ANNUAL REPORT

FY-2012

NIH Office of Technology Transfer

National Institutes of Health

U.S. Department of Health & Human Services

Contents

Message from the Director

Dear colleagues and partners in commercialization:

The NIH Office of Technology Transfer (OTT) constitutes one of the largest players in public-sector biomedical technology transfer, both in policy and practice. The efforts of our scientist inventors and technology transfer staff lead to private sector introduction of new products and services that improve public health. In addition, the licensing of unique biological materials serves the research needs of the private sector in their research and development pipelines. The rate of patent filing and transfer of technologies has remained steady over the last few years as the economy recovers slowly. Yet, our royalty income set a record high of $111M due to increased sales of a few products that more than offset slight declines in several others. OTT managed income from 505 companies under 803 licenses with more than half reporting product sales, most of which are not products requiring FDA approval. In addition to meeting our mission of facilitating improvements in health, the sale of products creates jobs as represented by $6.5B in combined sales. This is not just a success from older activities, as new technologies continue to be licensed and progress through clinical development. For example, UniQure's Glybera®, a break-through product based on NIH technology, reached the market this year in Europe. It is the first gene therapy product approved in the West, with US FDA approval under consideration. The pipeline of licensed technologies in clinical development suggests that royalty income will remain strong over time, with some year-to-year fluctuation dependent on product sales and patent expiration.

Drawing upon our policy and practice expertise, the OTT launched and expanded several initiatives to better meet the needs of the private sector in licensing our technologies for commercial research and product development. These initiatives contribute to the goals for federal laboratories as set forth in the President's October 2011 memorandum to shorten the negotiation pendency and increase the number of collaborative relationships with industry to better leverage federal assets that promote longer-term job creation. OTT's efforts represent a portion of all the NIH activities within the scope of the President's Memorandum. See www.ott.nih.gov/PDFs/NIH-TT-Plan-2013.pdf for the NIH's five-year plan in response to the Memorandum.

OTT has an important role to play in the full range of commercial collaborations. First, in the more pre-competitive end of the spectrum, OTT licenses to industry a number of research tools, such as cell lines and animal models. We have made this a more user friendly process with the introduction of the electronic Research Materials catalogue, eRMa, our web based e-licensing process. While the old paper based process took weeks to months to complete a transaction, the new system can process these transactions in as quickly as a day.

On the other end of the spectrum, transferring unique technologies to companies for product development, OTT initiated a streamlined license process for start-up businesses using a model one-year exclusive option license for a $2,000 royalty that can be converted into a long-term exclusive commercialization license. Because start-ups are cash strapped and need to allocate their funds to getting technology off the ground, the license royalties are deferred for several years and linked primarily to the company's investor funding.

OTT will make further improvements in how we do business to better meet the needs of the biomedical business community, while supporting the NIH mission to utilize intellectual property as an incentive to improve public health. Please send us any suggestions or comments you might have on how we are doing and how we might work even more effectively.

Sincerely,

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

Mission Statement

The mission of the Office of Technology Transfer (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 by scientists 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 in the development of the technology to ensure commercialization milestones are reached, products are brought to the market, and royalty fees are paid.

Licensing and Patenting

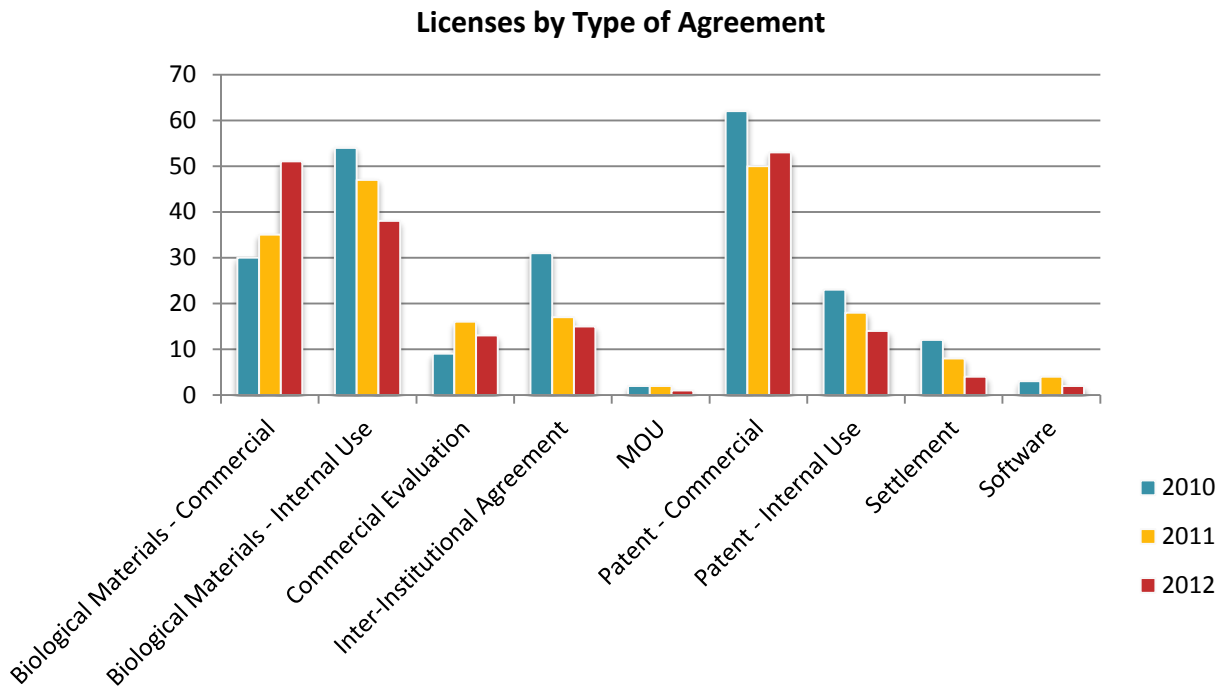
The ultimate goal of any technology transfer office is effective and responsible licensing to facilitate the development of early stage technologies. Inventions made by scientists in the NIH Institutes and Centers (ICs) and the FDA Centers are reported to the NIH OTT through their respective Technology 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 by collaborations with scientists in the ICs to support commercial development of the technologies. The goal for all involved is to enhance the likelihood that these efforts will lead to products to improve public health. In addition, these licensing activities help stimulate the economy when the Government's high-growth technologies are developed into products by small entrepreneurial companies as well as by large biotechnology and pharmaceutical companies. Charts of our metrics can be found at http://www.ott.nih.gov/ttmetrics/default.aspx.

In FY12, OTT initiated a new licensing program designed to reach a difficult market segment that OTT had not previously exploited--start-up companies. The initiative involving two model agreements tailored to the special needs of start-ups was a resounding success. In its first year, the program

brought in over 30 license applications for drugs and biologics. In FY13, it was expanded to include devices. Details of the initiative can be found at http://www.ott.nih.gov/startup/default.aspx and http://www.ott.nih.gov/nonprofitlicense/index.aspx. Available representative technologies include "drugs, vaccines, therapeutics, and certain devices that OTT determines will require significant investment to develop, such as those undergoing clinical trials to achieve FDA approval or Class III diagnostics."

In FY12, OTT executed 198 license agreements — 80% with US companies of which 42% were small businesses. Of the new licenses executed, 54 (27%) were with companies licensing from NIH for the first time; 74% of those first-time licensees were US companies and about 12% of those were small US businesses.

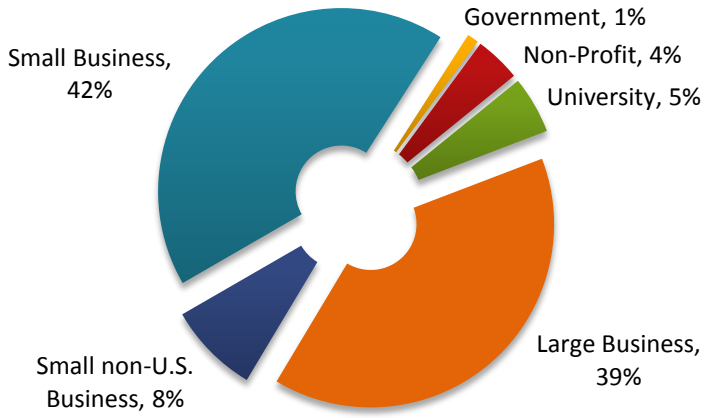
Over the last three years, the largest increase in agreement type has been in the number of biological material commercial licenses* with a slight increase between FY10 and FY11 of 17% and a sharper increase of 46% in FY12. In FY12, the number of patent commercial licenses rose slightly but still accounted for 28% of the total licenses executed. The most significant decline continues in the number of internal use§ licenses, both patent and biological materials, which have continued to drop over the last three years.



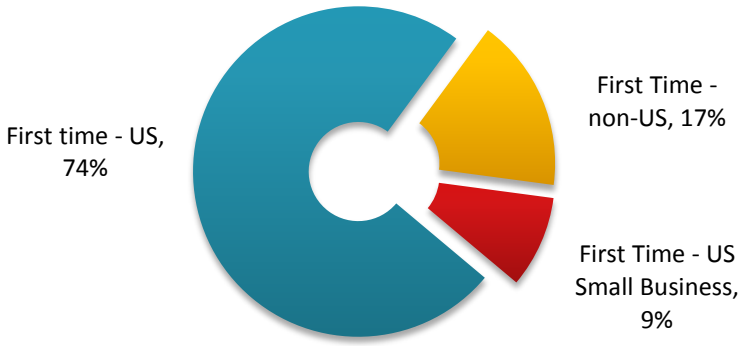
* Biological Material Commercial Licenses permit the use of unique biological materials from NIH, such as antibodies or cell lines, in commercial process or for sale and distribution as research tools.

§ 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.

Licensee by Business Type



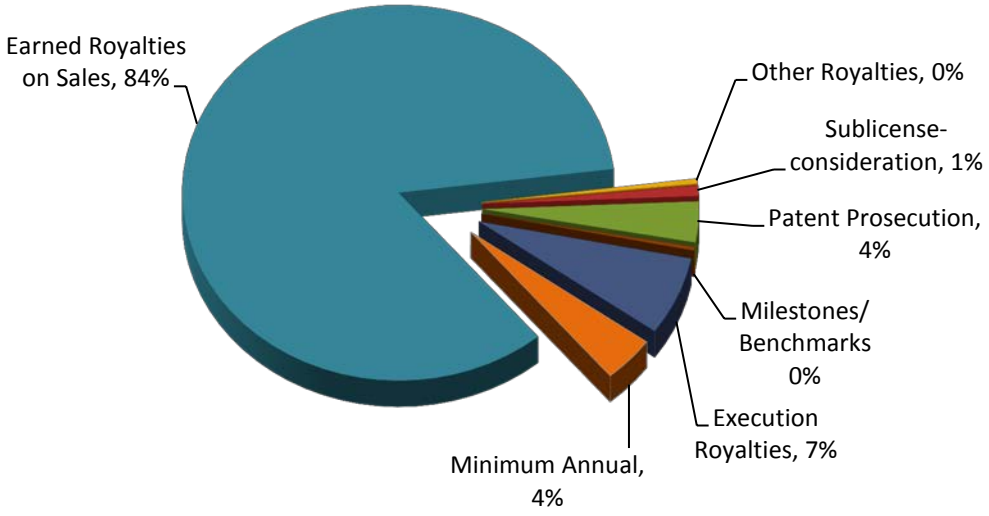
First Time Licensee by Business Type



Sales of products built around licensed NIH and FDA inventions remain strong with licensees reporting $6.5B in sales of these products. In FY12, OTT had 436 licenses reporting products on the market, and there were 52 drug, vaccine, and device candidates undergoing clinical trials.

Royalties collected on product sales account for 84%, primarily drugs and biologics, of the $111M in royalties collected in FY12 (see the chart below), with that percentage staying fairly steady for the last few years. The top 20 products generating royalty income account for nearly 97% 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 FY12 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 actual 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 utilizing technology licensed from NIH is Gardasil®, a vaccine to protect against cervical cancer. Another is Prezista™, a novel protease inhibitor for the treatment of HIV-1 in patients who are non-responsive to existing antiretroviral therapies.

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

NIH and MPEG LA announced the launch of Librassay®, a patent pool managed by MPEG LA to provide one-stop worldwide access to patent rights for the development of *in vitro* diagnostics and personalized medicine applications. This initiative promotes the NIH's policy to disseminate its technologies as broadly as possible when doing so promotes commercialization and improves public health. Librassay®'s initial pool includes approximately 400 U.S. and foreign patents from the NIH, FDA, and other leading research institutions. Companies wishing to develop diagnostic products can obtain non-exclusive, commercial licenses to their choice of patents in this pool. For more information, see the Librassay® press release at https://www.librassay.com/Media.aspx.

A team at the National Institute of Allergy and Infectious Diseases (NIAID) Office of Research Operations (ORO) invented the Sound Attenuation Canopy (SAC) to address the problem of ambient noise in the workplace. The SAC traps and mutes noise transmitted through the open space of a suspended ceiling system, common in many modern office buildings. The OTT and the NIAID Office of Technology Development collaborated with ORO to successfully transfer this technology non-exclusively to a well-established developer and manufacturer of architectural systems. The SAC positively affects human health by improving working conditions and productivity, acting as a fire retardant and debris barrier, and increasing energy efficiency. The SAC has been installed in at least one NIAID building, and plans are in the works to fabricate and install the SAC in NIAID's new office building. Expanding the number of people benefiting from improved worker safety and ergonomics is within the U.S. Government's interests in worker safety and ergonomics.

This year OTT launched its electronic Research Materials (eRMa) website to streamline and expedite the licensing of unpatented biological materials to for-profit companies under an internal research use license. This project addresses one of the important directives in the October 2011 Presidential Memorandum – Accelerating Technology Transfer and Commercialization of Federal Research in Support of High-Growth Businesses to streamline licensing procedures and thereby reduce the time required to license technologies. eRMa was designed and developed by the NIH Office of Technology Transfer with support from the NIH's National Cancer Institute Center for Cancer Research.

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 and Centers 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 payments, 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 received is 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 approvals (when needed), competitive market forces, changes in standard of patient care, license termination when patents expire, etc. The NIH and FDA intramural laboratories 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 biomedical research and development activities that might otherwise remain unfunded.

Beginning with FY10, OTT has made available to licensees the option of paying royalties through Pay.Gov (https://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. Previously, companies had

to use systems falling into historical use such as wires to lock boxes and paper checks. Since its launch, many 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. Pay.Gov was also included as part of the new electronic Research Materials website because of its ability to expedite the transfer of unpatented biological materials to for-profit companies as part of internal research use license agreements.

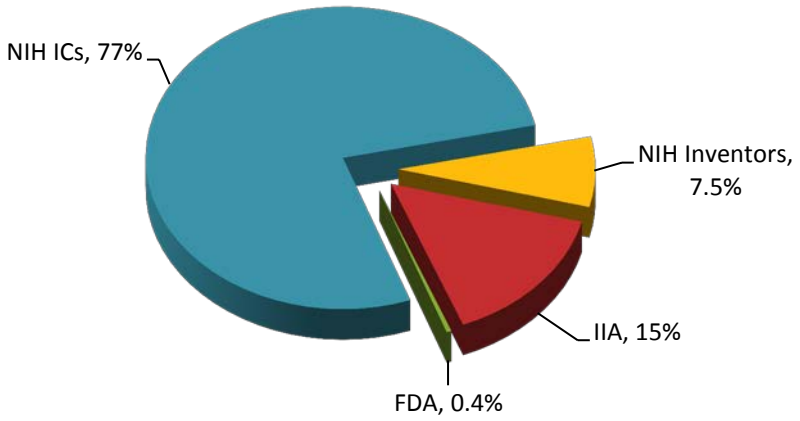
OTT administered $111M in royalties in FY12 with 77% of the total going to the NIH ICs and the FDA and 7.5% to the inventors. NIH distributed 15.5% of the royalties under Inter-Institutional Agreements (IIAs) to our extramural partners that are co-owners of the licensed inventions.

This income was received under 803 license agreements from 505 companies, or their subsidiaries, 75% of which are US based. Royalty levels continued an upward trend with almost a 13% increase over FY11 and setting a record high for the program. Although royalties on some products decreased sharply in FY11, others have been steadily increasing over the last few years with more than three quarters of all royalty income now coming from product sales based upon several technologies. This also means that the overall future royalty income will be highly sensitive to changes in sales of these products until major new products reach the market.

In accordance with statutory requirements and NIH policy, 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 FY12, 1,129 inventors received royalty payments amounting to $9.1M. Of these, 86 were first-time recipients, and 29 received the statutory cap, both of these numbers increasing over the previous year.

During this fiscal year, OTT continued to improve the process to identify patent prosecution costs that are due under licenses. This effort resulted in a recovery of $3.9M, a figure similar to what was collected the previous year.

Royalty Distribution



Monitoring and Enforcement

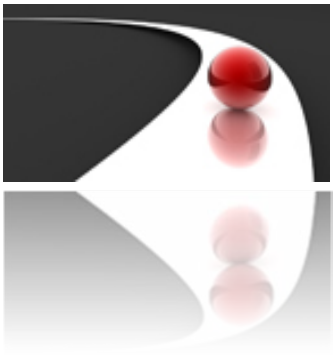
To ensure compliance with license obligations and development of technologies licensed from NIH and the FDA, OTT maintains a monitoring and enforcement program for its portfolio of 1,316 active license agreements. During FY12, 68 licenses were terminated, 5 of which were for cause and the remainder by the licensee, and 65 licenses expired. OTT investigated 14 cases of alleged infringement of NIH and FDA patents (15 less than last year), and these cases were closed either through licensing or by the company's voluntary withdrawal of the infringing product. At no time, however, did NIH ask for a 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. OTT terminated five licenses for non-compliance during the year, comparable to FY11. 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 ensured proper payments by licensees and resulted in the collection of over $1.2 million in overdue royalties.

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 US universities in technology transfer, OTT drafted and communicated policies and procedures to enhance the translation of early-stage technologies into practical application 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 Federal Government.

Among its administrative duties, OTT provides the agency determination for requests by the extramural and intramural communities for waivers of rights in inventions. In FY12, OTT reviewed 41 extramural waiver requests, comprising 32 requests to waive title to inventors, seven requests to waive the US manufacturing requirement, and two requests to waive rights to a third party. OTT also reviewed two requests to waive title to intramural inventors.

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 has neared completion of the comprehensive review of policies and procedures related to patenting, licensing, Cooperative Research and Development Agreements, material transfer agreements, royalty disbursement, and extramural activities.



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 is actively involved with the HHS Innovation Council and other intra-governmental efforts to apply innovative tools to enhance technology transfer.

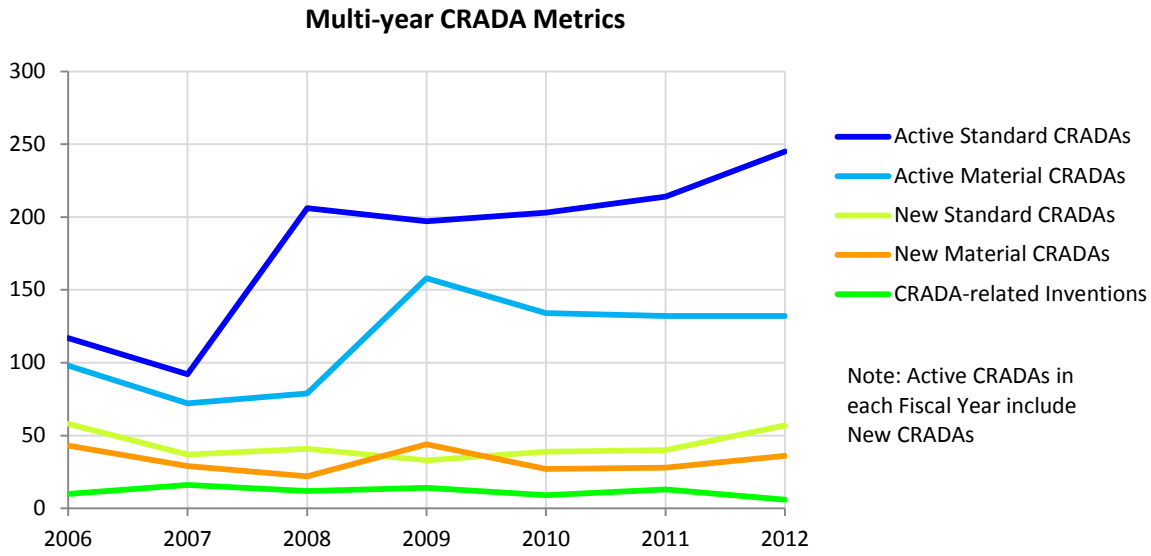
OTT staff served as advisors to NIH and HHS on many *ad hoc* issues related to technology transfer and intellectual property, including gene diagnostic technologies, stem cells, biotechnology patenting, patent reform, mouse model access, and NIH's drug rescue and repurposing program. The staff also reviewed and responded to several requests for OTT information under the Freedom of Information Act.

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 technology transfer offices. These discussions facilitated efforts to update the various material transfer agreement models and 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 goals. CRADAs are negotiated by technology transfer staff in the Institutes and Centers. 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 FY12, there were 377 active CRADAs; 245 were standard CRADAs and 132 were Materials-CRADAs. During the year, NIH executed 93 new CRADAs; 57 of which were standard and 36 were Material-CRADAs. Eighty four percent of these were with US companies and 58% of these are small businesses. The number of new CRADAs executed in FY12 was 37% higher than FY11, and the percentage of new CRADAs with small US companies dropped slightly. This last year, six CRADAs led to inventions reported by NIH or FDA researchers at five different Institutes and the FDA.



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CRADAs are complex documents, due in large part to the wide variety of statutory and policy requirements involved. Therefore, negotiation of CRADAs can be a time-consuming activity, delaying promising science until the details of the agreement can be agreed upon. This year the technology transfer offices in the NIH Institutes and OTT began a comprehensive review of CRADAs with the intent of moving the document away from a "model" approach to a "term sheet" approach. As part of this process, NIH is designing an online system, CRADA Builder, which would allow NIH to generate agreements using a series of guided questions to tailor the terms to the specific needs of the collaboration. The new system should be available by the spring of 2013.

Other Initiatives

ENTREPRENEURSHIP AND ECONOMIC DEVELOPMENT

In FY12 OTT continued its active participation in entrepreneurship and economic development activities that support the development of new innovative medical products.

One of the highlights of the year was the Partnership Intermediary Agreement (PIA) that OTT signed with BioHealth Innovation (BHI). BHI is a new regional private-public partnership in Maryland focusing on commercializing market-relevant biohealth innovations and increasing small company access to early-stage funding. With this agreement, the NIH will now benefit from BHI's assistance in evaluating the commercial potential of technologies and in making connections with small businesses and educational institutions to enhance the transfer of NIH and FDA technologies.

As one of the first projects under the PIA, BHI employed and placed an Entrepreneur-in-Residence (EIR) within OTT to help evaluate and identify licensing opportunities in the areas of drugs, vaccines, therapeutics, diagnostics, and medical devices from the intramural research programs of the NIH and the FDA. An NIH EIR is an industry expert with scientific, entrepreneurial/managerial, and financial experience who works with NIH to identify, evaluate, and support the development of new start-up companies based upon technology license agreements from OTT.

A second major project for the year was the completion of a Memorandum of Understanding Agreement with the Carey Business School at Johns Hopkins University in Baltimore, which conducts graduate level business educational programs with a specific focus on healthcare and health technology development. OTT staff worked with MBA students and faculty in their "Discovery 2 Market" classes for feasibility analysis and recommendations regarding certain technologies in the NIH and FDA intramural research portfolios. By providing actual current healthcare-related inventions for student analysis, OTT licensing and patenting managers receive additional feedback and insight into the market dynamics and commercial potential associated with inventions in their portfolios.

EDUCATIONAL AND TRAINING PROGRAMS FOR SCIENTISTS

FY12 was also very busy year in terms of educational and training activities conducted by OTT staff in the areas of technology transfer and entrepreneurship. One of the most popular programs were the courses organized or delivered by OTT staff members for the "Certificate in Technology Transfer" program hosted by the Foundation for Advanced Education in the Sciences (FAES) Graduate School at NIH. Class enrollment reached 120 students per semester, making it the largest program at the FAES Graduate School at NIH. Class offerings grew to 20 different courses, ranging from "Introduction to Technology Transfer" to "Translational Medical Product Development." An invited presentation about the program was given this year at the First Annual International Bioentrepreneurship Education Conference hosted by Johns Hopkins University.

OTT staff members were co-organizers and speakers for several programs with the National Center for Entrepreneurial Tech Transfer (NCET2). These included the "Research Commercialization Webinar Course," an introductory course given via the web during the spring and fall with an international registration of nearly 4,000 as well as the "University Start-Ups Conference," annual meeting and workshop at the Washington Convention Center.

Staff members also organized and participated in the "Chief Science Officer (CSO) Boot Camp" Program in conjunction with Montgomery College, Montgomery County Department of Economic Development, FAES Graduate School at NIH, and Human Work Flows, LLC. This program, designed to prepare academic and federal scientists for research jobs in industry, was awarded the 2012 "State and Local Economic Development Award" by the Federal Laboratory Mid-Atlantic Region.

Other Accomplishments

Members of the Office were recognized with regional and NIH awards for their significant contributions to technology transfer as well as the overall mission of NIH. These included one NIH Director's Award, five group and two individual NIH Office of the Director Merit Awards, and two Federal Laboratory Consortium (FLC) Mid-Atlantic Region awards.

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 with travel sponsored by the outside organizers, including the Asia-Pacific Economic Cooperation Research and Technology meeting in South Korea, BIO India International meeting in Mumbai, India, the U.S. Russian Scientific Forum in Moscow, International Economic

Forum of the Americas in Montreal, Canada, and Managing Knowledge in Synthetic Biology: The Creation of Tools for Stronger Intellectual Property Analysis in Edinburgh, UK.

Other domestic meetings included Federal Laboratory Consortium Mid-Atlantic and Annual Meetings, Georgetown University Biotechnology Program, , Licensing Executive Society Annual Meeting, Biotechnology Industry Organization Annual Meeting, Council on Governmental Relations March meeting, University Start-Ups Conference , NIH Small Business Innovation Research (SBIR) National Conference, TiE (The Indus Entrepreneurs) Conference on TB Drug Development , First Annual International Bio-Entrepreneurship Meeting, BioPharm American Conference, Maryland Entrepreneurship Conference, Children's National Medical Center Seminar on Technology Transfer, FITCI Seminar on Federal Tech Transfer, Research Commercialization Webinar, Faster Cures Principles for Responsible Negotiation of IP Summit, and Alliance Management Conference.

Additionally, OTT staff published the following articles:

"Partnering with the NIH: Now Part of the 'Value Proposition' for Start-ups", Steven M. Ferguson, CLP, *Journal of Commercial Biotechnology, Vol. 18, pp 60-67 (April 2012).*

"Intellectual Property Claims to Stem Cell Technologies: Research, Clinical Testing, and Product Sales", Ann M. Hammersla and Mark L. Rohrbaugh, in *Progenitor and Stem Cell Technologies and Therapies*, Anthony Atala, ed., Woodhead Publishing Ltd. (2012).