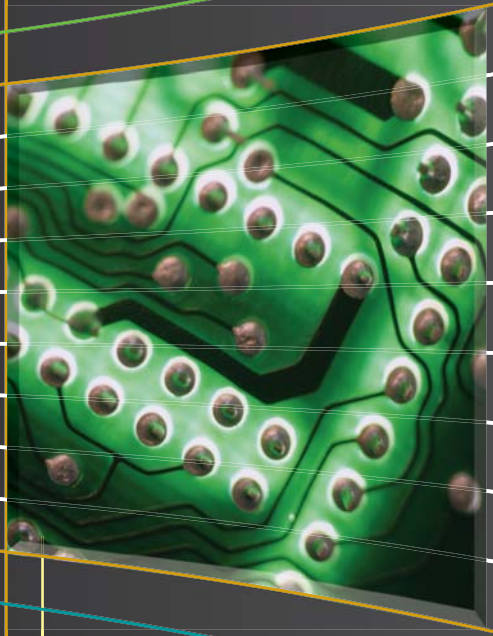
FY2006

AUTM U.S. Licensing Activity Survey



Survey Summary

A Survey of Technology Licensing (and Related) Activity for U.S. Academic and Nonprofit Institutions and Technology Investment Firms

AUTM®

AUTM U.S. Licensing Activity Survey: FY2006

Survey Summary

Message from the President

Dear AUTM Members and Colleagues,

AUTM is proud to release this summary report of the *AUTM U.S. Licensing Activity Survey™: FY2006*. The dedicated work of many people makes the Survey possible and AUTM expresses its gratitude to them, as well as the 189 research performing institutions who responded to it.

The Survey reflects the ongoing efforts of AUTM to inform the public about the activities of academic technology transfer professionals and to enhance their understanding of the context in which these activities take place. The impact of technology transfer is not in mere numbers reflecting the activities of offices, but rather in the benefit to the public of almost 700 new products reaching the marketplace in 2006. As practitioners, we're excited about this result and its contribution to the more than 4,350 new products introduced by our licensing partners since FY1998: the equivalent of nine new products every week – more than one per day every day of every year.

We are also excited by the almost 5,000 new relationships formed by licensing between companies and respondent institutions including more than 550 startups contributing to local economic development. Currently 12,600 active relationships reflected by licenses yield income rewarding students and faculty for their contributions to the supply chain of innovation.

Far from being "ponderous bureaucracies" as some critics have asserted, these results were accomplished by offices with 3.5 LFTE as the median number of licensing personnel and a total median office size of 6 FTE. While employment grew in FY2006, and some offices are large, in general a relatively small group of professionals manages the intellectual property generated by the faculty, students and staff of institutions conducting more than $45 billion (U.S.) in research.

The AUTM *U.S. Licensing Activity Survey: FY2006* provides a window onto the activities of AUTM's members and the institutions they serve. Our institutions transfer knowledge in many ways and we recognize that these numbers are just a part of the actual contributions from research performed at them. While no single set of measures can capture the full contribution of our institutions to society, nor capture the complex movement of research into beneficial use, we hope that you as the consumer of the information in this summary will find it useful.

Patrick L. Jones, Ph.D.
2007–2008 AUTM President

AUTM members engage in a variety of activities to achieve, and to further, broad public use of university innovations. Two key findings specific to U.S. institutions in FY2006 were reported:

- Universities received $45 billion plus in R&D expenditures at U.S. academic centers; and
- Technology transfer had record staffing levels, with total employees exceeding 1,800.

The following statistics represent a sampling of technology transfer activities required to achieve such figures. AUTM members:

- Managed 18,874 new invention disclosures
- Filed 15,908 total U.S. patent applications
- Saw 3,255 U.S. patents issued
- Signed 4,963 new licenses
- Managed 12,672 licenses and options that are yielding active income. Each single license represents a one-on-one relationship between a company and a university, hospital or research institution that earns income on products that benefit our communities.
- Had 697 new products introduced to the market in 2006 from active licensees;
- Introduced more than 4,350 new products into the market in the nine years from FY1998 to FY2006. That is 1.32 new products based on academic inventions introduced every single day over the last nine years
- Launched 553 new startup companies in 2006. That is 2.2 new companies for every working day of the year. Each is based on what is hoped to be a platform of academic technology, which will address market needs through the application of invested money by well-paid employees.
- 5,724 new spinouts since 1980 — more than one company every two days during 9,498 days of innovation.

Acknowledgments

We want to particularly thank the AUTM volunteers who take time to review their data each year and provide it to AUTM. Through the New Metrics Task Force activities, we have repeatedly heard how much others rely on the AUTM Annual Licensing Activity Survey, and have found these data extremely important in crafting policies and approaches to improve early-stage research, innovation and public impact. The Survey Committee, Rick and Nola Colman, and the Social Impact Vignettes Sub-Committee work tirelessly to make the data understandable and relevant. While constructing this report is a time-consuming process for the AUTM members who participate, the data and resulting reports are a daily reminder of the impact that academic technology transfer can bring to others.

Survey Committee

Christine Burke, *University of California*

Alice Li, *Cornell University*

Patricia Cotton, Ph.D., *University of California*

Kevin Cullen, Ph.D., *University of Glasgow*

Sean Flanigan, *University of Ottawa*

Tanya Glavicic-Theberge, *McGill University*

Jodi Hecht, Ph.D., *Beth Israel Deaconess Medical Center*

Marcel Mongeon, *Mongeon Consulting Inc.*

Tanya Moxley, *Springboard*

Robin Rasor, *University of Michigan*

Patrick Reed, *Georgia Tech Research Corporation*

Ken Sherman, *University of Nevada, Las Vegas*

William Tucker, Ph.D., *University of California*

Deanna Vandiver, *Louisiana State University Health Sciences Center*

Andrew R.O. Watson, Ph.D., *Oregon Health & Science University*

Social Impact Vignettes Sub-Committee

Deanna Vandiver, Chair, *Louisiana State University Health Sciences Center*

Nikki Borman, *Borman and Company LLC*

Jennifer Cook, *University of Mississippi*

Barbara Eccles, J.D., *Lakehead University*

Ray Hoemsen, *Red River College*

Laura Savatski, *Blood Center of Wisconsin*

Sincerely,

Dana Bostrom
AUTM Vice President, Metrics & Surveys
Editor, 2006 U.S. Licensing Activity
Survey Summary Report,
Portland State University

Robert Tieckelmann
Editor, 2006 U.S. Licensing Activity
Survey Summary Report
The Research Foundation of
State University of New York

Introduction and Overview

The AUTM Licensing Survey Summary is a standard for technology transfer professionals and public sector individuals that desire data on academic intellectual property licensing activities in the U.S. and Canada. Each year, member institutions allocate time and energy to volunteer their office metrics for compilation into the survey summary. AUTM volunteers collect, assemble and report the statistic data in a format that evolved to this current representation or summary of licensing activity. This information is disseminated to the AUTM membership and the general public in an effort to communicate our profession's activities and the benefits that we all reap from those activities.

While the instrument for the 2006 survey largely remained the same as in 2005, careful readers will note the addition of a new word in the title of the survey, the AUTM Annual Licensing "Activity" Survey. Because the AUTM instrument measures only certain activities that AUTM members undertake in order to effectively transfer technology — and AUTM is planning the introduction of additional surveys and changes to this annual survey — now seemed an appropriate time to change the name to better reflect the outcome of the instrument. Thus, this name change highlights that AUTM currently captures the activities that an office engages in rather than the impact or results of licenses. This name is consistent with the original purpose of the survey: to assist AUTM members in benchmarking their offices' resources and activities with peer organizations. AUTM intends to hold true to this purpose, while making changes to enhance utility.

For 2006, AUTM members report positive news in representative data when compared to the 2005 Survey Summary. Resources for technology transfer continue to increase, by way of more research funds received by our faculty, staff and students, and more staffing in technology transfer offices. It is likely little coincidence that new disclosures, patent applications and licenses all made gains as well. In future years, if the past is any guide, these activities should result in more products, licenses or other benefits more directly tangible to individuals.

Other AUTM Tools

AUTM is also preparing a Better World Report for release in 2007, as part of the Better World Project. These technology transfer success stories are told by members of our

professional organization, and we hope provide additional insight into the everyday results of academic technology transfer. Stories from across the globe can be found on the Better World Project Web site, and AUTM continues to accept stories. Statistics are often made more real with the inclusion of real-world stories.

Through the Metrics and Surveys Committee, AUTM is exploring new directions for technology transfer metrics. FY 2006-7 was active as AUTM volunteers presented our methods and metrics, and asked for input, from participants throughout the U.S., Canada, Europe and Asia. Our outreach extended to U.S. federal agencies, foundations and institutions and many other groups peripheral to AUTM but with significant overlap in mission, function and focus. The goal is to better understand the process and value of technology transfer, so as to better capture and explain it through statistics and stories accessible to non-practitioners.

As licensing activity becomes more complex, AUTM is evolving by making tools which make complex analysis easier for professionals of all types. Access to select data collected through AUTM's annual activities is now available by subscription to STATT (Statistics Access for Tech Transfer). As in prior years, the AUTM U.S. Licensing Activity Survey Full Report will be available to our membership and the public. The Full Report contains more detailed graphs and charts and all the public data from the 2006 survey.

For the third year, AUTM will release a report dedicated solely to Canadian respondents to the AUTM Annual Licensing Activity Survey. The Full Report will include both U.S. and Canadian data. Although other countries and non-AUTM institutions collect similar data, their results are not included in our report.

Context for AUTM Data

As in the past, AUTM data provides information about one aspect of the innovation ecosystem. AUTM provides systematic, objective data about primary activities of academic technology transfer. AUTM does not provide in-depth analysis of effectiveness rankings based on its data because offices and universities are not directly comparable. Policies, personnel, curricula and academic and research focus vary markedly from institution to institution. Readers are advised to examine the methodology and use of data in any ranking or effectiveness report carefully.

Goals of Technology Transfer

Brief History

Respondents to the annual survey have grown in number as AUTM membership has grown. U.S. respondents (universities, hospitals and research institutions) grew from 120 in 1991 to 189 in 2006. AUTM's growth in terms of potential respondents and the respondents to the survey has leveled. While the rate of growth is slowing in the U.S., innovation management is spreading and maturing across the globe.

The market segments and investment communities to which we make our technologies available are global and the comparisons the U.S. makes between and among our peers has increasingly included those outside of North America. Global collaborators seek to borrow, modify and share best practices, recognizing that academic technology transfer will require adjustments to fit well with each culture and economy. They also recognize the benefits will be far reaching. As a global team of administrators, researchers, inventors and other professionals critical to the management of university intellectual property, we have crafted a process worthy of replication.

Table of Contents

AUTM Success Stories

AUTM members contribute to our local, regional and global communities in meaningful ways. Each year we ask the membership to submit stories about products and processes of technology transfer that benefit society. This year twelve such stories were selected, and underline each page of the Licensing Activity Survey Summary, and demonstrate AUTM members' commitment to their institutions and society.

1 Review of the Survey Data

Technology transfer offices evolve over timeframes that are dependent upon many factors, including support from campus and institutional leadership. Once staff is dedicated to a technology transfer effort, the organization focuses on developing relationships and comprehension regarding innovation management with three critical groups: campus leadership; faculty, staff, and students; and the business community. The office staff works with these entities to create practices, infrastructure and a positive culture for innovation. Armed with the aforementioned, the goals and value of technology transfer are communicated to campus leadership, and the process of disclosure of innovation begins. A *disclosure* is a form, and is the process by which an institution takes ownership of a specific innovation, and can invest institutional resources to assist in its success. Soon a portfolio of technologies emerges, and the academic technology transfer office begins to evolve. The office is engaged with the local investment community and networking with helpful groups, including other academic technology transfer offices. The goal is to transition the innovation from academic support to end-users, often through the use of gap (noncharitable) funding.

A Ripe Idea Bears Fruit

North Carolina State University

While an apple a day in the U.S. seems a healthy, wise choice, it's not even an option in many parts of the world. Fruit and vegetable crops are historically susceptible to softening, over-ripening, and certain diseases during shipment and storage, often due to contact with ethylene. Ethylene in the atmosphere, when combined with the plant's internal production of the gas, hastens the ripening process and contributes to spoilage thus limiting how far fresh produce can travel.

Researchers from the College of Agriculture and Life Sciences at North Carolina State University have

A successful office may be judged by many metrics. Most institutions would define success through the criterion of public benefit. Offices that return the charitable support from government and private resources to the public in the form of products and services that benefit the local community are held in high regard by those communities and their technology transfer colleagues. To sustain the long-term relationships necessary to enable innovation transfer, and as studies such as the Milken report, (Mind to Market: A Global Analysis of University Biotechnology Transfer and Commercialization, September 2006) demonstrate, staffing is a key driver to this measure of success, and this section describes that driver.

> "SmartFresh...means nutritional, healthy food can be transported farther than ever before."

discovered a patent-protected method of inhibiting the ethylene response of fruits and vegetables with 1-MCP (1-methylcyclopropene), delaying the final ripening process.

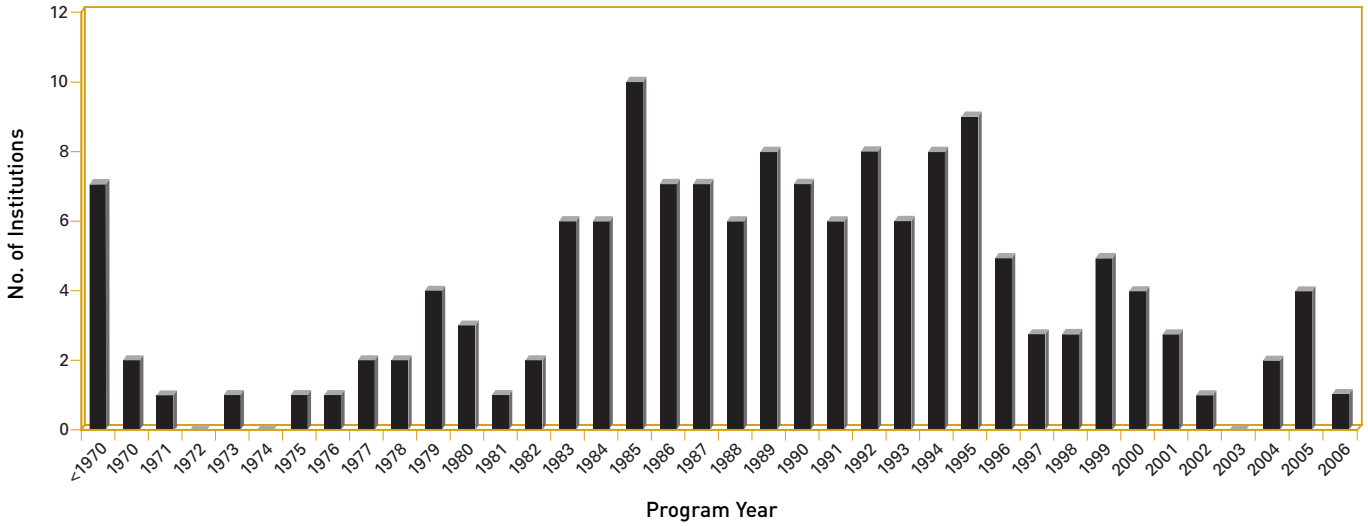
Following its discovery, the ethylene-inhibiting technology was quickly licensed by Rohm and Haas Co., which since has formed a subsidiary, AgroFresh Inc., to further develop and commercialize the innovation now marketed as SmartFresh. Registered by the U.S. Environmental Protection Agency as a reduced-risk product, SmartFresh is not applied directly to the produce. A container is opened in the storage facility or truck releasing the SmartFresh compound into the air, where it binds to ethylene receptors of the plants, preventing ethylene action. When the fruit is released from storage, ripening begins again.

The SmartFresh Quality System has been successfully approved and accepted for use in more than 26 countries including the European Union and the United States. Now, all over the world, SmartFresh is keeping fruits and vegetables juicy, crisp, and harvest-fresh during storage and transport, which means nutritional, healthy food can be transported farther than ever before. For more information, visit http://www.ncsu.edu/ott and http://www.smartfresh.com.

Staffing

Figures US-1 and US-2 show the growth of staffing in technology transfer programs as a function of program start date.

Figure US-1. Technology Transfer Program Start Date of U.S. Universities, 1970–2006



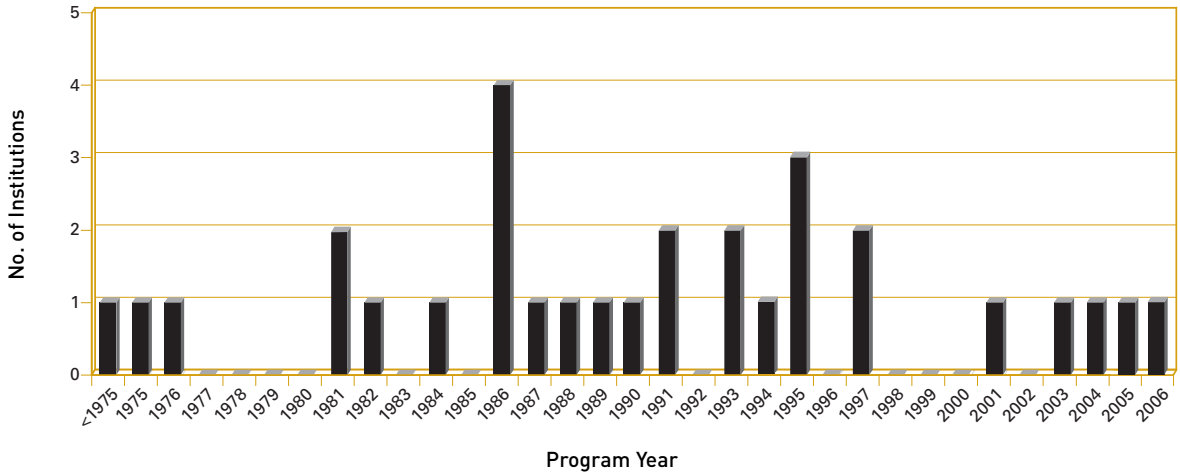
Atripla: The First Once-a-Day, Single Tablet Regimen for Adults with HIV

Emory University

Taking ten to fifteen pills a day—and a few more in the middle of the night—was commonplace a decade ago for HIV patients on antiretroviral therapy. Now, for the first time, adults with HIV can take one pill once a day with Atripla, a highly effective combination of three previously approved drugs. The three-in-one drug is expected to improve and lengthen the lives of millions of people worldwide.

Atripla was approved rapidly through the Food and Drug Administration's fast-track review program. It combines the antiretroviral drugs efavirenz (Sustiva), emtricitabine (Emtriva), and tenofovir disoproxil

Figure US-2. Technology Transfer Program Start Date of U.S. Hospitals and Research Institutions, 1975–2006



The initiation of new university technology transfer programs in FY2006 was consistent with the six prior years — only one program in the U.S. was initiated. A similar increase, one program, occurred in FY2006 for U.S. hospitals and research institutions.

Earlier reports mention a boom in program initiation that occurred for U.S. universities from 1983 to 1999. This observation bears repeating as nearly three-fourths of all programs were initiated during this 17-year time span. In contrast, in the last seven years, program initiation has only increased seven percentage points. The trend is similar for U.S. hospitals and research institutions.

fumarate (Viread)—all reverse transcriptase inhibitors effective at reducing viral loads.

Emtriva was invented by a trio of Emory University scientists. Raymond Schinazi, Ph.D., D.Sc. (Hon.), an infectious disease expert at Emory, has spent twenty years battling the virus that causes AIDS. With colleagues Dennis Liotta, Ph.D., a professor of chemistry at Emory, and Woo-Baeg Choi, Ph.D., a chemist who founded FOB Synthesis of Atlanta, he discovered the drug emtricitabine in 1996.

Emory sold all royalties and future rights to the drug in 2005 to Gilead Sciences and Royalty Pharma in a record $525 million intellectual property rights deal. Gilead and Bristol-Myers Squibb came out with Atripla by combining two medicines that contained all three antiretrovirals.

Because taking one pill once a day is easier to remember than other treatment regimens, researchers hope Atripla will curb the emergence of drug-resistant strains of HIV, which can result from skipped doses. A single pill also will be easier to transport, stock, store, and distribute, especially in remote areas of developing countries.

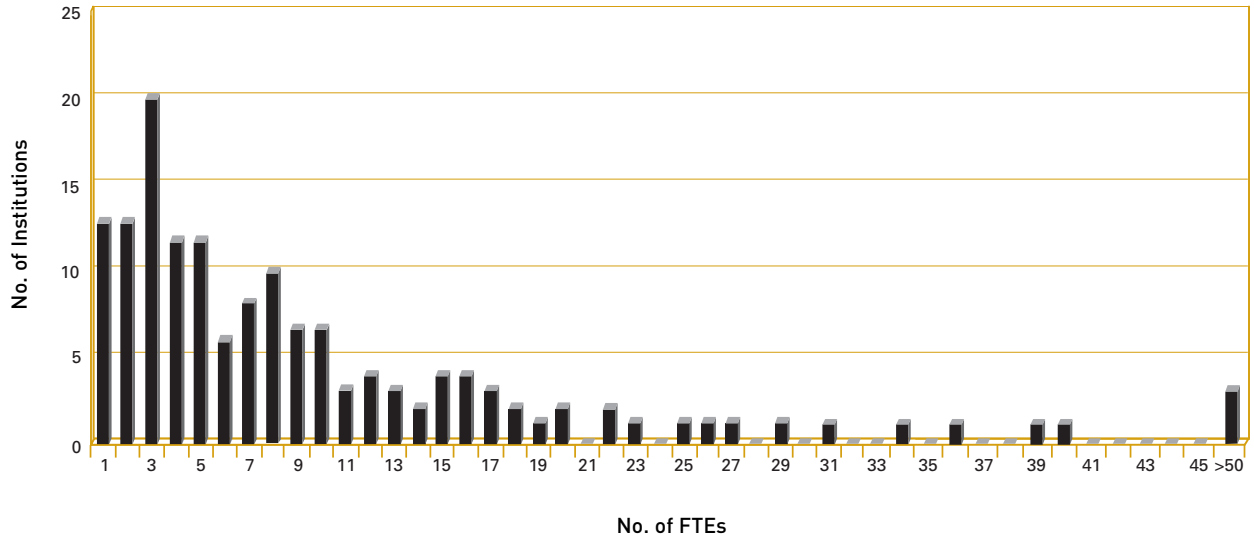
Atripla may be the pill that will change the treatment paradigm for those living with HIV/AIDS.

Schinazi says the new three-drug pill is like having "an H-bomb for the HIV virus. You blow it to smithereens with one simple pill—the virus doesn't know how to escape."

The success of technology transfer programs is reliant upon staffing, which includes licensing staff and administrative staff. In 2006, roughly half (76 of 151) of U.S. university respondents reporting had six or fewer staff members. In 2005, about half of U.S. university respondents reporting had five or fewer staff members. In 2006, slightly less than a third (46 of 151) reported three or fewer staff members. In contrast, only about one fifth (32 of 151) of U.S. university respondents reported staff levels of 15 or more.

A staffing summary for the last five survey years is compiled in Table US-1. Figures US-3 and US-4 show the staffing levels.

Figure US-3. Technology Transfer Office Staffing Levels, U.S. Universities, 2006



Vaccine Booster: Protein Production Process Revolutionizes Research and Development

Texas A&M University

The ability to produce large amounts of functional proteins is key in studying biological pathways and in the development of drug therapies and vaccines. The work of Max Summers, Ph.D., and co-inventor Gale Smith, Ph.D., along with a research team in Summers' laboratory at Texas A&M University, revolutionized this process, resulting in the safe, cost-effective, and large-scale production of proteins for a variety of diverse applications ranging from basic research to drug development.

While studying the molecular biology of the family of large rod-shaped insect viruses, known as baculoviruses, a virus gene promoter was identified that

Figure US-4. Technology Transfer Office Staffing Levels, U.S. Hospitals and Research Institutions, 2006

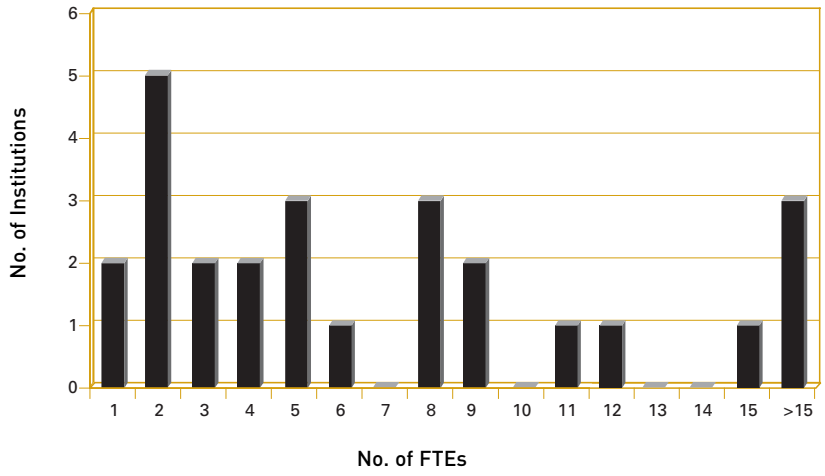


Table US-1. Staffing

Survey Year	One Third of Offices Surveyed (Staff)	One Half of Offices Surveyed (Staff)
2006	3 or fewer	6 or fewer
2005	3 or fewer	5 or fewer
2004	3 or fewer	6 or fewer
2003	3 or fewer	5 or fewer
2002	3 or fewer	5 or fewer

"BEVS is an enabling technology accepted by both academics and industry as one of the most important methods for producing large quantities of proteins."

could be used to express virtually any foreign gene in cultured insect cells or insects. This discovery led to the development of the Baculovirus Expression Vector System (BEVS).

Before the development of BEVS, scientists were limited primarily to using bacterial and yeast expression systems. While these methods are still used today, they are limited in their ability to express large, structurally complex proteins that retain the normal properties they possess when produced in mammalian cells. BEVS is an enabling technology accepted by both academics and industry as one of the most important methods for producing large quantities of proteins. In addition, baculoviruses are also considered safe for humans because they primarily infect insects.

The success of the system has led to 100 licenses and the development of several drugs that are expected to enter the market in 2008, including a papilloma virus vaccine for cervical cancer (Ceravix), a prostate cancer vaccine (Provenge), and a non-egg-based flu vaccine (FluBlØk). Protein Sciences Corp., a vaccine company based in Connecticut, was able to use the BEVS technology to develop its experimental human vaccine for H5N1 (bird flu virus) in record time—only eight weeks—demonstrating the power of the system to allow researchers to rapidly respond to threats to human health.

Table US-2 illustrates the historic staffing levels for all U.S. respondents since 1997. Staff levels are steadily increasing. The 2006 increase in staffing (136.7) is the largest since the staffing increase in 2002 of 192.9. The 2005 increase (45.1) was the lowest increase in the years reported in Table US-2. Staffing has more than doubled since 1997. It may be useful to note that the AUTM 2004 Salary Survey™, which was AUTM's first comprehensive examination of staffing in technology transfer in more than a decade, may have had impact on staffing for technology transfer.

Table US-2. Historic Staffing Levels of U.S. Offices of Technology Transfer, 1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Licensing FTE	415.4	452.6	494.2	552.5	627.7	733.7	793.7	832.9	847.0	910.7
Other FTE	461.6	476.0	538.7	575.5	630.8	717.8	759.5	817.0	848.0	921.0
Total FTE	877.0	928.6	1,032.8	1,128.0	1,258.5	1,451.4	1,553.3	1,649.9	1,695.0	1,831.7

Biofuel: Driving the Future

University of Florida

For years, an economic method to generate biofuel from cellulosic waste has eluded U.S. scientists trying to solve problems related to oil imports and climate change. But Lonnie Ingram, Ph.D., and his colleagues at University of Florida (UF), have generated fermentation technology for the production of ethanol for cellulosic sources that promises to use less energy than corn-based ethanol.

The cellulosic fermentation technology, which earned Ingram and his colleagues the nation's landmark 5 millionth patent in 1991, is overcoming some of the longstanding hurdles to cellulosic biofuel production. Additionally, because cellulosic biofuel can be created from certain trees and native plants, growing the fuel sources will benefit the environment.

Incoming Research Funds

Monitoring research expenditures is one way that users attempt to normalize technology transfer data, comparing data for organizations that have similar total external research funds. These funds are the lifeblood of all major research institutions and are also the catalyst for innovation and discovery throughout the United States. Each year, research faculty and staff apply for billions in charitable research support from government and private funding agencies. While the technology transfer professional rarely engages in the application (pre-award) process, it is incumbent upon the professional to keep a finger on the pulse of campus or institutional activity at the pre-award and post-award stages.

> "Basically, you would have a fuel source for our cars that, in the big picture, could help capture almost as much carbon dioxide as it produces."

Monitoring sponsored research expenditures often governs where the professional will focus efforts. Research expenditures occur over long time periods. Research outcomes that a company can turn into a product are often the result of many years of federal funding and dedicated insight by organization faculty, staff and students, as can be seen in the accompanying vignettes to this report. Trends that affect the funding process also affect the number and type of disclosures. Disclosures will lag any changes in

Thanks largely to the work of Ingram, Verenium Corp., began operation of a 20-million-gallon biomass-to-ethanol plant in Louisiana in June 2007. Verenium Corp., a Massachusetts-based company, possesses integrated, end-to-end capabilities in pretreatment, novel enzyme development, fermentation, engineering and project development. It recently acquired Celunol Corp., a startup company formed more than a decade ago after working with the UF Office of Technology Licensing. Verenium houses its R&D facilities at the UF-sponsored Sid Martin Biotechnology Incubator in Alachua, Florida, and is set to become a leader in the biofuel industry.

Cellulose is made up partly of sugars. Turning cellulose into biofuel requires using several enzymes to break up the sugars. Utilizing the necessary enzymes had previously been costly and difficult. However, because Ingram's C5 fermenting organism ferments all hemicellulose sugars, Verenium is confident it will be able to mass produce cellulosic biofuel on a large scale. Verenium plans to aggressively pursue a program of building and licensing cellulosic ethanol plants based on this technology.

"Basically, you would have a fuel source for our cars that, in the big picture, could help capture almost as much carbon dioxide as it produces," says UF researcher Gary Peter, Ph.D. "That would go a long way in slowing the biggest driver of global warming."

For more information, visit www.verenium.com.

funding, but tend to follow the general trends. Since most of the critical research at research organizations is conducted by faculty and graduate students, financial support for the graduate students is often the defining factor in speed of early-stage technology development.

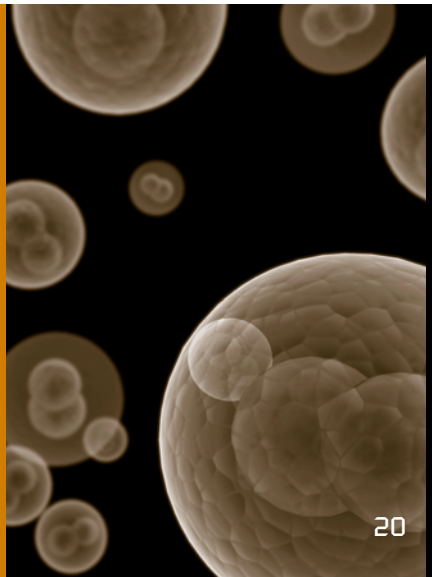
Incoming research funds or research expenditures are primarily from U.S. government agencies. Industrial sources account for the next largest share and the funds expended have continually increased throughout the years. Combined, the two sources account for between 71% and 75% of all research funds annually. This information is compiled in Table US-3.

Table US-3. Total Research Support from Federal and Industrial Sources for U.S. Universities, Hospitals and Research Institutions, 1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Total Research Expenditures ($ billions)	21.63	23.25	25.67	27.87	29.96	34.96	38.50	41.20	42.30	45.40
% Federal	65%	63%	63%	62%	64%	64%	66%	67%	67%	68%
% Industrial	9%	9%	10%	9%	8%	8%	7%	7%	7%	7%

Tapping a New Source for Stem Cells: Umbilical Cord Matrix

Kansas State University



At Kansas State University, four researchers have taken a stridently different approach to stem cell research. The pioneering work of Mark Weiss, Ph.D., Deryl Troyer, D.V.M., Ph.D., Duane Davis, Ph.D., and Kathy Mitchell, Ph.D., led to the discovery of an abundant source of primitive stem cells in the cushioning material, or matrix, within the umbilical cord known as Wharton's jelly. These cells can be easily obtained in large numbers and have been shown to possess promising therapeutic effects.

The first major breakthrough came in 2004 during an experiment on rats with Parkinson's disease. In laboratory trials, undifferentiated matrix cells from a

Total research expenditures increased $3.1 billion in 2006 to $45.4 billion. This was the largest absolute increase since 2003 ($3.54 billion) and the third largest increase since 1997. The 2006 increase (7.3%) was small on a percentage basis, eclipsing only 2005 (3%) and 2004 (7%) and slightly less than 1998 (7.5%) and 2001 (7.5%). The increases in total research expenditures average about 8.6% per year. The increase in 2002 of 16.7% ($5 billion) is the largest percentage increase since 1997.

Figure US-5 graphs the research expenditures from Table US-3. The increases in federal support are greater than the increases in industrial support since 1991. Industrial support peaked in 1999 when expenditures were 10% of total expenditures. The percentage that industrial support represents has been flat since 2003.

"Our cells are not making new neurons and forming new connections; they are doing something to rescue existing neurons."

human umbilical cord were transplanted into the brains of rats with Parkinson's disease. Over the course of a few weeks, between half and three-fourths of the rats showed a reduction in Parkinson's symptoms, and one rat experienced a 90 percent reduction in symptoms. Analysis showed that the matrix cells were doing something to save the rats' dying neural brain cells.

"Our cells are not making new neurons and forming new connections; they are doing something to rescue existing neurons," explains Troyer. "We're enamored with this idea because it's much easier to restore function to cells before they die because the circuitry is already in place."

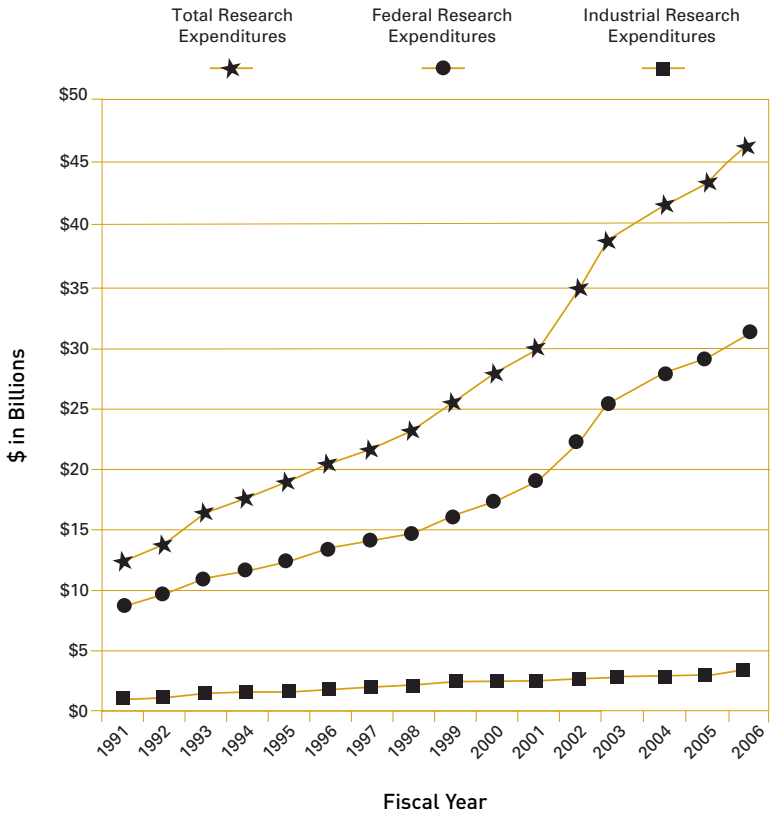
The researchers hope the cells will have broad applications in the areas of neurodegenerative diseases, spinal cord injury, stroke, tissue and bone healing, and cancer. The vast quantity of matrix cells could lead to their potential use as "feeder layers" on which blood-forming stem cells and bone marrow cells could be grown, expanded and banked.

In the animal area, it is hoped that the cells can be used to prevent disease in livestock, create more effective vaccines and increase efficiency of food production.

Two use-specific licenses have been issued to commercial entities to date, one in human medicine and one in equine medicine.

"Lyrica is the first and only approved drug to date for the effective treatment of diabetic peripheral neuropathy and postherpetic neuralgia..."

Figure US-5. Research Expenditures for U.S. Universities, Hospitals and Research Institutions, 1991–2006



A Many Hit Wonder: Lyrica™

Northwestern University

While in pursuit of finding an anticonvulsant agent for possible use in the treatment of epilepsy, Richard B. Silverman, Ph.D., professor of chemistry at Northwestern University, along with postdoctoral fellow Ryszard Andruszkiewicz, invented the novel compound pregabalin, which successfully treats epilepsy, neuropathic pain, anxiety disorder and fibromyalgia. Lyrica™, the trade name for pregabalin, is the first and only approved drug to date for the effective treatment of diabetic peripheral neuropathy and postherpetic neuralgia—two of the most common forms of nerve pain that afflict millions of people—and for fibromyalgia.

2 Intake and Intellectual Property Management

First notice of an innovation most often arrives at the technology transfer office in the form of a disclosure. The disclosure then begins a journey shaped by the women and men in these offices.

That journey was likely preceded by a sponsored research program. Most innovations are created by faculty with financial support from external sources for research. While technology transfer professionals are often not part of the process of applying for financial support (the pre-award process), it is incumbent upon them to respond to the invention disclosure.

The disclosure is logged into an intellectual property management process. The technology transfer office evaluates an invention disclosure, the most common kind of disclosure, and examines it for the critical invention tests (novel, non-obvious and useful). Another common type of disclosure is for copyrightable work, and a disclosure will be examined for information necessary to file a copyright registration. Often, the office or its legal representatives must negotiate with patent, trademark and copyright offices to have appropriate legal protection granted. The patent prosecution process timeline with the U.S. Patent and Trademark Office (USPTO) is currently affected by a large backlog of cases.

In a parallel path, if potential licensees for the newly disclosed innovation have not already been contacted, the technology transfer office will begin to seek licensees. There are myriad tools and venues for securing the financial backing necessary to convert an

Lyrica's acceptance among physicians and patients has made it one of the most successful new drug launches in recent years. Lyrica was launched in the United States in mid-September 2005 for neuropathic pain and epilepsy. In February 2007, Lyrica was approved in the United States for fibromyalgia. Lyrica has been in the European market for several years, having received market approval by the European Union in July 2004, for two indications, neuropathic pain and epilepsy. In March 2006, the European Union also approved Lyrica for the treatment of generalized anxiety disorder (GAD). Clinical trials continue in the United States with Lyrica for GAD.

Lyrica is protected by numerous patents that cover its composition, methods of syntheses, and clinical use for treatment of various conditions, such as epilepsy, pain and anxiety disorder. A license agreement between Northwestern University and Warner Lambert (later as acquired by Pfizer) granted exclusive rights. Worldwide sales of Lyrica in 2006, the first full year after Food and Drug Administration approval, was $1.2 billion.

For more information, see www.lyrica.com/.

innovation to a product or process for society's benefit. The professional may present the innovation to investors at a venture forum or to specific organizations with a track record of in-licensing universities' inventions. Regardless of the final licensees, the technology transfer professional seeks support from outside the institution to ensure the innovation achieves the maximum benefit for the community and society.

In FY2006, 189 institutions received 18,874 invention disclosures, an increase of 1,492 disclosures or 8.6% compared with the 17,382 disclosures from 191 institutions in 2005. Table US-4 shows invention disclosures received by all respondents since 1997.

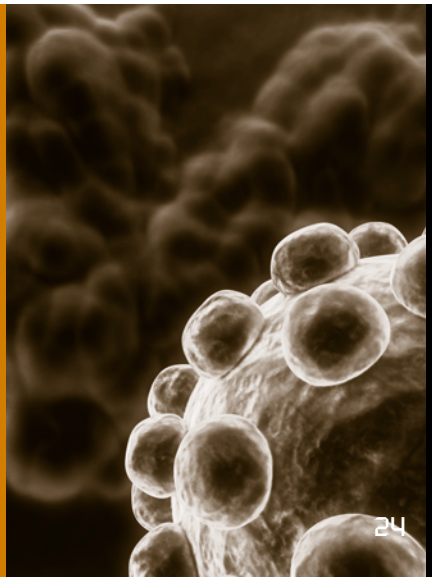
Patents are the most common form of statutory intellectual property sought by U.S. research institutions. Table US-5 shows new U.S. patent applications filed since 2001.

Table US-4. Invention Disclosures Received by U.S. Respondents, 1997–2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Number of Respondents	158	159	169	167	169	188	198	198	191	189
Invention Disclosures Received	10,613	10,987	11,607	11,974	12,624	14,398	15,510	16,811	17,382	18,874

Cord Blood Collection Method Delivers More Hope

Children's Hospital Oakland Research Institute



With its high concentration of hematopoietic stem cells, umbilical cord blood offers a potential source of treatment for patients who lack a matching bone marrow donor. Stem cells collected from umbilical cord blood have been used with success in transplants to treat a variety of pediatric disorders, including leukemia, sickle cell disease and metabolic disorders.

However, current umbilical cord collection methods are problematic. Not only is there a risk of bacterial contamination, harvesting enough blood is often challenging. Volumes collected with the current methods are sometimes insufficient for transplants in

Table US-5. Patent Applications Filed by U.S. Respondents Since 2001

	2001	2002	2003	2004	2005	2006
Number of Respondents	170	189	198	192	191	189
New Patent Applications Filed	6,397	7,319	7,921	10,517	10,270	11,622
Total U.S. Patent Applications Filed	10,687	12,222	13,280	13,803	14,757	15,908
U.S. Patents Issued	3,559	3,501	3,933	3,680	3,278	3,255

Figures US-6 and US-7 show the distribution of new U.S. patent applications filed by U.S. universities, and U.S. hospitals and research institutions respectively.

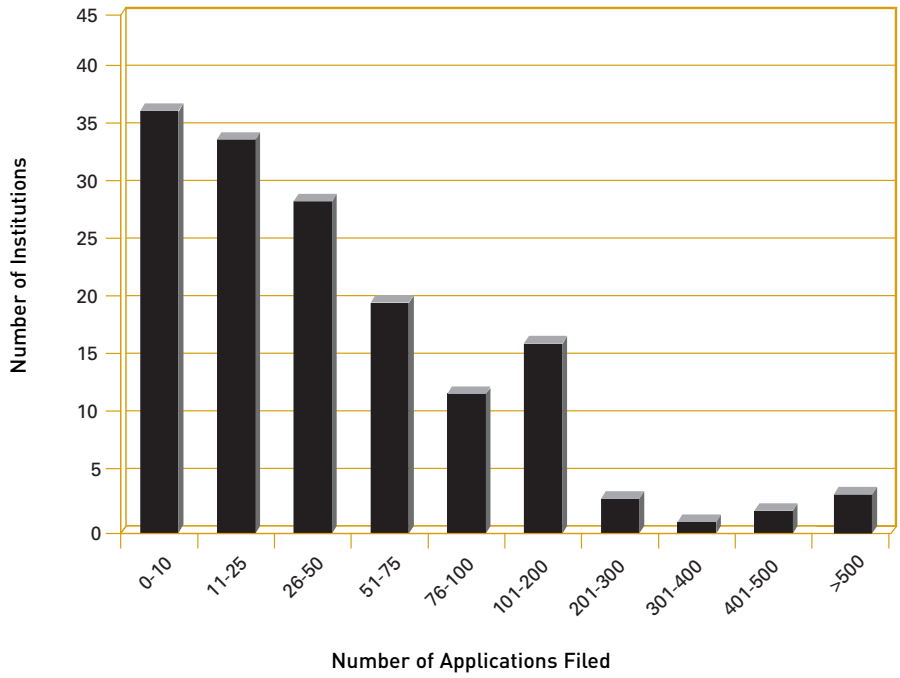
The filing of new U.S. patent applications most frequently corresponds with a decision to seek patent protection of a single invention disclosure, though sometimes two or more invention disclosures are combined into a single new U.S. patent application. Conversely, a single invention disclosure can occasionally generate more than one new U.S. patent application. In addition, filing a new U.S. patent application may not take place immediately

children, and rarely sufficient for adults. In addition, the success of the current methods relies heavily on the collector's expertise.

Frans Kuypers, Ph.D., a principal investigator at Children's Hospital Oakland Research Institute (CHORI), the research arm of Children's Hospital and Research Center Oakland,) has developed a cord blood collection device that provides a method for quickly and safely harvesting a large volume of blood from an umbilical cord in an aseptic environment after the delivery of the infant. Preliminary tests performed at CHORI show that the new device yields larger collection volumes in less than half the time, as well as eliminating injury due to needle sticks and aerosolized blood particles inherent in the current method of collection.

Cord Cell Technologies LLC is a startup medical device company formed to commercialize the new umbilical cord blood-collection method. Under the direction of Richard Meyst, president and chief executive officer of parent company Fallbrook Engineering, the invention has been fully developed and will be launched by Cord Cell Technologies within the next year, once Food and Drug Administration regulatory approval has been granted.

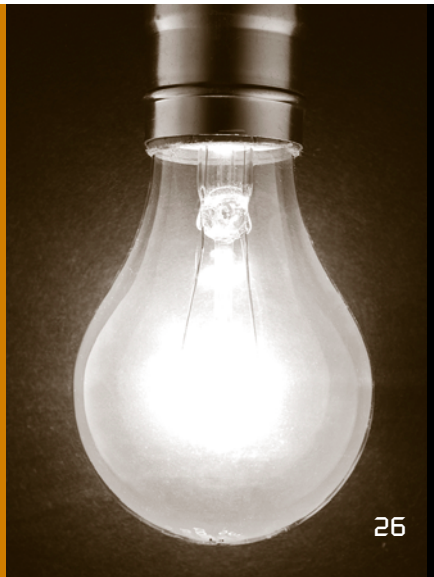
Figure US-6. New U.S. Patent Applications Filed by U.S. Universities, 2006



after submission of an invention disclosure, so seeking protection for an invention disclosure may not occur in the same year that the invention disclosure is received. Often, patent applications are filed based on a previous year's disclosures.

Fashioneers: Accessory to Better Quality of Life

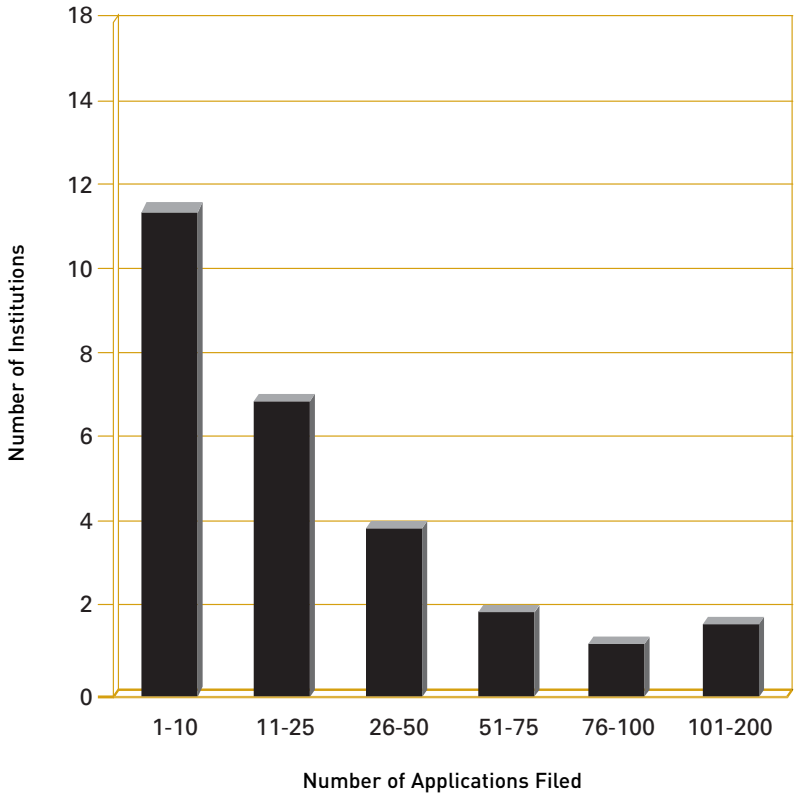
Ryerson University



When lymphedema sufferers at Princess Margaret Hospital's (PMH) Breast Cancer Survivorship Program reported the difficulties the swelling of their arms and increased risk of infection posed when donning clothing and accessories, the hospital recruited Ryerson University researchers to engineer a solution.

Sandra Tullio-Pow and Sue Barnwell, professors in Ryerson's School of Fashion, collaborated with Joyce Nyhof-Young, Ph.D., at PMH in a multiphase research project to address the special apparel needs of the 10 to 30 percent of breast cancer survivors affected by this chronic condition. Largely conducted through focus groups drawn from the Survivorship Program, the

Figure US-7. New U.S. Patent Applications Filed by U.S. Hospitals and Research Institutions, 2006



research identified their specific needs and field-tested the resulting designs.

"We were surprised at how challenging basic apparel was for lymphedema patients; how limited their manual dexterity was," says Tullio-Pow, whose background is in functional apparel design. "They told us that they can't fasten a button or easily detach Velcro®, and they worry about a metal zipper scratching their skin and causing infection. Once we knew what they needed, the solutions were fairly easy to generate."

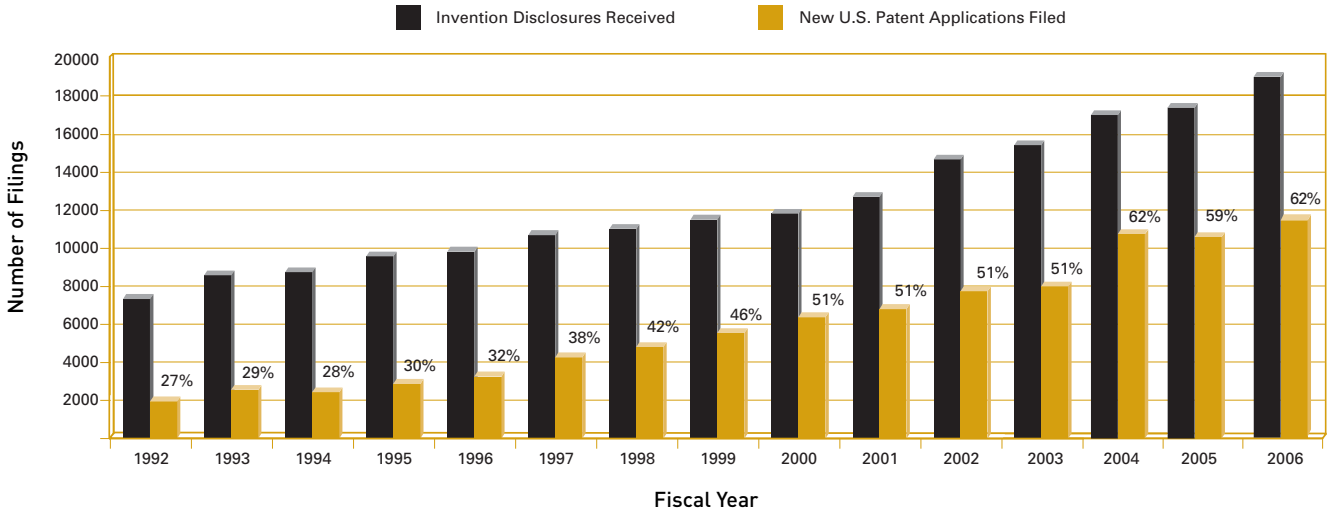
Focusing on style, comfort, and performance, the team designed an innovative purse for these women. A modular bag, with a hidden built-in sling for arm comfort, the purse features a wide adjustable strap for even weight distribution at the shoulder, long easy-to-grasp zipper tabs, and lobster-claw hardware to attach the modules. Perfect for hands-free carrying, the modules also attach to a body-contoured belt.

"The really rewarding aspect of this research is that these women who told us that they wanted a fashionable bag to carry, not a medical device, are suddenly having people come up and ask them where they can buy a purse like theirs," says Barnwell.

The next step is to test market the customized bag to a broader group. A limited number of bags will be available for purchase online, as well as a consumer feedback mechanism.

Tullio-Pow and Barnwell's research, "Lymphedema Lines: Clothing and Accessories for Female Breast Cancer Patients at Princess Margaret Hospital," won top prize at the 2006 Annual Meeting of the American Association for Cancer Education.

Figure US-8. New Patent Filings and Invention Disclosures Received, 1992–2006



With these caveats in mind, the ratio of new U.S. patent applications filed to invention disclosures received increases steadily as technology transfer programs mature. Figure US-8 illustrates this increase from 27% in FY1992 to 62% in FY2006. Total new patent applications filed as reported from 189 institutions increased in FY2006 to 11,622 compared to 10,270 similar applications filed in 2005. This increase of 1,352 applications is 13%.

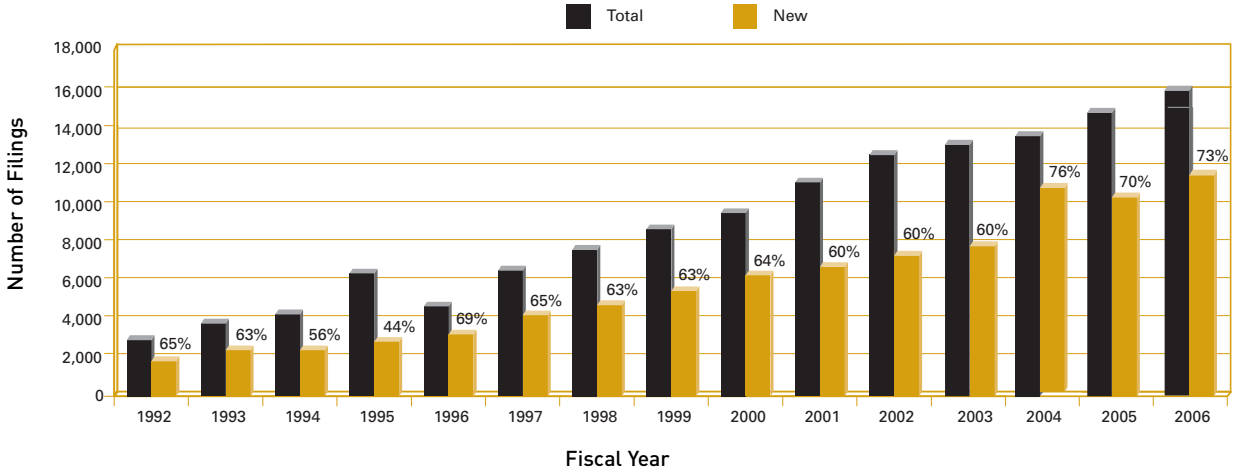
Something to Smile About

Harvard University

The National Institute of Dental and Craniofacial Research estimates that more than 80 percent of U.S. adults currently have some form of gum disease. In adults over the age of 35, gum disease is the leading cause of tooth loss. When inflamed gums begin receding, pockets between the teeth and gums are created. This allows bacteria to creep in below the gum line and quickly corrode bone and ligament that support the teeth causing periodontal (or gum) disease.

Samuel E. Lynch, then a Harvard Dental School researcher, began working on the GEM 21S project in 1985 with his colleagues. Over the course of his

Figure US-9. New Patent Filings and Total Patent Filings by U.S. Respondents, 1992–2006



The number of total U.S. patent applications filed is often greater than the number of new U.S. patent applications filed because procedures at the USPTO allow applicants to refile a patent application if the USPTO rejects the application twice or determines that there are multiple inventions in a single new patent application, necessitating filing of divisional applications. Thus, a single invention can be associated, procedurally, with more than one U.S. patent application. Figure US-9 shows that technology transfer offices manage about one extra U.S. patent application for every two to three new U.S. patent applications filed.

research, he began uncovering the wound-healing properties of PDGF (platelet-derived growth factor) and its potential to regenerate tissue, ligament and bone. To fully explore the application of the growth factor, Lynch left his academic position for industry. Initially the project floundered with the ups and downs of funding and the waxing and waning of interest in the technology.

In 2000, Lynch founded BioMimetic Therapeutics Inc. and began to make progress on all entrepreneurial fronts, from securing funding to licensing patent rights from Harvard, and discovering the right chemical combination for the product. With the right formula in hand, Biomimetics began clinical trials in more than eleven centers. They quickly concluded their studies by 2003 and worked toward Food and Drug Administration (FDA) approval for marketing.

In November 2005, the FDA approved GEM 21S for the treatment of periodontal bone defects. The company penetrated a market that was valued at more than $300 million, with the first fully synthetic product for periodontal disease.

GEM 21S is a fully synthetic regeneration system that combines PDGF with a bone matrix and can be applied below the gums by a periodontist. The system recruits the appropriate cells to the affected site for regeneration of gum tissue, ligament and bone. GEM 21S provides a therapeutic option to millions of patients suffering from oral bone and tissue loss.

Licensing Activity

Licenses are the most common document that transfer rights acquired for a specific technology to another organization. While technology transfer offices participate and engage in many other kinds of agreements and transactions, licenses are the most frequent kind of transaction that a technology transfer office has sole responsibility for in a given institution. Licenses are the written proof of a relationship between a research institution and another organization charged with using, developing or commercializing a given technology.

Technology transfer offices are engaged in efforts to disseminate technology created at the institution to others for public benefit. To achieve this goal, the institution must effectively capture, protect and manage intellectual property. Licensees can be individuals, but are primarily large and small companies. They may be recruited, encouraged or developed. Licensing is the process that provides the institution the guarantee that a given technology will be used to further the public good and, perhaps, generate revenue for the institution. Licensing is a deliberate process that can take many months for complicated technologies and opportunities, and considerably less time for repeat licensees.

Stinky Rainforest Fungus Put to Good Use by Going to Waste

Montana State University

More people can be threatened by disease following a disaster than by the disaster itself. Providing infectious-free and environmentally benign human-waste collection in portable toilets is an essential need for disaster agencies, as well as military operations and outdoor recreationists.

Montana State University (MSU) has helped meet this critical need by finding a fungus that kills human pathogens and removes odors in portable toilets. MSU researcher Gary Strobel found the fungus in the limbs of a Honduran cinnamon tree during a 1997 expedition. Serendipity, combined with clever sleuthing, led to his discovery that the fungi produces a mixture of gases that are microcidal.

New Licenses

Technology transfer offices license primarily to three company types: startups, large companies and small companies. Table US-6 shows the breakdown for licensing to these entities for U.S. universities, U.S. hospitals and research institutions, and technology investment firms. Licensing to small companies dominates total licensing with 48.7% of all licensing activity. Licensing to startups and large companies are 15.4% and 33.2%, respectively. U.S. hospitals and research institutions license small and large companies at 38.3% and 42.5%, respectively. AUTM tracks this information to gain more insight into the kinds of organizations that are most interested in accessing early-stage technology and how this innovation impacts the marketplace.

Table US-6. Licenses and Options Executed by U.S. Respondents in 2006: Exclusive vs. Nonexclusive

FY 2006	Number of Respondents	Total Executed	Startups	% of Total	Small Companies	% of Total	Large Companies	% of Total
U.S. Universities	161	4,192	698	16.7	2,127	50.7	1,327	31.7
U.S. Hospitals & Research Institutions	28	755	66	8.7	289	38.3	321	42.5
Technology Investment Firms	1	16	0	0	0	0	0	0
All Respondents	190	4,963	764	15.4	2,416	48.7	1648	33.2

As a researcher who has made a career of mining rainforests for valuable bacteria and fungi, Strobel said he had the eureka moment when he placed his new plant samples in a plastic box to eliminate plant mites. All of the plant-associated fungi died on the agar plates except one. He suspected that the remaining fungus had killed all of the others. He placed the remaining fungus in a container with many other organisms, including pathogens, and again, everything died but the initial fungus. Strobel hypothesized that the fungus produces a sterilizing gas, and then set out to sample and analyze fumes from his cinnamon tree sample. What he found were thirty ingredients in the gas that were toxic to microbes.

Strobel named the killer fungus *Muscodor albus*, Latin for "stinky white fungus." He collaborated with a local company, Phillips Environmental Products Inc., Belgrade, Mont., to develop the killer fungus as a sanitizer for the waste bags manufactured there as part of a portable and emergency toilet kit.

MSU licensed the use of *Muscodor albus* to Phillips Environmental Products, and the company now provides waste collection bags containing a dormant form of the fungus. When moisture enters the bag, the fungus is activated and produces its natural fumes, which neutralize odors and kill a host of potentially pathogenic bacteria, including *E. coli*. The toilets that incorporate the MSU technology are now deployed throughout the world by emergency organizations, the military and national park services.

Licensing is either exclusive or nonexclusive, and Table US-7 summarizes the area of licensing activity for 2006 for U.S. universities, U.S. hospitals and research institutions, and technology investment firms. Nonexclusive licensing dominates licensing activity. Exclusive licenses are often desired by licensees when a company must invest substantial resources to commercialize groundbreaking technology. Nonexclusive licensing programs are used when a new technology is likely to become a standard, is useful only in conjunction with other preexisting technology, or is developed by a company that requires freedom to operate rather than an exclusive advantage over other companies. Tracking this kind of information can provide useful information regarding licensing strategy for given technologies. Since AUTM members seek to maximize the public benefit through a licensing strategy, knowing more about the kinds of licenses other research organizations grant can be very helpful.

Table US-7. Licenses Executed by U.S. Respondents in 2006: Exclusive vs. Nonexclusive

		Licenses and Options Executed				
FY 2006	**Number of Respondents**	**Total Executed**	**Exclusive**	**Exclusive % of Total**	**Nonexclusive**	**Nonexclusive % of Total**
U.S. Universities	161	4,192	1622	39%	2,570	61%
U.S. Hospitals & Research Institutions	28	755	208	28%	547	72%
Technology Investment Firms	1	16	2	12.5%	14	87.5%
All U.S. Respondents	190	4,963	1,832	37%	3,131	63%

Life-Saving Device Detects Strokes

University of Cincinnati

Stroke is a leading cause of mortality in the United States, often due to limited availability of diagnostic and treatment methodologies. Xanthostat Diagnostics Inc., a Cincinnati-based startup company, is developing diagnostic technology to improve the detection of subarachnoid hemorrhage (SAH), a type of hemorrhagic stroke. This technology allows heath care providers to accurately diagnose a sentinel hemorrhage, or ministroke, thereby possibly preventing a major stroke.

Currently, doctors use a CT (computed tomography) scan to image bleeding in the brain to diagnose a stroke. However, the effectiveness of CT scan imaging drops off significantly 12 hours after the onset of symptoms. When

Table US-8 shows the exclusivity for licenses and options when the data are differentiated among the three company types. Exclusive licensing is the predominate form of licensing to startups. Nonexclusive remains the predominate form of licensing for small and large companies. The scope of a specific license is determined after analysis of the technology and market and the capabilities of the licensee(s).

Table US-8. Exclusivity of Licenses and Options Executed by U.S. Respondents in 2006 by Type of Licensee Company

		Licenses and Options Executed						
			Startups		Small Companies		Large Companies	
FY 2006	Number of Respondents	Total	Exclusive	Non-exclusive	Exclusive	Non-exclusive	Exclusive	Non-exclusive
U.S. Universities	161	4,192	638	60	947	1,180	466	859
U.S. Hospitals & Research Institutions	28	755	57	9	108	181	95	226
Technology Investment Firms	1	16	N/A	N/A	N/A	N/A	N/A	N/A
All U.S. Respondents	190	4,963	695	69	1055	1,361	561	1,085

the CT scan is inconclusive, the next step is a spinal tap to collect and analyze a cerebral spinal fluid (CSF). Currently, visual inspection is used to assess xanthochromia (yellowing of the CSF caused by increased bilirubin concentration), which indicates the likelihood of a ministroke. Unfortunately, approximately 25 percent of spinal taps are traumatic taps that cause bleeding into the spinal fluid and significantly impede the visual assessment of xanthochromia.

The University of Cincinnati technology under development by Xanthostat Diagnostics Inc. provides a novel approach to measure and differentiate stroke-related bleeding in cerebrospinal fluid. The technology works by spectroscopically scanning the CSF sample. Proprietary signal processing software distinguishes the optical signature of bilirubin from the confounding signature of hemoglobin, allowing physicians to clearly differentiate blood from the ministroke from blood introduced to the CSF through a traumatic spinal tap.

The device evolved from a transdisciplinary collaboration between University of Cincinnati faculty in the Colleges of Medicine and Engineering. Fred Beyette Jr., Ph.D., and Joseph Clark, Ph.D., joined their research efforts in the development of this technology and subsequently formed Xanthostat Diagnostics Inc.

The inventors recently received a $9 million grant from the National Institutes of Health to further develop devices that will allow physicians to quickly assess patients and prevent future catastrophic hemorrhages. Xanthostat hopes to have devices ready for clinical assessment by mid-2008.

Active licenses and options represent active relationships between institutions and, usually, the for-profit world of corporations and investment communities. This interface between academic research and investors is managed each day by technology transfer professionals throughout the United States. When there is a successful licensing event and revenue flows back to the parent institution, this is one validation, of many possible metrics, that academic ideas are being commercialized.

This year, 189 respondents reported 4,963 active licenses/options for FY2006, this is a slight increase over the 4,932 licenses/options reported by 191 respondents for FY2005. A new series of tasks and issues emerge with the signing of a license. The license must be managed properly to ensure all parties and their diverse interests are protected. Each license is unique, and many contain clauses and schedules that must be reviewed and discussed throughout the life of the license. In many cases, the work necessary to negotiate and execute a license is eclipsed by the work necessary to monitor, maintain and comply with the license, especially if the intellectual property leveraged by the license, that is patents or copyrights, have not been granted by the relevant office. The obligations the institution has to the licensee and the public are realized in the ongoing management of active licenses. AUTM does not currently track data about activity in this area.

Software Offers Prescription for Pharmaceutical Therapies

University of Minnesota

Medication errors are among the most common medical errors, harming at least 1.5 million people every year, according to a 2006 report from the National Academy of Sciences Institute of Medicine. The extra medical costs of treating drug-related injuries occurring in hospitals alone conservatively amount to $3.5 billion a year, and this estimate does not take into account lost wages and productivity or additional health care costs.

Recognizing the need to manage the scope and breadth of the drug therapies prescribed to patients, Bob Cipolle, Pharm.D., FCCP, FASHP; Linda Strand, Pharm.D., Ph.D.; and Peter Morley, Ph.D., University of Minnesota School of Pharmacy faculty, conceived of a practice to improve patient care. That was 20 years ago. Since then,

3 Conclusions

The creative power of our universities, hospitals and research institutions, and technology investment firms is manifested in many everyday products and processes.

The focus of this annual report remains on the results of our collective efforts and not on a detailed review of the data that describes the various processes and mechanisms of technology transfer. The vignettes in the report and other AUTM publications are perhaps the best measure for sharing with a broad audience the tangible value of technology transfer.

> "[The software is] rich in capabilities to support improvement and tracking of any patient, drug, and disease to provide effective and safe recommendations on patient care."

Technology transfer continues to mature, yet many aspects of technology transfer are relatively constant. Our offices are small; one-third of these offices are staffed with three or fewer people. Federal funding of sponsored research increased slightly more each year than industrial funding. Industrial funding, as a percentage of total funding, has been flat at 7% for four years. Invention disclosures and patent applications are steadily increasing, while patents issued continue to decline from a peak in 2003. Licensing to small companies predominates as does nonexclusive licensing to large and small companies. And, our ranks work closely with both sides of the technology transfer process, first with academicians to foster innovation and then with members of the business community to create value for society.

they also developed software to assist in this practice, helping pharmacists manage drug therapies for patients.

Cipolle describes this software, called the Assurance Pharmaceutical Care System, as "rich in capabilities to support improvement and tracking of any patient, drug, and disease to provide effective and safe recommendations on patient care."

The software allows pharmacists to develop care plans for each patient, create and manage patient-specific outcomes, and personalize reports for health care patients and providers.

Last year, the University of Minnesota signed an agreement to launch Medication Management Systems Inc., a corporation focused on commercializing this software. The goal of the company is to ensure patients are taking the right drugs for the right conditions, in the proper dosages, and getting the desired results.

The report generated by the software can make visits with health care practitioners more effective, resulting in better treatment and less pharmaceutically induced medical events. Inventors Cipolle, Strand, and Morley are among the company's founders, as well as seasoned health care management professionals.

The Minnesota Legislature passed a law requiring new approaches to manage the effective use of medications, recognizing trained pharmacists as healthcare practitioners, and allowing Medicaid users to receive pharmaceutical care services through a reimbursement system. The Assurance Pharmaceutical Care System answers the needs expressed by this legislation. The one-on-one pharmacist service is improving patients' quality of life and lowering health care costs.

AUTM is completing its initial analysis of metrics that could be used to better describe academic technology transfer, and changes to the AUTM Licensing Activity Survey should be evident in the 2007 version of this survey.

However, there are important constants no matter what metrics are used. AUTM and the hundreds of technology transfer offices that participate in this survey highlight some of the impacts of academic technology transfer.

CAL Helps Schools Meet Mandates and Deliver Tests

University of Kansas

Formed in 2005, Computerized Assessments and Learning LLC (CAL) is a startup company that markets products and services developed through grants, contracts, and projects funded by assorted state and federal governmental and private foundation support to the Center for Educational Testing and Evaluation (CETE) at the University of Kansas. CAL's primary marketable product is a computer test delivery system for states and local school systems to deliver, via computer, test items and related testing services as part of a state-mandated or a local district's testing program. Included as part of the system are: item input, item on-screen delivery, capturing student responses,

AUTM U.S. Licensing Activity Survey: FY2006

Survey Summary

Data Appendix

scoring, reporting and data-analysis components.

Most states do not currently deliver mandated testing programs online, and the movement to online testing is rapidly growing as states attempt to implement new testing programs under the federal mandate of No Child Left Behind initiative. To market its online test delivery system and services, CAL has entered into an exclusive teaming agreement with Data Recognition Corp (DRC), whereby CAL serves as the subcontractor for the delivery of the online computer testing component in response to requests for proposals related to state-mandated or other testing programs. Currently, CAL has subcontracts with DRC to deliver some aspect of online testing services to students in Idaho, Alaska and South Carolina.

CAL is in the forefront on testing, assessments, and psychometric applications to create assessment systems that support the teaching and learning process while being responsive to needs and demands for school accountability. Translating theory into best practices, CAL's computerized testing engine assists educators to become data-supported decision makers.

AUTM U.S. Licensing Activity Survey: FY2006

Summary of FY 2004–2006

U.S. Univers

	Program Start	2006 Licensing FTE	2006 Research Expenditures	2004-2006 Cumulative Total Research Expenditures	2006 Licenses & Options Executed	Cumulative Active Licenses	2006 Startups	2006 Invention Disclosures	2004-2006 Cumulative Invention Disclosures	2006 US Patents Issued	2006 New Patent Applications	2004-2006 Cumulative Adjusted Gross Income
niv.	1985	5	$131,814,265	$337,691,967	19	16	5	154	368	23	49	$6,842,457
	1988	4	$126,522,000	$396,812,500	18	64	0	93	223	10	93	$1,529,085
	1991	N.A.	$23,396,082	$73,487,038	2	13	1	15	46	0	0	$590,731
of Medicine	1983	13	$330,630,000	$1,113,531,000	55	482	1	96	337	13	32	$22,539,000
ston Medical Ctr.	1976	7	$350,883,260	$1,013,137,065	25	124	4	103	302	12	65	$5,841,692
State Univ.	2001	0	$9,912,000	$27,929,000	0	0	0	5	18	2	4	0
Univ.	1986	4	$26,108,921	$74,782,604	25	165	5	94	316	10	51	$11,153,905
of Technology	1978	5	$411,126,907	$1,192,298,907	55	132	12	533	1731	152	449	$33,340,977
n Univ.	1992	5	$243,259,000	$696,050,000	30	155	12	111	338	21	18	$15,663,903
eserve Univ.	1986	10	$290,530,274	$807,802,751	37	160	4	174	437	10	35	$30,178,340
f America	1997	1	N.A.	N.A.	1	4	1	4	9	1	1	$1,619,217
	1987	2	$116,258,121	$449,969,121	10	35	4	56	156	13	22	$7,241,174
am & Mary	2005	1	$44,749,784	$128,334,404	0	0	0	8	23	1	8	0
Univ.	1970	3	$267,400,000	$735,900,000	15	44	5	42	137	8	31	$2,807,956
ch Fdn., Inc.	1979	11	$605,341,000	$1,704,361,000	49	397	6	237	663	59	114	$17,052,700
	1992	2	$39,335,631	$115,395,380	5	14	1	17	53	1	8	$877,676
ege	1985	2	$190,632,094	$535,854,517	8	113	0	38	112	12	24	$4,860,327
	1995	2	$102,156,000	N.A.	5	16	4	95	N.A.	5	83	N.A.
	1986	5	$589,637,000	$1,592,049,666	51	470	5	160	415	39	78	$11,503,70,673
	1999	1	$10,700,000	$32,353,000	2	N.A.	1	10	25	1	9	$496,000
niv.	1995	2	$14,061,000	$41,597,000	2	13	0	30	54	3	18	$1,090,707
Medical School	1999	1	$33,013,000	$100,532,000	3	30	0	6	25	1	22	$21,424,583
	1985	8	$366,020,127	$1,037,524,353	22	N.A.	3	130	337	19	43	$616,315,695
Univ.	1996	2	$55,791,099	$154,714,459	4	9	1	26	81	2	12	$232,066
st Univ.	N.A.	0	$12,700,000	0	0	0	0	2	0	0	1	0
Technology	N.A.	0	$9,100,000	N.A.	1	1	N.A.	3	N.A.	N.A.	3	N.A.
ional Univ.	N.A.	1	$65,805,000	N.A.	1	1	N.A.	20	N.A.	0	14	N.A.
iv.	1996	4	$189,229,916	$585,867,301	2	42	0	51	154	12	36	$18,002,607
Univ.	1996	1	$69,524,779	$199,612,971	8	19	0	48	132	5	72	$243,105
v.	1993	4	$197,683,529	$454,356,502	31	148	2	45	119	5	23	$9,632,232
Technology	1990	6	$467,724,048	$1,334,753,790	25	215	8	366	967	39	239	$8,610,859
	1977	7	$623,958,100	$1,837,890,100	41	559	3	277	562	35	167	$56,576,028
Fdn., Inc.	1986	1	$86,863,000	$271,118,000	1	25	1	26	105	3	5	$1,005,909
RTI)	1991	7	$380,815,996	$1,080,648,428	53	254	2	257	460	9	41	$19,883,518
	1935	6	$248,458,000	$726,519,000	140	690	3	120	372	19	33	$11,778,856

AUTM U.S. Licensing Activity Survey: FY2006

Summary of FY 2004–2006

U.S. Univers

	Program Start	2006 Licensing FTE	2006 Research Expenditures	2004-2006 Cumulative Total Research Expenditures	2006 Licenses & Options Executed	Cumulative Active Licenses	2006 Startups	2006 Invention Disclosures	2004-2006 Cumulative Invention Disclosures	2006 US Patents Issued	2006 New Patent Applications	2004-2006 Cumulative Adjusted Gross Income
Univ.	1973	14	$1,757,268,191	$5,026,220,923	75	484	6	363	1123	82	329	$32,011,966
niv. Research Fdn.	1942	2	$98,283,021	$275,519,086	5	43	0	43	88	4	18	$3,221,621
	1989	2	$14,777,603	$43,941,346	3	15	2	12	36	8	17	$1,493,967
	2004	1	$45,000,000	N.A.	7	6	2	18	N.A.	2	6	N.A.
Univ. System	1986	6	$281,020,100	N.A.	13	56	4	138	N.A.	17	58	N.A.
nst. of Technology (MIT)	1940	15	$1,212,800,000	$3,372,800,000	121	740	23	523	1550	121	321	$99,742,085
of Georgia Research Inst.	2001	4	$74,700,000	$231,700,000	11	24	1	33	91	2	22	$366,330
of Wisconsin												
	1984	1	$104,282,102	$321,524,284	5	50	2	130	228	2	4	$1,626,201
South Carolina	1994	3	$150,088,251	$436,297,471	10	38	3	43	139	3	21	$2,540,630
	N.A.	0	$24,500,000	$64,223,980	2	2	0	15	41	1	3	$1,788,500
Univ.	1992	6	$358,097,000	$1,017,315,000	45	351	4	156	447	21	148	$63,818,302
ological Univ.	1988	3	$44,199,616	$121,206,616	9	69	2	41	152	8	24	$1,385,365
e Univ.	1995	3	$189,917,000	$561,094,000	12	47	2	67	179	11	16	$1,249,855
Univ.	1980	2	$103,048,865	$289,523,865	29	109	5	32	95	2	30	$399,829
hool of Medicine of NYU	1991	5	$269,562,764	$745,062,764	7	48	1	39	166	6	13	$42,307,908
. of Technology	1990	3	$77,583,000	$229,501,000	33	44	0	70	167	2	37	$965,438
te Univ.	1990	1	$112,035,529	$289,039,931	2	19	0	33	76	0	24	$342,982
	1989	4	$210,804,000	$698,052,000	36	195	5	101	297	19	36	$4,000,234,138
A&T State Univ.	1999	2	$38,700,000	N.A.	7	13	3	21	N.A.	2	4	N.A.
State Univ.	1984	4	$207,000,000	$688,807,227	65	533	5	208	562	41	128	$7,767,830
ate Univ.	1995	2	$103,778,000	$308,904,000	56	89	0	35	127	11	26	$4,808,142
niv.	2000	2	$52,991,546	$155,084,776	6	22	1	52	142	13	46	$2,968,222
niv.	N.A.	6	$348,439,588	$1,084,702,883	21	142	6	170	423	15	120	$35,526,249
	1990	8	$652,328,819	$1,610,828,819	28	143	5	145	472	27	64	$2,261,210
	1991	2	$24,363,000	$81,233,376	4	14	0	32	74	4	26	$8,285,210
Univ.	1995	1	$103,808,255	$314,806,368	8	46	1	45	98	6	18	$2,719,335
& Science Univ.	1989	4	$257,302,253	$739,271,495	36	208	3	115	320	10	35	$2,146,792
niv.	1980	4	$189,606,000	$540,201,000	42	175	1	49	129	9	22	$5,230,699
.	1989	5	$656,634,000	$1,901,066,000	22	156	4	152	461	37	106	$5,403,433
Univ.	2005	1	$40,035,885	$110,090,784	0	1	0	12	30	2	10	0
h Fdn.	1988	7	$388,500,000	$1,190,837,600	110	356	14	256	701	32	241	$11,475,216
ytechnic Inst.	1993	6	$64,277,619	$187,270,522	18	45	2	75	248	12	46	$569,593
lation of SUNY	1979	12	$724,792,510	$2,170,759,813	44	412	12	288	797	34	130	$37,678,695
	1998	2	$81,693,556	$225,698,442	6	48	3	77	194	34	56	$1,245,372
ate Univ. of NJ	1989	7	$264,054,649	$796,241,292	35	228	0	132	430	41	120	$15,059,171

AUTM U.S. Licensing Activity Survey: FY2006

Summary of FY 2004–2006

U.S. Univers

	Program Start	2006 Licensing FTE	2006 Research Expenditures	2004-2006 Cumulative Total Research Expenditures	2006 Licenses & Options Executed	Cumulative Active Licenses	2006 Startups	2006 Invention Disclosures	2004-2006 Cumulative Invention Disclosures	2006 US Patents Issued	2006 New Patent Applications	2004-2006 Cumulative Adjusted Gross Income
s Univ.	1993	2	$43,097,103	N.A.	4	12	1	20	N.A.	2	12	N.A.
odist Univ.	1998	N.A.	$12,599,334	$39,407,565	0	0	0	2	N.A.	3	8	$5,436
	1970	13	$699,211,807	N.A.	109	1,293	7	518	N.A.	118	541	N.A.
Technology	2000	1	$28,432,351	N.A.	11	16	3	15	N.A.	3	6	N.A.
. System	1992	6	$586,242,199	$1,588,956,199	73	490	1	115	358	32	54	$21,695,968
rch Fdn.	1987	5	$317,748,000	N.A.	11	218	1	91	281	16	57	$14,659,469
on Univ	1984	4	$106,986,000	N.A.	1	55	1	31	N.A.	3	6	N.A.
	1978	4	$136,171,347	$404,220,694	14	64	0	41	138	16	25	$2,265,496
	1985	2	$136,030,929	$405,821,009	1	42	0	14	101	2	6	$20,920,837
	1995	2	$53,988,492	$156,733,764	7	37	3	57	149	8	37	$2,964,963
a	2006	0	$71,000,000	0	2	5	0	15	0	1	10	0
	1988	4	$535,846,792	$1,544,759,792	26	189	3	90	286	15	70	$3,827,534
s for Medical Sciences	1994	1	$106,356,605	$325,992,420	7	50	0	33	75	16	15	$1,010,936
ia System	1979	95	$3,035,949,000	$8,744,260,000	226	1,750	39	1,308	3808	270	1,075	$341,810,012
Florida	1985	2	$107,996,000	$362,517,700	17	31	4	114	295	30	N.A.	$1,231,554
/UCTech	1986	8	$391,000,000	$1,091,527,000	24	167	2	141	355	16	63	$24,498,287
ati	1983	4	$148,512,700	$443,911,654	14	89	2	116	282	11	52	$1,482,952
o	1993	10	$632,973,484	$1,702,078,684	57	193	10	198	522	14	120	$82,660,975
ticut	1987	5	$152,500,000	$485,100,000	13	68	1	67	222	26	30	$4,136,622
Research Inst.	1984	3	$70,596,051	$204,664,003	4	60	1	24	95	5	18	$586,370
re	1997	2	$148,800,000	$386,182,736	2	16	0	35	130	6	N.A.	N.A.
	2004	1	$13,768,000	N.A.	N.A.	N.A.	N.A.	11	N.A.	N.A.	N.A.	N.A.
	1983	14	$459,114,540	$1,365,111,803	73	361	10	260	811	78	124	$120,571,880
	1979	5	$323,843,000	$953,809,000	85	597	1	106	305	13	87	$35,119,960
	1987	5	$236,708,881	$645,850,121	11	8	4	64	166	1	37	$2,397,990
Chicago, Urbana	1981	19	$808,374,000	$2,440,104,000	80	354	9	319	893	41	157	$23,132,338
search Fdn.	1975	5	$346,357,000	$993,415,000	43	302	4	89	258	22	38	$46,739,717
	1994	2	$132,106,000	$368,012,000	9	33	0	52	122	3	22	$5,913,734
Medical Center	1994	2	$71,542,000	$211,727,000	5	35	0	22	40	2	2	$437,983
y Research Fdn.	1984	2	$184,113,481	$528,613,634	18	103	4	85	240	20	24	$2,524,685
le	1996	3	$148,246,000	$407,388,000	8	32	3	72	200	4	61	$218,342
d Biotechnology Inst.	2000	2	$34,200,326	N.A.	5	N.A.	0	32	N.A.	5	29	N.A.
d, Baltimore	1989	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	92	280	8	147	$589,724
d, Baltimore County	1994	2	$65,718,000	$173,588,000	2	30	0	20	83	9	19	$244,221
d, College Park	1987	2	$313,826,827	$912,177,769	28	242	2	114	340	22	75	$3,668,265
husetts	1994	12	$404,962,000	$1,127,279,000	45	196	2	141	403	18	55	$81,347,098

AUTM U.S. Licensing Activity Survey: FY2006

Summary of FY 2004–2006

U.S. Univers

	Program Start	2006 Licensing FTE	2006 Research Expenditures	2004-2006 Cumulative Total Research Expenditures	2006 Licenses & Options Executed	Cumulative Active Licenses	2006 Startups	2006 Invention Disclosures	2004-2006 Cumulative Invention Disclosures	2006 US Patents Issued	2006 New Patent Applications	2004-2006 Cumulative Adjusted Gross Income
	1989	4	$303,500,000	$853,588,000	10	61	0	42	118	1	26	$1737,461
n	1982	7	$796,963,386	$2,327,552,170	97	330	9	288	860	79	137	$45,275,133
ota	1957	18	$594,877,000	$1,658,811,000	83	720	3	230	705	28	80	$147,095,916
ppi	1992	2	$47,425,000	$139,433,000	9	22	2	21	50	5	8	$5,847,937
i, all campuses	1987	7	$332,276,876	N.A.	16	105	2	107	292	15	38	$14,615,224
a	1995	1	$60,070,832	$177,273,951	2	17	0	10	16	2	4	0
ka	1992	3	$323,861,560	$923,829,773	13	169	5	88	255	17	52	$3,782,858
at Las Vegas	2005	1	$90,775,956	$256,371,874	1	1	0	10	18	0	10	$76,500
at Reno	2000	2	$70,539,360	N.A.	2	18	0	23	N.A.	5	20	N.A.
mpshire	1997	2	$128,270,352	$329,814,770	12	58	2	32	62	4	9	$441,295
xico/Sci. & Tech. Corp.	1995	6	$181,122,808	$529,909,928	23	49	7	96	242	13	62	$1,848,845
arolina at Greensboro	2002	2	$27,323,053	N.A.	1	6	0	19	55	0	1	$82,516
arolina, Chapel Hill	1985	5	$583,996,531	$1,255,751,718	49	238	5	97	330	27	67	$8,140,660
arolina, Charlotte	1993	2	$29,177,632	$79,007,392	4	32	3	60	200	8	54	$107,951
lorida	N.A.	0	$4,110,000	0	0	1	0	3	0	1	1	0
exas Health Science Ctr.	1999	1	$26,311,243	$67,581,948	6	14	0	15	39	2	5	$301,810
na, All Campuses	1984	4	$135,238,856	$376,950,569	10	40	5	56	171	16	71	$1,356,231
	1992	4	$95,732,891	$267,488,177	26	80	0	48	133	2	8	$9,624,279
vania	1986	10	$640,224,563	$1,967,419,046	37	482	3	306	1052	49	517	$24,198,631
gh	1992	6	$601,568,000	$1,763,110,000	54	168	5	165	446	22	88	$17,907,190
sland	1991	2	$56,706,000	$166,606,000	1	6	0	19	55	4	24	$3,018,166
er	1980	7	$355,293,162	$1,002,086,433	24	98	7	141	416	24	77	$102,223,507
labama	1995	1	$20,580,325	N.A.	1	12	0	10	35	1	5	$2,160,404
arolina	1993	3	$173,323,287	$451,194,493	20	47	6	84	199	11	49	$859,932
lorida	1990	3	$265,804,555	$802,026,561	21	81	6	109	367	29	88	$4,609,056
n California	1971	9	$431,000,000	$1,283,862,000	46	203	5	131	378	34	83	$7,728,420
see	1983	3	$240,280,186	$711,647,080	10	127	5	92	217	15	134	$3,379,532
Austin	1991	5	$446,686,000	$1,201,553,000	50	142	7	98	312	36	52	$20,053,396
ealth Science												
	1985	4	$174,831,472	$477,395,807	35	118	3	62	152	5	20	$7,807,448
edical Branch	1988	5	$155,036,202	$496,088,202	13	84	2	71	197	12	31	$3,135,798
outhwestern Med. Ctr.	1990	7	$336,840,793	$972,045,705	15	310	0	133	330	28	25	$35,804,536
	1994	1	$47,900,000	$108,333,994	9	56	2	38	95	4	21	$1,080,448
esearch Offices	N.A.	0	$14,528,391	N.A.	0	0	0	0	N.A.	2	3	N.A.
	1968	10	$246,566,451	$834,199,134	61	165	17	180	492	20	92	$46,482,670
t	1998	2	$95,540,632	$298,981,244	7	38	3	43	101	2	13	$375,764

AUTM U.S. Licensing Activity Survey: FY2006

Summary of FY 2004–2006

U.S. Univers

	Program Start	2006 Licensing FTE	2006 Research Expenditures	2004-2006 Cumulative Total Research Expenditures	2006 Licenses & Options Executed	Cumulative Active Licenses	2006 Startups	2006 Invention Disclosures	2004-2006 Cumulative Invention Disclosures	2006 US Patents Issued	2006 New Patent Applications	2004-2006 Cumulative Adjusted Gross Income
Patent Fdn.	1977	7	$238,754,000	$706,347,000	61	357	5	177	512	15	220	$14,065,097
gton/Wash. Res. Fdn.	1983	16	$936,360,325	$2,665,616,826	155	875	10	310	811	37	84	$85,685,379
orida Research Fdn.	2007	0	$12,588,645	N.A.	1	3	0	0	N.A.	0	0	N.A.
sin at Madison	1925	22	$831,895,000	$2,393,869,000	159	907	7	464	1286	69	203	$138,819,173
	1987	4	$138,670,000	$429,350,635	10	59	4	54	147	8	13	$1,540,319
	1990	6	$387,857,107	$1,090,184,842	47	236	3	132	374	15	49	$17,545,386
nwealth Univ.	1994	2	$149,256,000	$428,200,000	32	42	2	74	235	9	84	$3,039,068
ellectual												
	1985	1	$155,493,910	$439,713,629	10	241	1	119	350	28	47	$7,115,679
iv.	1985	3	$146,382,536	$437,538,214	5	64	0	66	136	3	N.A.	$144,829,681
te Univ. Research Fdn.	1939	4	$130,198,611	$383,839,068	22	100	0	70	135	6	45	$2,496,353
v. St. Louis	1985	4	$519,871,000	$1,440,849,000	41	1,693	2	119	345	21	115	$32,819,861
iv.	1988	4	$220,731,000	$672,537,000	9	99	2	50	149	12	23	$9,979,130
an Univ.	2005	1	$38,946,094	N.A.	1	5	0	20	N.A.	1	7	N.A.
iv.	2001	1	$47,710,864	$126,090,106	3	10	0	7	22	0	8	$165,036

AUTM U.S. Licensing Activity Survey: FY2006

Summary of FY 2004–2006

U.S. Hospita
Research Ins

	Program Start	2006 Licensing FTE	2006 Research Expenditures	2004-2006 Cumulative Total Research Expenditures	2006 Licenses & Options Executed	Cumulative Active Licenses	2006 Startups	2006 Invention Disclosures	2004-2006 Cumulative Invention Disclosures	2006 US Patents Issued	2006 New Patent Applications	2004-2006 Cumulative Adjusted Gross Income
coness Medical Ctr.	1997	4	$202,000,000	$575,447,000	18	119	3	92	242	13	39	$6,140,122
hen's Hospital, Inc.	1986	8	$413,118,000	$1,146,524,000	41	205	4	130	352	27	49	$23,912,852
	1995	5	$77,358,000	$201,857,000	18	69	N.A.	45	157	14	19	$2,853,000
c Medical Ctr. Res. Inst.	2005	1	$26,478,630	$64,458,682	3	11	2	8	17	1	9	$365,530
ital Boston	1991	10	$164,527,000	$447,064,161	27	181	2	98	319	20	40	$39,770,794
ital Oakland												
	2001	1	$48,988,030	$137,651,289	4	11	1	18	83	4	7	$1,214,041
ital, Cincinnati	1997	6	$124,962,349	$449,617,883	21	48	3	24	111	3	38	$7,501,324
tional Medical Ctr.												
s. Inst.	1986	2	$150,834,000	$387,148,000	5	25	0	19	87	11	10	$220,078,859
Fdn.	1989	9	$196,641,000	$501,056,355	25	146	3	176	473	13	133	$18,748,022
ncer Inst.	1981	6	$187,453,413	$544,439,030	37	359	2	66	196	20	25	$14,835,282
er Ctr.	1984	1	$88,362,439	$255,292,338	29	55	55	50	149	3	3	$1,831,288
n Cancer Res. Ctr.	1988	5	$276,200,000	$723,671,939	31	118	1	57	105	3	16	$7,528,344
ncer Ctr & Res. Inst.	2004	1	$78,800,000	$78,800,000	1	2	0	43	N.A.	0	24	N.A.
n Inc.												
t of Health	1986	2	$37,175,000	$265,883,000	2	0	0	5	51	1	8	$6,899,300
Cancer Ctr.	1987	5	$409,679,711	$1,065,524,745	24	111	2	147	397	25	71	$13,533,732
edical												
Research	1986	12	$448,000,000	$1,219,000,000	92	778	9	302	939	29	94	$55,116,478
Med. and Res. Ctr.	1994	3	$56,687,342	$154,684,143	11	66	0	25	61	3	9	$1,001,947
edical Ctr.	1993	1	$68,083,000	$187,831,003	4	49	3	15	60	5	4	$2,913,372
cal Research Fdn.	1990	4	$48,714,245	$129,393,268	4	43	0	11	41	7	15	$9,258,050
Inst. for Cancer Res.	1981	7	$294,814,000	$787,385,000	28	241	5	41	135	22	22	$184,020,467
Medical Ctr. of Boston	1995	1	$9,786,724	$18,405,084	1	9	0	5	14	1	12	$929,017
n's Research Hospital	1995	3	$191,008,740	$486,281,996	33	253	0	47	123	8	8	$5,209,498
spital dba												
General Hos	1976	21	$528,621,000	$1,474,807,000	131	834	8	339	857	56	132	$452,122,780
r Biological Studies	1969	5	$79,265,000	$234,376,000	22	251	1	29	74	17	6	$12,852,341
	1991	2	$46,841,000	$128,394,000	23	104	0	5	16	3	3	$52,930,706
eanographic Inst.	1993	0	$114,477,724	$335,182,907	5	12	0	3	12	0	5	$806,937

AUTM U.S. Licensing Activity Survey: FY2006

Summary of FY 2006

	Year 0.5 Prof. FTE Devoted to Tech. Transfer	Total Sponsored Research Expenditures	Invention Disclosures Received	New US Patent Applications Filed	Licenses & Options Executed	Adjusted Gross License Income Received	Licenses & Options Yielding License Income	Legal Fees Expended	Legal Fees Reimbursed	US Paten Issued
U.S. Technol Investment										
ration Technologies	1987	$0	32	7	16	$3,696,707	232	$843,758	$0	10
y Investment Firms		**$0**	**32**	**7**	**16**	**$3,696,707**	**232**	**$843,758**	**$0**	**10**