NIH OFFICE OF TECHNOLOGY TRANSFER
ANNUAL REPORT
FISCAL YEAR 2008

INTRODUCTION

The National Institutes of Health (NIH) Office of Technology Transfer (OTT) accomplishments reflect its leadership among technology transfer offices at governmental and non-profit biomedical institutions. The core mission is to improve public health through the management of inventions arising from the intramural research programs at the NIH and the Food and Drug Administration (FDA), Department of Health and Human Services (HHS). OTT also serves as the lead office for technology transfer policy within the HHS on both intramural and extramural matters. With its unique combination of policy and practice, the OTT has developed and implemented innovative new approaches to meet this goal. The accomplishments of the year are reflected in transactional as well as programmatic activities.

OVERVIEW

The OTT manages a wide range of inventions made by NIH and FDA intramural scientists. The NIH uses various types of license agreements to transfer inventions that might be embodied in intellectual property, such as rights to use patents, or tangible property, such as biological materials. Licensed patents can be pending or issued in the US or in foreign countries. While these technology transfer activities ensure HHS compliance with the Stevenson-Wydler Act, the Federal Technology Transfer Act and related legislation, the primary goal is to improve public health by getting these technologies into the hands of corporate researchers for further research and the development of new biomedical products.

OTT reviews intramural inventions reported by the NIH Institutes and Centers (ICs) and the FDA; works with ICs/FDA to assess the commercial and patent potential of the technologies; oversees patent prosecution (the legal process of obtaining a patent from the US Patent and Trademark Office and its foreign equivalents); negotiates licenses for commercial use in research and development; and monitors licensing agreements with companies to ensure compliance with their development and royalty payment obligations. Other associated activities include marketing and outreach to companies, inter- and intra-agency coordination activities, support of collaborative research mechanisms, and facilitating access to patented technology for NIH intra- and extramural research programs.

OTT serves as the Technology Transfer Competitive Service Center for the National Institute of Mental Health (NIMH) and the NIH Office of Research Resources. This involves invention reporting, Material Transfer Agreements (MTAs), research collaboration agreements, including Cooperative Research and Development Agreements (CRADAs).

OTT's policy and practice experience is sought by organizations world-wide. In its role as lead office for technology transfer policy matters, OTT represents NIH/HHS at interagency, intergovernmental, and international fora; provides comment (through the NIH Office of Legislative Policy and Analysis) on legislative proposals regarding technology transfer issues; provides the agency determination for extramural and intramural invention waivers of title to inventors or third parties and U.S. manufacturing requirement waivers. CRADAs are negotiated by ICs with final review by the NIH CRADA Subcommittee, which includes OTT review for policy issues. In addition, OTT supports the Subcommittee with staffing by the CRADA Administrator and Coordinator.

SUMMARY OF ACTIVITIES

OTT technology transfer activities for FY08 (NIH and FDA unless noted otherwise):

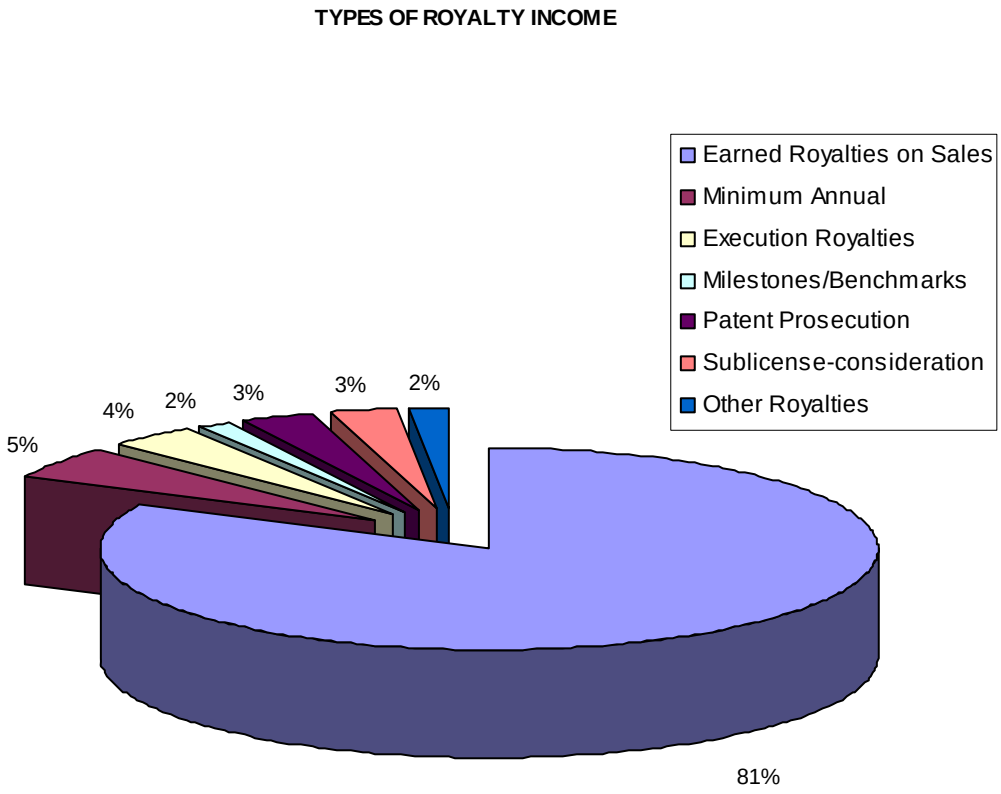
Invention Disclosures Received	402
New U.S. Patent Applications Filed	176
Total U.S. Patent Applications Filed	343
Issued Patents	88
Executed Licenses	259
Royalties (in millions)	$97.2
Executed CRADAs (NIH Only)	72
Standard	33
Material	39
Waivers (NIH only)	50

The activity levels have remained stable in the last several years in most categories except for the significant increase in royalties administered and in the number of Cooperative Research and Development Agreements (CRADAs) and a decrease in the number of waivers. The number of CRADAs rose by 61% in the past year to the highest level since FY05. The increase was reflected in both Standard and Material CRADAs - 33 compared to 23 (70%) and 39 compared to 21 (54%), respectively. Requests from grantees and the intramural program for waivers of rights to intellectual property or U.S. manufacturing requirements decreased from 78 to 50.

The amount of royalties administered by OTT rose from $87.7M in FY07 to $97.2M in FY08, an increase of 9 percent. Almost $79 million (81%) of this amount came from "earned" royalties on the sale of products or services with the top 20 inventions accounting for $77.4M (98% of the earned royalties). For example, NIH received earned royalties for TAXUS™ Express2™, a drug- device combination used to treat cardiovascular disease, Gardasil®, a vaccine to protect against cervical cancer, Synagis®, used for the prevention and treatment of the most common cause of pneumonia and bronchiolitis in infancy and early childhood - respiratory syncytial virus, and Prezista™, a treatment for HIV-1 in drug-resistant patients. See http://www.ott.nih.gov/fy-2008-top-20-commercially-successful-inventions for a complete list of the top 20 inventions.

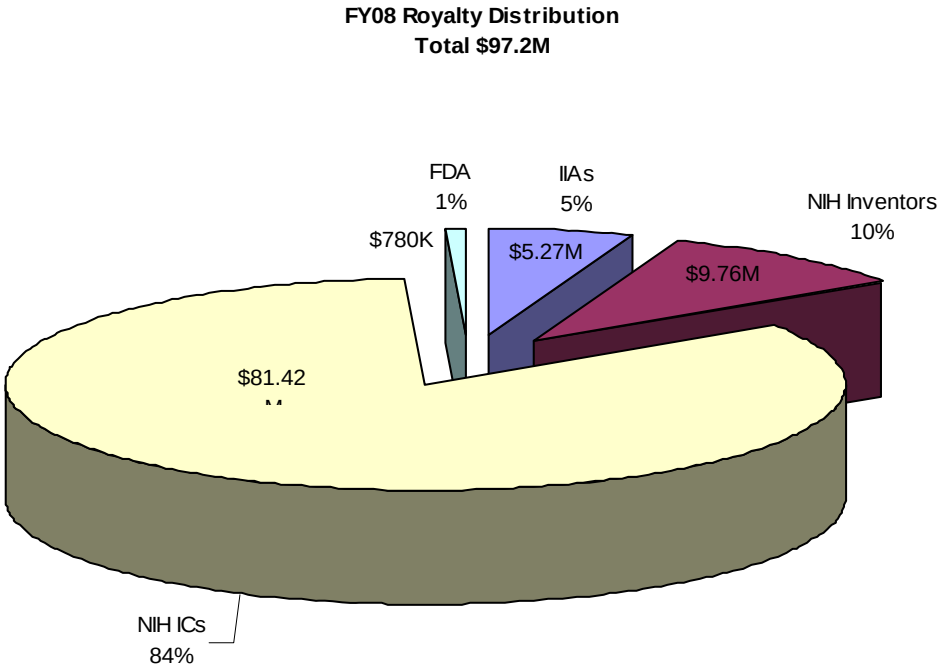
Royalty income was distributed through the NIH Office of Financial Management (OFM) in accordance with applicable law and policy. The vast majority of the royalty income (84%) managed by NIH/OTT represented income from NIH inventions and was distributed by OFM to the NIH ICs where the inventions were made. Inventors received 10% of the royalty distribution.[1] The FDA received a portion (1%) for income from licenses to FDA intramural inventions. Over $5 million was distributed to institutions outside of NIH under Inter-Institutional Agreements (IIAs) for the portion of royalties owed to them for co-inventions. In these cases, OTT has taken the lead in managing the patenting and licensing of inventions and shares the income.

The pie chart below shows the breakdown of the types of royalty income received under licenses.

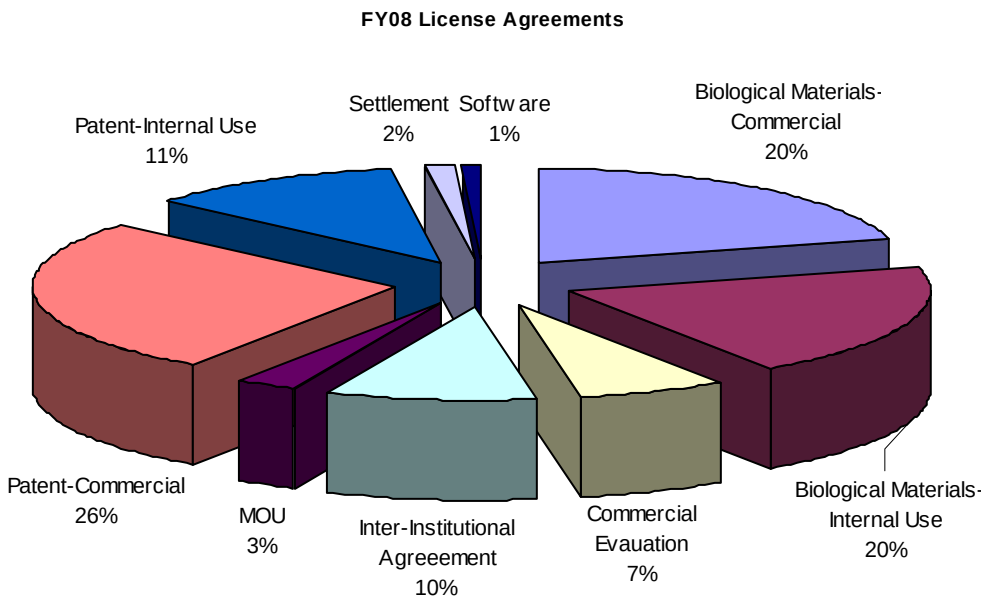


The breakdown of the royalty distribution is shown in the pie chart below.

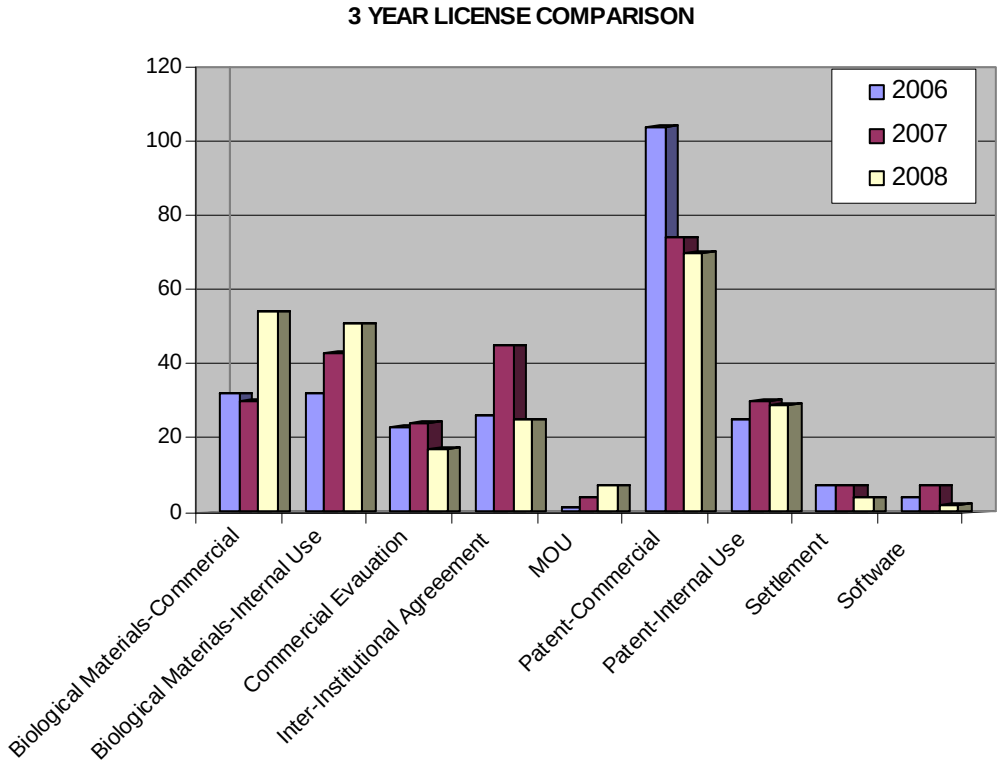
[1] In each fiscal year, NIH and FDA inventors for technologies under a given license share the first $2,000, 15% of the amount up to $50,000 and then 25% thereafter with a cap of $150,000 per person per year.



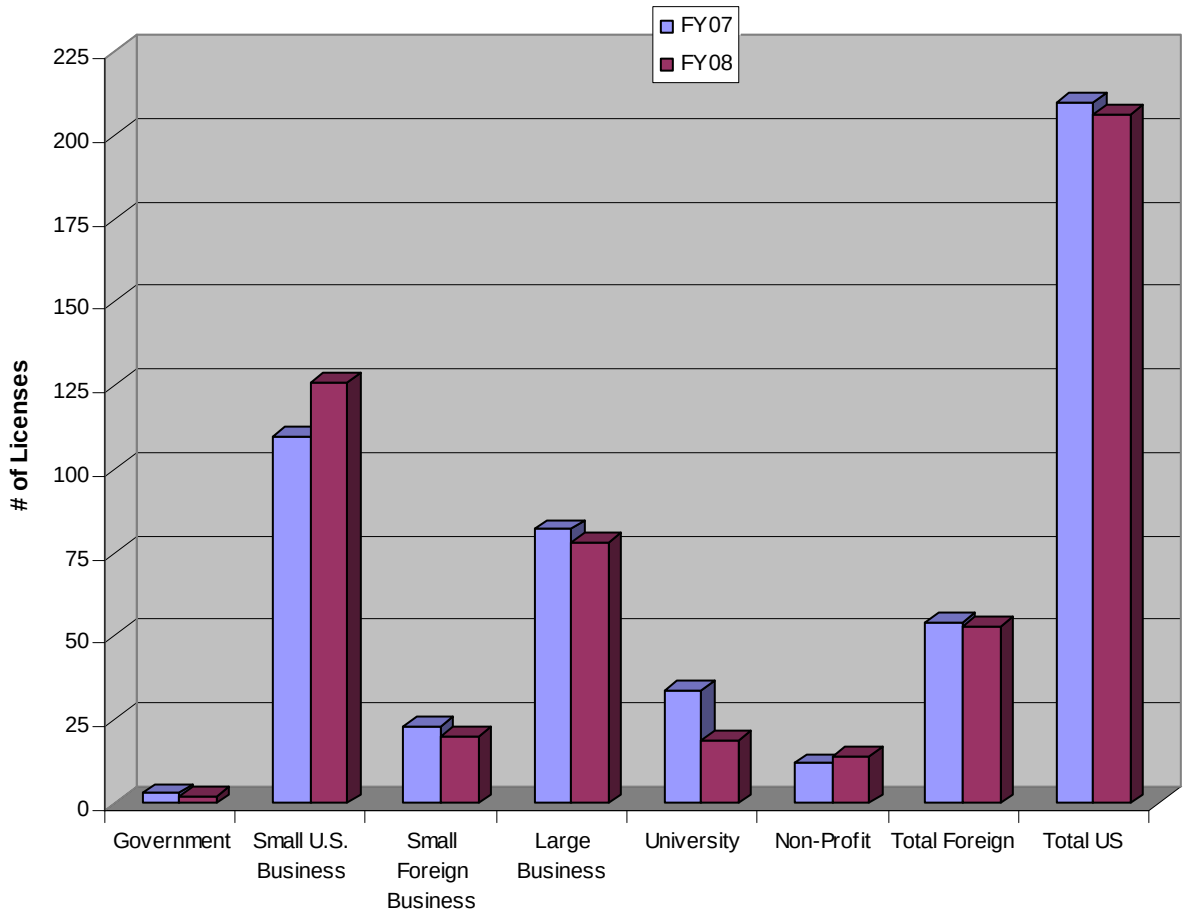
A total of 259 licenses were executed in FY08. The pie chart below provides a breakdown of the types of agreements OTT executed to transfer NIH and the FDA's inventions. Quantitatively the largest number of licenses continues to be patent commercial licenses, which number 70. Sixty percent of the patent commercial licenses were non-exclusively licensed compared to 64 percent in FY07. Biological Material Licenses (BMLs) of non-patented materials for use in commercial products or for internal commercial research use, rank 2nd and 3rd, respectively. The total number also includes 26 administrative amendments that modify executed license agreements to correct or clarify non-substantive terms or obligations.



The chart below shows the three year comparison for the various types of licensing agreements OTT utilizes.



Federal laboratories are required to give preference to small U.S. companies in their licensing efforts. The chart below shows the type of licensed entity for FY07 and 08.



In FY08, there were 253 products on the market under active licenses with OTT. The majority of these are research tools or reagents. OTT licensing efforts have transferred technologies utilized in 25 FDA approved products, 13 are still in use as approved vaccine or therapeutic and an additional one is approved in the EU and pending with the FDA. There are five technologies in Phase III clinical trials, 23 in Phase II, and 18 in Phase I.

FY08 brought another successful year of licensing for OTT. Of the 259 newly executed agreements, a variety of them may have a significant impact on public health, both foreign and domestic. For example:

- A FDA technology provides for a rapid high efficacy conjugation method developed for production of polysaccharide-protein conjugate vaccines. Polysaccharide-protein conjugate vaccines are a new class of vaccines designed to immunize infants and healthy children against diseases caused by invasive bacteria, including *H influenzae* type b (Hib) and *meningitis.* Bacteria such as these are often difficult to vaccinate against effectively as their polysaccharide outer coats are poorly immunogenic. By linking these outer coats to proteins, the immune system can be led to recognize the polysaccharide as if it were a protein antigen and generate protective antibodies against it. OTT licensed this technology for use for commercialization by organizations in India and South Africa.

- A patent pending technology involving methods of treating proliferative disorders, e.g., cancer, and suppressing immune responses was licensed to Emiliem, Inc. for the development of anti-inflammatory and cancer therapeutics. The inventor at the National Heart Lung and Blood Institute (NHLBI) is collaborating with the company under a Cooperative Research and Development Agreement.

- An NIH technology provides for a potential gene therapy for a rare disease, Glycogen Storage Disease Type I licensed to GlyGenix, Inc. for commercial development. This is an excellent example of an agreement that supports the NIH's role in trying to address all categories of disease states, i.e., novel technologies are developed and licensed for small patient populations and not just for the blockbuster drugs that, while important, are more routinely pursued by commercial entities. OTT's efforts on behalf of the NIH, like intramural programs, are particularly focused on meeting unmet health needs, and these types of agreements are typical of our licensing efforts.

- A technology was licensed to several companies for the use of sodium nitrite, administered by various routes, for pulmonary arterial hypertension, ischemia reperfusion injury, and reperfusion associated with organ transplantation. Negotiation and execution of this worldwide agreement was complex because it involved the use of a well characterized chemical and was developed jointly by four NIH institutes and four external academic institutions. Successfully navigating the complex legal issues raised by this technology with multiple co-owners was quite challenging. For one indication, the licensee has already received Orphan Drug Status from the FDA and, if developmental work for the other indications is successful, then a new product may be available to treat a large patient population.

As a means to ensure appropriate development and compliance with its licenses, OTT continues to diligently and effectively enforce its agreements through post-license monitoring of active license agreements. During this last year, four audits were conducted by outside firms in order to ensure proper payment of royalties to the NIH. Two settlement agreements to resolve outstanding issues between the NIH and licensees were also negotiated. Of particular note, one settlement agreement involved the transfer

of clinical grade material to an NIH institute for use in its intramural program. This effort balanced access to material for use in future clinical studies with licensee compliance with its agreement. Such flexibility often allows OTT to achieve multiple goals and supports its mission to improve the public health through attentive monitoring and enforcement of its agreements.

Other significant post-license activities relate to royalty collection and administration. During this past fiscal year, OTT was able to sharply increase the total amount of licensee royalty payments collected while simultaneously reducing the direct and administrative costs in such collection efforts by completing a transition to an almost entirely paperless system.

On behalf of its client Institute, NIMH, the OTT Competitive Service Center executed five CRADAs, one Clinical Trial Agreement, two Research Collaboration Agreements, 13 Confidential Disclosure Agreements, and 62 Material Transfer Agreements (MTAs)

The scope of OTT's formal and informal policy activities is broad. These include health-related technology transfer and intellectual property matters, support of legislative affairs, as well as administrative oversight of NIH-wide CRADA activities through the Cooperative Research and Development Agreement Administrator and Coordinator. Using the experience of US universities and the NIH in technology transfer as reference, OTT provided advice on policies and procedures to enhance the translation of early-stage technologies into practical applications. Technology transfer policies support entrepreneurial innovation and competitiveness while balancing public health goals. OTT provided its expertise to offices and programs both internally within the U.S. Department of Health and Human Services and externally across the U.S. Government.

Among its administrative duties, OTT provides the agency determination for requests by the extramural community for waivers (to inventor, of the U.S. manufacturing requirement, and for assignment to third parties). In FY08, OTT reviewed 48 extramural waiver requests, of which 38 were requests to waive title to inventors, six regarded US manufacturing, and four were requests for permission to assign to third parties. Of the two intramural waiver requests, one was a waiver of title and the other US manufacturing.

OTT has led a variety of initiatives and implemented major policy changes in the CRADA process. These include the ongoing revision of the U.S. Public Health Service's policies and procedures for CRADAs and working with other NIH stakeholders to address issues to establish standard criteria for NIH extramural staff to be a CRADA Principal Investigator.

Members of OTT actively participate in a wide array of NIH and US Government wide projects that address programmatic components of technology transfer. Examples include membership on the Trans-NIH Task Force on Nanotechnology, the Data/Resources Sharing Interest Groups, and the Inter-Agency Working Group on Technology Transfer. Members of OTT represent HHS and NIH in interagency and intergovernmental fora, such as the Global Issues in Nanotechnology working group in

the US Government's National Nanotechnology Initiative, the Interagency working group for the Working Party on Biotechnology in the Organisation for Economic Cooperation and Development, and the Biomarkers Consortium. OTT in the past year has also asked to serve as advisors to NIH and HHS on many *ad hoc* issues related to technology transfer and intellectual property including pandemic influenza, gene diagnostic technologies, and the transfer of materials from human subjects.

OTT worked with WARF/WiCell to revise the MOU governing the transfer of human embryonic stem cell lines from University of Wisconsin into intramural PHS research programs. This MOU includes a requirement to offer similar terms to extramural recipients of NIH funding.

NEW AND ONGOING INITIATIVES

In order to provide excellent service to our NIH and FDA clients, a significant effort was made in FY08 to boost effective communication and to make these efforts, in addition to managing the associated thousands of patent cases and hundreds of license applications, as seamless as possible. Two prime examples of these efforts are: 1) a Technology Transfer Working Group; and 2) conducting patent and license docket audits. The Working Group, with representatives from multiple NIH ICs and OTT, is working to put recommendations into place to identify specific areas of responsibilities in order to decrease duplicative efforts and improve inter-office communications. OTT's docket-audit initiative is ongoing and its main goal is to focus limited resources on the most important NIH and FDA scientific discoveries. The process of conducting a complete review of its extensive patent portfolio of about 3500 US patents alone has begun with recommendations to the ICs and the FDA for cases that should be dropped. Efforts such as these are critical to OTT's ability to appropriately and effectively manage the NIH and FDA intellectual property portfolios.

Marketing continues to be a priority for OTT with 252 new and revised abstracts posted on the OTT website. A direct e-mail marketing database for vaccine related technologies was developed that includes over 100 companies. Additionally, OTT, in collaboration with the National Cancer Institute's Center for Cancer Research, is developing a web-based research materials catalogue in an effort to facilitate and expedite the licensing of intramural research materials to for-profit companies.

Synapse™, the text mining tool that helps OTT staff provide individualized and targeted technology matching service to potential licensees, has been upgraded for faster searches across databases. In addition, Synapse™ now has a list of available technologies from 22 non-profits that engage in biomedical research. These enhancements allow for the development of customized reports to industry. Overall, OTT tracks the licensing needs of over 250 companies, ranging from large pharmaceutical giants to small start-ups, as well as over 20 venture capitalist companies, technology brokers, and alliance seeking companies.

Developed in collaboration with the NIH SBIR/STTR Office, Pipeline to Partnership (P2P) is a virtual space where NIH licensees and SBIR/STTR grantees can showcase their technologies and product development for an audience of potential strategic partners and investors. The goal is to advance further development of technologies that are in the pipeline. The website has expanded to include almost 150 unique technologies from 140 companies. http://www.ott.nih.gov/p2p. (Updated September 2013: P2P is no longer available.)

OTT has begun development of a new online product showcase to present many of the products licensed and developed from intramural inventive technologies. Products showcased on this site are utilized every day to detect, treat or prevent disease or assist researchers as they continue to explore ways to develop newer and more effective health care products and procedures. The Showcase will eventually include several hunder products that are now or have been on the market. Some are FDA-approved and many do not need FDA approval. The beta version can be seen at http://www.ott.nih.gov/service/product-showcase.

OTT has also started to develop an electronic website for Research Materials (eRM) that will serve as a marketplace for the many research materials available for licensing from the NIH and FDA intramural research programs. The website will have a searchable catalogue of materials, license fee information, fillable license agreements, and an automated verification of the availability of the research material from the researcher. The interactive website will provide a marketing and licensing option that is designed to expedite the licensing process, decrease transaction costs, and facilitate greater dissemination of research materials.

In April of this year the task of adding a module to TechTracS® was initiated that will accelerate dissemination of information about new licensing opportunities for NIH and FDA technologies. TechTracS® is currently used by OTT to manage the entire IP portfolio of about 10,000 invention claims filed by NIH and FDA employees. This module, when completely developed, will allow for NIH and FDA technologies available for licensing to be posted directly to the OTT website. The system will support rapid dissemination of the technologies through syndication services such as RSS and more efficient data exchanges will be facilitated within the NIH technology transfer community.

This year, a new initiative named "next-Generation Technology Transfer Management" (n-TTM) was begun to look into "upgrading" the current OTT TechTracS® database. n-TTM is envisioned to interact effectively in the e-marketplace, automate business processes between NIH technology transfer offices, and integrate systems to increase efficiencies and reduce exposure to risk. This is a multi year project and it is anticipated that the business case will be completed in early FY09.

OTT serves as a primary NIH contact for local and state economic development organizations, particularly in their efforts to assist new start-up firms develop technologies from the NIH and FDA. OTT helped organize a major technology transfer conference "University Startups 2007: Enabling Innovation - A Transaction-focused Conference as well as the "University Angel Group Workshop" both held on the NIH

campus in FY08. OTT is also working with the Federal Laboratory Consortium and Maryland TEDCO to develop a Research Resources website that will provide information to small companies and research and development institutions on resources available through NIH.

International technology transfer remains a priority for OTT. This year, OTT entered into 53 license agreements with institutions and markets outside the U.S. In FY08, OTT met with international delegations visiting NIH, including from South Africa, Japan, Lebanon, Malaysia, China, Korea, Canada, and Taiwan. OTT also provided training for technology transfer specialists from Uganda and Italy through its International Technology Transfer Fellowship Program.

Providing educational and training opportunities in technology transfer remains a goal for OTT. NIH has significant number of fellows, post-doctoral staff, and other scientific staff who do not wish to pursue bench-research careers. Although non-academic careers in science can be both satisfying and rewarding, specific training and mentoring for these careers has not always been easily obtained at NIH. OTT also assisted the FAES Graduate School at NIH in expanding technology transfer course offerings in FY08 as well as implementing a new "Certificate in Technology Transfer" educational program.

INTERNAL ISSUES

The office underwent some important personnel changes this year with the addition of a new Director of Policy and the replacement of two branch chiefs in the Division of Technology Development and Transfer (DTDT), the Director of DTDT, and the promotion of the former Director, DTDT to the newly created position of Deputy Director, Licensing and Entrepreneurship. By building on home grown talent as well as bringing in new people from outside the office, OTT continues to develop its role as a leader in biomedical technology transfer.

Members of the office were recognized for their significant contributions to the overall mission of NIH as well as technology transfer. These awards include the prestigious NIH Director's Award, six NIH Office of the Director Merit Awards for personal and group achievements, three National Cancer Institute CCR Federal Technology Transfer Awards, Uniformed Service Public Health Service Junior Scientist of the Year Award and Commendation Medal, and 11 Technology Transfer Instructional Awards.

Philip S. Chen, Jr. Distinguished Lecture on Technology Transfer

OTT co-sponsored the third lecture titled "Innovation in the Imaging Sciences at the National Institutes of Health" presented by Robert S. Balaban, M.D.

Articles authored by OTT Personnel

Cristina Thalhammer-Reyero, "Transfer and Valuation of Biomedical Intellectual Property," *Taxation and Valuation of Technology: Theory, Practice, and the Law*, 2008 (http://www.ott.nih.gov/sites/default/files/documents/pdfs/ipvaluation2008.pdf)

Uri Reichman, Bharat Khurana, and Steven M. Ferguson, "Biopharmaceutical Research Collaborations between India and the West: A Guide to Prospective Partnerships," *Advances in Biopharmaceutical Technology in India*, 2008 http://www.ott.nih.gov/sites/default/files/documents/pdfs/AdvBiopharmTechIndia2008.pdf

Ranjan Gupta, Bjarne Gabrielsen and Steven M. Ferguson, "Nature's Medicines: Traditional Knowledge & Intellectual Property Management," *Traditional and Indigenous Knowledge: IP Perspective*, 2008

Bruce Goldstein, "'Sui Generis': A Unique Form of Intellectual Property Governing Compilations of Data," Chapter, *Association of University Technology Managers' Technology Transfer Manual*, 2008 (in press)

Posters presented by OTT personnel

AUTM Innovation Showcase, 2008

Select Presentations by OTT personnel

OTT staff was invited to give presentations at many meetings domestic and international, including:

Biotechnology Industry Organization (BIO) Annual Meeting, June 2008

International Conference on Rare Disease and Orphan Drugs (ICORD), May 2008

LES Maryland Chapter, March 2008

Ohio Valley Affiliates for Life Sciences (OVALS) Conference, April 2008

Federal Laboratory Consortium Mid-Atlantic Regional Meeting, September 2008

USPTO's annual Global Intellectual Property Academy, May 2008

British Embassy Biosecurity Trade Mission, April 2008

Penn State Hershey Medical Center Career Day, November 2007

Keynote Speaker at the 2nd Annual Tech Transfer Summit, Paris, October 2008

University of British Columbia, Office of Industry Relations, Vancouver, Canada, July 2008

University Startups 2007: Enabling Innovation - A Transaction-focused Conference, October 2007

University Angel Group Workshop, October 2007

NIHCC's annual course, "Introduction to the Principles and Practices of Clinical Research," February 2008

NCRR Seminar on Technology Transfer, October 2007

USDA Technology Transfer Course, October 2007 and September 2008

NIST-MIT Enterprise Forum, October 2007

Licensing Executive Society Annual Meeting, Vancouver, Canada, October 2007

Biotech & Pharma Public Private Partnerships, October 2007

Duke University Conference on Making Technology Transfer Work for Global Health, December 2007

U.S.-Vietnam Joint Commission Meeting on Scientific & Technological Cooperation, February 2008

Association of University Technology Managers Annual Meeting, February 2008

USPTO/SIPO Program on Traditional Knowledge & Genetic Resources, Chengdu, China, October 2007 and Beijing, China and New Delhi, India, April 2008

Emergent Biosciences Seminar Series, May 2008

NIH Patent & Technology Transfer Special Interest Group, August 2008

Medi 2008 Medical Device Conference, September 2008