Annual Report

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Message from the Director

Dear colleagues and partners in commercialization:

The NIH Office of Technology Transfer (OTT) report for fiscal year 2011 shows the ongoing strength of the technology transfer policy and transactional activities at the NIH, including the management of inventions from the NIH and FDA intramural research programs. Despite a decline in the number of new licenses, most likely due to ongoing economic challenges, we observed a significant growth in the number of first-time small US business licensees, the number of products under license reaching the clinical trial phase of development, and the number of new NIH CRADAs with small US businesses. OTT also collected more royalties than in each of the previous three years. Our data are also consistent with the market trend of more early-stage, high-risk development occurring in small to medium biotechnology companies, which may ultimately be acquired by or sublicense their technology to a large company.

The large NIH portfolio of patents and licenses giving rise to products has an important impact on the health of the nation and our economic development. More than 400 licenses reported sales of products in FY11 with combined total annual sales approaching $6B. In a study last year led by Dr. Ashley Stevens at Boston University (NEJM Vol. 364, pp. 535-541), we showed that 153 FDA approved drugs and biologics were developed under licenses from public sector institutions in the last 40 years. By far, the largest contributing institution is the NIH with 22 (14%) of the technologies. Our particular strengths are in cancer therapeutics and infectious disease indications, such as vaccines. We were also able to show that drugs based on technologies from public sector institutions received priority review at the FDA at twice the rate of the private sector, indicating the public sector technologies were more likely to meet an otherwise unmet medical need. My further analysis suggests that the NIH contribution to the public sector drug technologies has had an even greater impact with about twice the proportion of drugs receiving priority review as compared to all the other public sector institutions.

While the transfer of technology from NIH has a huge impact on health and the economy, we want to do it even better. We continue to explore ways to innovate around the management and transfer of our technology resources to meet the needs of companies or non-profits licensing our technologies and the public at large. Some of these innovations include adopting the Pay.gov electronic payment system and the new model license for start-up companies launched at the beginning of FY12.

The President's Memorandum—Accelerating Technology Transfer and Commercialization of Federal Research requires federal agencies to develop plans to meet the challenge of enhancing technology transfer to the private sector. We are committed to this goal and look forward to implementing new ways of doing business in the coming year in collaboration with our innovative scientists and Technology Development Coordinators in our Institutes and Centers. In the meantime, we welcome any comments or suggestions you may have to improve the way we do business.

Sincerely,

Mark L. Rohrbaugh, Ph.D., J.D.
Director, Office of Technology Transfer

Mission Statement

The mission of OTT is to improve public health through the management of National Institutes of Health (NIH) and Food and Drug Administration (FDA) inventions and in doing so serve a leading role in public sector biomedical technology transfer policy and practice.

NIH and FDA are agencies of the Department of Health and Human Services (HHS).

Purpose

OTT serves as a bridge that connects the inventive discoveries made in the NIH and FDA intramural research programs to commercial partners that develop these technologies into products and services to benefit public health. Without this bridge, the public would not benefit from the full potential of these biomedical discoveries. In carrying out its mission and purpose, OTT applies its policies and practices to the management of NIH's and FDA's inventions, including: the appropriate use of the patent system; marketing NIH and FDA technologies to identify appropriate commercial partners; negotiating licenses to ensure the timely development of technologies; and monitoring the progress of the development of the technology to ensure commercialization milestones are reached and royalties are paid.

Licensing and Patenting

The ultimate goal of any technology transfer office is effective and responsible licensing to facilitate the development of technologies. Inventions made by scientists in the NIH Institutes and Centers (ICs) and FDA Centers are reported to the NIH OTT through their Technology Development Coordinators (TDCs) who provide important input to OTT for its assessment of patenting and licensing decisions. OTT has continued its efforts to work ever more cooperatively with companies to facilitate the licensing of inventions, which at times is enhanced through collaborations with ICs for commercial development of products, with the hope that these efforts will lead to products that improve public health and create jobs. These efforts have helped stimulate the economy through small entrepreneurial companies created to commercialize a technology licensed from OTT as well as large companies developing high-growth technologies. Charts of our metrics can be found here.

In FY11, OTT executed 197 license agreements — 82% with US companies of which 52% were small businesses. Of the new licenses executed, 43 (22%) were with companies licensing from NIH for the first time; 81% of those first-time licensees were US companies and about 91% of those were small US businesses. A very positive trend can be seen in the number of small US companies licensing for the first time. While the total number of first-time licensees rose 35% from 2009 to 2011, the number of US first-time licensees rose by 75% and the number of small US businesses licensing from NIH for the first time rose by 350%!

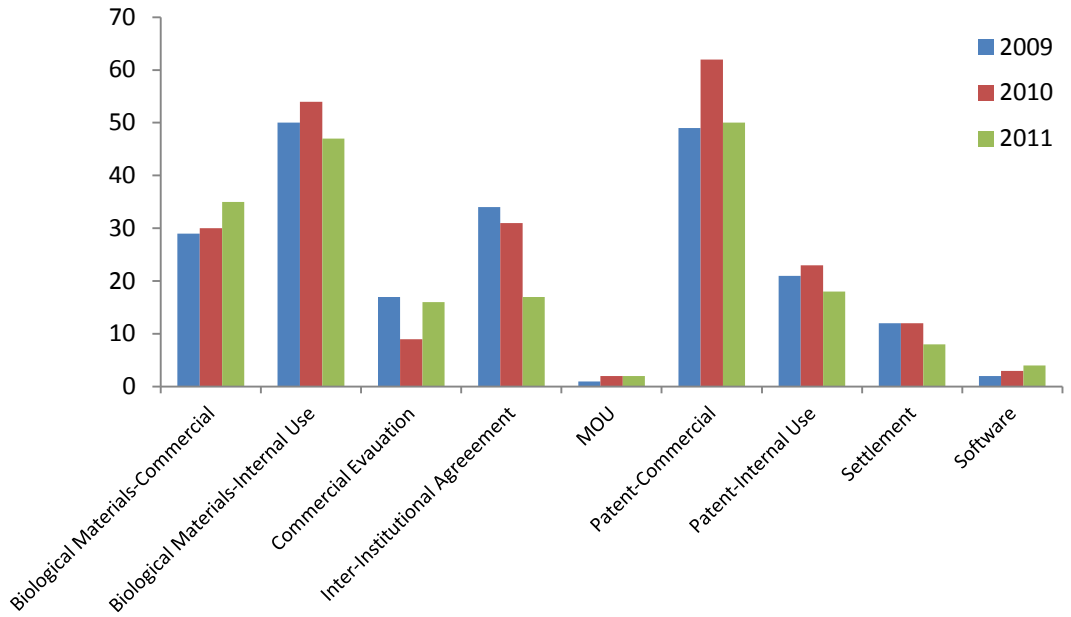
Over the last three years, the biggest fluctuation in agreement type has been in the number of patent commercial licenses with FY09 and FY11 almost identical in separating a rise of 27% in FY10. In FY11, the number of biological material commercial licenses[*] rose to a level higher than the previous two years (accounting for 18% of agreements versus 13% last year), the number of commercial evaluation licenses jumped back to nearly 2009 levels (doubling the percentage of the total agreements from last year), and the number of patent-internal use[§] licenses dropped below the number of the previous two years but accounting for only a 1% drop from last year as a percentage of the total.

OTT believes that the 9% decrease in license applications in FY11 and consequential decrease in the number of executed agreements in large measure can be tied to the difficult economic times that faced both the public and private sectors, but the reason for the increase in 2010 is unclear. OTT has increased its flexibility in structuring the terms of its agreements in an effort to assist potential licensees during these difficult times. One important program that focuses on minimizing entry barriers for start-ups is the NIH Start-up Exclusive Licenses. This is a pilot program that will run from October 1, 2011 until September 30, 2012 with the primary goal to facilitate the licensing of therapeutics and vaccines to start-up companies. Specific details of the program can be found by clicking here.

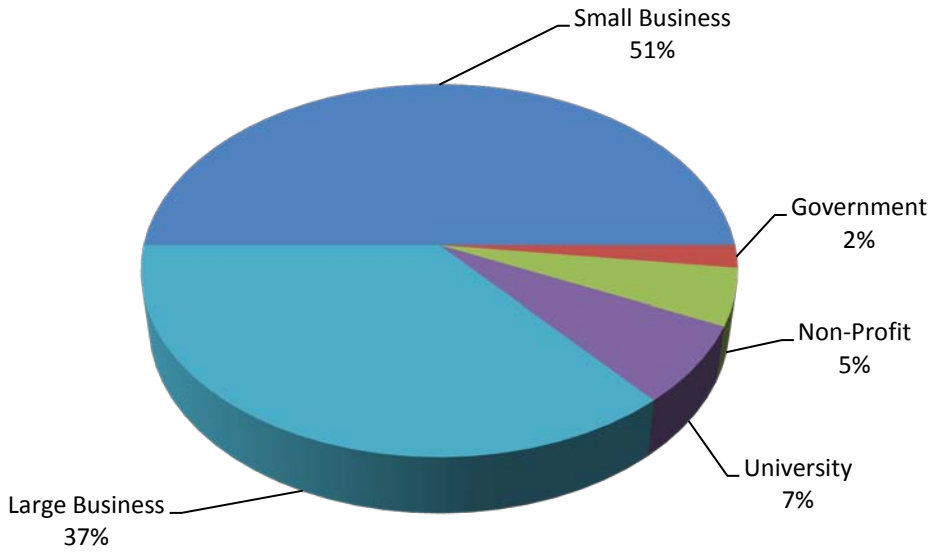
[*] Biological Material Commercial Licenses permit the use of unique biological materials from NIH, such as antibodies or cell lines, in commercial process or for sale and distribution as research tools.

[§] Patent Internal Use licenses grant companies the right to use patented inventions in their internal research programs but do not permit their use in the sale of products or services.

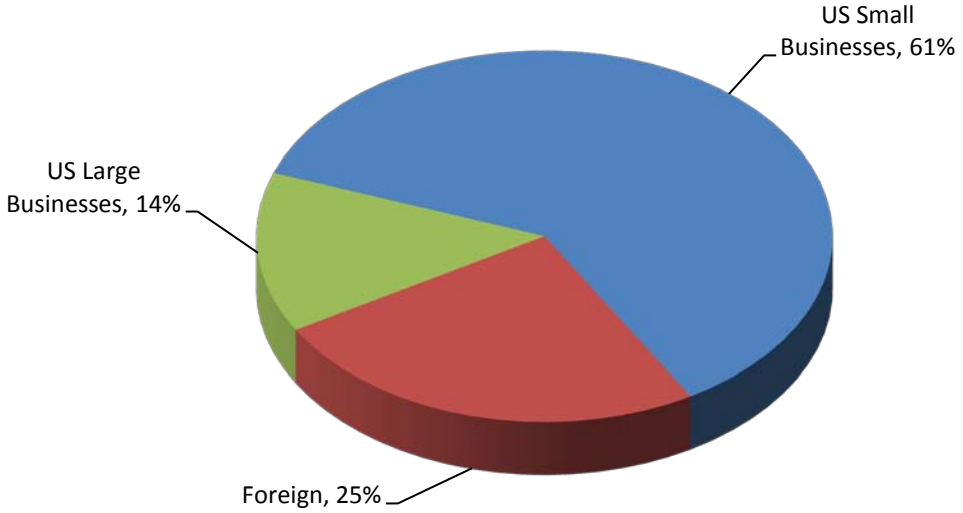
Licenses by Type of Agreement



Licensee by Business Type

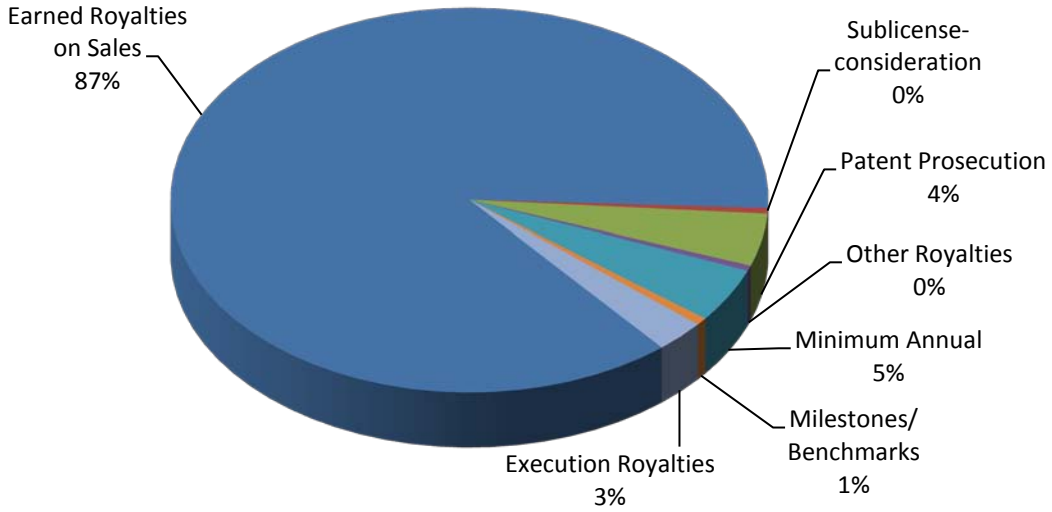


First Time Licensee by Business Type



Sales of products built around licensed NIH and FDA inventions remain strong with licensees reporting nearly $6B in sales of these products. In FY11, OTT had 441 licenses reporting products on the market. Royalties collected on product sales account for 87%, primarily drugs and biologics, of the $97M in royalties collected in FY11 (see the chart below), with that percentage staying fairly steady for the last few years. The top 20 products generating royalty income account for 85% of the total royalty income. Thus, sales of a limited number of products generate the vast majority of the royalty income.

Royalty Income by Type



The FY11 technology transfer outcomes follow a long trend of successful licensing of biomedical inventions made by NIH and FDA scientists and reflect HHS's dedication to technology transfer — the broader economic impact of which becomes especially important during difficult economic times. While most of the royalty income collected by OTT is based on sales of pharmaceutical and biotechnological products and services, most of the products and services on the market under OTT licenses are research tools and reagents. Although the sales of research tools cannot compete in volume or financial return with sales of FDA-approved products, they make a considerable impact in advancing both private and public sector research.

One of the best selling products under license from NIH is Synagis®, a monoclonal antibody used for the prevention and treatment of serious lower respiratory tract disease caused by respiratory syncytial virus, the most common cause of pneumonia and bronchiolitis in infancy and early childhood. Another is PreserVision®, a nutritional supplement used to treat macular degeneration of the eye.

The success of OTT's licensing program and its overall mission of serving global public health is reflected in the following examples:

Adeno-associated viruses (AAVs) are attractive delivery vectors in the field of gene therapy. NIH and University of Iowa scientists collaborated in the development AAV5 vectors for use in gene delivery. The AAV5 technologies have been licensed extensively, under both internal research and commercialization licenses. The most recent license was to Amsterdam Molecular Therapeutics (AMT) for the commercial development of gene therapy products targeting diseases in the brain and liver, with a focus on orphan diseases. In support of the NIH's public health mission, OTT agreed to reduce royalties when AMT collaborates with academic institutions on therapies for ultra orphan indications. This is just one approach that OTT uses under its license agreements to provide incentives for companies targeting rare and neglected diseases, which broadens the application of NIH technologies to meet public health needs.

The launch of MenAfriVac®, a low-cost meningitis vaccine for sub-Saharan Africa, provides a compelling story of interagency and inter-institutional collaboration to meet a global health need. Meningitis infection can result in deafness, mental retardation, seizures, paralysis, and death. Although group C meningitis vaccines were developed in the 1960s, they had little effect in the meningitis belt of Africa, where nearly half a million people live and where group A meningitis, not found in industrialized countries, prevails.

Under a 2004 license agreement, OTT transferred conjugate vaccine technology developed by FDA inventors Drs. Che-Hung Robert Lee and Carl Frasch to PATH (Programs for Appropriate Technology in Health), through its Meningitis Vaccine Program (MVP) to facilitate product development. The result was the successful launch of a first vaccine whose development was tailored to meet the needs of a specific region.

With a focus on meeting the public health goal, OTT provided PATH with the appropriate flexibility to form multiple partnerships to manufacture the vaccine. The agreement included the right to sublicense

the non-exclusively licensed technology, which was atypical at that time for nonexclusive licenses and critical to allowing PATH to partner with the Serum Institute of India at essentially no cost. In exchange for technology know-how, Serum Institute is able to produce the vaccine at less than $0.50 per dose.

The license agreement also provides for distribution of millions of doses royalty-free, which are needed to support adoption of the new vaccine, as acceptance of new vaccines into any market can pose challenges. An initial vaccination campaign began in December 2010 in Burkina Faso, Mali, and Niger (three countries in which meningitis is considered hyperendemic). So far, nearly 20 million doses have been administered and much illness and many deaths have been averted.

Trans-NIH Initiatives

SBIR-TT Initiative

Small Business Innovation Research-Technology Transfer (SBIR-TT) is used at NIH to advance the commercial development of intramural NIH inventions. It can be viewed as a way for NIH to "spin-off" inventions using the statutory authorities available. Inventions from the NIH Intramural Research Program are licensed to qualified small businesses that have been awarded an SBIR contract to develop the technology into commercial products that benefit the public. These inventions would be commercially promising but for identifiable, high-risk research gaps that have delayed their commercialization. Using SBIR funding to overcome these hurdles and reduce the commercial risk, the contractors work closely with the inventors to bridge the research gaps.

The SBIR Program is a federally mandated program that requires federal agencies expending over $100 million annually in extramural research and development to set aside 2.5% of that budget for awards to for-profit, small U.S. businesses. SBIR funds are granted to small businesses in order to develop a commercial product that supports the agency's stated mission or a commercial product of utility to the awarding agency's internal research program(s).

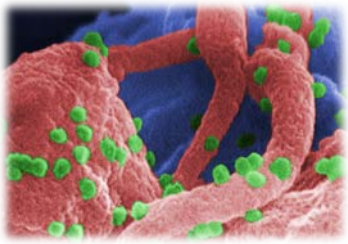
In FY 11, the first SBIR-TT contract was awarded by the National Cancer Institute for a low-field electron paramagnetic resonance imaging device to optimize development of anti-angiogenic therapeutics in cancer animal models. Four new solicitations were announced this fiscal year from three different NIH Institutes.

Other Initiatives

This year, the effort to develop the Neglected Tropical Diseases e-portal was accelerated by the addition of new partners — BIO Ventures for Global Health (BVGH), TDR/TropIKA, and Thomson Reuters IP and Science Group/Discovery Logic. The portal, renamed Global Health Connect, will be a one-stop, unified, global source for all available neglected disease information. It will include real-time, scientific data, resources, patents, publications, available technologies for commercialization, funding information, interactive analytics, and space for researchers to discuss findings, ask questions, and collaborate. BVGH received a small planning grant from the Bill & Melinda Gates Foundation that was used to develop a mock-up of what Global Health Connect might look like.

NIH, through OTT, joined World Intellectual Property Organization (WIPO) Re:Search, a new consortium where public and private sector organizations share valuable intellectual property and expertise with the global health research community to promote development of new drugs, vaccines, and diagnostics to treat neglected tropical diseases, malaria, and tuberculosis. The consortium includes the WIPO, leading pharmaceutical companies, BIO Ventures for Global Health, and NIH. According to the World Health Organization, neglected tropical diseases today impair the lives of an estimated 1 billion people. By providing a searchable, public database of available intellectual property assets, information, and resources, WIPO Re:Search will facilitate new partnerships with organizations that conduct research on treatments for these diseases. Members contributing patents agree to offer licenses minimally on a royalty-free basis for research world-wide and distribution or sale in the least developed countries.

OTT contributed U.S. government-owned patents to the Medicines Patent Pool (MPP), a voluntary patent pool for antiretroviral medicines (ARVs) designed to facilitate access to HIV treatment in developing countries. This license made the NIH the first contributor to the Medicines Patent Pool, which promises to enhance access to anti-retroviral treatment for people living with HIV/AIDS in developing countries. The patents relate to patents on methods of using protease inhibitors for the treatment of HIV, a technology resulting from research undertaken by the NIH and the University of Illinois at Chicago. The license is seen as a first step for an expected ongoing collaboration as OTT and the MPP consider additional potential license agreements to add other NIH or FDA patents to the pool for technologies that may have potential as new HIV therapeutics.



Marketing

OTT reaches out to maintain close communication with its existing and potential licensees to better meet their needs. OTT staff meets with interested parties to discuss scientific, business, and legal issues in support of the transfer of NIH and FDA technologies. During this last year, a number of separate meetings with companies led to executed licenses.

To keep up with new advancements in personal devices, OTT launched an iPhone/iPad app to make it easier for companies to find inventions to license. This app provides real time streaming of information on and easy searching for technologies available for licensing. Technologies that are available for further collaboration with NIH researchers are also included in the app.

To better underscore the lengthy process of bringing a biomedical product to the market, OTT developed its Product Development Pipeline. Many inventions from the NIH and FDA Intramural Research Programs have been licensed and are now in clinical development with the hope of eventually reaching the market. These inventions are shown as a development pipeline and illustrate the valuable synergy between NIH/FDA and industry as well as the depth and richness of the science conducted in these labs. In FY11, there were 13 inventions in Phase III clinical development, 29 in Phase II, and 28 in Phase I. This represents nearly double the number in Phase III and a 61% increase of those in Phase I last year.

Royalty Administration

While the essential purpose of the technology transfer process is to improve public health, the collection of royalties is an important by-product. Royalties collected from licensees of NIH and FDA intramural research program inventions are distributed to the inventors, the Institutes/Centers (ICs) that developed the inventions, and, when relevant, extramural institutional co-owners of the inventions. There are various payments collected as royalties under licenses, including upfront license fees, annual minimum payments to maintain a license, payments associated with the achievement of commercial development milestones and "running royalties" as a percentage of the sales of products or services. By far, the largest amount of royalty funds is received on sales of products. Royalty collections fluctuate from year to year and are impacted by a variety of factors, including rise and fall in sales, FDA licensing approval, license termination when patents expire, etc. The ICs use the income to pay technology transfer expenses (such as patent expenses and technology transfer administrative costs) and to support research and training programs, including the purchase of expensive laboratory instrumentation or pharmaceuticals for clinical trials. Royalty funds thus support activities that might otherwise remain unfunded.

Last fiscal year, OTT made available to licensees the option of paying royalties through Pay.Gov, a web-based royalty payment application allowing companies to make Automated Clearing House (ACH) payments by debit from a checking or savings account. Since its launch, 25 companies have tried the new system and all appear pleased with its ease of use and significant speed of payment processing over conventional check payment systems. With respect to research materials where ready access is needed for important research programs, the new system has allowed companies to quickly and easily make their payments such that NIH can expedite the release of these vital materials.

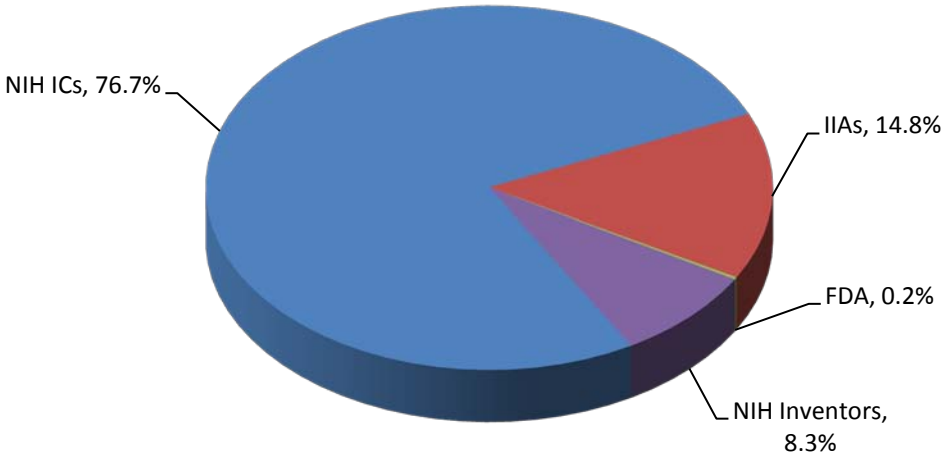
The OTT administered $97M in royalties in FY11 with 75% of the total going to the ICs and 10% to the inventors. The remainder was distributed under Inter-Institutional Agreements (IIAs) to our extramural partners that are co-owners of licensed inventions.

This income was received under 835 license agreements from 492 companies, or their subsidiaries, three quarters of which are US based. Royalty levels continued an upward trend, primarily due to changes in earned royalties on sales from two products, with almost a 6% increase over 2010 and matching the $97M received in FY08. Although royalties on some products decreased sharply in FY11, others one have been steadily increasing over the last few years.

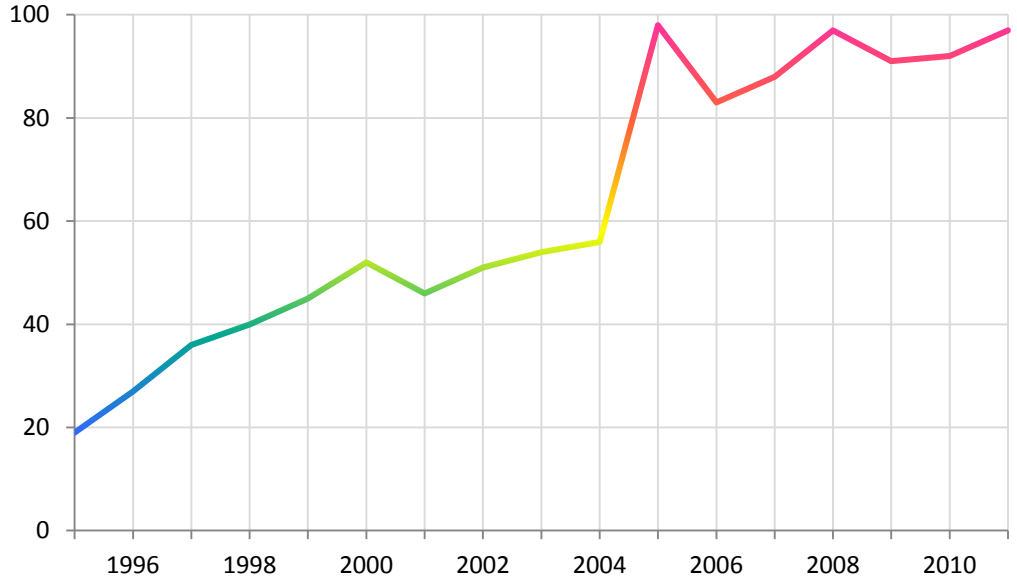
In accordance with statutory requirements, inventors under a given license receive annually the first $2,000 received by the NIH; 15 percent of royalties above $2,000 and up to $50,000; and 25 percent of royalties in excess of the first $50,000 up to a cap of $150,000 per year per inventor. Inventors who have assigned their inventions to the US Government receive royalty payments whether they have remained at NIH, retired or moved to other institutions. In FY11, 1,147 inventors received royalty payments amounting to $8.1M. Of these, 64 were first-time recipients, and 21 received the statutory cap.

During this fiscal year, the Office continued to improve the process to identify licensees that are required to reimburse the ICs' patent prosecution costs. As a result of this effort, $4.2M was recovered in FY11, a 46% increase over FY10.

Royalty Distribution



Royalty Income



Monitoring and Enforcement

To ensure compliance with license obligations and development of technologies licensed from NIH and the FDA, OTT maintains a monitoring and enforcement program for its portfolio of 1,328 active license agreements. During FY11, 55 licenses were terminated and 61 licenses expired, 29 cases of alleged infringement of NIH/FDA patents were investigated, 13 more than last year, and closed either through licensing or by the company's voluntary withdrawal of the infringing product. At no time, however, did NIH ask for product to be withdrawn or seek an injunction. OTT conducted internal audits of all licenses for administration and royalty compliance, resulting in an overall collection rate of 95% of royalties due in fiscal year 2011. OTT terminated five NIH licenses for non-compliance during the year, comparable to FY10. Additionally, OTT contracted with firms to conduct external audits of two licensees with significant licensed product sales to verify proper payment under the terms of the license. Overall, OTT's enforcement activities resulted in the collection of over $1.8 million in overdue royalties during the year.

Policy Activities

The scope of OTT's formal and informal policy activities is broad, including health related technology transfer and intellectual property matters and support of legislative affairs. Leveraging the experience of NIH and U.S. universities in technology transfer, OTT drafted and communicated policies and procedures to enhance the translation of early-stage technologies into practical applications for the benefit of public health. OTT, working through the NIH Office of Legislative Policy and Analysis, serves as a resource for the development of NIH input on a variety of legislative initiatives directed to technology transfer, intellectual property policy, and associated operational issues. Additionally, OTT provided support for training activities and expert advice to programs both internally within HHS and externally across the U.S. Government.

Among its administrative duties, OTT provides the agency determination for requests by the extramural and intramural communities for waivers. In FY11, OTT reviewed two requests to waive title to intramural inventors and 42 extramural waiver requests, comprising 32 requests to waive title to inventors, eight requests to waive the U.S. manufacturing requirement, and two requests to waive rights to a third party.

OTT has led a variety of initiatives directed to NIH-wide technology transfer policies and procedures. OTT representatives serve as Vice-Chair and Executive Secretary of the Public Health Service (PHS) Technology Transfer Policy Board (TTPB). The TTPB serves as the principal advisory board to NIH, the Centers for Disease Control and Prevention, and the Food and Drug Administration in establishing and modifying, as appropriate, PHS technology transfer policies. In that capacity, OTT advanced the comprehensive review of policies and procedures related to patenting, licensing, Cooperative Research and Development Agreements (CRADAs), material transfer agreements (MTAs), royalty disbursement, and extramural activities, such that its completion is expected in FY12.

Members of OTT actively participate in a wide array of NIH-wide and Government-wide projects that address programmatic components of technology transfer. Within NIH, OTT policy staff serves on the Trans-NIH Task Force on Nanotechnology, the Data/Resources Sharing Interest Groups, the NIH Biomarkers Consortium, and the Cancer Human Biobank. Members of OTT policy staff represent HHS and NIH in interagency and intergovernmental fora, such as the Inter-Agency Working Group on Technology Transfer, Global Issues in Nanotechnology Working Group in the U.S. Government's National Nanotechnology Initiative, and the Interagency Working Group for the Working Party on Biotechnology in the Organisation for Economic Cooperation and Development.

OTT policy staff served as advisor to NIH and HHS on many *ad hoc* issues related to technology transfer and intellectual property, including gene diagnostic technologies, stem cells, biotechnology patenting, patent reform, mouse model access issues, and NIH's drug rescue and repurposing programs.

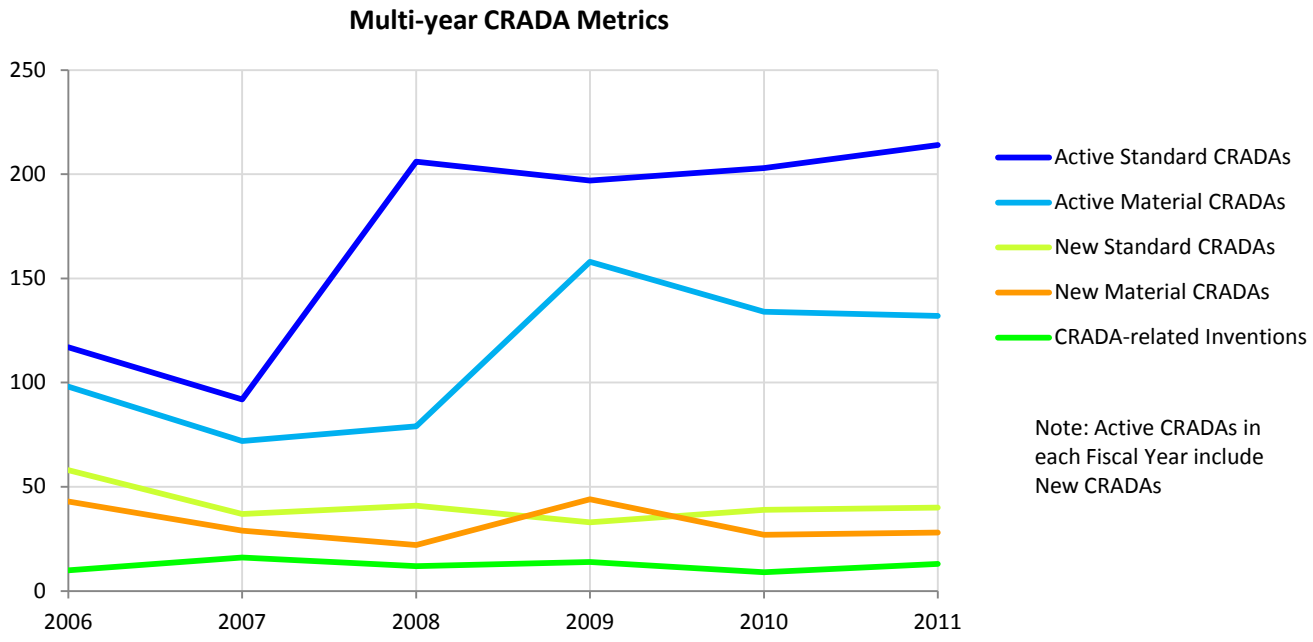
In support of OTT's negotiations of inter-institutional agreements between NIH and university collaborators, OTT policy staff spearheaded efforts to encourage and enhance dialogue between NIH and university technology transfer offices. OTT advanced discussions among representatives from NIH's

extramural grantees, the Council on Governmental Relations, AUTM, and NIH IC technology transfer offices. These discussions have been directed to facilitating efforts to update the various material transfer agreement models and to draft new models. Through these activities, OTT policy staff supported the transfer of materials among researchers and non-profit entities in a direct and expeditious manner.

Cooperative Research and Development Agreements (CRADAs)

Cooperative Research and Development Agreements (CRADAs) provide an opportunity for NIH investigators to join with their colleagues from industry and academia in the joint pursuit of common research goals. CRADAs are negotiated by technology transfer staff in the ICs, while OTT collates and administers CRADA data and serves as a member of the NIH CRADA Subcommittee. While there are various mechanisms that support collaboration between companies and intramural scientists, the CRADA is the only mechanism that permits the NIH to offer an exclusive option to license inventions made within the scope of the collaboration agreement and opens up the possibility to receive funds from the company collaborator. NIH is not legally permitted to transfer funds to the collaborator under a CRADA but can work with companies receiving funds under separate awards such as SBIR/STTR.

During FY11 there were 346 active CRADAs; 214 were standard CRADAs and 132 were Materials-CRADAs. During the year, NIH executed 68 new CRADAs; 40 of which were standard and 28 were Material-CRADAs. Eighty percent of these were with US companies, and 71% of the US companies are considered small businesses. The number of new CRADAs executed in FY11 was similar to FY10 but the percentage of new CRADAs with small US companies climbed sharply. This last year, 12 CRADAs led to inventions reported by NIH or FDA researchers at five different Institutes and the FDA.



Other Accomplishments

Members of the Office were recognized with national, regional, and NIH awards for their significant contributions to technology transfer as well as the overall mission of NIH. These included seven group and one individual NIH Office of the Director Merit Awards, two national Federal Lab Consortium (FLC) awards, three FLC Mid-Atlantic Region awards, and one NIH bronze Plain Language and Clear Communication Award. A member of the Office was elected as Chairperson of the Federal Lab Consortium, the nationwide network of federal laboratories.

Members of the OTT staff were invited to give presentations at many domestic and international meetings. These outreach efforts help communicate NIH's technology transfer policies, increase

opportunities for licensing technologies, learn from others engaged in technology transfer, engage in cooperative technology transfer with governmental and non-profit institutions, and provide training to institutions implementing technology transfer mechanisms. Staff presented at international sites, including U.S. Patent and Trademark Office trainings in China and Morocco, Technology Transfer Summit Europe, and the Developmental Center for Biotechnology of Taiwan. Other domestic meetings included Federal Laboratory Consortium Annual Meeting, World's Best Technologies, Georgetown University Biotechnology Program, MIT Enterprise Forum, Licensing Executive Society Annual Meeting, Biotechnology Industry Organization Annual Meeting, Virginia TECHSTORM Conference, NIH Small Business Innovation Research (SBIR) National Conference, Technology Transfer Society Annual Conference, and Biopharm Licensing & Alliance Management Conference.

Additionally, OTT staff published the following articles:

"The Role of Public Sector Research in the Discovery of Drugs and Vaccines," *New England Journal of Medicine, Vol. 364, pp. 535-541*, Ashley J. Stevens, Jonathan J. Jensen, Katrine Wyller, Patrick C. Kilgore, Sabarni Chatterjee, and Mark L. Rohrbaugh.

"Research Tools Policies and Practices: Perspective of a Public Institution," *AUTM Technology Transfer Practice Manual, 3rd Edition, Volume 4*, Susan Ano, Uri Reichman and Steven Ferguson.

"Research Discoveries after Kubin," *AUTM Technology Transfer Practice Manual, 3rd Edition, Volume 4*, Nancy W. Vensko and Steven M. Ferguson.

"License Compliance Issues for Biopharmaceuticals: Special Challenges for Negotiations between Companies and Non-Profit Research Institutions," *les Nouvelles, Volume XLVI No. 3 pp. 216-225*, Todd A. Ponzio, Hans Feindt and Steven M. Ferguson, CLP.