of Diabetes and Blindness; and perhaps you could have the testimony of both of these components together, thereby—

Senator SCHWEIKER. You want the two together?

Dr. FIELD. Yes; if that is agreeable to you, sir.

Senator SCHWEIKER. I see nothing wrong with that. So in other words, you want to bring the Governor's committee up here at the same time?

Dr. FIELD. Right.

Senator SCHWEIKER. Will the Governor's committee concerned with diabetes also present themselves. We will combine the two groups. We will ask Mr. Stenzler, to introduce the other associates with the Governor's committee.

Mr. Stenzler is chairman of the Governor's committee.

Mr. STENZLER. Thank you.

Senator SCHWEIKER. Carl, welcome to the hearings. Will you introduce your associates along with Dr. Field.

Mr. STENZLER. On my left is Dr. Arnall Patz.

Dr. Patz is both a member at this moment of the Commonwealth of Pennsylvania's Committee Concerned with Diabetes and Blindness; he is also representing the National Society for the Prevention of Blindness.

Dr. Patz is an ophthalmologist, professor of ophthalmology at Johns Hopkins; and I think one of the most learned men in the entire country in areas of retinology.

On my right is Dr. Richard Field, who introduced himself, who is senior scientist at the Retina Foundation, associate professor of medicine at Harvard School of Medicine and one of the rare individuals who is both endocrinologist and with extraordinary knowledge of the ophthalmology of a diabetic.

To my right again is Dr. Robert Bradley, who is medical director of the Joslin Medical Clinic; and I think his reputation speaks by itself.

On his right is Dr. Christian Klimt.

Dr. Klimt is professor and director of the division of clinical investigation at the University of Maryland School of Medicine. He was coordinator for the 13 universities that collated their efforts in determining what is now a very serious question of perhaps even knocking out the effectiveness of oral insulin.

He is also at the present moment working as a coordinator with the National Eye Institute in coordinating the program to evaluate the effectiveness of photocoagulation.

Senator SCHWEIKER. How would you like to proceed?

Do you want to proceed, Dr. Field?

STATEMENT OF DR. RICHARD FIELD, SENIOR SCIENTIST, RETINA FOUNDATION, BOSTON, AND ASSOCIATE CLINICAL PROFESSOR, HARVARD MEDICAL SCHOOL; CARL STENZLER, CHAIRMAN, GOVERNOR'S COMMITTEE CONCERNED WITH DIABETES AND BLINDNESS; DR. ARNALL PATZ, SEEING EYE PROFESSOR, JOHNS HOPKINS UNIVERSITY, AND THE SOCIETY FOR THE PREVENTION OF BLINDNESS; DR. ROBERT BRADLEY, MEDICAL DIRECTOR, JOSLIN MEDICAL CLINIC, BOSTON; AND DR. CHRISTIAN KLIMT, PROFESSOR AND DIRECTOR, CLINICAL INVESTIGATION, UNIVERSITY OF MARYLAND SCHOOL OF MEDICINE

Dr. FIELD. Yes.

Let me say that, first of all, I am—there is no nepotism involved here; I am no relation to Jim Field, although we are good friends.

Senator SCHWEIKER. There is no nepotism, though.

Dr. FIELD. Right.

Senator SCHWEIKER. We are very sensitive about things like that. [Laughter.]

Dr. FIELD. I would like to preface my remarks by saying I am now wearing my Retina Foundation hat and the Governor's committee as a whole may not agree with all of or the sum and substance of the various points that I bring up.

Let me make some observations concerning diabetes in general and then concerning diabetic retinopathy in particular.

When Banting and Best discovered insulin, now some 51 years ago, great optimism was generated that the total solution to the problems of diabetes was at hand. All that had to be done was to normalize the blood sugar, using diet and exercise as adjuvants to insulin therapy, and the diabetic would become virtually a normal person, without any disadvantages. Unfortunately, this has not turned out to be the case.

Without minimizing the monumental advance represented by the discovery of insulin, which allowed youth onset diabetics to survive well beyond their previous preinsulin 4- or 5-year life expectancy, it is now clear that with the treatment methods currently available, the life expectancy of any diabetic at onset is reduced by one-third of that of the sex-matched, nondiabetic population of the same attained age.

This circumstance includes all the advantages for survival contributed by the availability of antibiotics for the control of infections and tuberculosis as well as improved surgical techniques for the management of severe peripheral circulatory disease.

The underlying cause of the foreshortened survival is a bodywide deterioration of the very smallest blood vessels caused by relentless thickening of their walls and narrowing of their passage ways for the flow of blood.

Although much investigation has gone into seeking and defining a biochemical, molecular mechanism interrelating the known disturbances of sugar, fat, and protein metabolism in the diabetic, at present, there is no proven translation of any of the known facts which explains the deteriorative small blood vessel changes.

Although such microlesion can frequently be recognized early in the syndrome of clinical diabetes, almost all the evidences indicate

that the blood vessel damage is directly related to the duration of known diabetes.

On the average, 12 to 20 years of symptom-free existence transpire before any problems or disability due to the underlying advancing small blood vessel changes begin to appear.

Thereafter, slow but relentless progression of manifestations of damage to the eyes, kidneys, heart, nervous system, peripheral circulation, occur.

After another 5 to 10 years on the average, early death ends the misery of blindness, incapacitating deterioration of kidney function, devastating and at times painful losses of function of the nervous system.

Usually there is progressive deterioration of heart capacity, the latter frequently terminated by acute fatal heart attacks.

In 1955, the advent of oral antidiabetic agents which could reduce abnormally high blood sugar levels in the older diabetic population also created great optimism.

It was hoped that a convenient treatment method for the very large adult diabetic population was at hand and that it would improve their outlook in regard to long-term diabetic vascular disease.

Without raising the controversy created by the university group diabetes program as to the possibility that treatment with oral agents increased the death rate of diabetes, let me emphasize the finding of the UGDP which is often overlooked in the heat of the disputes over mortality.

To me, it is the most important discovery of the project. That is the fact that treatment did not benefit the patient in regard to the development and progression of the manifestations of their diabetic vascular deterioration. Clearly, then, oral agents are not the answer.

Thus, diabetes has a peculiar and perhaps unique position amongst the great national health problems. The primary symptoms of thirst, excessive urination, and fatigue, almost always can be controlled and the patient feels well for many years.

The medical profession, because of understandable but unwarranted optimism, promises or implies that under treatment his life will be normal in duration and capacity.

When the problems of diabetic vascular disease begin to produce symptoms and disability they tend to be minor at first, but slowly and relentless progress over an attenuated period of years, destroying the patient physically, emotionally, socially, and last but not least, financially.

It is small wonder that under these circumstances the general public, their governmental representatives, and the diabetic population itself are unaware of the enormity of the existing problem and the gravity of the threat to the health of the Nation.

The identification of diabetes as a root problem is further beclouded by isolation of some of its long-term vascular problems as diseases of the specific organs which are damaged or fail terminally.

I believe it is true that next to hypertension, diabetes and abnormal carbohydrate metabolism are the major recognizable producers of coronary artery disease, heart attack, and strokes. Certainly diabetes is a major cause of chronic kidney failure.

[Whereupon, a buzzer sounded in the hearing room.]

Dr. FIELD. How long does that thing ring?

Senator SCHWEIKER. That means I have to go to work. I will have to go to the Senate Chamber and vote. These things are very important, you know.

We will just take a short recess while I go and vote. I should be back in 10 minutes.

[Short recess.]

Senator SCHWEIKER. The Senate Health Subcommittee will resume hearings, and you may go ahead and proceed. Sorry, Dr. Field, for the interruption.

Dr. FIELD. Thank you, Senator.

I feel safe in venturing the guess that diabetes causes more mortality, direct and indirect, more morbidity, more disability, more economic loss, more family and social disruption and poliomyelitis, cystic fibrosis, cerebral palsy, all popular causes, combined. Perhaps it rivals even cancer in regard to morbidity and economic losses, since malignancy is by and large a short-term problem, while diabetic disability may stretch over decades.

Yet, until these bills were introduced by Senator Schweiker and Senator McGee, little concerted, focused or comprehensive action has been proposed or taken.

Now, I can support the contentions I have raised concerning the gravity of the diabetes problem by citing a study of the impact of this disease on the Massachusetts General Hospital (MGH) and the Massachusetts Eye and Ear Infirmary in the year 1957.

Dr. Mitchell T. Rabkin, now the general director of the Beth Israel Hospital in Boston and then a research fellow, surveyed every 1957 patient-record of the MGH which could be identified as belonging to a diabetic—no matter for what reason he was hospitalized. The findings are illustrative:

Item 1: The incidence of diabetes in the hospitalized population was 6.4 percent.

Item 2: Being diabetic increased a person's chance of being hospitalized. Once in the hospital, the diabetic stayed significantly longer than the average nondiabetic and stood much less of a chance of leaving the hospital alive. The chances were at least 1 in 5 that the diabetic would return and would be readmitted during the same calendar year. If he did leave the hospital, the chances were at least 50-50 that he was no better functionally.

Item 3: One diabetic in 14 had had a previous amputation; a similar number required amputation or vascular surgery during the hospitalization in question; 15 percent of the total cost of services to diabetics derived from vascular surgery.

Item 4: We are all interested in economics. The bill for the diabetic was substantially larger than average. If an amputation had been required, it was double that of the other diabetics.

Item 5: Of the total costs of hospital care for the diabetics, one-third was paid by the patients and their insurers, one-third was paid by the community through its taxes to government and one-third the hospital contributed as free service.

If projecting these observations to 1973 incidence rates with inflationary monetary standards can be done, we can guess that well over 10 percent of the Massachusetts General Hospital hospitalized population will be diabetics this year and that the total cost will be in the neighborhood of \$1 million, and that the cost to the taxpayer for this care to diabetics will approximate \$350,000.

Let me point out that the 900-bed MGH is but one of seven or eight major hospitals in Boston and that we are fortunate to have the Joslin Clinic in Boston, which deals almost exclusively with diabetics.

Thus, in Boston alone, the cost of hospitalization of diabetics must be enormous, at the very least, \$10 million per year.

Dr. Rabkin's conclusion: "The burden of responsibility for diabetics—both on the hospital and community—will rise. Preparation for this increasing burden of responsibility in regard to provision of facilities and defraying of costs would seem mandatory." Unfortunately, the warning was not heeded.

Bills S. 17 and S. 648, under consideration, represent, in my opinion—that is, the Retina Foundation—the first active, constructive steps to meet these responsibilities.

One particular facet of diabetic vascular diseases deserves special consideration and that is the diabetic retinopathy.

It is the leading cause of new blindness in the age 20 to 60 sector of the population. In a sense, the fantastic increase of blindness due to diabetes is a tribute to medical science as thousands of patients have been saved from acute diabetic disease by the discovery of insulin or would have fallen victims of uncontrollable infection without antibiotics.

Doctors Kanarek and Cole of the Harvard School of Public Health analyzed the situation using the data from the Health Interview Survey of the U.S. Public Health Service and estimated that in 1970, there were 144,000 people in the United States whose economic capacity was impaired by visual inadequacies caused by diabetic retinopathy. Their projected estimate for the year 2000, a mere short 27 years into the future, was 573,000 visually impaired diabetics.

This estimate would not be affected by any changes in the birth rate but presumes the prevalence of retinopathy will remain stable and that new diabetics will increase in number at the rate of 9 percent per year as they have over the last 10 to 15 years.

In the event, however, the discovery of new diabetics does not continue to increase and the 1970 incidence rate remains unchanged, then they project 223,000 visually impaired in the year 2000. The truth probably lies between these two limits but more likely it will be closer to the larger rather than the smaller figure, if current circumstances prevail.

I think it is no surprise that psychiatrists have determined that next to cancer, the population fears blindness more than any other medical disaster.

While the elderly are hard hit by diabetic retinopathy, increasing numbers of teenagers and young adults are being affected.

Its occurrence in young adults causes tremendous social and economic dislocation. All too often, a young man starting to buy a home and to become established in a trade or business has his future destroyed, not only for himself, but also for his wife and young children, because of disabling blindness.

The loss of vision in a young mother is equally destructive to the family as she cannot care for her young children or see them grow to adulthood.

You may be curious as to the reasons that an internist and endocrinologist such as myself would be working at an institute devoted

to retina research. This circumstance derives from several considerations:

First, the ophthalmologists recognize that retinopathy is a manifestation of a systemic process and its solution requires encompassing the whole body phenomena of diabetes.

Second, the eye because of the transparency of its media allows the unique opportunity for direct observation of the circulation in the small blood vessels.

Third, and perhaps quite important, techniques and apparatus for the quantitative measurement of blood flow rates, oxygen content, and carbon dioxide content of the blood coursing through the vessels in a living diabetic patient are developed to the point of clinical exploitation.

Comparative measurements can be made from time to time and under varying conditions such as drug trials and differing metabolic states of the whole patient.

Fourth, the opportunity to obtain fluids and tissues from the eye for sophisticated biochemical study is quite frequent because of the need for various indicated surgical procedures.

Fifth, there are two empirically derived treatment techniques that have proven to the satisfaction of most observers to have a beneficial influence on diabetic retinopathy. These are photocoagulation and pituitary ablation. Neither is highly successful and both involve the destruction of useful functioning tissues. Neither can be considered a satisfactory form of therapy.

However, both represent an opportunity to unravel at least the sight-destroying phase of diabetic retinopathy. In a manner of speaking, they appear to provide the clues to the underlying mechanisms of damage—provided we are able to define by careful investigation means through which they have their effects.

Sixth, the total solution to and the discovery of effective preventive therapy for the whole diabetic microvascular problem is obviously very complex. Even with expansion and increased concentration of research efforts one can postulate that the ultimate answer to diabetic microvascular disease will be a long time in coming. However, we maintain there is good reason to believe that with the tools and techniques now available, we would be able to interdict the sight-destroying phase of diabetic retinopathy in the very near future.

We are confident that, with adequate support available, the various ophthalmologic investigative groups throughout the country, including our own, working in concert and collaboration, would come up with a practical, nondestructive therapy which would preserve vision for those at risk. The appalling prediction for the year 2000 need not come to pass.

Our minimum estimate of the cost of maintaining the diabetic blind for the year 1970 was \$360 million. Without calculating the effect of inflation, the cost in the year 2000 will be an absolute minimum of \$1 billion.

There is no way to assess the intangible costs of suffering and deprivation to the victims and their families. Contrast these sums with what is being allocated for research into the cause and cure of diabetic retinopathy. Counting all projects which include at least some phase of study related to the problem, the expenditure is only \$250,000 or about 0.5 percent of the cost.

Reflect also, on the fact the diabetic population spends no less than \$70 million per year on oral agents which, although useful and convenient, do not appear to help the eye and vascular components of diabetes.

In a recent issue of Science an editorial published the information that the National Eye Institute budget for 1974 is scheduled to be decreased by \$1.7 million. The NEI has the next to lowest budget of \$33.8 million for 1973 with only Environmental Health set at a lower figure of \$25.9 million.

With the Dental Research Institute receiving \$40.3 million, we come up with the fact that for every \$1.25 being spent to save teeth, only \$1 is being spent to save vision and eyes. My point is not to suggest less support for dental research, but to emphasize the inadequacy of funding of the eye research field.

Now, seldom does medical science have forewarning of an impending health crisis. Traditionally, the forces of research and public health control have not been mobilized effectively until after a catastrophic event has occurred. We firmly believe that an opportunity to avoid a major future health disaster by the timely application of research is at hand in the case of visual impairment from diabetic retinopathy.

Therefore, we support in the strongest possible terms enactment of S. 17 or S. 648 and make the following suggestions in the event they are revised or coalesced:

One, that the duration of the planning phase be reduced to no more than 60 days in regard to diabetic retinopathy; that the charge to the task force include a specific instruction for collaboration and consultation with the Director of the National Eye Institute in order to utilize the recommendations of a task force of that Institute which has already considered the problem of diabetic retinopathy.

Two, that supplemental funds of \$5 million yearly for the National Eye Institute be included in the enactment specifically for research into the causes and cure of diabetic retinopathy;

Three, that greater emphasis, in these two enactments, be given to hard research, both clinical and laboratory, in structure and funding, and that the contract mechanism be utilized to a limited extent.

Four, that specific provision be made for research, education, and delivery of foot care by podiatrists, as an integral part of the programs in prospect of reducing the requirement for amputation of gangrenous diabetic feet.

Senator, thank you for your attention.

Senator SCHWEIKER. Thank you very much, Dr. Field.

Now, we will turn to the chairman of the Governor's committee for its presentation.

I do want to say that Mr. Stenzler was one of the first to encourage me to legislatively take some action in this field. We talked about it for some time off and on. He emphasized frequently that we faced a very grave crisis. So, I am glad particularly to have Mr. Stenzler here.

Carl, you may proceed as you wish.

Mr. STENZLER. Thank you very much.

Dr. Patz, from Johns Hopkins, and representing the National Society for the Prevention of Blindness will discuss the retinopathy.

Dr. Patz is a professor of ophthalmology at Johns Hopkins.

Dr. PATZ. Mr. Chairman, it is a pleasure to participate in these hearings on diabetes and, with your permission, I would like to submit my written material and limit my comments to clarify certain points that have been raised concerning blindness.

Dr. Field has alluded already to the fact that diabetes in the 20- to 60-year-old patient is the largest cause of blindness in the country. And the important thing that most investigators predict, as Dr. Field has, is that within the next few decades, this cause of blindness may indeed be greater than all other causes of adult blindness combined.

During the morning, Dr. Zapp from HEW referred to an Eye Institute program consisting of a 16-hospital cooperative study. He recognized the priority of diabetic blindness. Dr. Zapp stressed that research along these lines may represent the largest single research program coming out of his department.

As one of the investigators in this center, I would like to clarify just what the program involves.

Photocoagulation is a method of applying light or laser to the back of the retina to control the blood vessel reflex in the back of the eye. This technique is not new. The fact is, it was first introduced approximately 13 years ago. But during these 13 years of existence, there have been no adequately controlled studies to clearly document whether or not this is valid to control the disease when treated. So that the prime importance of this study for 16 hospitals is to see if indeed photocoagulation is better than no treatment at all; because in some cases, it has been demonstrated that photocoagulation can actually harm.

And if photocoagulation is proved to be a successful form of treatment, only about one out of three patients with advanced diabetic retinopathy, will be amenable to this kind of treatment.

Furthermore, in selected cases, where a success has occurred, the benefits might only be temporary, and a return of the retinopathy may return in later years. So when we analyze the significance of this major study; namely, 16 hospitals, which represent the major diabetic retinopathy institutions in the country, what that means in terms of the present priorities of blindness, this is simply stopgap, because indeed the major need is an environment of developing methods for prevention.

Now, the Eye Institute's budget, as Dr. Field pointed out, is in the realm of approximately \$2 million; and I would like to amplify the one point that he raised. Namely, that if we took the rock-bottom figure, all investigators recognize that there are at least 60,000 blind diabetics in the early 1970's. If you take the yearly maintenance cost for a diabetic individual at approximately \$5,000, you come up with a minimum figure of \$250 million just to maintain the blind population of this country. And if one accepts the larger incidence figure, we run into a threefold estimate in that amount.

And this does not take into account the personal and family hardships incurred by the blind patient and his family; and it also does not take into account the loss of productivity, the loss of type structure that would be developed from this person. And in terms of our economic evaluation, we are looking at about a 1-percent investment in terms of the cost maintaining our blind. If there is \$2 million for research, through the national institute, a minimum figure of \$250 million to support these people's illness is required.

In reference to the National Society for the Prevention of Blindness, one role of education is important. And on behalf of this foundation, I would like to state that there is a priority in educating the diabetic patient to the need for frequent eye examinations; and there is a need to disseminate specialized information on retinopathy to the practitioner caring for the patient.

In conclusion, I would like to make a personal plea that if from these two important legislative bills of Senator Schweiker and Senator McGee special diabetic funds are adopted, that they be funded independently and in addition to basic and clinical research programs; and that a major increase in basic research and research training be provided.

Thank you.

Senator SCHWEIKER. Thank you very much.

Mr. STENZLER. Thank you very much. Boy, I am proud of this group that is with me.

Dr. Robert Bradley, the medical director of the Joslin Clinic will pick up the ball.

Senator SCHWEIKER. Go ahead.

Dr. BRADLEY. Mr. Chairman, I hope that you will accept my formal statement, which relates to diabetes and degenerative vascular disease. It emphasizes the larger vessel involvement in the diabetic; and allow me to digress into several areas which come to mind based on today's testimony. And then perhaps I will emphasize the highlights of the report on diabetes and degenerative vascular disease.

First of all—

Senator SCHWEIKER. Would you like to submit your formal statement for the record?

Dr. BRADLEY. I would like to submit my formal statement for the record; yes, sir.

First of all, the impression may have been gained from some of the testimony today, starting with Senator McGee, that the diabetic might live longer and thrive better than other individuals. This is one of the questions that many patients ask us: "Well, you know, Doctor, since I have had diabetes, I have had no cold this winter; isn't it a good thing to have it; because you're on a good diet; you take better care of yourself."

The next question is does this mean that a person does better if a person has diabetes than a person without it. And that, unfortunately, has led me to tell an oblique lie frequently; which is, "Yes; maybe that's so." But it isn't true; there is no way that a diabetic is going to do as well as his nondiabetic counterpart.

I think that I might just cite a few examples of the physical wrecks which one finds in the diabetic world, related to various types of vascular complication.

There is a complication known as neuropathy, which has not been stressed in detail here today, but which is a rather basic complication. But unfortunately, it might have been of some interest to these people.

These are people who are fairly well disciplined, come from a reasonably good background genetically, but inexorably, over time, suffer the ravages of vascular disease. And I am talking about individuals who are still in their thirties, and one is in the forties, who have one or more legs, at least one eye gone and the other with major coronary

artery disease, which causes complete disability, with peripheral vascular disease.

Perhaps I might speak to the comment made by one of our fine young patients; and he talked about a young man about his age who was under dialysis.

At first—I don't think he is still in the audience—but his friend Jaye, unknown to him, was admitted to the hospital in Boston at 2 a.m. this morning and I had the good fortune to be on call at that time, with fluid in his lungs, either due to further kidney failure or, very likely, now, in his late 20's, with acute coronary attack, and again he is a diabetic who might be considered for dialysis.

Very frequently the diabetic cannot have dialysis for a kidney because their coronary or other blood vessel disease is so severe.

Also, this morning it was particularly emphasized that the acute complications of diabetes have not been solved; and at 1:30 a.m., a young man who was admitted, age 26, 14 years of diabetes, is in the hospital in a diabetic coma. A well-disciplined young man; takes care of himself, but he had the misfortune to develop pneumonia. And before he could really pull himself out of this from the standpoint of the diabetes, he went into diabetic coma.

This is just to emphasize that the problems, the acute problems, have not been solved.

Now, in order to discuss my statement appropriately, I would like to, just for a moment, discuss this problems of prevalence of diabetes.

It has been said by one young lady, a short while ago, that we really don't know. This is true. The estimate which was given by the scientifically-bound not to exaggerate, will give you a number of around 5 million people. But I am sure that this individual, any individual would say to you this is very low. In my report, I have indicated 10 million as a conservative estimate of the prevalence of diabetes.

Recently, a committee of the American Diabetes Association recommended a 5-percent estimated prevalence. It is a known fact that in older people, when one checks blood sugars as a criterion for diabetes, that the prevalence will rise greatly, all the way from 20 to 80 percent, depending upon the age of the individual.

This is critical; because the magnitude of the problem of diabetes as it relates to degenerative vascular disease, relates to how often diabetes is playing a role.

In the figures which I have presented here, which represent figures for all people in the United States, you will notice that arteriosclerotic degenerative vascular diseases, involving the heart and the central nervous system, account for almost one-half of all deaths in the United States.

Coronary disease, arteriosclerotic disease of the heart, account for one-third of all deaths. That takes you up to 700,000 deaths per year or more at the present time.

Now, if diabetes accounted for only 5 percent of those, you might say, well, 30,000 or 40,000 deaths, 10,000 or 15,000 to stroke in the diabetic, isn't bad. Well, let's suppose that this entire prevalence of diabetes, suggested by high blood sugar, coming closer to 20 to 50 percentile, was playing a significant role. Then one should say that the deaths due to coronary disease in the diabetic are between 300,000 to

400,000 per year, and the stroke 20,000 to 30,000 per year, or a quarter of all the deaths in the country.

Now, this is doing a little bit of playing with numbers, but I think it relates to the total picture for the disease.

You heard it said today a number of times that the diabetic is two and one-half times more likely to have this or that. And unfortunately the individual looks at that and says, "Well, that's a diabetic; I'm not a diabetic; and my friends aren't diabetic; so who cares?"

The fact of the matter is, many of these people are suspect because of a diabetes invisibility. The most common symptoms of diabetes isn't excessive thirst and excessive urination. It is the fact that there aren't any symptoms for a long period of time.

The invisibility, therefore, means that it is playing an unknown but vastly larger role in these blood vessel diseases than one can state, based upon what we call general stroke.

Now I would like finally to make one summary comment about diabetes just to stimulate thinking about it.

Some time ago in thinking how to describe diabetes, it occurred to me that one could honestly state that diabetes affects more years of human living than any other single disease. Now the only competitor, a dubious competitor, dubious honor would be aging itself, which may all be hardening of the arteries, may be partly diabetes related or mental illness.

As one thinks of all the other conditions in terms of years affecting human life, diabetes could very well be No. 1.

Now with that in mind, I had not meant to say this, but I was very much concerned this morning about the testimony that I heard because as I looked over the two bills which are being considered, I had some concern about trying to implement diabetes activities outside the National Institutes of Health, which I think has done a great deal in these last 20 years or more, because I heard the representatives of the National Institutes of Health make it seem as if they could not recognize diabetes needs.

Now I am concerned about large sums of money. I have had a change of thought here today. Is it not possible for those who work for NIH to identify diabetes for what it really is.

Is it because they cannot because of higher powers in the government who state exactly how they feel about it? I do not know.

Senator SCHWEICKER. There are some budgetary restraints put on members of the executive branch in this regard, so you may well be right.

Who is next?

Mr. STENZLER. Dr. Christian Klimt, professor and director, Clinical Investigation, University of Maryland School of Medicine.

Mr. KLIMT. Senator Schweiker, it is a pleasure for me to be able to speak here in the role of epidemiologist. Please do not mistake this term. It has nothing to do with skin disease. It means I am concerned about the quantitative aspects of a disease like diabetes.

I will emphasize in my testimony—and I move here that my written testimony be accepted in the record—the uncertainties which exist with regard to diabetes.

Diabetes is in most cases a disease of unknown origin. Only in a few instances is pancreatitis known to be the cause of diabetes. For the vast majority we have no idea what causes diabetes.

It was recognized early in human history, and it is geographically universal as far as mankind is concerned. Only in diabetics with onset during early age is the disease clearly recognizable with acute onset and the likelihood of early death in ketoacidosis if hypoglycemic treatment is not promptly instituted. The majority of diabetics are diagnosed during adulthood, and there is no acute onset which can be discerned. The frequency of diabetes in a population is determined by using a glucose tolerance test. This consists of administering glucose to a fasting individual and of measuring blood glucose levels immediately 1, 2, and 3 hours thereafter. The interpretation of the results of this test is not uniform or standardized either within the Nation or internationally. The factors which influence the outcome of the diagnostic test are manifold. Depending on which interpretation you put to the test, you may vary the prevalence of diabetes manifold. In fact, diabetes is largely defined by the excess risk people with high blood sugar levels have of suffering a cardiovascular complication. Most juvenile diabetics die from a specific kidney disease and adult-onset diabetics suffer two and one-half times as frequently myocardial infarctions than do nondiabetics of the same age and sex. They also are subject to more strokes, amputations, and in particular visual impairment and blindness. From the aforementioned remarks, it will have become clear that any estimate of the frequency of diabetes is arbitrary and depends on which criteria you use. It is clear, however, that diabetes is not a rare disease and the frequency increases with age. In our society more women are diagnosed as being diabetic than men. The same is not true for other societies such as Japan. Historically, we originally had mortality figures which indicate equal frequency of diabetes by sex. Since women are more frequently examined during the childbearing age, diabetes is diagnosed in them more often. The diabetes survey of the city of Oxford in New England has indicated that a complete survey will find more undiagnosed male diabetics than female ones, approximately equalizing the frequency of the disease in both sexes.

In the past, diabetes was diagnosed less frequently in the black race. With improvement in medical care, that difference has disappeared and by now the black female is the subgroup with the most frequently diagnosed diabetes.

Diabetes ranks seventh in the abbreviated list of causes of death and if we recognize that among the cardiovascular deaths—the most frequent single cause of death—they may be a sizable proportion variously estimated to be as high as 25 percent which also suffers from diabetes, we get an impression of the importance of this disease.

It is quite clear that an important research objective in the area of diabetes will have to be a recognition of the cause or causes of diabetes. There may be many different causes which lead to an insufficiency of the insulin-producing apparatus. While the treatment with insulin is life saving in the juvenile diabetic and in the keto-acidosis-prone diabetic, it is as yet uncertain whether the lifespan of the diabetic is being prolonged by insulin treatment or blood glucose control or by any other means. Results from a recent prominent study financed by the National Institute of Arthritis, Metabolism, and Digestive Disease known as the university group diabetes program raised several very important questions for the treatment of the dia-

betic. No benefit and possible detrimental effects were shown for both types of oral antidiabetic drugs, a sulfonylurea and a biguanide drug. The groups treated with insulin have so far shown neither positive nor negative findings. Thus, the question as to whether blood glucose control with an apparently nontoxic substance like insulin is indeed beneficial from the point of view of prolonging a patient's life is as yet not resolved. It is clear that many disturbing symptoms of diabetics are controlled by blood glucose reducing agents including the oral drugs and insulin.

We urgently need a massive study testing whether blood glucose control is indeed a beneficial method of treating diabetics. Diabetes is undoubtedly familiarly aggregated but for the entirety of the group diagnosed as diabetics no simple genetic inheritance pattern can be demonstrated. It may be possible to do so for those diabetics which onset during early age. One of the most crucial questions in view of the excess risk of diabetics of suffering a cardiovascular event such as a heart attack or stroke is to determine which diet and which form of living is in fact the most favorable for the diabetic. Very little is known in this regard since even the question of antiatherosclerotic diet for coronary-prone nondiabetic persons is not fully resolved. The antidiabetic diet at this stage is little more than a diet to control weight and to reduce the calories from fat and implicitly reduce the intake of saturated fatty acids. All this tends to emphasize the need for massive research on the effect of diet, the first line of defense in the disease diabetes.

Insulin is an extract of beef or pork pancreas. The supply of pancreas is quite limited. If you raise the word "shortage" as I have done once in my position, I will get total silence, because the moment you do, the price of pancreas goes up, and it is all cornered. There is no free pancreas available in the world useful for the production of insulin.

The United Kingdom can increase its production of insulin by a mere 10 percent. The corresponding figure for this country is not available, except for emergency reasons we have a 1-year's supply stored away.

Insulin can be synthesized but so far not in commercial quantities and at acceptable cost. This is an urgent goal, and its accomplishment would serve two purposes: it would provide an abundant supply of insulin and the synthetic insulin modeled on the human molecule would avoid side reactions because of impurities and avoid sensitization to the foreign protein, that is, beef and pork insulin.

A complication of diabetes which is often an early one leading in fact to the diagnosis of the disease is diabetic retinopathy.

Lastly, considerable basic research is required to determine what leads in the diabetic to a thickening of the basement membrane of small vessels. This finding which is uniform throughout the body leads to many of the pathological findings in diabetes. Nobody knows what causes it or even less what might be done to prevent it.

From the above observations, I would draw the following conclusions and make the following recommendations:

1. A task force of interested and qualified people should be convened as soon as possible to map out a strategy to resolve the unknown questions needed for adequate therapy of diabetes.

2. Proceed in requesting the kind of financial support which a massive attack on the problem of diabetes would require.

3. Achieve a forceful, planned, and balanced research program of basic science and clinical science in the area of diabetes. Items to be focused on are:

(a) Potential cause or causes of diabetes.

(b) Quantitative evaluation of blood glucose control and its effect on the longevity of the diabetic.

(c) Conduct a clinical trial to evaluate the effect of various diets on the diabetic.

(d) Research in chemotherapeutic means of preventing or postponing diabetic retinopathy.

(e) Promoting a coordinated research program to make the industrial production of synthetic insulin feasible. This may be patterned after the penicillin research.

The above statement has benefited greatly from comments of professional colleagues, in particular those participating in the joint studies known as the university group diabetes program and the diabetic retinopathy study.

I thank you.

Senator SCHWEIKER. Thank you very much. Does that complete your panel's testimony at this point?

Mr. STENZLER. All except mine.

First, I think you witnessed a rather unusual presentation. We presented four divergent points of view that are with the qualifications of being nationally interested, nationally recognized and nationally authoritative.

I think at this point we have hopefully made a very strong presentation of the problem that I define with the Commonwealth of Pennsylvania Committee on Diabetes and Blindness.

One, in 1970 Gov. Milton Shapp responded to lay requests, as you did, Senator Schweiker, for organized public interest in diabetes and created the Governor's Committee on Diabetes and Blindness. The commission was charged with four tasks:

1. To represent the 300,000 known diabetics in Pennsylvania, and, by extension, the diabetic population of the United States.

2. To effect proper identification of the disease and of its progressive, deliberative nature; and to educate the public as to its findings.

3. To develop recommendations as to needed therapeutic and research action; and to determine how funds might best be allocated.

4. To lobby its recommendations to national officials in order that legislation appropriating funds for therapy and research might be obtained.

The Governor delegated the chair to myself, and the committee was structured in a rather unique manner.

One, the committee is composed of the most important or most recognized national and international physicians whose functional areas are most impacted by the diabetes syndrome—heart, eyes, kidneys, brain and the nervous system.

In doing this, I wondered this morning about what is a diabetiologist. I found myself thinking that diabetiologist is a specialist, but he is really a general practitioner, because the diabetes syndrome has grown so big so fast that no one man can possibly know all the answers.

Therefore it is necessary to bring into play the expert knowledge of the heart man, of the brain man, of the vascular man, of the nerve man, of the podiatrist, because all have a knowledge which could add considerable input to what has amounted to literally a colossal failure in 50 years. We do not know any more now than we knew 50 years ago.

Now in defining the committee's primary function, one, I have tried to develop the committee as a catalyst for developing legislation and obtaining funds. The committee is fundamentally a loose coalition of various special interest groups concerned with diabetes and blindness. None is asked to relinquish its identity, area of expertise or capacity to obtain funds for therapy and research.

The committee is an umbrella-like mechanism, and it tries to eliminate the competition that previously existed among groups moving ostensibly in the same direction. The history of this competition has historically been a continuance of unmet need and gross duplication of effort.

In its fullest sense, the committee is a medical body with a political overlay and political viability.

Now each committee member is currently preparing a critical summation of the problems of diabetes as they affect his area of expertise. These papers will be combined into a major report of findings and recommendations to be issued later this year. A selection of those papers already completed is included in appendix C, and I would like to offer six of them for the record.

In addition, each member is responding to public requests for information and education. The intention is to identify the problem, to alert the general public as to the potential seriousness of its impact, and to generate public and private interest in a support for needed legislation and funds.

Now the recommendations of the Governor's committee—and let me put it this way—it is generally agreed upon, there are some differences of opinion. They are:

1. You have heard much about the eyes. There are by national health report, 1964-65, now 151,000 with no useful vision in either eye.

There are 230,000 more who have visual limitations. I think it is generally agreed that it is urgent that we preserve what sight is left and that we develop by crash program the needed therapy to just stop the progression.

I have heard many times the remark of cure and cause. They are remote. And every doctor here knows it.

Right now when you are making a body count of several million with visual limitations, and now possibly several hundred thousand with no sight, the important priority is to preserve that sight—incidentally those lives because once blindness occurs, death is predicted for 50 percent in 5 to 10 years from either cardiac or kidney or brain damage.

2. The development of arrest therapy for those young persons who are, or will be affected by nephropathy—kidney disease. Again just stop the progression. When a youngster is identified with kidney disease, it is fatal, it is finished. It is a point of establishing just the needed ability to stop it if one can.

3. A program of therapy is needed that will stop the degeneration of the large and small blood vessels. This is apparently an inherited

characteristic. It is this that leads to cardiovascular problems. If that can be resolved by crash program—and when I say crash, it might take an awfully long time, because they do not know where to begin, but it means a hurry-up beginning, major recognition of three major problems.

I am aware of the problems of the psychotherapy of youngsters and taking insulin and growing up, but this is measuring terms where I think they are most paramount, blindness or life or death.

I do not think anybody will challenge that, because diabetes affects and targets every age with equal venom. There are no ages at all that are in any way given a lighter sentence.

4. The education of the public as to the severity of the disease, so as to know how to live with it, because it is occurring in almost every family. All one has to do is just ask questions. And the answer comes back, yes, my mother had it or my grandmother had it, or I knew Joe Blow who had it, I know so and so who had it, and maybe they are or are not having trouble.

Now to accomplish these goals, the committee recommends two courses of action.

First, the creation of a National Commission on Diabetes charged with the exploration of the problems and/or promise of therapy, prevention techniques and cure of diabetes. Through a structured membership—five of the Nation's most eminent specialists, plus two lay leaders—this commission would recognize that diabetes is a syndrome with impact on all body systems. Commission membership would represent those functional areas of the body most affected by the disease—heart, eyes, kidneys, brain and the nervous system.

Within 1 month of its creation, the commission would present recommendations concerning therapy and specific research directions to its chairman, who would be appointed by the President. These recommendations would then be forwarded to existing institutions—possibly the National Institutes of Health—which are already charged with research and/or therapeutic responsibility; ample facilities of this kind already exist and additional ones are unnecessary. What is necessary is new impetus for research such as the Commission might provide.

Within 1 year and for each year thereafter, the Commission would submit a report to the National Institute of Health testifying as to accomplishments or breakthroughs in therapy and research, or the lack thereof. It would also prepare summaries of its major recommendations in lay language, and would release this information for public consumption. The Commission would, thus, be a research and coordinative device, as well as an educative mechanism.

Second, an appropriation of \$50 million of Federal funds earmarked for research and education to be allocated over a period of 3 years at the discretion of Congress. This money will be matched by an equal sum received from 50 States. States contributions will be prorated by population. This is necessary in order that prevention and arrest therapies can be developed and made available immediately to the general public. Such funding would also provide for young new brains to explore the field. The money would also be used to educate doctors as to how to best educate their patients as to the full impact of diabetes, as how to best live with it. Training centers could be established similar to those already operated by the Joslin Clinic.

In addition, the money would be used to educate the public about the progressive nature of the disease.

The Governor's Commission feels that the above recommendations apply only to the immediate present, and are but stopgap solutions to the problem. Additional funds are necessary to permit an extensive, long-range research into the cause and cure of diabetes, and to increase the knowledge available as to the full impact of the disease on all major functions of the body. Furthermore, once initiated, funds research into prevention and arrest therapy, and the provision of services to those in need must be continued.

I think I have gone a little too long. I will delete my comment about the two bills, which are certainly monumental. They recognize what for too long has gone unrecognized.

Senator SCHWEIKER. I want to say I am very much impressed with the leadership that Pennsylvania has provided in this area. There is no question that it is in the forefront of the States' effort. I think the panel assembled here and the experts who are working so closely with this group are very impressive.

I want to commend the panel, also Dr. Field and Klimt for the fine contribution they have made. We certainly appreciate your coming today very much. Thank you all.

We are running a little bit behind schedule because of my vote and also because the morning session lasted a little longer than we expected. We still have three witnesses.

Our next witness is Mr. Morton B. Stone, president, Disease Detection Information Bureau.

We will ask all the three witnesses remaining if they will submit their formal statement in the record and then just verbally summarize the highlights for us of their testimony or any other salient points they would like to make.

STATEMENT OF MORTON B. STONE, PRESIDENT, DISEASE DETECTION INFORMATION BUREAU

Mr. STONE. Senator Schweiker, I am Morton Stone, president of Disease Detection Information Bureau.

My testimony today will deal primarily with diabetes detection and patient education, some of the more practical problems with diabetes today.

The statistics presented by the witnesses today are somewhat dismaying. The number of diabetics in the United States may be up to 10 million right now. The statistics from the pharmaceutical industry in terms of sales of diabetic products such as insulin, urine testing materials and such, indicate that there are only 2.5 million diabetics under medical treatment today, which means that between 2 million and 7.5 million diabetics are out there as invisible diabetics, diabetics who should be found and brought into the health care system today.

Diabetes detection is a new thing. The tools, the techniques, the procedures for diabetes detection are known. Detection programs utilize not only professional personnel to conduct programs in supervisory capacities, but also paramedical personnel to conduct testing. They utilize the consumer to organize screening programs. They utilize the entire health care team. They are designed to find the unknown dia-

betics, the invisible diabetics, and bring them into the health care system.

Diabetes detection consists of screening of individuals, referral of these suspects to physicians and then definitive diagnosis by physicians. Following diagnosis, the newly found diabetic requires the development of a management or control program which will enable him to live with his diabetes.

We have heard some testimony saying that early detection really does not mean much in terms of morbidity or mortality. Senator McGee and Mrs. Jackson, who were detected as diabetics, would take issue with that statement. I believe they stated quite firmly that they felt that being detected, being diagnosed and treated with today's methods certainly has made their lives more profitable, more productive, more happy, and healthy.

Many diabetics are discovered during routine visits to health care facilities, a visit to the physician's office, annual employment check-ups, or hospitalization for a nondiabetic condition.

Some diabetics are discovered in community diabetes screening programs.

The State of Pennsylvania leads the Nation in diabetes screening with some 170,000 citizens screened in calendar year 1971.

Throughout the Nation, in 1971, not more than 1½ million citizens were screened in these community programs. Perhaps 8,000 new diabetics were diagnosed by physicians as a result of these screenings. We do not know how many diabetics were found in private physician's offices, although there was a statement this morning that some 80,000 were discovered that way.

If we look at the figures, the 2 million at the low side of the invisible diabetics (those who are not in the health care treatment field now) and the RDANP—at the high side—are 7½ million invisible diabetics who have the condition and do not know it. If you look at how many are found each year, you can say that we are on a losing ground in this health treadmill. We are not finding these unknown diabetics, and we are losing ground each year as more and more diabetics come into the genetic pool.

If we hope to maintain the present level of diabetes detection activities, it will take a decade to find today's hidden diabetics. By that time the number of undetected diabetics will have quadrupled.

The present methods for screening for diabetes are relatively simple and inexpensive. The blood glucose tests available today are specific and sensitive enough to serve as the primary screen, which will separate suspects for the bulk of the population.

Senator SCHWEIKER. One of the earlier witnesses, in referring to what I believe was this particular test, stated that there was quite a wide variation in analysis of results of this test as to classifying a person with diabetes. Would you agree with that?

Mr. STONE. The screening test is solely to determine whether or not that person has an abnormal blood glucose level at the time of the test. It is not a diagnostic test. It is strictly a screen to say, at that moment, what the blood sugar level is.

Senator SCHWEIKER. If the test shows a positive result, what would be the next test or series of tests?

Mr. STONE. In Pennsylvania, after a primary screen, the suspect is then given a glucose load and retested. If he shows positive at that

level, he is then referred to the physician, his own private physician—if he has no private physician, then into a clinic—at which time a full battery of diagnostic tests are given, including the glucose tolerance test.

The physician, at that time, will take a medical history and will make a clinical determination as to whether that suspect is truly a diabetic. But the screening test itself is not diagnostic. No test alone can be—the physician is the sole determiner as to the diagnosis of that particular person.

Senator SCHWEIKER. Excuse me for the interruption. Go ahead.

Mr. STONE. As I said, the techniques for referral of suspects into health care system has been perfected, as they have shown in the Commonwealth of Pennsylvania. We know that screening can be done at the community level, at a practical inexpensive and medically acceptable fashion.

We also know that such screening is acceptable to the consumer. Unfortunately not all State health departments are like Pennsylvania's where you have the funding, manpower, and commitment; and not all communities are funded or have the availability of facilities or people to conduct screening programs.

We think that rapid and readily accessible screening facilities may be set up so that such screening can take place. We know there are enough people who are interested in civil endeavors, like members of the Lion's club, the Rotaries, Homemakers Extension, and so on, who wish to become involved in community screening activities.

They have expressed their desire to be involved in such. There are people and there are organizations at the community level who are willing and ready and able to participate in such programs.

After we are through with diagnosis, which is the last step of the detection program, the next step is management of the condition. This requires an individualized program which is supervised by physician, but conducted by the health care team. Each diabetic is an individual; and as an individual, his condition requires different management than that of any other person.

Of course, there are many similarities in a management plan for a group of diabetics, but there are subtle differences, and these differences can make the difference between success and failure in the medical management of the diabetic.

Management requires that the diabetic be educated in diet, urine testing, exercise, foot and eye care, and medication dosages when they are indicated, oral hygiene and even psychology. If a diabetic is a child, then the parents must be similarly educated.

The person with diabetes must assume an active participatory role in the control of his condition. The health care professional, physician, nurse, dietitian or aide, must relegate their skills to a more supportive position. Effective care of diabetes cannot be carried out without the cooperation of an informed patient who is supported by a professional health care team.

Ames Co. publishes a newspaper that is directed to some 70,000 consumers. It is a bimonthly newspaper that is designed for diabetics, parents of diabetics, and spouses of diabetics. We average about 1,000 letters each month from our readers. A good half of those letters asks our editorial board questions about diabetics, about diet, about foot care, about eye care.

These are questions that these readers are not getting answers to from their health care team today, from their private physicians, from their hospitals. These are questions that bother them enough to write a letter to our editorial office.

Education of the diabetic is a priority item. Although some hospitals, clinics, and diabetes associations offer education courses for diabetics, the availability of effective educational programs for diabetics is extremely limited.

The private physician has not been trained as an educator and does not have the availability of time or staff to conduct education programs for his diabetic patients.

The increase in patient load in private physician's offices requires that the doctor devote major emphasis in treating immediate needs of the sick. This has seriously diminished the amount of doctor time available for implementation of a patient health education program. Hospitals and clinics which have teaching programs also suffer from the problem of time, staff, material, and education. There are far too few diabetes education centers in the United States at the present time.

There is a need for community diabetes education centers where the diabetic can get the expert ongoing education needed for him to become relatively self-managing.

As Dr. Etzwiler said this morning, the diabetic is a patient only a couple of hours a year, those times when that diabetic is in the doctor's office. The rest of the time that diabetic is a person, a person with a health problem, a person with a foot problem, a person with a diet problem, a person with an exercise problem.

That person needs to be self-managing. His educational program should make him self-managing.

Last March we conducted a workshop at the Minneapolis Diabetes Education Center, in which we looked at the interdisciplinary approach to the education and management of the patient with diabetes. We are presently working on editing a monograph based on that conference, which will be published, this summer. The monograph describes the team approach to teaching and restresses strongly the self-responsibility approach to the diabetic. Although the education system outlined with monograph is designed for the diabetic, its concepts may well be applied to the management of many other chronic disease conditions. We would hope that this type of educational approach, which stresses self-management and self-reliance, can be incorporated into any proposed diabetes clinic in S. 648 and S. 17 or the amalgamation of the two bills.

Because community cooperation is essential to the success of any health center, it is our hope that any program of clinics that involves all community resources, personnel, funding and ongoing activities which are so necessary, should be supported by the citizens of the community and the users of the clinic facilities. Consumer representation in a diabetes program is strongly recommended.

Unlike research which is dedicated to producing benefits in future years, diabetes detection, and patient education is a now thing. Presently available technology in screening and newly developed techniques in education can be applied in communities throughout this Nation. Both detection and education can be implemented by trained paramedical aides, thus reducing the already strained workload of the practicing physician.

Utilization of this manpower for detection and education will allow the physician to concentrate his efforts in the delivery of health care to patients with frank illness, both of the acute and chronic variety. The framework for a system to deliver detection and education already is in existence through the various State health departments, city health departments, hospitals, clinics, diabetes associations, civic and service clubs.

The techniques for diabetes detection have been proven, in field tests. The Disease Detection Information Bureau produced a program guide which I presented to the committee which outlines, step by step, how to conduct such a program. But, unfortunately many communities are strapped for funds. Here is where help is needed. At the community level the diabetes detection and education programs can be tailored to meet the demographic profile of the area.

If there is a high risk area, then diabetes detection and education would be scaled at a high level. If it is a low risk area—low risk in terms of having a large segment of younger citizens—then the program could be tailored accordingly. Such flexibility will allow the diabetes detection and education program to reach the citizens who need it most, at the lowest expenditure funds and in time. Although diabetes, today, can neither be cured nor prevented, it can be detected and diagnosed with presently available technologies. Management plans can be developed by the health care team, and with proper education the diabetic person can be relatively self-managing.

We feel that with increased emphasis on and activity in detection, and with the provision of modern education programs, the 3 million or 10 million diabetics, and 5 to 10 million undetected diabetics can be significantly aided.

Thank you.

Senator SCHWEIKER. Thank you very much, Mr. Stone. I think that is a very helpful and constructive statement, and we will certainly include the full text in the record.

We appreciate your being with us today and being so patient since we were running a little behind time.

Next we will call on Dr. Theodore G. Duncan, president of the Garfield G. Duncan Research Foundation, Inc.

Dr. Duncan, would you please come forward, and, if you would, highlight and emphasize the salient points you would like to make.

STATEMENT OF THEODORE G. DUNCAN, M.D., PRESIDENT, THE GARFIELD G. DUNCAN RESEARCH FOUNDATION, INC.

Mr. DUNCAN. I am Dr. Theodore G. Duncan of the Garfield Duncan Research Foundation.

I certainly thank you for this opportunity.

You were given signatures of about 12,000 people earlier this afternoon, and I would like to add another 11,000 to that and the fact that three busloads from Philadelphia came down to see you today and the work you are doing here.

Senator SCHWEIKER. We will be glad to have it.

Mr. DUNCAN. There is one controversy before today about differentiation between juvenile diabetes and maturity onset diabetes. Actually age does not need to be a distinction, because juvenile diabetes can refer to later ages, and maturity onset diabetes can occur in youth.

Likewise insulin is taken sometimes both by the maturity onset diabetic, but always by the juvenile diabetic, so just because a patient is taking insulin does not mean that that patient is a juvenile diabetic.

Now you have heard a lot about the complications of a diabetic. It is very important, because this is where the money is going. But there are probably 5 million or more diabetics in the United States that are going to school, they are working, and if you could see my office in the afternoon, you would see a group of good healthy patients doing their job to society. Five million people. We worked just 1 week to gather these thousand signatures. These are the voters. They are interested in what is going on in diabetes.

Twenty percent of our population has the diabetic gene. That means 40 million people are directly influenced in the United States by diabetes. Some experts state that in 2,000 years, everybody will have diabetes. So you can see that this disease is a true genetic polluter.

Now, figures are hard to understand, so if we take them back to your area of Philadelphia, there are a minimum of 160,000 diabetics in Philadelphia and surrounding counties. If we are dealing with one complication, there are 4,000 blind diabetics in that area, and 320 diabetics become blind each year.

To digress, you asked this morning: and why haven't we heard more about these complications? I think doctors are partly at fault, because when we talk to a patient who has diabetes, we say, well, only a few people do get complications, it is 1 in 40 that get diabetic retinopathy. So the chances are that a person will not become blind. So a large majority of diabetics, although may be affected by vessel disease and pathology, need not lose total function. Now we need help. We need help in three areas: Basic research, 100-percent support; clinical research, 100 percent support.

Seventy-five percent funding is just totally impossible. The other 25 percent is hard to get.

Now, on patient education, if the funds are available initially for reconstruction of equipment, initial salaries, there is no reason why patient education centers after 1 or 2 years could not be finally self-sufficient; with a little help from the Government initially, these units could carry their own weight. This is not so of research. Large funding is necessary for research.

Now at the present time, hospital synthesis is decreasing. The need for acute medical beds is decreasing. There are beds available in the United States that are empty now. The present beds in the hospitals are for acute patients. They are high-cost beds. If we admit a patient with pneumonia, Blue Cross or Blue Shield will honor that; but if we admit a patient with mild symptoms of diabetes for treatment and teaching, sometimes the funding from Blue Cross or Blue Shield or other third-party insurance companies, will not honor the charge for that patient.

Therefore, it is suggested that when the diabetic teaching units are established in the United States, and they should be located in heavy population areas and not limited to six, possibly the research areas could be limited to six, but these areas have to be standardized, and the Secretary of Health, Education, and Welfare should be requested to establish standards for these units so that third-party carriers such as medicare and Blue Cross have a basis upon which they pay the charges.

In addition, if the medicare law so stated that teaching for the diabetic education would be part of the fee that they would pay, not just for treatment, because treatment and teaching go hand in hand, and these teaching units could be located within present hospital structures, but should be financially independent.

The teaching unit should not be required to assume any indirect cost of the hospital; for them, you dilute every dollar that is paid for the diabetic. The unit should have an organizational structure with a board being made up of physicians, community members with talent, talent in running organizations, talent in financial responsibilities so that they can insure the continuing success of this treatment unit.

At the present time, there are not enough treatment units in the United States, and I would like to mention that Joslin Clinic is a guiding example. They have helped me quite a bit in the development of our clinic in the Pennsylvania hospital.

Now, just a word about the Garfield Duncan Foundation. Our charter was established in 1967. It has five names, and looks very much like your bill, to establishing a teaching unit, to train paramedical personnel, to aid in public education, to do research for the diabetic, and aid in diabetic detection.

Now, what has been done? Currently, the Pennsylvania hospital is making available one floor to the Duncan Foundation for diabetic teaching units. Funds are available. The Philadelphia Foundation just granted us one of the biggest amounts that they have ever requested or ever given in their history. This is matching funds, and we are looking for the other half; and if you gentlemen have any ideas, I would appreciate them.

We will have a diabetic teaching manual published in March. Senator McGee this morning said that the diabetic can have a good life.

Senator SCHWEIKER. We would like to get a copy of that manual for our records when you are finished.

Mr. DUNCAN. Incidentally, the title of this manual is "The Good Life With Diabetes."

We are interested in public education, and equipment has been purchased, and within a few months we will have a dialaphone for diabetic information in the area. I think I will make no more remarks.

Many interesting things have been said today. I should not repeat them. I would just like to conclude by saying that we do need a massive infusion of talent and financial assistance. Thank you for your attention.

Senator SCHWEIKER. Doctor, in your conclusion you mentioned that 20 percent of the population carry the diabetic gene, is that correct?

Mr. DUNCAN. Yes, that is about 40 million people in the United States.

Senator SCHWEIKER. Which means that depending upon the marriage mix and the gene mix, their children may or may not have the diabetes relating to the laws of genetics. I am pretty sure you are aware of the stories that were in the newspaper about an extremely high incident of diabetes in a central Pennsylvania area—whether you have been involved in looking into that or not, I do not know. There is an obvious need to study the factors that have caused this excessively high incidence of diabetes in central Pennsylvania. And,

of course, as I understand it, Pennsylvania is second or third in the country in terms of its incidents of diabetes.

Would you have any comment on either of these facts?

Mr. DUNCAN. There is no doubt that diabetes is carried in families. It is genetic diabetes. This is primary diabetes. We see in some Indian locations, reservations, that the amount of diabetes goes up 12 percent. There are certain locations in New Jersey where the number of diabetes are much increased on the normal population. It is true that it is a genetic disease.

Senator SCHWEIKER. I have here in front of me a document published by the Pennsylvania Department of Public Health, last year I think it was, which indicates that as a result of a survey the bureau of Tyrone and Blair Counties had a prevalence of disease 50 to 70 percent in excess of normal rate. It goes into a lot of details about exceedingly high incidents.

Is your foundation mainly concerned with all aspects of the problem or is it focusing on certain specific aspects?

Mr. DUNCAN. Sir, we tackle what we can handle first. This is a new foundation. When you are doing basic research, the tremendous amount of money—we have done quite a bit of clinical research. Our last one was the new 100 insulin, new insulin that Ely Lilly sponsored. Most of this research has been done in clinical fields rather than systematic research. As one gets a little bit bigger bank account, then you can go a little bit more into the basic research. That is the reason your bill would be a great help to the diabetics in the United States, because it does provide research money, basic research money. It is a basic research that will eventually cure the disease.

Senator SCHWEIKER. Dr. Duncan, we certainly thank you very much for coming today and appreciate your testimony, as well as the work that your foundation is doing.

Thanks again for being with us.

Last, but by no means least, is our final witness of the hearings today, John Nagle, of the National Federation for the Blind.

STATEMENT OF JOHN NAGLE, CHIEF, WASHINGTON, OFFICE, NATIONAL FEDERATION OF THE BLIND

Mr. NAGLE. My name is John Nagle. I am chief of the Washington office of the National Federation of the Blind. My address is 1346 Connecticut Avenue, NW., Washington, D.C.

Mr. Chairman, we were appearing today to express the full and unqualified support of the National Federation of the Blind, S. 17, National Diabetes Research and Education Act for 1973.

Mr. Chairman, the National Federation of the Blind is a nationwide organization with a membership primarily of blind men and women. Representative of every background and activity and area in the Nation, the members of the National Federation of the Blind are rank and file Americans sharing with our fellow citizens the same goals and ambitions, same talents and abilities. By our organized efforts, by our individual example, we seek to translate hopes and objectives held in common to improved conditions in equalized opportunities for all blind people.

We as blind people know that today blindness does not have to be a disaster in a person's life. We also know that far too often it is a dis-

aster because of no help or training at all or because of inadequate help or incompetent help or training necessary for adjusting to the changed circumstances resulting from loss of sight.

We as blind people believe that the economic and social consequences of blindness upon the individual, his family and society generally are so great and grave as to justify and demand a substantial governmentally managed and financed effort to ascertain the costs and to control the consequences of diabetes, and out of the blindness attributable to this disease may be eradicated from the lives and experience of the men, women and children of this Nation, and throughout the entire world.

Mr. Chairman, I have endeavored to obtain statistics to support the crucial need for enactment of S. 17, but though I found figures aplenty, they vary to such an extent I will not cite them. I did learn this from my research statistics. Diabetes is a major disease in this Nation, affecting the lives of millions of Americans, both adults and children.

I also learned that diabetes is one of the major causes of diminished or destroyed vision in America.

As a major disease in the Nation, as a major cause of blindness in the Nation, the dollar cost for health care facilities and personnel for rehabilitation of vocational rehabilitation facilities and personnel, for loss of earnings and welfare costs, for vanished taxes and curtailed and terminated productivity, for the irreparable harm and devastating damage to the lives and the livelihoods of a great number of people, all these are harmful to the Nation's strength and a detriment to the Nation's well-being, and demands resolution by nationally directed attack upon the dread disease diabetes, that all may be free from its ravages and that the Nation may be relieved of its cost and burden. S. 17, the National Diabetes Research and Education Act of 1973 would mount just such an attack. As American citizens with a proud concern for this Nation, we urge you to give your prompt and favorable approach to this proposed most ameliorative legislation, and as blind people, as persons who know of the consequences of diabetes in our own lives, for many of us are without sight because of diabetes, we ask and urge that you act quickly and affirmatively on S. 17, that its benefits may sooner be reflected in the lives of Americans living today, in the lives of generations of Americans who will come after us. It is our hope that the program of research and education contained in S. 17 will prove so far reaching and so effective that in but a few years the disease diabetes will be unknown in our society, and the word diabetes will retain only a slight measure of interest and curiosity for the medical students and medical historians of tomorrow.

I thank you, Senator, for this opportunity to present these views.

Senator SCHWEIKER. Mr. Nagle, let me say that it was a very fine and articulate presentation.

I certainly join with your statement in its hopes and aspirations. I think I should summarize our hearing here today. We have heard witnesses from all walks of life, from all occupations and all backgrounds and from different parts of the country, and in essence they said that diabetes is a disease that ravages our people to the tune of some \$2 billion. It is now the fifth leading cause of death in the United States; and perhaps if other factors were taken into account, the second and third highest.

As was also pointed out, it is the second leading cause of blindness today. Unfortunately according to the projections it may well be within a decade the first leading cause of blindness. And as also was pointed out, never have we been able to predict a medical emergency with such certainty in terms of this area of blindness in diabetics, as we have had projected here today solely by current statistics and figures at their present rate of incidence.

Rather tragically here too today we have heard administration witnesses say that the present per capita expenditure of \$1.60 per diabetic American is due to take a nose dive in the next year, tragically in the area of training grants and other areas of special expertise where great skill and training is needed.

I think if nothing else, the administration witnesses today have alerted us to an impending crisis in the curtailment of Federal funds for diabetes at a time when we are escalating our military expenditures some \$5 billion, and foreign aid a half billion dollars, and many billions beyond that, depending upon what the final recommendations are for Vietnam. We have also heard witnesses today saying that under this cutback program we will not be able to fund 75 to 80 percent of the research grants for fiscal year 1974 that will be and have been approved. Also, in addition to our short 3- to 5-year span of research that a longer term approach in this disease is needed, something on the order of 15 to 20 years, as well as an all-encompassing approach that takes into account the many organs and parts of the body that diabetes affects.

We have also heard here today an indication that technology perhaps might help us in the area of an artificial pancreas, although this also is down the road, and a matter of conjecture. A great amount of money and effort on education, on diet, on nutrition and on just using the medical knowledge we have, screening and detection, would do a lot to help our diabetics today.

So, Mr. Nagle, I just want to say we are very indebted for your being here, and I think it was very appropriate to give just a compelling and important message at the close of these hearings.

We thank you for being here.

MR. NAGLE. Thank you, Senator.

[The prepared statement of Mr. Nagle follows:]

PREPARED STATEMENT OF MR. JOHN F. NAGLE, CHIEF, WASHINGTON
OFFICE, NATIONAL FEDERATION OF THE BLIND

Mr. Chairman and Members of the Committee:

My name is John F. Nagle. I am Chief of the Washington Office of the National Federation of the Blind. My address is 1346 Connecticut Avenue, N.W., Washington, D.C. 20036.

Mr. Chairman, we are appearing here, today, to express the full and unqualified support of the National Federation of the Blind for S. 17, the National Diabetes Research and Education Act of 1973.

Mr. Chairman, the National Federation of the Blind is a nationwide organization with a membership primarily of blind men and women.

Representative of every background, activity and area in the Nation, the members of the National Federation of the Blind are and rank and file Americans, sharing with our sighted fellow citizens the same goals and ambitions, the same talents and abilities.

By our organized efforts, by our individual example, we seek to translate hopes and objectives held in common into improved conditions and equalized opportunities for all blind people.

We as blind people know that, today, blindness does not have to be a disaster in a person's life.

But we also know that far too often, it is a disaster because of no help or training at all or because of inadequate or incompetent help or training necessary for adjusting to the changed circumstances resulting from loss of sight.

We as blind people believe that the economic and social consequences of blindness upon the individual, his family and society, generally, are so great and grave as to justify and demand a substantial governmentally managed and financed effort to ascertain the causes and to control the consequences of diabetes in order that blindness attributable to this disease may be eradicated from the lives and experience of the men, women and children of this nation and throughout the entire world.

Mr. Chairman, Members of the Committee, I have endeavored to obtain statistics to support the crucial need for enactment of S. 17, but though I have found figures a plenty, they vary to such an extent I will not cite them.

But I did learn this from my search for statistics--

Diabetes is a major disease in this Nation, affecting the lives of millions of Americans, both adults and children.

I also learned that diabetes is one of the major causes of diminished or destroyed vision in America.

And as a major disease in the Nation, as a major cause of blindness in the Nation, the dollar cost--

For health care facilities and personnel;

For rehabilitation and vocational rehabilitation facilities and personnel;

For lost earnings and welfare costs;

For vanished taxes and curtailed or terminated productivity;

The irreparable harm and devastating damage to the lives and livelihoods of a great number of our people--

All these are harmful to the Nation's strength and detrimental to the Nation's well-being, and demand resolution by a nationally directed attack upon the dread disease, diabetes, that all may be freed from its ravages, that the Nation may be relieved of its cost and burden.

S. 17, the National Diabetes Research and Education Act of 1973, would mount just such an attack.

As American citizens with a proud concern for this Nation, we urge you to give your prompt and favorable approval to this proposed most ameliorative legislation.

As blind people, as persons who know the consequences of diabetes in our own lives, for many of us are without sight because of diabetes, we ask and urge that you act quickly and affirmatively on S. 17 that its benefits may the sooner be reflected in the lives of Americans living today, in the lives of generations of Americans who will come after us.

It is our hope that the program of research and education contained in S. 17 will prove so far-reaching and so effective that in but a few years the disease, diabetes, will be unknown in our society, and the word "diabetes" will retain only a slight measure of interest and curiosity for the medical students and medical historians of tomorrow.

Senator SCHWEIKER. That will conclude our hearings on diabetes by the Subcommittee on Health.

The legislative record will be held open so those interested groups and individuals, who have not because of the time today, been able to participate, can do so by submitting prepared statements and pertinent material for the record.

[The following material was subsequently supplied for the record:]

PREPARED STATEMENT OF HON. GUY VANDER JAGT, A REPRESENTATIVE IN CONGRESS
FROM THE STATE OF MICHIGAN

Mr. Chairman, I appreciate this opportunity to advocate passage of Federal legislation to expand research and related activities in the field of diabetes. I believe that diabetes is one of America's major unmet health needs, and have introduced H.R. 4882, identical to S. 648, in the House of Representatives. In response to my recent invitation, 33 Members already have joined as cosponsors of the legislation and more are expected to do so.

Your committee is receiving much evidence of the hazards of diabetes, its extent in the American population, and the inadequacy of current Federal efforts to expand knowledge of this disease, improve treatment techniques and achieve the capability of preventing its onset. Accordingly, I do not feel it necessary to present a lengthy statement.

However, I would like to emphasize that the incidence of diabetes is rapidly increasing. Furthermore, the new statistics suggest that traditional measures of diabetes' incidence are outmoded or incomplete. For example, a survey has just been completed of more than 1 million Michigan school children. Preliminary results suggests that 1 child out of every 587 has diabetes, as compared to the traditional national estimate of 1 in every 2,500. I am confident that more thorough surveys of children in other States would also reveal that diabetes is more widespread among youth than commonly assumed.

While, insulin, diet, and exercise can help victims of this disease to lead normal lives, they nonetheless face statistical forecasts suggesting as diabetics they are much more likely than other people to develop blindness, blood vessel or nervous disorders, or other physical problems. While the discovery of insulin and other technical achievements have been of great value to diabetics, they have not solved the many mysteries of this disease.

The growing evidence of diabetes among children is an especially compelling reason for expanding Federal Research, training, and demonstration programs of the National Institute of Arthritis, Metabolism, and Digestive Diseases and coordinative agencies. Certainly, I am not wedded to the terms of H.R. 4882. But I believe that it is vital that we have comprehensive hearings in the Senate and House on the subject of diabetes, and develop an effective program to combat the disease. I welcome this hearing, and look forward to similar sessions which have been promised in the House.



Lynchburg General - Marshall Lodge Hospitals

TATE SPRINGS ROAD • LYNCHBURG, VIRGINIA 24504 • TELEPHONE 846-6511

March 7, 1973

United States Senate
Committee on Labor and Public Welfare
Washington D. C. 20501

Dear Sir:

I understand that Richard S. Schweiker has introduced a bill in the senate which would establish diabetes research, treatment and detection programs. I strongly support such a bill and would be very interested in seeing such legislation enacted.

Diabetes is such a prevalent disease in this country, and it is increasing every year. It seems strange that so much of the public's money is spent on diseases such as multiple sclerosis, when diabetes is a much greater problem and affects so many more people.

Sincerely yours,

Shirley Sorensen

Shirley Sorensen, Chairman,
Central Virginia Chapter, American
Diabetes Assn.

Senator SCHWEIKER. The meeting is adjourned.
[Whereupon at 5 p.m., the meeting was adjourned.]



