ESTIMATED ANNUALIZED BURDEN HOURS—Continued

Type of respondent and instrument	Estimated number of respondents	Estimated number of responses per respondent	Average burden hours per response (in hours)	Estimated total annual burden hours requested
Adults—Biospecimen Collection: Blood	2,303	1	18/60	691
Adults—Tobacco Use Form	17,077	1	4/60	1,138
Adults—Follow-up/Tracking Participant Information Form	41,239	2	8/60	10,997
Youth—Extended Interview	12,392	1	32/60	6,609
Youth—Shadow youth who age into youth cohort—Assent for Extended Interview	2,734	1	2/60	91
Youth—Shadow youth who age into youth cohort—Extended Interview	2,515	1	42/60	1,761
Adult—Parent Interview	12,392	1	14/60	2,891
Adults—Parents of Shadow youth who age into youth cohort—Parent Permission and Consent for Parent Interview	2,734	1	2/60	91
Adults—Parents of Shadow youth who age into youth cohort—Parent Interview	2,515	1	17/60	713
Adults—Follow-up/Tracking Participant Information Form for Youth (completed by parents)	14,907	2	8/60	3,975
Adults—Follow-up/Tracking Participant Information Form for sample Shadow youth (completed by parents)	5,468	2	8/60	1,458

Dated: January 31, 2014.

Glenda J. Conroy,

Executive Officer (OM Director), National Institute on Drug Abuse, NIH.

[FR Doc. 2014–02603 Filed 2–5–14; 8:45 am]

BILLING CODE 4140–01–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Government-Owned Inventions; Availability for Licensing

AGENCY: National Institutes of Health, HHS.

ACTION: Notice.

SUMMARY: The inventions listed below are owned by an agency of the U.S. Government and are available for licensing in the U.S. in accordance with 35 U.S.C. 209 and 37 CFR Part 404 to achieve expeditious commercialization of results of federally-funded research and development. Foreign patent applications are filed on selected inventions to extend market coverage for companies and may also be available for licensing.

FOR FURTHER INFORMATION CONTACT: Licensing information and copies of the U.S. patent applications listed below may be obtained by writing to the indicated licensing contact at the Office of Technology Transfer, National Institutes of Health, 6011 Executive Boulevard, Suite 325, Rockville, Maryland 20852–3804; telephone: 301–496–7057; fax: 301–402–0220. A signed Confidential Disclosure Agreement will be required to receive copies of the patent applications.

HIV–1 BED: A Simple Serological Assay for Detecting Recent Infection and Estimating Incidence of Multiple, Worldwide HIV–1 Subtypes

Description of Technology: This CDC developed invention is a simple enzyme immunoassay that detects increasing levels of anti-HIV-IgG after seroconversion and can be used for detection of HIV–1 infection. The assay, termed IgG-Capture BED–EIA, incorporates a branched peptide derived from 3 different subtypes to allow equivalent detection of antibodies of different subtypes. The competitive format of the assay allows detection of increasing proportion of HIV–1 IgG for almost 2 years after seroconversion. This is different from what is normally observed in a conventional EIA (with antigen coated plates) that plateaus soon after seroconversion. This assay will be important for HIV prevention activities, targeting resources, and evaluation of ongoing interventions.

Potential Commercial Applications:

- HIV clinical serodiagnostics
- Informing clinical decision-making
- Public health/HIV monitoring programs and incidence surveillance

Competitive Advantages:

- Ready for commercialization
- Simple and high-throughput capable
- Detects HIV–1 subtypes prevalent in N. America, Europe, Japan, Thailand, Australia, and also central and E. Africa

Development Stage: In vitro data available

Inventors: Bharat S. Parekh and J. Steven McDougal (CDC)

Publications:

1. Parekh BS, *et al.* Determination of mean recency period for estimation of HIV type 1 Incidence with the BED-capture EIA in persons infected with diverse subtypes. AIDS Res Hum Retroviruses. 2011 Mar;27(3):265–73. [PMID 20954834]
2. Dobbs T, *et al.* A comprehensive evaluation of the proficiency testing program for the HIV–1 BED incidence assay. J Clin Microbiol. 2011 Oct;49(10):3470–3. [PMID 21832016]
3. Parekh BS, *et al.* Quantitative detection of increasing HIV type 1 antibodies after seroconversion: a simple assay for detecting recent HIV infection and estimating incidence. AIDS Res Hum Retroviruses. 2002 Mar 1;18(4):295–307. [PMID 11860677]
4. Dobbs T, *et al.* Performance characteristics of the immunoglobulin G-capture BED-enzyme immunoassay, an assay to detect recent human immunodeficiency virus type 1 seroconversion. J Clin Microbiol. 2004 Jun;42(6):2623–8. [PMID 15184443]
5. Nesheim S, *et al.* Temporal trends in HIV Type 1 incidence among inner-city childbearing women in Atlanta: use of the IgG-capture BED-enzyme immunoassay. AIDS Res Hum Retroviruses. 2005 Jun;21(6):537–44. [PMID 15989458]

Intellectual Property: HHS Reference No. E–555–2013/0—Research Tool. Patent protection is not being pursued for this technology.

Related Technologies:

- HHS Reference No. E–357–2013/0—Research Tool. Patent protection is not being pursued for this technology.
- HHS Reference No. E–358–2013/0—Research Tool. Patent protection is not being pursued for this technology.

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Improved Botulism, Botulinum Neurotoxin Type-E Diagnostics

Description of Technology: CDC researchers have improved upon a prior,

HHS patented mass spectrometry-based Endopep-MS assay that is able to rapidly detect and differentiate all seven botulinum neurotoxin (BoNT) types A to G. This current improvement comprises the addition of two optimized substrate peptides that increases the assay's sensitivity, relative to prior substrates, for botulinum neurotoxin type-E (BoNT/E) by greater than 100 fold.

Currently, the primary method of detecting BoNT contamination entails mouse lethality bioassays. In addition to the sacrifice of numerous animals, these lethality assays are expensive and require several days to obtain results. During a suspected BoNT exposure, time is of the essence. The previously patented mass spectrometry approach can provide diagnostic results for all seven BoNT types in a matter of hours, at greater cost-efficiency and without animal toxicity studies. The specific innovation builds upon those earlier improvements by providing new substrates that allow for tremendous increases in the degree of sensitivity for BoNT/E-specific detection within clinical samples.

Potential Commercial Applications:

- Detection of bolulinum neurotoxin type-E (BoNT/E) in clinical samples
- Basic research investigating neurotoxin activity, Clostridium botulinum and botulism
- Biodefense, biosecurity
- Food safety assurance

Competitive Advantages:

- More sensitive, greater cost-efficiency and provides results significantly faster than traditional BoNT/E mouse lethality assays
- Builds upon a previously established and patented mass spectrometry-based Endopep-MS assay, adding optimized peptides that improve current BoNT/E detection sensitivity >100 fold

Development Stage: In vitro data available.

Inventors: Dongxia Wang, Suzanne R. Kalb, John R. Barr (all of CDC).

Publications:

1. Kalb SR, *et al.* The use of Endopep-MS for the detection of botulinum toxins A, B, E, and F in serum and stool samples. Anal Biochem. 2006 Apr 1;351(1):84–92. [PMID 16500606]
2. Boyer AE, *et al.* From the mouse to the mass spectrometer: detection and differentiation of the endoproteinase activities of botulinum neurotoxins A–G by mass spectrometry. Anal Chem. 2005 Jul 1;77(13):3916–24. [PMID 15987092]

Intellectual Property: HHS Reference No. E–528–2013/0—PCT Application No. PCT/US2013/073885 filed 09 Dec 2013.

Related Technology: HHS Reference No. E–460–2013/0—US Patent No. 7,611,856 issued 03 Nov 2009.

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*.

Novel One-Well Limiting-Antigen Avidity Enzyme Immunoassay To Detect Recent HIV–1 Infection Using a Multi-Subtype Recombinant Protein

Description of Technology: This CDC developed Limiting-Antigen avidity Enzyme Immunoassay (LAg-avidity-EIA) provides an easy way to measure increasing binding strength (avidity) of HIV antibodies as part of maturation HIV antibodies after seroconversion, providing a method to distinguish early-stage from long-term HIV–1 infection. Surveillance of HIV–1 provides information on prevalence rates of the disease, but determination of new infection rates (HIV–1 incidence) is difficult to deduce. Longitudinal follow up is expensive and can be biased.

Unlike assays which use antigens derived from only one subtype and use two wells, this new approach employs a multi-subtype recombinant protein, rIDR–M, to permit equivalent detection of antibody avidity among different subtypes, and measures binding strength of antibody in one well. This assay will allow the simultaneous testing of more specimens and better overall reproducibility due to its design. Further, the approach is likely to be more robust and provide more accurate results. The assay may be used for individual diagnosis of recent or long-term infection, but may also act as an important tool for worldwide HIV–1 surveillance, assessing new trends of infections, and monitoring success of varied and comparable prevention efforts implemented by major public health agencies.

Potential Commercial Applications:

- Population surveillance: estimation of HIV–1 incidence in cross-sectional specimens
- Identifying recent infection risk factors
- Following antibody avidity maturation over time

Competitive Advantages:

- Assay permits equivalent detection of HIV antibody avidity among different subtypes
- Design of LAg avidity-EIA allows for testing more samples and better reproducibility when compared to two-well avidity index EIA

Development Stage: In vitro data available.

Inventor: Bharat S. Parekh (CDC).

Publications:

1. Duong YT, *et al.* Detection of recent HIV–1 infection using a new limiting-antigen avidity assay: potential for HIV–1 incidence estimates and avidity maturation studies. PLoS One. 2012;7(3):e33328. [PMID 22479384]
2. Wei X, *et al.* Development of two avidity-based assays to detect recent HIV type 1 seroconversion using a multisubtype gp41 recombinant protein. AIDS Res Hum Retroviruses. 2010 Jan;26(1):61–71. [PMID 20063992]

Intellectual Property: HHS Reference No. E–522–2013/0—Research Tool. Patent protection is not being pursued for this technology.

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov.*

Stable, Early-Stage Biomarker for Diagnosis of Bacillus Anthracis Infection and Anthrax Vaccine Development

Description of Technology: This invention comprises monoclonal antibodies, proteins, and related nucleic acid coding sequences that identify all or part of the antigenic anthrose oligosaccharide of *Bacillus anthracis,* the causative agent of anthrax toxicity in humans. It is imperative to identify virulent *B. anthracis* with speed and specificity, however there presently is substantial difficulty in early-stage recognition and diagnosis of anthrax inhalation. Improved diagnostic assays that can reliably identify anthrax exposure in its earliest stages and distinguish anthrax from other flu-like illnesses are sorely needed.

CDC and collaborative researchers have developed this technology and confirmed the value of an anthrose biomarker assay as a potentially valuable tool in informing early-stage response decisions following potentially anthrax exposure with *in vivo* primate data. This invention may be used for development of point-of-care anthrax exposure tests, as well as therapeutics and vaccines directed against *B. anthracis.*

Potential Commercial Applications:

- Biodefense, biosecurity
- Point-of-care *B. anthracis*-exposure diagnostic
- Anthrax vaccine development
- Development of *B. anthracis* therapeutics

Competitive Advantages:

- Valuable tools for screening at-risk individuals following possible anthrax exposure
- May be developed as a rapid, lateral-flow assay for emergency point-of-care diagnosis
- In vivo primate studies validate efficacy as serologic biomarker following aerosolized spore exposure

- Anthrose biomarker assay readout is critically unaffected by ciprofloxacin (anti-anthrax) treatment

Development Stage:

- In vitro data available
- In vivo data available (animal)

Inventors: Conrad P. Quinn (CDC), Elke Saile (CDC), Geert-Jan Boons (Univ of Georgia), Russell Carlson (Univ of Georgia)

Publication:

Saile E, *et al.* Antibody responses to a spore carbohydrate antigen as a marker of nonfatal inhalation anthrax in rhesus macaques. Clin Vaccine Immunol. 2011 May;18(5):743–8. [PMID 21389148]

Intellectual Property: HHS Reference No. E–474–2013/0—PCT Application No. PCT/US2011/021242 filed 14 Jan 2011, which published as WO 2011/088288 on 21 Jul 2011

Related Technologies:

- HHS Reference No. E–158–2013/2
- HHS Reference No. E–167–2013/0
- HHS Reference No. E–196–2013/0
- HHS Reference No. E–203–2013/0
- HHS Reference No. E–210–2013/0

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov.*

Therapeutic, Bifunctional Janus Microparticles With Spatially Segregated Surface Proteins and Methods of Production

Description of Technology: CDC researchers have developed a fabrication process to create bifunctional microparticles displaying two distinct proteins that are spatially segregated onto a single hemispheric surface. At present, there is no described way of producing biological microparticles with two distinct types of separated proteins. Bifunctional Janus particles generated by the CDC approach possess biologically relevant, native conformation proteins attached to a biologically unreactive and safe substrate. They also display high densities of each type of proteins that may enable a range of capabilities that monofunctional particles cannot, such as improved drug targeting and bioimaging agents.

The possible uses of these particles are limited only by the biological functions of proteins. For example, two recognition proteins could be used to bring different biological effectors together for enzymatic activation or breakdown. A recognition protein plus an activation molecule could simultaneously bind a cell and stimulate the immune system or facilitate the breakdown of toxic products. Alternatively, a protein drug plus a targeting and internalization motif could target treatment to a specific subset of cells and reduce nonspecific effects of drugs with severe side effects. Such bifunctional Janus particles can be used to create an entirely novel class of smart particle capable of high avidity targeting to and stimulation of multiple cell types. With these new particles, scientists and biomedical engineers can potentially improve the range, specificity and capabilities of therapeutic interventions and research.

Potential Commercial Applications:

- Development of improved bioimaging agents and approaches for basic research and therapeutic use
- Cellular adhesion and uptake promotion
- Innumerable therapeutic and research usages, for example:
  - —Microparticle propulsion and targeting: ActA/RGD
  - —Nanoparticle Antibiotic: Fc/Ab
  - —Targeted cell killing: Fc/RGD
  - —Arbitrary linkages: Streptavidin-biotin

Competitive Advantages:

- Circumvents issue with current bifunctional microparticles having low density attachment and being operatively impotent
- Enables a range of capabilities that monofunctional particles cannot, such as improved targeting of drugs and bioimaging capabilities
- Provides a dense concentration of antibody binding events to create an artificial immunological recognition milieu that will overcome immunoevasive or -suppressive strategies, and/or mutations by pathogens

Development Stage: In vitro data available

Inventors: David White (CDC), Todd Sulchek (Georgia Tech Research Corp), Jennifer Tang (Georgia Institute of Technology)

Publication:

Tang JL, *et al.* Bifunctional Janus microparticles with spatially segregated proteins. Langmuir. 2012 Jul 3;28(26):10033–9. [PMID 22624704]

Intellectual Property: HHS Reference No. E–457–2013/0—U.S. Patent Application No. 61/815,784 filed 24 May 2013

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Recombinant Nucleic-Acid Based Flavivirus Nucleic Acids for Development of Vaccines and/or Sero-Diagnostics

Description of Technology: CDC scientists have developed recombinant flavivirus nucleic acids for the generation of broad protective immunity against flaviviruses, as well as the development of sensitive serologic diagnostic tools. Mosquito borne viral encephalitis is often caused by a flavivirus, such as Japanese encephalitis virus, dengue virus or West Nile virus. Infection by these pathogens is often lethal to both humans and animals.

Specifically, these novel recombinant nucleic acids encode critical structural proteins of flaviviruses, such as yellow fever virus. The invention provides for a method of immunizing a subject against infection by a number of pathogenic flaviviruses. Furthermore, generated antigenic subviral particles can also serve as a tool for the development of specific, antibody detection-based flavivirus diagnostic assays.

Potential Commercial Applications:

- Development of a broadly useful commercial vaccine for pathogenic flaviviruses
- Insect-borne disease monitoring and surveillance programs
- Generated antigen can be used for high-specificity serologic diagnostic assays

Competitive Advantages:

- In vivo animal studies demonstrate specific antibody generation and complete protection
- Desired immune response provided by a single intramuscular injection in both murine and equine studies
- Potential for vaccine use and the development of commercial flavivirus infection diagnostic assays and kits

Development Stage:

- In vitro data available
- In vivo data available (animal)

Inventor: Gwong-Jen J. Chang (CDC)

Publications:

1. Chang GJ, *et al.* Flavivirus DNA vaccines: Current status and potential. Ann N Y Acad Sci. 2001 Dec;951:272–85. [PMID 11797784]
2. Chang GJ, *et al.* A single intramuscular injection of recombinant plasmid DNA induces protective immunity and prevents Japanese encephalitis in mice. J Virol. 2000 May;74(9):4244–52. [PMID 10756038]

Intellectual Property: HHS Reference No. E–341–2013/0—

- U.S. Patent No. 7,417,136 issued 26 Aug 2008
- U.S. Patent No. 8,105,609 issued 31 Jan 2012
- U.S. Patent Application No. 13/338,529 filed 28 Dec 2011
- Various international patent applications pending or issued

Related Technologies: HHS Reference No. E–341–2013/1—

- U.S. Patent No. 7,227,011 issued 05 Jun 2007
- U.S. Patent No. 7,521,177 issued 21 Apr 2009
- U.S. Patent No. 7,632,510 issued 15 Dec 2009
- U.S. Patent No. 7,662,394 issued 16 Feb 2010
- U.S. Patent No. 8,221,768 issued 17 Jul 2012
- U.S. Patent No. 8,232,379 issued 31 Jul 2012
- Various international patent applications pending or issued

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov.*

Vaccine Attenuation via Deoptimization of Synonymous Codons

Description of Technology: Research scientists at CDC have developed compositions and methods that can be used to develop attenuated vaccines having well-defined levels of replicative fitness and enhanced genetic stabilities. Infections by intracellular pathogens, such as viruses, bacteria, and parasites, are cleared in most cases after activation of specific T-cell immune responses that recognize foreign antigens and eliminate infected cells. Vaccines against those infectious organisms traditionally have been developed by administration of whole live attenuated or inactivated microorganisms. Although research has been performed using subunit vaccines, the levels of cellular immunity induced are usually low and not capable of eliciting complete protection against diseases caused by intracellular microbes. CDC inventors discovered that replacement of one or more natural (or native) codons in a pathogen with synonymous unpreferred codons can decrease the replicative fitness of the pathogen, thereby attenuating the pathogen. The unpreferred synonymous codon(s) encode the same amino acid as the native codon(s), but have nonetheless been found to reduce a pathogen's replicative fitness.

Potential Commercial Applications:

- Vaccine design and development
- Functional improvements for current vaccines
- Increasing the phenotypic stability of live attenuated vaccines
- Attenuation optimization endeavors

Competitive Advantages:

- Retains the protective and immunogenic advantages of native-codon live attenuated vaccine strains
- Alleviates some critical safety issues associated with using live attenuated vaccines
- Likely to possess greater long-term genetic stability than single-point mutations (fewer reversions)

Development Stage: In vitro data available

Inventors: Olen M. Kew, Cara C. Burns, Raymond Campagnoli, Jacqueline Quay, Jing Shaw (all of CDC)

Publication:

Burns CC, *et al.* Modulation of poliovirus replicative fitness in HeLa cells by deoptimization of synonymous codon usage in the capsid region. J Virol. 2006 Apr;80(7):3259–72. [PMID 16537593]

Intellectual Property: HHS Reference No. E–328–2013/0—

- PCT Application No. PCT/US2005/036241 filed 07 Oct 2005, which published as WO 2006/042156 on 20 Apr 2006
- U.S. Patent Application No. 11/576,941 filed 19 Nov 2007
- Various international patent applications pending or issued

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Photoinduced Electron Transfer Fluorescent Primer for Nucleic Acid Amplification

Description of Technology: CDC scientists have developed a rapid and cost-efficient method for generating fluorescently labeled primers for PCR and real-time PCR. At present, fluorescent primers are useful for detecting and identifying microbes and specific nucleic acid sequences, amplifying nucleic acids for pyro-sequencing, determining the levels of gene expression, and many other uses. However, problems exist with current techniques used to create fluorescent primers. For one, labeling is not one hundred percent efficient, leading to inaccurate results. Further, it is expensive and time consuming for researchers to make and label their own unique primers. This technology allows for the creation of custom primers in which fluorescent dye attaches to all oligomers.

This technology employs photoinduced electron transfer (PET) nucleic acid molecules that can be used detect and amplify target nucleic acid molecules. PET tags are attached to the 5′-end of a target-specific oligo for fluorescent labeling of the primer. PET tag activity can be quenched by at least two consecutive guanosines (G–G) within the tag sequence and activity is un-quenched when the PET tag hybridizes with its complementary nucleic acid molecule.

Potential Commercial Applications:

- Efficient fluorescence-labeling of oligonucleotides
- Quantitative methods
- Pyro-sequencing
- Basic laboratory research

Competitive Advantages:

- Avoids aberrant quantitative data generation resulting from inefficient fluorescent labeling reactions
- Allows for multiplex reactions
- Cost-efficient for time, sample preservation and cost of analysis
- Method can readily be used as part of an oligo-labeling kit
- No need for HPLC purification
- Does not require a quencher dye

Development Stage: In vitro data available

Inventors: Jothikumar Narayanan, Vincent R. Hill, Brian F. Holloway (all of CDC)

Publication:

Jothikumar N, Hill VR. A novel photoinduced electron transfer (PET) primer technique for rapid real-time PCR detection of Cryptosporidium spp. Biochem Biophys Res Commun. 2013 Jun 28;436(2):134–9. [PMID 23727382]

Intellectual Property: HHS Reference No. E–292–2013/0—

- PCT Application No. PCT/US2008/084347 filed 21 Nov 2008, which published as WO 2009/067664 on 28 May 2009
- U.S. Patent Application No. 12/743,607 filed 19 May 2010
- Various international filings pending

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Virus Replicon Particles as Rift Valley Fever Vaccines

Description of Technology: Rift Valley fever (RVF) virus primarily infects animals but also has the capacity to infect humans. The disease causes abortion and death among RVF-infected livestock, resulting in substantial economic loss to people living in many parts of Africa and Arabian Peninsula. Currently, there is no commercial vaccine for RVF. CDC scientists have developed a RVF virus replicon particle (VRP) vaccine candidate. Research findings revealed that immunization of mice with a single dose of the RVF–VRP was found to be safe and elicited immune response that offered 100% protection following exposure to lethal dose of virulent virus. RVF–VRPs have the potential to become effective and efficient RVF vaccines in livestock animals and humans.

Potential Commercial Applications:

- Rift Valley fever vaccine for livestock and/or humans
- VRPs may serve as useful laboratory tool to study the basic mechanisms of virus replication, assembly, kinetics, and virus maturation

Competitive Advantages:

- Murine survival study showed single-dose immunization completely protected mice against a virulent RVFV challenge at 100,000-fold greater than the 50% lethal dose (LD(50))
- Rapid onset of a systematic antiviral response suggests conference of early protection
- Low genetic diversity for RVF virus indicates a strong potential for broad-use effectiveness with this vaccine

Development Stage:

- In vitro data available
- In vivo data available (animal)

Inventors: Kimberly Dodd, Cesar G. Albarino, Brian H. Bird, Stuart T. Nichol (all of CDC)

Publication:

Dodd KA, *et al.* Single-dose immunization with virus replicon particles confers rapid robust protection against Rift Valley fever virus challenge. J Virol. 2012 Apr;86(8):4204–12. [PMID 22345465]

Intellectual Property: HHS Reference No. E–272–2013/0—

- U.S. Application No. 61/661,614 filed 19 Jun 2012
- PCT Application No. PCT/US2013/046250 filed 18 Jun 2013, which published as WO 2013/192944 on 27 Dec 2013

Related Technology: HHS Reference No. E–254–2013/2

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov.*

Molecular Detection and Viral-Load Quantification for HIV–1 Groups M, N and O, and Simian Immunodeficiency Virus-cpz (SIVcpz)

Description of Technology: This invention provides materials, methods, and assays for detecting HIV–1 groups M and O and optionally HIV–1 group N and simian immunodeficiency virus-cpz (SIV-cpz). Specific nucleic acid primers for hybridization, amplification, and detection of HIV–1 are also provided for. The nucleic acid amplification assays can detect small concentrations of HIV–1 and are also useful for quantitative examinations of viral load concentrations within biological samples.

Potential Commercial Applications:

- Blood and plasma donation screening
- Diagnostic detection of HIV–1
- Public health programs
- Monitoring HIV treatment and disease inhibition/progression

Competitive Advantages:

- Broad-use, generic viral detection for groups M, N and O HIV–1, and also SIVcpz
- Requires minute quantities of virus for use, making this assay ideal for confirmation of early-stage infection
- Sensitive and highly specific
- Easily formulated for kits
- Established efficacy in patient samples

Development Stage:

- In vitro data available
- In situ data available (on-site)

Inventors: Renu B. Lal, Danuta Pieniazek, Chunfu Yang (all of CDC)

Publication:

Yang C, *et al.* Detection of diverse variants of human immunodeficiency virus-1 groups M, N, and O and simian immunodeficiency viruses from chimpanzees by using generic pol and env primer pairs. J Infect Dis. 2000 May;181(5):1791–5. [PMID 10823786]

Intellectual Property: HHS Reference No. E–271–2013/0—U.S. Patent No. 8,575,324 issued 05 Nov 2013

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Virus Microneutralization Assay Data Analysis for Vaccine Development, Enhancement and Efficacy Improvement

Description of Technology: This CDC generated invention entails improved methods of analyzing microneutralization assays, especially for the purposes of determining specific antibody concentrations and optimizing vaccine formulation. More specifically, the invention is a set of SAS based programs using 4-parameter logistic curve fitting algorithms to interpolate between individual data points, allowing for enhanced accuracy and precision when establishing neutralization titers. This method allows every experiment to be analyzed the same way, provides greater accuracy by interpolating curve fits between dilutions, prevents transcription errors or manual calculation errors, develops and applies consistent quantitative control rules, and improves operational speed and efficiency.

Potential Commercial Applications:

- Commercial virus vaccine evaluation and strain selection
- Virus strain surveillance programs
- Harmonize data analysis and standardize reporting procedures for improved worldwide, health-programs cohesion

Competitive Advantages:

- Demonstrated improvements in accuracy and precision calculating virus microneutralization titers
- Programs produce structured datasets allowing for rapid report generation and high-level analyses
- Useful for improved strain selection in future influenza (or other) vaccine development

Development Stage:

- In vitro data available
- In situ data available (on-site)

Inventors: Jarad Schiffer and Kathy Hancock (CDC)

Publications:

1. Klimov A, *et al.* Influenza virus titration, antigenic characterization, and serological methods for antibody detection. Methods Mol Biol. 2012;865:25–51. [PMID 22528152]
2. Vequilla V, *et al.* Sensitivity and specificity of serologic assays for detection of human infection with 2009 pandemic H1N1 virus in U.S. populations. J Clin Microbiol. 2011 Jun;49(6):2210–5. [PMID 21471339]

Intellectual Property: HHS Reference No. E–262–2013/0—

- PCT Application No. PCT/US2011/041459 filed 22 Jun 2011, which published as WO 2011/163370 on 29 Dec 2011
- U.S. Patent Application No. 13/700,978 filed 29 Nov 2012

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Fluorescent Primer(s) Creation for Nucleic Acid Detection and Amplification

Description of Technology: CDC researchers have developed technology that consists of a simple and inexpensive technique for creating fluorescent labeled primers for nucleic acid amplification. Fluorescent chemical-labeled probes and primers are extensively used in clinical and research laboratories for rapid, real-time detection and identification of microbes and genetic sequences. During nucleic acid amplification, the ''UniFluor'' primer is incorporated into newly synthesized double stranded DNA. As a consequence, quenching of the dye's fluorescent signal occurs decreasing the fluorescence of the sample several fold. The decrease in fluorescence can be measured and observed using any commercially available nucleic acid amplification system that measures fluorescence (e.g., real-time PCR/thermocyclers). Because many real-time PCR applications require a multitude of fluorescently labeled primers or probes, the single-labeled primer technique also allows researchers and clinicians to perform their work at lower cost.

Potential Commercial Applications:

- Quantitative detection and/or amplification of specified nucleic acid sequences
- Efficient fluorescence-labeling of oligonucleotides

- Pyro-sequencing
- Basic laboratory research

Competitive Advantages:

- Simple to implement
- Rapid, real-time detection
- Used with standard laboratory equipment capable of monitoring fluorescence-intensity shifts
- Cost-effective
- Easily adapted for use in kits or arrays

Development Stage: In vitro data available

Inventors: Vincent R. Hill and Jothikumar Narayanan (CDC)

Intellectual Property: HHS Reference No. E–252–2013/0—

- PCT Application No. PCT/US2006/000175 filed 03 Jan 2006, which published as WO 2006/074222 on 13 Jul 2006
- U.S. Patent No. 7,709,626 issued 04 May 2010
- Several international patent applications pending or issued

Related Technologies:

- HHS Reference No. E–273–2013/0
- HHS Reference No. E–292–2013/0

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Multi-Antigenic Peptide(s) Vaccine and Immunogen for Conferring *Streptococcus Pneumoniae* Immunity

Description of Technology: Disease caused by *Streptococcus pneumoniae* (pneumococcus) is an important cause of morbidity and mortality in the United States and developing countries. Pneumococcal disease is prevalent among the very young, the elderly and immunocompromised individuals. This invention is an improved, immunogenic peptide construct consisting of a combination of antigenic epitopes of the PsaA (37-kDa) protein from *S. pneumoniae.* In addition, the peptides of the invention have the capability of serving as specific immunogens in a subject, effectively eliciting the production of antibodies and conferring protective immunity against *S. pneumoniae* infection following immunogen administration.

Potential Commercial Applications:

- Development or improvement of *S. pneumoniae* vaccines
- Public health vaccination programs
- Clinical serodiagnostic development

Competitive Advantages:

- May provide better immune protection than current, single-epitope based vaccines
- Broader spectrum of *S. pneumoniae* serotypes addressed
- Immunization with these peptides was shown to reduce carriage in murine studies

Development Stage:

- In vitro data available
- In vivo data available (animal)

Inventors: Edwin W. Ades, George M. Carlone, Jacquelyn S. Sampson, Scott E. Johnson, Danny L. Jue (all of CDC)

Intellectual Property: HHS Reference No. E–248–2013/1—

- PCT Application No. PCT/2001/021626 filed 10 Jul 2001, which published as WO 2002/004497 on 17 Jan 2002
- U.S. Patent No. 6,903,184 issued 07 Jun 2005
- U.S. Patent No. 7,501,132 issued 10 Mar 2009
- U.S. Patent No. 8,642,048 issued 04 Feb 2014
- Various international patent applications pending or issued

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Device To Measure Muscle Contractile-Relaxant and Epithelial Bioelectric Responses of Perfused, Intact Tracheal Airways Tissue In Vitro

Description of Technology: CDC and collaborative researchers have developed a device allowing for simultaneous measurement of smooth muscle contractile/relaxant activity and transepithelial potential difference (Vt) [or short circuit currents (Isc)] and resistance (Rt) within an intact airway *in vitro.* Investigation of the underlying mechanisms of lung diseases, such as asthma or cystic fibrosis, involves understanding the roles of airway smooth muscle and epithelium. Smooth muscle is involved in the control of the airway diameter; epithelium regulates the ionic composition of the liquid lining the airways through electrogenic ion transport and releases factors that regulate the ability of smooth muscle to contract.

This invention allows for the measurement and study of pulmonary diseases under conditions retaining normal spatial relationships between all the cell types and an unmanipulated/undistorted tracheal airway wall. Further, the device permits evaluation of epithelial functional integrity using pharmacological techniques. Agents can be separately added to the lumen, where they must first cross the epithelium to reach the smooth muscle, or to the outside of the airway, where there is no hindrance of said agents to the muscle. The invention also permits the effective *in vitro* screening of the effects of agents and drugs on airway epithelium and smooth muscle within the same preparation.

Potential Commercial Applications:

- Investigations into physiological mechanisms of airway diseases, such as cystic fibrosis and asthma
- Screening of drugs and therapeutic compounds directed to complex, multi-tissue type matrices
- Biomedical research exploring pharmacology-physiology integration

Competitive Advantages:

- Allows simultaneous measurement of transepithelial potential difference, transepithelial resistance, smooth muscle activity and changes in tracheal diameter
- In vitro analysis of trachea or tracheal segments retaining native, in situ structure
- Pharmacological agents may be added separately to the lumen for screening purposes
- First and only such ‘‘single-preparation’’ device allowing for such broad array of data output

Development Stage:

- Early-stage
- In vitro data available
- In situ data available (on-site)
- Prototype

Inventors: Jeffrey S. Fedan (CDC), Yi Jing (CDC), Michael Van Scott (East Carolina University)

Publication:

JIng Y, *et. al.* Simultaneous measurement of mechanical responses and transepithelial potential difference and resistance, in guinea-pig isolated, perfused trachea using a novel apparatus: pharmacological characterization. Eur J Pharmacol. 2008 Nov 19;598(1–3):98–103. [PMID 18835555]

Intellectual Property: HHS Reference No. E–246–2013/0—U.S. Patent No. 7,907,999 issued 15 Mar 2011.

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

A Bias-Free Sampling and Collection Trap for Resting Mosquitoes

Description of Technology: This CDC developed collection device is a small (approximately 1 cubic foot) open-sided container that attracts mosquitoes seeking a daytime resting location. The container is dark-colored and constructed of molded wood-fiber or recycled, high-density plastic. Mosquitoes that enter the dark space of the container are aspirated through a battery-powered fan into a collection receptacle. The receptacle is especially attractive to *Culex* and *Anopheles* mosquitos' vectors of West Nile Virus and malaria parasites, respectively.

For research aims, this device avoids the sampling biases associated with

CO_2-baited traps (attracting mosquitoes in host-seeking mode, about a tenth of the population, and only females) or ovitraps/gravid traps (attract egg-laying females, again about a tenth of the population), making this device superior to other mosquito-sampling traps currently in use. Because all adult mosquitoes must find secluded locations to rest every day, this device samples all sectors of the mosquito population. It also represents a highly effective trap for blood-engorged mosquitoes that rarely enter other types of traps.

Potential Commercial Applications:

- Mosquito sampling for research and epidemiological surveillance purposes
- Mosquito control programs
- Ecological and/or population-genetics interests

Competitive Advantages:

- Receptacle circumvents sampling biases inherent to other mosquito traps
- Device is particularly adept at luring *Culex* and *Anopheles* mosquitoes

Development Stage: In situ data available (on-site)

Inventors: Nicholas A. Panella, Rebekah J. Kent, Nicholas Komar (all of CDC)

Publication:

Panella NA, *et al.* The Centers for Disease Control and Prevention resting trap: a novel device for collecting resting mosquitoes. J Am Mosq Control Assoc. 2011 Sep;27(3):323–5. [PMID 22017100]

Intellectual Property: HHS Reference No. E–223–2013/0—U.S. Patent Application No. 12/813,279 filed 10 Jun 2010

Related Technologies:

- HHS Reference No. E–166–2013/0
- HHS Reference No. E–175–2013/0
- HHS Reference No. E–641–2013/0

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Real-Time PCR Assays for Human Bocavirus Detection and Diagnosis

Description of Technology: CDC researchers have developed a real-time PCR assay for the detection and viral-load quantitative estimations of human bocavirus (HBoV) from clinical specimens. At present, there have been few reports on the epidemiology, geographic distribution or clinical features of HBoV infection. Additionally, symptoms affiliated with bocavirus infections overlap with numerous other respiratory illnesses. This CDC assay provides sensitive, specific, and quantitative detection of HBoV in patients with respiratory illness by a method of real-time PCR targeting the HBoV NS1 and NP–1 genes. Use of this assay in conjunction with additional diagnostic methods and treatments should facilitate improved diagnosis and, subsequently, directed treatment and patient outcome.

Potential Commercial Applications:

- Human bocavirus (HBoV) research tools
- Respiratory illness diagnostics and research
- Public health surveillance
- Confirmation/diagnosis of HBoV infection

Competitive Advantages:

- Specific and sensitive
- Capable of rapid HBoV detection and distinction from alternate respiratory-illness linked pathogens
- Superior to other HBoV detection methods in cost-efficiency, accuracy and quantitation of viral load

Development Stage: In vitro data available

Inventors: Dean D. Erdman and Teresa C. Peret (CDC)

Publication:

Lu X, *et al.* Real-time PCR assays for detection of bocavirus in human specimens. J Clin Microbiol. 2006 Sep;44(9):3231–5. [PMID 16954253]

Intellectual Property: HHS Reference No. E–213–2013/0—Research Tool. Patent protection is not being pursued for this technology.

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Simple, Rapid, and Sensitive Real-Time PCR Assays for Detecting Drug Resistance of HIV

Description of Technology: This novel assay features real-time PCR reagents and methods for detecting drug-resistance related mutations in HIV, for newly diagnosed patients and those individuals currently receiving antiretroviral therapies. As the use of antiretroviral compounds to treat HIV infection proliferates, viruses adapt and evolve mutations limiting the efficacy of these drugs and disrupting the success of treatment. To address this problem, CDC researchers have developed this RT–PCR assay, intended for diagnosis of different point mutations in patient samples at an achievable sensitivity of 1–2 log greater than conventional point-mutation sequencing methods. More specifically, this assay measures the differential amplifications of common and mutation-specific reactions that target specific codons of interest. Given its low cost, simplicity, high-throughput capability, and tremendous diagnostic sensitivity, this assay will be useful for detection and surveillance of drug resistance-associated mutations and will aid in the clinical management of HIV infection.

Potential Commercial Applications:

- Clinical management of HIV infected patients
- Pre-treatment evaluation baseline HIV infection to tailor appropriate drug combinations
- Monitor the spread of resistant viruses
- Blood donation screening
- Research tool to study emergence and biology of drug resistance mutations

Competitive Advantages:

- Cost-effective
- Sensitive and rapid
- Capable of resistance mutation detection in both subtype B and non-B subtypes of HIV–1, and in HIV–2
- Easily formatted for use in kits
- High-throughput capable

Development Stage: In vitro data available

Inventors: Jeffrey A. Johnson, Walid M. Heneine, Jonathan T. Lipscomb (all of CDC)

Publications:

1. Johnson JA, *et al.* Simple PCR assays improve the sensitivity of HIV–1 subtype B drug resistance testing and allow linking of resistance mutations. PLoS One. 2007 Jul 25;2(7):e638. [PMID 17653265]
2. Johnson JA, *et al.* Minority HIV–1 drug resistance mutations are present in antiretroviral treatment-naïve populations and associate with reduced treatment efficacy. PLoS Med. 2008 Jul 29;5(7):e158. [PMID 18666824]
3. Li JF, *et al.* Detection of low-level K65R variants in nucleoside reverse transcriptase inhibitor-naive chronic and acute HIV–1 subtype C infections. J Infect Dis. 2011 Mar 15;203(6):798–802. [PMID 21257741]
4. Nishizawa M, *et al.* Highly-Sensitive Allele-Specific PCR Testing Identifies a Greater Prevalence of Transmitted HIV Drug Resistance in Japan. PLoS One. 2013 Dec 16;8(12):e83150. [PMID 24358257]
5. Wei X, *et al.* Minority HIV mutation detection in dried blood spots indicates high specimen integrity and reveals hidden archived drug resistance. J Clin Virol. 2011 Feb;50(2):148–52. [PMID 21130027]

Intellectual Property:

HHS Reference No. E–198–2013/0—

- PCT Application No. PCT/US2005/019907 filed 07 Jun 2005, which published as WO 2005/121379 on 22 Dec 2005
- U.S. Patent No. 8,043,809 issued 25 Oct 2011
- U.S. Patent No. 8,318,428 issued 27 Nov 2012

- U.S. Patent No. 8,592,146 issued 26 Nov 2013
- U.S. Patent Application No. 14/059,085 filed 21 Oct 2013
- Various international patent applications pending or issued

HHS Reference No. E–214–2013/0—

- PCT Application No. PCT/US2012/025638 filed 17 Feb 2012, which published as WO 2012/2112884 on 23 Aug 2012
- U.S. Patent Application No. 13/985,499 filed 14 Aug 2013

HHS Reference No. E–511–2013/0—

- U.S. Application No. 61/829,473 filed 31 May 2013

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Exposure and Activity Detection Assays for Anthrax Lethal Factor and Lethal Toxin

Description of Technology: This CDC developed invention identifies an assay for extremely fast and sensitive detection of *Bacillus anthracis* lethal toxin (LTx), the toxin responsible for the lethal effects of anthrax infection. This assay has already been successfully tested in animals and will allow for early detection of anthrax exposure and screening of lethal factors to monitor anthrax toxicity, for example for vaccine trial candidates.

LTx is composed of two proteins, protective antigen (PA) and lethal factor (LF). In one scenario, the assay effectively detects LF by first using magnetic protein G beads to capture and concentrate LF in samples, then testing for LF on the bead by reacting it with a peptide substrate designed to mimic LF's natural target. By using techniques such as mass spectrometry, FRET or liquid chromatography, this test can check for LF rapidly and with extraordinary specificity and sensitivity. Methodology and basic assay validation have been confirmed in animals and naturally-exposed (by contaminated meat in a Bangladesh processing facility) human serum samples.

Potential Commercial Applications:

- Emergency anthrax exposure diagnostics
- Testing of and research into anthrax therapeutics, vaccines
- Biodefense, biosecurity
- Livestock health screening

Competitive Advantages:

- Rapid turnaround
- Highly sensitive-detects picomolar toxin levels
- Reproducible and quantitative anthrax lethal factor (LF) assessment
- Easily adaptable for high-throughput screening of numerous specimens

Development Stage:

- In vitro data available
- In vivo data available (animal)
- In vivo data available (human)
- In situ data available (on-site)

Inventors: Anne E. Boyer, Conrad P. Quinn, John R. Barr (all of CDC)

Publications:

1. Boyer AE, *et al.* Detection and quantification of anthrax lethal factor in serum by mass spectrometry. Anal Chem. 2007 Nov 15;79(22):8463–70. [PMID 17929949]
2. Boyer AE, *et al.* Kinetics of lethal factor and poly-D-glutamic acid antigenemia during inhalation anthrax in rhesus macaques. Infect Immun. 2009 Aug;77(8):3432–41. [PMID 19506008]
3. Kuklenyik Z, *et al.* Comparison of MALDI–TOF–MS and HPLC–ESI–MS/MS for endopeptidase activity-based quantification of Anthrax lethal factor in serum. Anal Chem. 2011 Mar 1;83(5):1760–5. [PMID 21302970]
4. Boyer AE, *et al.* Lethal factor toxemia and anti-protective antigen antibody activity in naturally acquired cutaneous anthrax. J Infect Dis. 2011 Nov;204(9):1321–7. [PMID 21908727]

Intellectual Property: HHS Reference No. E–196–2013/0—

- PCT Application No. PCT/US2007/004156 filed 15 Feb 2007, which published as WO 2007/136436 on 29 Nov 2007
- U.S. Patent Application No. 11/675,233 filed 15 Feb 2007
- Various international filings pending or issued

Related Technologies:

- HHS Reference No. E–158–2013/2
- HHS Reference No. E–167–2013/0
- HHS Reference No. E–203–2013/0
- HHS Reference No. E–210–2013/0
- HHS Reference No. E–474–2013/0

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Select *M. Tuberculosis* Peptides as Mucosal Vaccines Against Pulmonary Tuberculosis

Description of Technology: This CDC-developed technology relates to novel vaccines or boosters directed against pulmonary tuberculosis. There is currently only a single vaccine against tuberculosis, the (Bacillus Calmette-Guérin) BCG vaccine. Reports suggest widely variable effectiveness for the BCG vaccine and that BCG administration has very limited success against prevention of the primary pulmonary form of the disease. With a marginally useful vaccine and rising rates of multidrug-resistant and extensively drug-resistant (MDR and XDR) tuberculosis strains, it is clear there is a public health need that must be met.

Researchers working at CDC have developed improved vaccine formulations and processes of delivery for enhancing the immune response against *M. tuberculosis*. These improvements may be implemented as stand-alone vaccines or in conjunction with BCG as part of a prime-boost strategy. Intranasal immunization engenders a strong immune response in the lungs, which is beneficial because the *M. tuberculosis* pathogen primarily gains entry through the respiratory/alveolar mucosa. By specifically stimulating mucosal immunity with select recombinant *M. tuberculosis* polypeptides at the typical site of pathogen entry, it is envisioned that these formulations and delivery methods will be able to prevent *M. tuberculosis* infection and subsequent pulmonary tuberculosis disease.

Potential Commercial Applications:

- Tuberculosis vaccine development and improvement
- Public health and BCG vaccination programs

Competitive Advantages:

- Versatile, has potential as stand-alone vaccine or booster for use with current BCG vaccine
- Peptides specifically selected for generating mucosal immunity, to address the protective-failings of the BCG vaccine
- Potential for needle-free delivery that elicits robust, well-directed immune response

Development Stage:

- In vitro data available
- In vivo data available (animal)

Inventors: Suraj Sable, *et al.* (CDC)

Publication:

Sable SB, *et al.* Cellular immune responses to nine Mycobacterium tuberculosis vaccine candidates following intranasal vaccination. PLoS One. 2011;6(7):e22718. [PMID 21799939]

Intellectual Property: HHS Reference No. E–192–2013/0—

- PCT Application No. PCT/US09/030754 filed 12 Jan 2009, which published as WO 2009/089535 on 16 Jul 2009
- U.S. Patent Application No. 12/812,541 filed 08 Oct 2010
- Various international patents issued or pending

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Detection of Retroviruses and HIV–1 Groups -M and -O Discrimination Within Clinical Serum Samples

Description of Technology: CDC researchers have developed methods for

detecting retroviruses within a patient blood sample and discriminating HIV–1 samples within serum specimens. HIV–1 can be genetically classified into two major groups, group M (major) and Group O (outlier) with group O comprising all divergent viruses that do not cluster with group M. The identification of group O infections raised public health concerns about the safety of the blood supply because HIV–1 screening by group M-based serologic tests does not consistently detect group O infection.

The assay is based on the selective inhibition of Amp-RT reactivity of Group M viruses by nevirapine, a non-nucleoside RT inhibitor. Group O viruses can be generically identified by the resistance of their Amp-RT activity to nevirapine. The assay can be used to screening of the blood supply and to rapidly differentiate group M from group O virus.

Potential Commercial Applications:

- Clinical monitoring of individual patient antiretroviral therapy
- HIV/AIDS public health programs
- Surveillance of retroviral drug resistance
- Screening of blood donations

Competitive Advantages:

- Rapid diagnostic which greatly reduces time and labor for improved clinical monitoring of HIV treatment
- Ready for commercialization
- Easily adapted to kit format
- Assists continued usefulness of common antiretroviral therapeutics
- Useful for high-throughput serum samples screening

Development Stage: In vitro data available

Inventors: Thomas M. Folks, Walid Heneine, William Marshall Switzer, Shinji Yamamoto (all of CDC)

Publications:

1. Yamamoto S, *et al.* Highly sensitive qualitative and quantitative detection of reverse transcriptase activity: Optimization, validation, and comparative analysis with other detection systems. J Virol Methods. 1996 Sep;61(1–2):135–43. [PMID 8882946]
2. Heneine W, *et al.* Detection of reverse transcriptase by a highly sensitive assay in sera from persons infected with human immunodeficiency virus type 1. J Infect Dis. 1995 May;171(5):1210–6. [PMID 7538549]
3. Reisler RB, *et al.* Early detection of reverse transcriptase activity in plasma of neonates infected with HIV–1: A comparative analysis with RNA-based and DNA-based testing using polymerase chain reaction. J Acquir Immune Defic Syndr. 2001 Jan 1;26(1):93–102. [PMID 11176273]

Intellectual Property:

HHS Reference No. E–232–1993/0 —
- PCT Application No. PCT/US1996/001257 filed 26 Jan 1996, which published as WO 1996/023076 on 01 Aug 1996
- Various international patents issued or pending

HHS Reference No. E–232–1993/1—
- U.S. Patent No. 5,849,494 issued 15 Dec 1998
- U.S. Patent No. 6,136,534 issued 24 Oct 2000

Related Technologies:

HHS Reference No. E–129–2013/0—
- PCT Application No. PCT/US1999/013957 filed 16 Jun 1999, which published as WO 1999/66068 on 23 Dec 1999
- U.S. Patent No. 6,787,126 issued 07 Sep 2004
- Various international patents issued

HHS Reference No. E–129–2013/1—
- U.S. Patent No. 7,691,572 issued 06 Apr 2010

Licensing Contact: Whitney Blair, J.D., M.P.H.; 301–435–4937; *whitney.blair@nih.gov*

Dated: January 31, 2014.

Richard U. Rodriguez,

Director, Division of Technology Development and Transfer, Office of Technology Transfer, National Institutes of Health.

[FR Doc. 2014–02491 Filed 2–5–14; 8:45 am]

BILLING CODE 4140–01–P

DEPARTMENT OF HEALTH AND HUMAN SERVICES

National Institutes of Health

Government-Owned Inventions; Availability for Licensing

AGENCY: National Institutes of Health, HHS.

ACTION: Notice.

SUMMARY: The inventions listed below are owned by an agency of the U.S. Government and are available for licensing in the U.S. in accordance with 35 U.S.C. 209 and 37 CFR Part 404 to achieve expeditious commercialization of results of federally-funded research and development. Foreign patent applications are filed on selected inventions to extend market coverage for companies and may also be available for licensing.

FOR FURTHER INFORMATION CONTACT: Licensing information and copies of the U.S. patent applications listed below may be obtained by writing to the indicated licensing contact at the Office of Technology Transfer, National Institutes of Health, 6011 Executive Boulevard, Suite 325, Rockville, Maryland 20852–3804; telephone: 301–496–7057; fax: 301–402–0220. A signed Confidential Disclosure Agreement will be required to receive copies of the patent applications.

Multivalent Immunogenic Peptides (Vaccines) for the Treatment of Prostate and Breast Cancer

Description of Technology: The development of more targeted means of treating cancer is vital. One option for a targeted treatment is the creation of a vaccine that induces an immune response only against cancer cells. In this sense, vaccination involves the introduction of a peptide into a patient that causes the formation of antibodies or T cells that recognize the peptide. If the peptide is from a protein found selectively on/in cancer cells, those antibodies or T cells can trigger the death of those cancer cells without harming non-cancer cells. This can result in fewer side effects for the patient.

TARP (*T* cell receptor gamma *a*lternate *r*eading frame *p*rotein) is a protein that is selectively expressed on the cells of about 95% of prostate cancers and about 50% of breast cancers. This invention concerns the identification of a combination of immunogenic peptides within TARP and their use to create an anti-cancer immune response in patients. By introducing these seven peptides into a patient, an immune response against these cancer cells can be initiated by the peptides, resulting in treatment of the cancer.

Potential Commercial Applications:

- Peptides can be used as vaccines to induce an immune response against cancer
- Treatment of any cancer associated with increased or preferential expression of TARP
- Specific diseases include breast cancer and prostate cancer

Competitive Advantages:

- Targeted therapy decreases non-specific killing of healthy, essential cells, resulting in fewer non-specific side-effects and healthier patients
- Use of multiple peptides permits production of a more thorough complement of T cells against the antigen

Development Stage:

- In vitro data available
- In vivo data available (animal)
- In vivo data available (human)

Inventors: Jay A. Berzofsky, et al. (NCI)

Publications:

1. Epel M, et al. Targeting TARP, a novel breast and prostate tumor-associated antigen, with T cell receptor-like human recombinant antibodies. Eur J Immunol. 2008 Jun;38(6):1706–20. [PMID