AUTM

Association of University Technology Managers, Inc.

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Academic Research Drives U.S. Economy:

Public and Private Investment Produces $34 Billion Impact and 280,000 Jobs

More than $33.5 billion in economic activity and 280,000 jobs are directly attributable to the commercialization of academic research in 1998, according to the FY 98 licensing survey conducted by the Association of University Technology Managers (AUTM). The eighth annual report from the licensing group found that $24 billion in private and public support for research last year produced 11,800 technology disclosures; generated 4,800 patent applications; and yielded 3,700 new licenses, including nearly 400 new companies—many of which are leading the U.S. economy's high-tech boom.

"Although interesting, these statistics are merely numbers," says Louis P. Berneman, AUTM's President and Managing Director for the Center for Technology Transfer at the University of Pennsylvania. "Woven together, these numbers tell a compelling story of how new technology derived from academic research is a fundamental pillar of industrial advancement. Knowledge—its creation, storage, transmission, and application—is the principal source of our increasingly good health, unprecedented economic growth, and unrivaled global security."

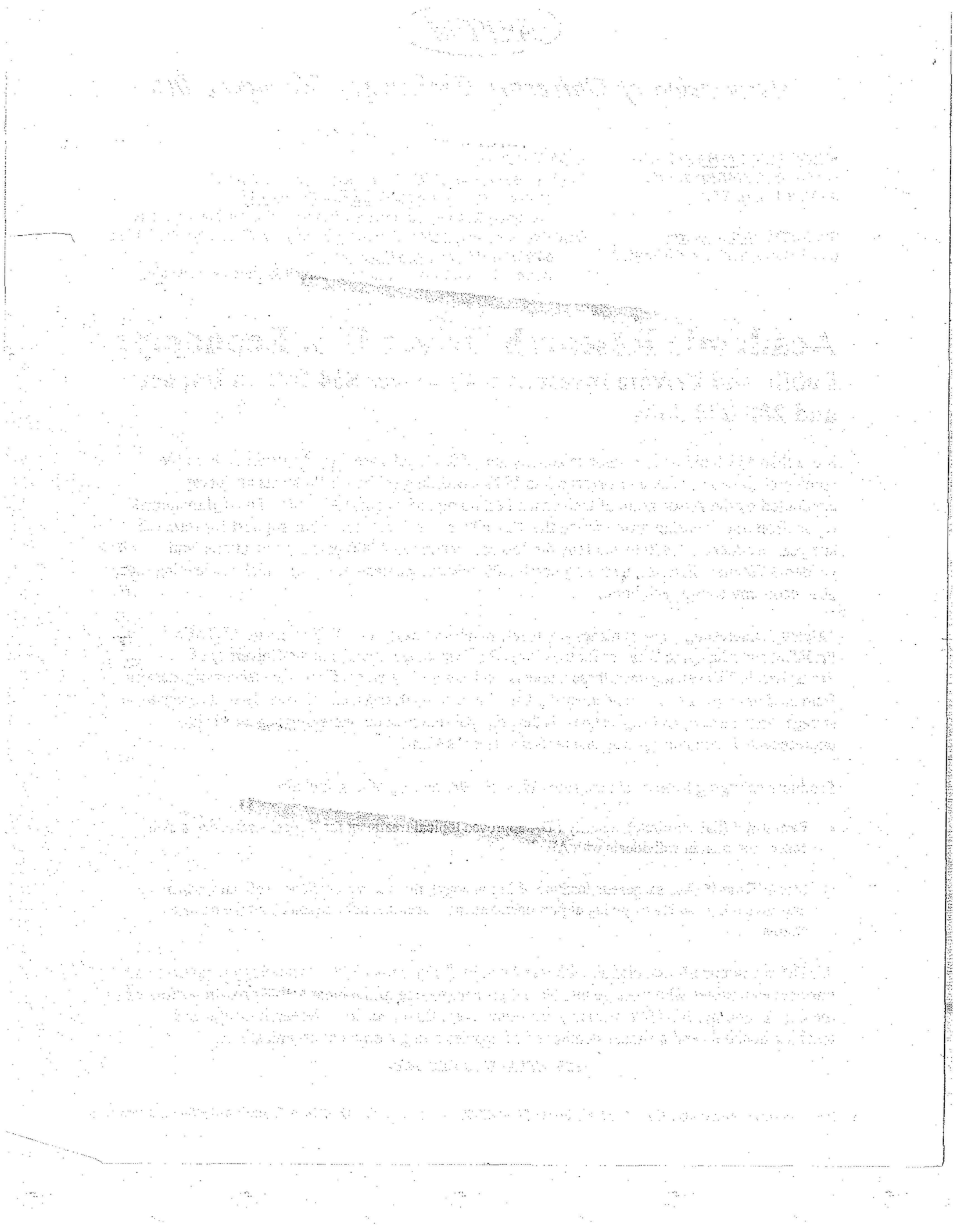
Products emerging from academic research in FY 98, among others, include:

- **Panretin™** (Salk Institute), a newly FDA approved topical treatment for Kaposi's sarcoma, a skin cancer common in individuals with AIDS.

- **StormVision™** (Massachusetts Institute of Technology), the weather prediction software, which improves public safety by giving airport operators more accurate information about the paths of storms.

AUTM is a nonprofit association with membership of more than 2,200 technology managers and business executives who manage intellectual property—one of the most active growth sectors of the U.S. economy. AUTM's members represent over 300 universities, research institutions, teaching hospitals and a similar number of companies and government organizations.

-SEE ATTACHED REPORT-



FY 98 AUTM SURVEY

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Research Expenditures	$24 billion
Invention Disclosures	11,784
New U.S. Patent Applications	4,808
U.S. Patents Issued	3,224
Licenses Signed	3,668
New Companies Formed	364

Philadelphia, PA - In its eighth annual FY 98 Licensing Survey released this week, the Association of University Technology Managers (AUTM) reports that moving research results from the laboratory to the marketplace contributed $33.5 billion to the economy and supported 280,000 jobs. Public and private support for research at members' institutions totaled $24 billion and generated an outpouring from faculty of 11,784 technology disclosures. Members' institutions applied for 4,808 new U.S. patent applications; were issued 3,224 U.S. patents from previous filings; consummated 3,668 new licenses and options with industry partners; and facilitated the creation of 364 new companies, 79% of which established their business operations in proximity to the academic institution at which the discovery was made. Industry partners are involved in 17,088 licenses, developing and bringing to the market products, processes, and services based on academic discoveries.

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Universities patent and license discoveries to:

- ***commercialize research results funded primarily by the federal government for the public good.***
- ***recruit, reward, and retain faculty and students.***
- ***induce collaborations with industry.***
- ***promote economic growth.***
- ***generate income to promote and support teaching and research.***

Enhancing our Economy

Technology transfer involves identifying discoveries made in research laboratories that may have public and commercial benefit; protecting the intellectual property rights of these discoveries; and licensing commercialization rights to industry.

Technologies developed in academia have been instrumental in spawning new industries, improving productivity, and creating new businesses and jobs. For example, research at the University of Pennsylvania in the 1940s contributed to the first electronic calculator, the forerunner of today's

computers. Recombinant DNA technology, which was developed at Stanford University and the University of California in the 1970s, is central to the U.S. biotechnology industry. More recently, Carnegie Mellon University received a patent for an important Internet search engine. Research, knowledge, and technology have and will continue to transform our lives.

Our partners in the technology transfer enterprise—government and industry—recognize that investments in science pay off by producing both cutting-edge ideas and a highly skilled workforce. The partnership is working. Government makes long-term investments in research. Industry obtains rights to our cutting-edge ideas and employs our graduates to develop and produce products.

In FY 98 alone, at least 385 products were introduced to the market to join the thousands of technologies like improved data compression, faster modems, Internet search engines, as well as vaccines, drugs, and other health-related treatments discovered in academia. Products emerging from academic research are as varied as their paths to commercialization. Examples of newly available products include:

- **Fast ForWord®** (Rutgers University and Univ. of California/San Francisco), a scientifically validated software to remediate language and learning difficulties, now available to children in all U.S. public schools.
- **Panretin™** (Salk Institute), a newly FDA approved topical treatment for Kaposi's sarcoma, a skin cancer common in individuals with AIDS.
- **Quad 7™** (North Dakota State University), a herbicide additive that, by improving the performance and ease of application of existing herbicides, decreases the herbicide costs by half for corn, soybeans, and sugar beets.
- **StormVision™** (Massachusetts Institute of Technology), the weather prediction software, which improves public safety by giving airport operators more accurate information about the paths of storms.

Starting New Businesses

Given the recent consolidation and globalization of industries, basic science discoveries at academic institutions are often too embryonic to license to large companies. Increasingly, universities are licensing technologies to small companies and are facilitating the creation of new businesses to develop and commercialize university technologies.

Small businesses, companies with fewer than 500 employees, are the principal commercializing partners for university technologies. In FY 98, academic institutions signed 3,668 new licenses and options, up 10% from FY 97. In FY 98, 63% of licenses were signed with small businesses, including 364 new ventures that were started to move discoveries from the laboratory to the marketplace. These new businesses are a boon to local economic growth in that 79% of new ventures locate in geographic proximity to the discovery institution. Since 1980, AUTM Survey participants have consummated 20,083 total licenses, including 2,578 new entrepreneurial ventures, about 70% of which continue to be active.

FY 98 Licenses

12% to New Start-up Ventures

51% to Small Companies

37% to Large Companies

364 New Companies

Improving our Health and Productivity

Technologies developed in academia have been instrumental in new diagnostic and therapeutic products that have saved lives, reduced suffering and disability, and improved our ability to prevent disease. Biomedical discoveries made at academic institutions and licensed to industry to bring to market that are available today address hundreds of healthcare concerns.

Examples include:

- *Abelcet* (M.D. Anderson Cancer Center), a safer, more effective treatment for systemic fungal infections.
- *Adenocard*® (Univ. of Virginia Patent Foundation), restores normal heart rhythm in patients with abnormally rapid heart beats originating in the upper chambers of the heart; is the drug of choice for the treatment of paroxysmal supraventricular tachycardia (PSVT).
- *Arrow-Trerotola PTD™ Catheter* (Johns Hopkins University), declotting device; a new alternative to surgery or thrombolytic drugs for end-stage renal patients.
- *CA125* (Dana-Farber Cancer Institute), a major diagnostic and prognostic test for ovarian cancer.
- *Cardiolite*® (Univ. of Cincinnati, Harvard, Massachusetts Institute of Technology, and Research Corporation Technologies (RCT)) *and Myoview*™ (Univ. of Cincinnati and RCT), myocardial imaging agents; largest market in nuclear medicine.
- *Enhanced Cued Memory Recall Test* (Albert Einstein College of Medicine), a clinically validated screen for disorders such as Alzheimer's disease; an invaluable and widely used tool to measure the effect of drugs that influence memory.
- *Epicel*™ (Harvard University), provides replacement skin for burn victims.
- *Juven*™ (Iowa State University) with HMB™ (Iowa State University and Vanderbilt University), a mixture of three nutrients, including HMB™, that help the body to synthesize more protein; maximize food utilization; and restore lost muscle.
- *OrthoPak® Bone Growth Stimulator* (Univ. of Pennsylvania), only device that provides round-the-clock treatment for nonunion fractures with electrical current.
- *Rapid Infusion System* (Univ. of Pittsburgh), allows for efficient transfusion of large volumes of blood products in high blood loss situations such as organ transplant or trauma procedures.
- *ReoPro*™ (SUNY Research Foundation), used as a therapeutic and prophylactic drug, approved for all angioplasty procedures, prevents complications from angioplasty and stent implants.
- *TRAC and Finn Knee* (Univ. of Chicago/ARCH), prosthetic knee, benefiting individuals who have no other option but to have reconstruction knee surgery.
- *V.A.C.*® (Wake Forest University), aids in healing of wounds, and is used for treating patients with bedsores.

Non-health related products based on university licensed technologies include:

- *ACELP Technology* (Univ. de Sherbrooke), voice compression software embedded into many telecom equipment of major manufacturers in the industry; improves quality of voice transmission.
- *Autoscope*® (Univ. of Minnesota), monitors traffic patterns on highways.
- *Baculovirus Expression Vector System* (Texas A&M University System), a system for the expression of proteins in a well-regulated insect cell system; the system of choice in drug discovery programs.
- *Diagnostic for Porcine Stress Syndrome* (Univ. of Toronto), genetic test; enables identification of pigs producing poor quality meat.
- *Environmental Modeling Research Laboratory System* (Brigham Young University), groundwater, surface-water, and watershed modeling systems.

- *Expert Library Manager* (Clemson University), software program that provides library management and assists in day-to-day operations.
- *Leukocell*® (Ohio State University), a vaccine against feline leukemia virus.
- *Genetic Marker Test* (Utah State University and Univ. of Illinois), a genetic marker test that can identify the genetics for spider lamb syndrome in sheep; replaces the need for progeny testing.
- *Hydrophone* (Penn State University), improved steamer cables used in marine seismic imaging.
- *"Living in Our World" Social Studies Textbooks* (North Carolina State University), geared toward curriculum in the state for fourth through seventh grades; ties in key issues with realities of modern life.
- *MINOS*™ (Stanford University), a software package for solving large-scale optimization problems (linear and nonlinear programs); heavily used as a nonlinear solver for algebraic modeling systems.
- *MPEG-2* (Columbia University), video compression. MPEG-2 is at the heart of every digital video appliance including digital television, like HDTV, and DVD players.

Improving Competitiveness in a Global Market

Every American citizen should take pride in this considerable financial commitment because it explains why our country is in the forefront in so many areas of basic science and applied technology.
—Sen. Orrin Hatch, R-UT.

The very effective manner in which universities protect and license discoveries is now being proposed as the standard that federal laboratories should use in their technology transfer and economic development activities. On May 11, 1999, the House of Representatives passed the Technology Transfer Commercialization Act of 1999, H.R. 209. That same day Sen. Orrin Hatch, R-UT, introduced S. 999, a companion bill in the Senate, to improve the ability of federal agencies to patent and license federally owned inventions.

> "The purpose of this bill is to help ensure that the fruits of federally conducted and supported research will be translated into new products and jobs that can benefit the American public," Hatch stated in his remarks. "This bill is necessary in order to adopt a uniform policy across the federal government concerning the circumstances in which it is appropriate to grant an exclusive or partially exclusive license to intellectual property owned by the federal government... Each year the federal government makes a substantial investment in research and development... Much of this...civilian R&D...is carried out by universities across our country. Every American citizen should take pride in this considerable financial commitment because it explains why our country is in the forefront in so many areas of basic science and applied technology. While there is intrinsic value in research for the sake of advancement of knowledge, another, more tangible, benefit occurs when the mysteries of science are translated into new technologies that protect and promote the public health and welfare and create jobs."—Sen. Orrin Hatch, R-UT.

Both Rep. Constance Morella, R-MD, and Sen. Hatch refer to the AUTM Survey and the success that universities have had in technology transfer since the passage of the Public Law 96-517 (Patent and Trademark Amendments Act of 1980) as justification of those proposed statutes. The Bayh-Dole Act, named for its co-sponsors Senators Birch Bayh of Indiana and Robert Dole of Kansas, was enacted on December 12, 1980. This Act created a uniform patent policy among the many federal agencies that fund research, enabling small businesses and non-profit organizations, including universities, to retain title to inventions made under federally funded research programs. Hatch quoted AUTM Survey data as evidence of the success that universities have had in moving research results from the laboratory to the marketplace and thereby growing the economy and benefiting the public. [See AUTM web site http://www.autm.net/legislation/index.html for status of S. 999.]

AUTM is a nonprofit association with membership of more than 2,200 technology managers and business executives who manage intellectual property resulting from research at universities, nonprofit research institutions, teaching hospitals, and businesses worldwide. AUTM's membership includes technology development and management professionals working in about 300 academic institutions and in a similar number of companies, professional services firms, and government.

AUTM conducts an annual Licensing Survey to assess the productivity and economic impact of its members' institutions' technology transfer activity. This year's Survey includes responses from 179 institutions: 132 U.S. universities; 26 U.S. teaching hospitals and nonprofit research institutes; 20 Canadian institutions; and 1 patent management firm.

The Survey is available soon printed in summary or full report form. To order publications visit AUTM's web site at www.autm.net (see AUTM Publications; Survey and Statistics) or contact AUTM Headquarters: 49 East Avenue, Norwalk, CT 06851-3919, phone: 203/845-9015, fax: 203/847-1304, e-mail: autm@ix.netcom.com.