



The Greater Philadelphia Region

BIOTECH BOOMTOWN

BY
JEFF WIDMER

The Wistar Institute in Philadelphia is the first independent nonprofit biomedical research institute in the U.S.



The Mouse that Roared

As the world convenes in Philadelphia for BIO 2005 from June 19–22, the spotlight shines on the Delaware Valley where biotech and Big Pharma are moving innovation from bench to bedside.

The mouse looks like it's wearing a bad toupee. Which is ironic, since this toupee is a piece of hairless skin grafted onto the animal's back. That's not the only thing that's different about this situation. The graft is artificial human skin and the mouse has been genetically engineered so its immune system won't reject the transplant—both products of a biotech revolution as seismic as the political one that swept through this city 230 years ago.

The experiments are being conducted by Meenhard Herlyn, DVM (doctor of veterinary medicine) and his team of 25 scientists at the Wistar Institute in Philadelphia, the venerable organization responsible for vaccines that fight rubella and rabies, among other diseases.

Herlyn's mouse is part of ongoing experiments to find a cure for melanoma, one that can't come too soon for the scientist who has spent the past 29 years searching for the disease's trigger. Worldwide, the World Health Organization says, there are an estimated 132,000 cases of malignant melanoma (the most dangerous form of skin cancer) annually. One in three cancers worldwide is skin-related; in the United States, that figure is one in two.

The magnitude of the problem is not lost on researchers at Wistar. Inside the 111-year-old brick building near the University of Pennsylvania campus, rows of lockers, stacks of boxes and bottles of reagents crowd the narrow aisles between laboratory benches. There are shiny incubators for growing skin, centrifuges that look like washing machines and a freezer holding 60,000 vials of tumor cells.

Herlyn's office is a place of calm amid the clutter. On the walls he's hung a painting of a building and cows, a map of the ancient world, a whiteboard covered with diagrams. Wistar's chairman of the Molecular and Cellular Oncogenesis program has a generous smile and a firm grip. A quiet man, he discusses his work in patient tones, his eyes large and luminous, capable it seems of seeing everything.

In the lab across the hall, Herlyn removes a T-flask from the incubator and slides it under a microscope. Through the lens, the visitor can see the target of his research—melanoma cells that resemble small sticks of dynamite, with fuses poking out of both ends. Herlyn is looking for something deeper, the pathological changes that lead to cancer.

"I want to look at the mechanism of disease. Then I develop proof of principle for therapies, for why these cancers develop. We make artificial skin and create melanomas so we can manipulate cells, change

biomedical
research companies have brought
187 new medicines to market,
including first-in-class products
for HIV/AIDS, cancer, and rare
genetic disorders.

Nearly a half-million people are directly or indirectly employed by the biotech and pharmaceutical industries.



10 VITAL STATS

Biotech is big business, especially in the Greater Philadelphia Area.

According to economic promoter Select Greater Philadelphia, the region has:

- Eight of the world's largest pharmaceutical companies within a 50-mile radius
- More than 100 hospitals, 150 research labs, five medical schools, the country's No.1 children's hospital, and four specialty hospitals doing research in pediatrics, cancer treatment, and ophthalmology
- More than 12,000 scientists, nearly 36,000 technicians and engineers, and 68,000 computer and math specialists
- More than 80 colleges and universities
- More than four times the national concentration of pharmaceutical manufacturing
- The largest freshwater port in the world
- Access to 25 percent of the nation's population in less than a day's drive
- Office rental rates that are half those in New York City metro area and lower than Boston, Chicago, and Washington, D.C.
- Annual venture capital investment of \$568 million within the region, 44 percent of which goes to bioscience
- Five regional institutions in the top 100 for annual National Institutes of Health funding (the University of Pennsylvania ranks third)

genes. We get to see how many genes we need to alter to create cancer.”

His wife, Dorothee Herlyn, DVM, does related work at Wistar. She is trying to develop vaccines that focus the immune system on fighting cancer.

“We’ve had some successes based on early diagnostics but the treatment of advanced disease has not progressed much in 30 years,” says Meenhard Herlyn. “Now we are getting close. There is great hope that, with some new insight, the next five years will bring major progress. That is because we now know how the signaling of the cancer cells is disturbed through genetic mutations. We know which of these pathways are activated; often enzymes are responsible. We can find drugs to basically block those enzymes. All we have to do now is figure out the most important pathways, basically genes, to target, and how to combine drug A with B or C.”

The credit for much of that progress belongs to scientists like Herlyn, who was among the inventors on the original patents

involving monoclonal antibodies, which use immune-system cells to make proteins that fight disease.

But Herlyn’s mouse would remain unknown if it weren’t for people like Meryle Melnicoff, Ph.D., who oversees Wistar’s technology transfer efforts as director of business development. It’s her job to move research from the laboratory bench to the patient’s bedside, via three points of a triangle: academic researchers to biotech firms to global pharmaceutical companies with the muscle to commercialize a product.

“As a nonprofit research institute, it is part of Wistar’s mission to ensure that its scientists’ innovations move from the laboratory to the clinic as expeditiously as possible,” says Melnicoff. “For Wistar, as for most nonprofit research centers and universities, that means licensing its discoveries to companies with the resources to transform them into commercially viable products.”

The problem for Big Pharma, Melnicoff says, is screening the thousands of candidates

According to PECO Energy, the Delaware Valley boasts more than 60 pharmaceutical companies or facilities.



20,000 biotech executives, investors, journalists, policymakers and scientists from more than 60 countries are expected to attend the Biotechnology Industry Organization's annual convention.

Networking on that scale can only lead to more collaboration and more discoveries, Herlyn says. "Academia can help the industry select the right drugs for the right disease. The scaling up of drug production and the management of toxicity studies can be done much better by companies, since they have the enormous robotics to do these large drug screens."

Fermenting Change

With all its gleaming tanks, pipes and diagrams on computer screens, the clean room at Centocor's Malvern facility looks more like the interior of a nuclear power plant than the facility where the company's hottest product, Remicade®, is manufactured. It might as well be, for all its complexity. But in this modest corporate park, with its lush lawns and walkers who flood the streets at noon, Centocor is harnessing power of a different sort—the power of proteins to heal.

Remicade was created from monoclonal antibody technology similar to the technology developed at the Wistar Institute. Like vaccines, the product is classified as a biologic or biopharmaceutical, a therapeutic made from human or animal protein. Biopharmaceuticals are fundamentally different from small-molecule drugs made from chemical compounds, because biologics can mimic or duplicate natural proteins in the body.

"You take a small-molecule drug and you treat the symptom," says Ron Schmid, vice president of public relations at Centocor. "When you create a biologic like Remicade that uses cells to express proteins, it can stop the progression of a disease, and that is a sea change from drugs of the past."

Biopharma is also creating a revolution in business. Monoclonal antibodies for cancer therapy alone could grow into a \$13 billion a year industry by 2008, according to a report by Kalorama Information in New York.

For Centocor, fusing the power of biology and technology means that the equipment isn't the only thing that shines. Since Remicade was approved by the U.S. Food and Drug Administration in 1998 for the treatment of Crohn's disease (and later for rheumatoid arthritis), Centocor has treated more than 600,000 patients worldwide. Company revenues have skyrocketed from \$450 million in 1999 to \$2.3 billion in 2004; during that time, worldwide employment has increased from 1,600 to 4,000, Schmid says.

In 1999, Big Pharma took note when global healthcare giant Johnson & Johnson purchased the biotech firm.

"It's an exciting industry to work in," says Paul Voronko, senior director of Manufacturing Operations at Centocor's Malvern facility, located about 30 miles northwest of Philadelphia. "It has grown tremendously in the past 20 years, from an industry with a lot of promise but few products to one in which biotech products are becoming the more common solutions. It's gratifying to see the science finally living up to its potential."

Veterinarians use biotech-based products and vaccines on a daily basis to treat various pet ailments.

10 FAST FACTS

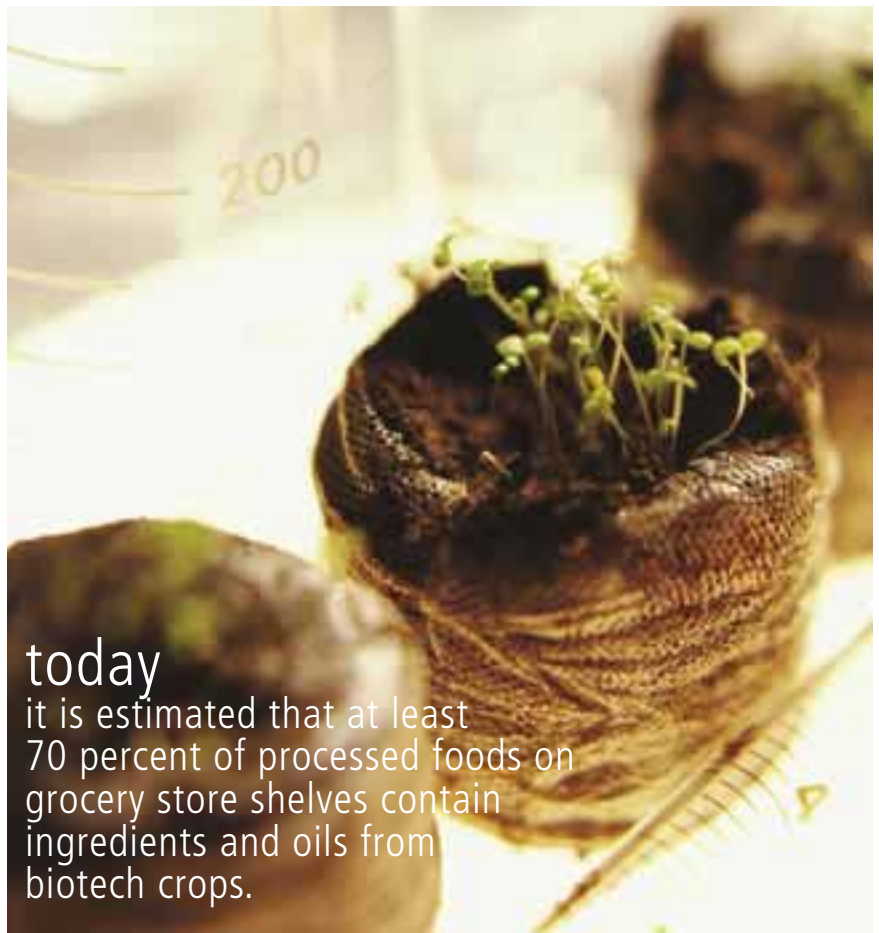
**The Philadelphia International Airport—
a major economic player.**

Philadelphia International Airport (PHL) is one of the nation's busiest in terms of aircraft operations (486,164 takeoffs and landings annually) and passenger traffic (28.5 million people a year).

- The airport (phl.org) consists of seven terminals spread over 2.5 million square feet offering 120 boarding gates. Some 29 airlines provide more than 600 daily nonstop flights to more than 130 domestic and international cities, meaning it's only two hours by air to 50 percent of the U.S. population and six hours non-stop to California, Great Britain, Europe and Latin America.
- The airport is a major economic player, generating an estimated \$8 billion in annual revenue for the region. Some 200 businesses tied to the airport provide jobs for nearly 22,000 workers.

US Airways, the dominant airline at PHL, has its international base in Philadelphia, which is one of the largest Caribbean gateways. The airline offers regular, international, and express service from terminals at PHL. US Airways also offers these statistics about airport usage:

- Daily departures from Philadelphia: 494
- Nonstop flights to the Caribbean: 16
- Nonstop flights to Europe: 11
- Nonstop flights within the U.S. and Canada: 113
- Number of US Airways employees based in Philadelphia: 5,311
- Number of US Airways gates: 78
- Number of self-service check-in kiosks: 56
- Size of the US Airways maintenance hanger in square feet: 100,000



today
it is estimated that at least
70 percent of processed foods on
grocery store shelves contain
ingredients and oils from
biotech crops.

The Business of Science

Balancing science and business is something Frank Baldino Jr., Ph.D., does well. Cephalon Inc., the company he founded in 1987, is one of the world's fastest-growing biotechs, with revenues rising 42 percent from 2003 to 2004. Last year, worldwide revenues exceeded \$1 billion for the first time. The company went public in 2001.

"I am even more proud of our underlying contribution to human health," Baldino says. "The lives of hundreds of thousands of patients have been improved because of our products."

Cephalon discovers, develops and markets products to treat sleep and neurological disorders, cancer and pain. It currently markets three proprietary products—Provigil®, Gabitril® and Actiq®—in the United States, and more than 20 products internationally. The company employs about 2,400 people in the United States and Europe, with headquarters in the Philadelphia suburb of Frazer, a scant

2.6 miles west of Centocor's Malvern facility.

Baldino says Cephalon owes much of its success to its home in the Greater Philadelphia region. "Our location has provided clear advantages over the past 17 years," he says. "Philadelphia has more medical schools than any city in America. Most of the major pharmaceutical companies are within 100 miles of Philadelphia. As we build a global business, it's notable that Philadelphia is approximately equidistant from San Francisco and London."

Baldino believes the timing is right for tremendous growth in life sciences in the Delaware Valley. "I can't think of a better place to build a business."

Re-engineering R&D

You won't hear an argument about that from senior management at Wyeth BioPharma, the biotech unit of Wyeth. With annual revenues of more than \$17 billion, the global pharmaceutical company has 52,000 employees in 125 countries, 6,200 of whom

Biopharma is not only creating a revolution in how to treat diseases but in business as well.

work in marketing and R&D in its Collegeville, Pennsylvania, headquarters.

Like its parent, known for products such as pain-reliever Advil®, pediatric vaccine Prevnar® and antidepressant Effexor®, Wyeth BioPharma is becoming a significant player in its own right, with major offerings that include Enbrel® for rheumatoid arthritis and Mylotarg® for cancer therapy.

Wyeth BioPharma has developed and launched seven biotech therapies, second only to Genentech in number. Under the leadership of Robert R. Ruffolo Jr., president of Wyeth Research, this number is expected to double in the next decade. His campaign to overhaul research poured more than \$2 billion into R&D in 2004 alone, focusing 6,000 scientists on three major areas of discovery and development: vaccines, proteins and small molecules.

His team is already starting to see results. The company has increased the number of novel compounds moving into development from an average of three per year in the 1990s to 12 per year for each of the last four years. From 2001–2004, the company submitted 40 investigational new drug (IND) applications for new molecular entities (NME), compared to an average of one to three per year in the late 1990s.

“We worked hard to transform R&D,” Ruffolo says from headquarters near Philadelphia. “This year, for the first time in our history, we were named by R&D Directions as one of the top 10 pipelines in the world. The magazine said Wyeth has an ‘industry-best’ eight drugs on the list of ‘100 Great Investigational Drugs in Development,’ more than any other company in the world.”

Ruffolo credits some of that success to partnerships.

“One of the reasons biotech companies like to collaborate with us is because we are one of the largest biotech companies in the world,” he says, noting long-term partnerships with ViroPharma of Exton, Pennsylvania, on hepatitis C projects and with Harvard University and the University of Pennsylvania on a wide range of research projects. “We are probably one of the few companies that do research in all three platforms of medicine—small molecule drugs, biotechnology drugs and vaccines—and have a blockbuster product in all three areas.”

Dr. Michael E. Kamarck, senior vice president of Wyeth BioPharma’s Technical Operations & Product Supply, agrees. “A major characteristic of biopharmaceuticals is the alliance. Because it costs in excess of \$500 million to build a new facility, we share capacity with Amgen and Genentech, for example, to make sure the facilities are fully utilized.”

While collaboration helps grow a business, location plays an essential role in the equation.

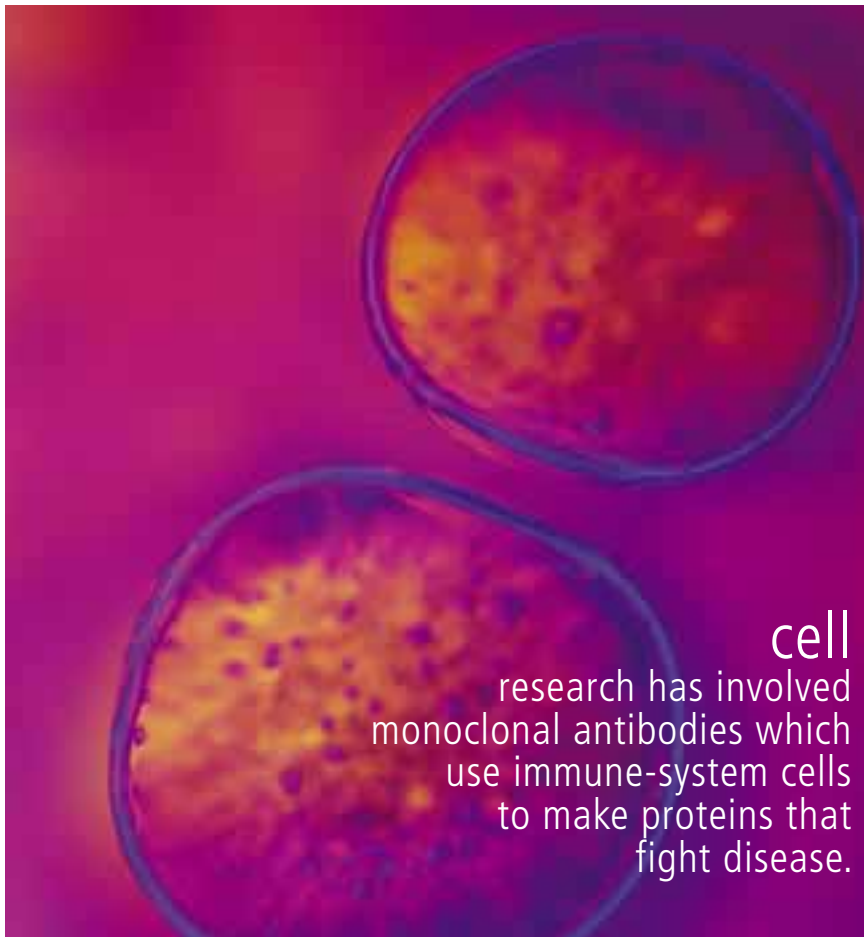
“Having our headquarters for biopharma in Philadelphia allows us access to academic resources and state-of-the-art technology, to Europe and the West Coast,” says Cavan M. Redmond, who provides commercial leadership for R&D as Wyeth BioPharma’s executive vice president and general manager. “All of that makes it easy to attract talent.”

Redmond characterizes the Delaware Valley as having “the greatest untapped potential of anywhere I’ve seen. We’re going to see this region continue to grow in the area of biotech.”



healthcare
is the number one market
for biotechnology
and is largely responsible
for biomedical research
and breakthrough medicines.

In the past year, AstraZeneca's R&D arm signed 270 collaboration agreements with external partners.



Think Locally, Act Globally

That's also the view at the U.S. headquarters of AstraZeneca in Wilmington, Delaware.

"The region is strategically placed for a pharmaceutical company because of its proximity not only to several biotech companies but to the FDA," says Catherine Bonucelli, M.D., vice president of External Scientific Affairs with the company. "It's also a great place to live."

AstraZeneca's roots in the Delaware Valley date to 1912, and its R&D center in Wilmington is home to the discovery and development of Seroquel®, the atypical antipsychotic that has become a major brand and growth engine for the company. Today the company specializes in drugs for gastrointestinal, cardiovascular, neuroscience and oncology therapeutic areas, with products that include Arimidex®, Crestor® and Nexium®. AstraZeneca employs more than 64,000 people worldwide, with 4,800 working in Delaware, and boasts annual

revenues of more than \$21.4 billion.

Its pipeline is promising. The company holds 17 projects in Phase I, 17 in Phase II and 25 in Phase III development. There are 28 NME projects in Phase I and Phase II development, with 23 high-quality NMEs now in preclinical testing. In 2004, the company invested \$3.8 billion in R&D.

AstraZeneca didn't reach this level alone. Senior management knows that sharing knowledge within the region and the industry can help manage project times and costs. Many of those activities involve biotech. In the past year, R&D signed 270 collaboration agreements with external partners. Collaborations with Abgenix Inc. and Cambridge Antibody Technology are expected to complement AstraZeneca's strengths in small molecule treatments by adding antibody-based therapeutics.

"AstraZeneca is committed to engaging in partnerships that complement our ongoing efforts to conquer disease," says David Brennan, president and CEO of AstraZeneca

10 WORD PICS

Brave new words for a complex business with its own language.

Here's a list of frequently used terms in the biotech industry:

- **B cells.** White blood cells that react to foreign substances, such as invading bacteria or viruses, by making proteins called antibodies.
- **Antibody.** A protein on the surface of B cells that is secreted into the blood in response to a foreign substance, such as a bacterium or virus.
- **Antigen.** A substance that, when introduced into the body, stimulates the production of an antibody. Antigens include bacteria and viruses.
- **Monoclonal antibodies.** Antibodies that are produced in large quantity by the progeny of a single hybrid cell formed in the laboratory by the fusion of a B cell with a tumor cell. The hybrid cell multiplies rapidly, producing large quantities of the monoclonal antibody.
- **Reagent.** A substance used in a chemical or biological reaction to detect, examine or produce other substances.
- **Fibroids.** Growths or tumors that develop in the muscular wall of the uterus.
- **Biopharmaceutical.** Therapeutic biological compound, including recombinant proteins, monoclonal and polyclonal antibodies, antisense DNA or RNA, therapeutic genes, and most vaccines.
- **Investigational New Drug application (IND).** An application that a drug sponsor must submit to the FDA in order to obtain permission to test a new drug in humans. The IND contains the plan for the clinical study.
- **New Drug Application (NDA).** An application requesting FDA approval to market a new drug for human use in interstate commerce.
- **New molecular entity (NME).** A medication containing an active substance that has never before been approved for marketing in any form in the United States.

Closing the Gap

Virtua Health Systems

Biology isn't the only discipline where collaboration and technology are helping to improve outcomes. Healthcare organizations in the Delaware Valley are increasing their use of both partners and technology to control costs, improve diagnostics and facilitate communications among all parties, from providers to patients.

"The gap between university and community hospitals is narrowing," says Richard P. Miller, president and CEO of Virtua Health, a multi-hospital healthcare system headquartered in Marlton, New Jersey. "We already perform clinical trials for Fox Chase Cancer Center and Johns Hopkins is talking with us about others. Virtua is beginning to play a major role in research and technology advancement. Our core mission will always be to take care of patients, but we can improve patient care through research, technology optimization and strategic partnerships."

Virtua has distinguished itself as one of the first Six Sigma organizations in healthcare and as an early adopter of clinical and digital technologies. It has developed a strategic alliance with GE Healthcare to optimize technology, develop leadership and streamline clinical operations.

"We see these alliances as the mechanism to move us along the healthcare continuum at a much faster rate," Miller says of Virtua, which has 7,100 clinical and administrative personnel and 1,800 physicians as medical staff members.

Unlike traditional vendor/customer relationships where customers agree to exclusively purchase the vendor's products in exchange for discounts, the

Virtua/GE relationship contains no preset agreements to buy GE products. "In essence, the collaboration leverages the respective strengths of both organizations in transforming healthcare delivery by creating a learning lab environment," says Miller.

A case in point is Virtua's treatment of uterine fibroids. With healthcare evolving toward less-invasive surgical approaches, Virtua became one of the first healthcare systems in the nation to obtain the InSightec Ltd. ExAblate® system, a magnetic resonance guided, focused ultrasound technology for the non-invasive treatment of uterine fibroids. Performed as an outpatient procedure, ExAblate is an alternative to hysterectomy, myomectomy and uterine artery embolization.

Virtua is also planning to replace its hospital in Voorhees, New Jersey, with a digital campus that includes a cancer center, doctors' offices, restaurants and a 300-bed hospital where clinical equipment will tie into the IT framework so that physicians can share information regardless of their location.

But Virtua's vision of healthcare care doesn't stop with new technology, Miller says. "The Six Sigma program at Virtua led to the GE partnership. To improve performance, we asked, 'How do we take the quality equation in industry, where they look at providing higher quality at a lower cost, and transfer that to healthcare?' We looked at GE's systems and how they applied them to manufacturing and brought that process to Virtua, then put a lot of rigor and measurement to everything we do."

Industrial-Strength Technology

Siemens

"Healthcare providers are increasingly turning to partners and technology to control costs and improve outcomes," says Tom McCausland, president and CEO of Siemens Medical Solutions USA, which employs nearly 5,000 people from U.S. headquarters in the Philadelphia suburb of Malvern, Pennsylvania.

Siemens Medical Solutions is a division of Germany's Siemens AG, one of the largest electrical engineering and electronics companies in the world. The medical division focuses on two major areas—imaging and information technology.

"We use imaging equipment in diagnostics and treatment," McCausland says. "We want to find problems faster, because that offers a higher cure rate and lowers the overall cost to society. Secondly, if there is a problem, we use imaging techniques as an assist to guide minimally invasive procedures, avoiding full-blown procedures."

Like Virtua, Siemens has also applied industrial processes to healthcare, especially in the area of information technology. "There is a technology built into our software called workflow engines. It's a concept that's been around in the industrial world for a long time, in the oil refineries of south Philadelphia or the paper mills. Everybody knows the

right things to do, but those procedures are not well-documented. We can use the workflow engine to create standardized processes and embed them in software so that it alerts and assists clinicians in making decisions and avoiding mistakes. It makes sure the right dosage of the right medicine gets to the right patient at the right time."

Siemens uses clinical partners such as Temple University and University of Pennsylvania to develop the protocols and techniques that apply the technology the company produces. "We're working with Penn's radiology, cardiology and radiation therapy departments to develop new applications using magnetic resonance imaging in neurology."

And Siemens latest achievement? Yet another high-tech marvel? No, it's a system to deal with paperwork, a mundane but overwhelming chore that physicians may dread even more than disease.

"We're helping organizations look at how a patient moves and paperwork flows through a facility so patients don't have to wait for results," McCausland says. "We're also looking at electronically submitting information to insurance companies."

Having procedures covered faster and more fully—that may be the real medical miracle.

Outsourcing is a fast-moving trend throughout the biotech industry.

North America. "When we combine these collaborations with the talented and committed scientists working in our laboratories, our ability to succeed is greatly enhanced."

Proximity to the wealth of biotech firms and educational institutions in the region is also important to AstraZeneca, Bonuccelli says. "We have the opportunity to pull together sectors, not just the pharma industry but the medical device industry, academic centers and healthcare centers. It's not realistic to think any one company or academic center alone will have the resources to get the best outcomes."

Taking Out a Contract

When Big Pharma looks to partner, manufacturing is often the place it starts, says Robert Broeze, president of Laureate Pharma Inc., a 75-person contract manufacturing organization based in Princeton, New Jersey.

"The reason partnering is so important in our industry is, no matter the size of your company, it is very difficult to do everything yourself," says Broeze, whose company, with \$10 million in annual sales, has joined Safeguard Scientifics Inc. as a subsidiary.

"Outsourcing is becoming an ever-increasing trend in the industry. In some cases, companies want to utilize their financial resources for clinical trials. Their manufacturing facility may be busy doing other things, or they may have one product that is different from their other products and decide to outsource rather than to build a facility."

Laureate's expertise in monoclonal antibody-based technology and its location make it an attractive partner, Broeze says. The company has signed collaboration agreements with Southern Research Institute and GTC Biotherapeutics, among others.

"We're right in the middle of one of the biggest pharmaceutical corridors in the nation—within an hour's drive for many of our clients."

Partners in Profit

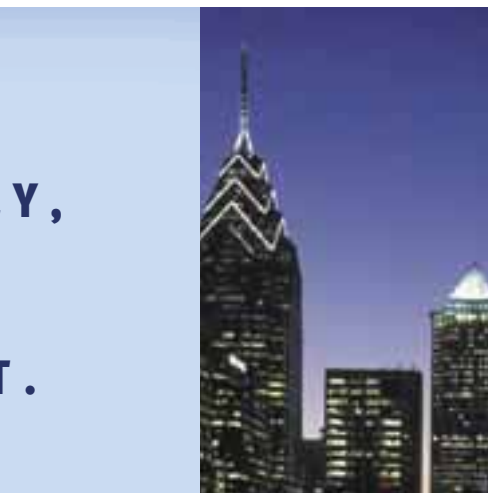
Collaboration isn't limited to Global Pharma. Celgene Corporation, headquartered in Summit, New Jersey, is the ninth-largest biotech company in the world, posting impressive commercial, clinical, regulatory and financial results.

Celgene is completing its second successful year as a profitable company. During 2004, total revenue increased by 39 percent to \$377.5 million, while net income rose more than twofold to \$52.8 million.

Those results have enabled Celgene to reinvest capital in its future. In 2004, Celgene devoted more than 40 percent of its revenue to research and development. "As a consequence of its ongoing investment in cutting-edge science, Celgene now has a robust pipeline comprising 19 compounds, six of which are in clinical trials," says John W. Jackson, chairman and CEO. In the next 12 months, Celgene has the potential to realize three



**AFTER YOUR
MEETING IN PHILLY,
DON'T CHECK OUT.
CHECK IT OUT.**



Photos: R. Kennedy, B. Krist, R. Nowitz and G. Widman for GPTMC

History. Culture. Shopping. Nature. Nightlife. Bring your family and friends and linger over a cozy dinner. Chill out over drinks at a cool cabaret. Whatever you're into or up for, let Philly extend an unforgettable invitation to stay a little longer.

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BIO membership has more than doubled since its founding in 1993.

drug approvals in four indications, he says.

Commercial programs include pharmaceutical sales of Thalomid®, Focalin™ and the Ritalin® family of drugs and biotherapeutic products and services. Flagship product Thalomid (thalidomide) treats a type of leprosy while Ritalin and Focalin treat people with attention deficit hyperactivity disorder.

“The company takes great pride in helping tens of thousands of patients worldwide,” Jackson says. “As we work to improve people’s lives, we are also building a highly profitable global biopharmaceutical company.”

Writing the Bio on BIO

Nowhere is collaboration more apparent than at the international conventions sponsored by the Biotechnology Industry Organization. BIO represents more than 1,100 biotechnology companies, academic institutions, state biotechnology centers and related orga-

nizations across the United States and 31 other nations. BIO members are involved in the research and development of healthcare, agricultural, industrial and environmental biotechnology products.

Its annual convention, BIO 2005, is expected to draw as many as 20,000 attendees to the Pennsylvania Convention Center in Philadelphia from June 19–22.

“The Greater Philadelphia area is a global center for medical research with an entrepreneurial spirit that is fostering a strong and emerging biotechnology industry,” says Jim Greenwood, president and CEO of BIO. “The Philadelphia area is home to many top-tier universities and research centers. In 2004 alone, more than \$810 million in NIH grants and contracts were won by local universities and companies. Eight of the largest U.S. pharmaceutical companies are located within a 50-mile radius of the city, so there’s a strong biotech-pharma partnership.”

The convention’s growth has paralleled

that of the burgeoning industry BIO represents. The number of approved biotechnology drug and vaccine products in the United States has soared from 22 in 1993 to 212 in 2004, while investment in the industry skyrocketed during that time from \$3 billion to \$20.9 billion, including a record \$4.9 billion for venture-stage companies. Since its founding in 1993, BIO’s membership has more than doubled to 1,131.

Wheels of Fortune

Biopharma contributes significantly to the economic health of the Delaware Valley. Thousands of people are employed by the industry in the region. But biotech is just the crest of a wave of economic progress, according to Jim Shannon, chief marketing officer at Select Greater Philadelphia, an economic development organization.

Business is growing. Greater Philadelphia is home to 15 Fortune 500 companies and 41

PHL
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FOOD & DRINK
SHOPPING

...and that's just on the way to your destination.

PHILADELPHIA INTERNATIONAL AIRPORT. ALL THAT AND **LOW-FARES** TOO.

www.phl.org

Greater Philadelphia's cost of living estimates—50 percent lower than New York, Boston, and San Francisco metro areas.

7 WEB SITES

To learn more
about the biotech industry,
visit these Web sites.

- National Center for Biotechnology Information**
ncbi.nlm.nih.gov
 Established in 1988 as a national resource for molecular biology information, NCBI creates public databases, conducts research in computational biology, and develops software tools for analyzing genome data.
- Biotechnology Industry Organization**
bio.org
 BIO represents more than 1,100 biotechnology companies, academic institutions, state biotechnology centers, and related organizations across the United States and 31 other nations.
- Pennsylvania Bio**
pennsylvaniabio.org
 BIO's equivalent on the state level.
- New Jersey Technology Council**
njtc.org
 New Jersey has a number of resources for entrepreneurs, including the NJTC Venture Fund, which makes catalytic seed, start-up and early-stage venture capital investments.
- Select Greater Philadelphia**
selectgreaterphiladelphia.com
 One of several economic development and marketing organizations in the Delaware Valley, Select offers several consumer-friendly publications about the region.
- U.S. Food and Drug Administration**
fda.gov
 The site contains glossaries and definitions of key terms in several industrial sectors.
- Council for Biotechnology Information**
whybiotech.com
 Founded by biotechnology companies to share information about research and opinions concerning biotechnology in agriculture.

Fortune 1,000 companies. The Delaware Valley is also an incubator. Last year, the region had the fifth-highest number of fastest growing, privately held technology companies in North America, according to the Deloitte Technology Fast 500.

The area is undergoing a building boom. Greater Philadelphia contains almost 134 million square feet of multi-tenant office space in 1,689 buildings, with another 1 million square feet of space under construction.

Employment is rising. Last year, employment increased by 0.5 percent and is expected to climb by an additional 1.3 percent in 2005. The population is rising, too, up 2 percent between 2000 and 2004.

The infrastructure is solid. The region features an international airport with more than 600 daily flights to more than 130 domestic and international destinations and the third-busiest train station in Amtrak's national network, serving 3.7 million passengers a year.

Lifestyle is also a draw. Greater Philadelphia boasts a cost of living that Select Greater Philadelphia estimates is at least 50 percent lower than the New York, Boston, and San Francisco metropolitan areas.

"It's a great home for innovation," says Shannon, "and a great place to live, work, and do business."

There are more than 370 biotech drug products and vaccines currently in clinical trials targeting more than 200 diseases, including various cancers, Alzheimer's disease, heart disease, diabetes, multiple sclerosis, AIDS, and arthritis. Understanding biotech's impact, let alone its science, is a challenge.

Mighty Mouse Returns

Biotech and the Delaware Valley have come a long way. Yet despite the progress, all points on the triangle, from academic institutions to biotech firms to global pharmaceutical companies, still face two intractable foes: money and time.

"The resource requirements to develop a drug are incredible," says Wyeth's Ruffolo. "Most biotech companies and certainly most universities don't have the resources needed to develop new drugs. It is not unusual for the entire R&D process to take 15 years—Tygacil™, one of the new antibiotics we've submitted, was granted priority review by the FDA and took 17 years to discover and develop. The cost is somewhere between \$800 million and \$1.5 billion to bring a new drug to the market. When people hear about a major advance coming from the genomics revolution, the expectation is that the drug is around the corner. In reality, it's a decade or more away."

At the Wistar Institute, Meenhard Herlyn has waited long enough. With a small army of mice and nearly 29 years of work devoted to breaking the secret of the most deadly form of skin cancer, he's more than ready for a cure, one that will give patients at least half of Ruffolo's time-and-money equation.

"Today we are on the verge of major breakthroughs in cancer therapy. Prevention is important, but people will still develop cancer. We will work on early detection because cancer, when detected early, is in most cases curable. The director of the National Cancer Institute has said that by 2015 he expects people will no longer suffer and die from cancer of all kinds. It is a hard challenge, but I am with him. I am an optimist."

JEFF WIDMER is the author of *The Spirit of Swiftwater: 100 Years at the Pocono Labs*. You can read excerpts of this book and other samples of his work at jeffwidmer.com.