Patient Capital: How Venture Capital Investment

How Venture Capital Investment Drives Revolutionary Medical Innovation

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About the Study

This study was prepared by Michaela Platzer, president, Content First, LLC, a public policy research services firm based in Washington, DC. The purpose of the study is to provide policy makers, the press, and the public with an overview about the pivotal role venture capital backed companies have played, and will continue to play, in the development of novel medical innovation from new biotechnology therapies to revolutionary medical devices. These innovative medical technologies affect virtually all Americans.

The study is part of the National Venture Capital Association's (NVCA) Medical Industry Group (MIG) public outreach program aimed at collecting and disseminating information about the important role that life sciences venture investing plays in driving revolutionary medical innovation. NVCA's MIG focuses on addressing the unique needs of venture backed companies investing in the life sciences industry.



Patient Capital

How Venture Capital Investment Drives Revolutionary Medical Innovation



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Executive Summary

Patient Capital: How Venture Capital Investment Drives Revolutionary Medical Innovation demonstrates that many of the nation's most innovative medical breakthroughs have been brought to market by billions of dollars of venture capital investment in life sciences companies. The economic impact and medical contributions of these life sciences companies have been enormous.¹ The revolutionary medical breakthroughs produced by venture capital backed companies such as Amgen, Genentech, Genzyme, Gilead Sciences, Kyphon, Intuitive Surgical, and Scimed Life Systems, along with hundreds of smaller innovative life sciences companies, amount to highly tangible and valuable improvements to the U.S. economy and to people's lives. Today, small venture backed companies often serve as the research and development (R&D) pipeline for the larger life sciences corporations who seek to acquire the most promising innovations. Whether these emerging companies someday grow to the size of a Fortune 500 corporation or are acquired for their groundbreaking products, they all rely on the venture capital industry to get their start.

Select Venture Capital Backed Life Sciences Companies Employment and Revenue, 2006 (ranked by employment)

Company	Employment	Revenue
Boston Scientific Corporation	28,600	\$7.8 Billion
Amgen, Inc.	17,310	\$14.3 Billion
Genentech, Inc.	10,533	\$9.3 Billion
Genzyme Corporation	9,000	\$3.2 Billion
Watson Pharmaceuticals, Inc.	5,830	\$2.0 Billion
Cephalon, Inc.	2,895	\$1.8 Billion
Gilead Sciences, Inc.	2,515	\$3.0 Billion
Kyphon Inc.	1,090	\$407.8 Million
Intuitive Surgical, Inc.	563	\$372.6 Million

Source: Hoover's

Impact of Discoveries by Venture Capital Backed Life Sciences Companies

- Saves millions of lives
- ► Improves medical procedures
- Reduces health care costs
- Provides overall economic benefits to the U.S. economy

Venture capital investors seek and invest in the most promising therapies and technologies to combat costly and too often fatal chronic conditions such as heart disease, cancer, stroke, and diabetes. Venture investment allows small startup life sciences companies to develop these technologies and commercialize them so that millions of Americans can have access to the most advanced treatments available. The monetary support and expert business counsel provided by venture capitalists speed the time it takes to move novel medical therapies and technologies from the lab to the patient. Due to the high risk, the uncertainty of outcomes, and the long-term nature of life sciences commercialization, venture investment is often the only funding option for these small companies.

Venture Capitalists Are Committed to Growing the Life Sciences Sector

- Since 2002, over \$29 billion in venture capital investment has flowed into the life sciences sector. This investment pace is steadily growing. In 2006 alone, venture capital investment totaled \$7.2 billion in emerging life sciences companies, representing 28 percent of all venture capital investment.
- Experts agree that virtually the entire biotechnology industry and most of the significant breakthroughs in the medical devices industry would not exist without the support of the venture capital industry.
- Employment at venture capital backed life sciences companies comprised 54 percent of total life sciences employment and 60 percent of total life sciences revenue in 2006.
- Venture financed life sciences companies supported 493,800 jobs and generated \$132 billion in revenue in 2006.
- There have been more than 100 venture backed initial public offerings (IPOs) in the life sciences sector since 2002.

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Venture Capital Life Sciences Investment Compared to Total Venture Capital Investment, 2002–2006

Source: PricewaterhouseCoopers/National Venture Capital Association MoneyTree™ Report. Data provided by Thomson Financial.

Venture Capital Backed Life Sciences Companies Produce Enormous Health Gains and Cost Savings

Venture Capital Funds Disruptive Innovation

- While some of these venture financed life sciences companies have disrupted entrenched industries, others have spawned entirely new ones. The venture backed company that developed angioplasty technology not only has impacted the medical industry's approach to heart surgery, but it has also spawned multiple cardiac delivered therapies and drug delivery systems. This technology also costs significantly less than the cost of open bypass surgery.
- Venture backed medical technologies, including Magnetic Resonance Imaging (MRI) and ultrasound diagnostic imaging, have virtually eliminated exploratory surgery for countless conditions. Other examples of venture backed breakthroughs include implantable defibrillators, spinal implants, glucose self-monitoring devices for diabetes, and pulse oximetry.
- A venture capital backed drug to reduce the risk of breast cancer in high-risk women costs approximately \$1,050 per year, far less than the \$14,000 average cost per year for surgery and other invasive breast cancer treatments.
- Venture backed companies today serve as the R&D pipeline for larger life sciences companies looking for innovation. In the last 5 years, close to 200 venture backed life sciences companies have been acquired for their innovations.

Examples of Venture Capital Investment In Chronic Diseases

Disease	Venture Capital Support During the Past 20 Years
Cardiovascular/Heart Disease	\$14.9 Billion in 2,028 Deals
Cancer	\$14.7 Billion in 1,619 Deals
Diabetes	\$4.9 Billion in 595 Deals

Source: PricewaterhouseCoopers/National Venture Capital Association MoneyTree™ Report. Data provided by Thomson Financial.

Venture Capital Investment Combats America's Leading Causes of Death

- Venture capital backed life sciences companies develop revolutionary medical technologies and drugs to treat chronic diseases afflicting millions of Americans from arthritis, cancer, and diabetes to heart disease and stroke.
- During the past 20 years, the venture capital community has invested an estimated \$15 billion in more than 2,000 deals specializing in cardiovascular diseases, \$14.7 billion in some 1,600 deals focused on combating cancer, and close to \$5.0 billion in almost 600 deals to develop new treatments for controlling diabetes.
- More than 100 million (1 out of 3) Americans have been positively impacted by innovations developed and launched by venture capital backed life sciences companies during the past 20 years.

Venture Capital Backed Life Sciences Investment Depends Upon a Predictable and Efficient Path Within the Regulatory Environment

- The future of medical innovation is tremendously promising and will lead to continuous improvement in health care, provided government regulations keep pace with the advancement of these important innovations.
- Life sciences startup companies face special challenges given the high degree of risk and the cost and time it takes to bring these innovative health care therapies and technologies to the marketplace. An unpredictable regulatory environment weighs heavily in the calculation of investment risk in a new technology.
- The venture capital industry's commitment to this critical life-saving sector of the U.S. economy must be accompanied by a regulatory environment that is conducive to the efficient delivery of medical breakthroughs.



Section 1: Venture Capitalists Are Committed to Investing In and Growing the Life Sciences Sector

Life Sciences Companies Are Capturing an Increasing Share of Venture Capital Dollars

or the last 20 years, the venture capital community has enabled many of the most promising life sciences companies to conduct groundbreaking scientific research, while simultaneously building viable businesses that bring these innovative products to the marketplace and contribute to the U.S. economy.

The venture capital community invested \$7.2 billion in life sciences companies in 2006, up from \$2.8 billion in 1998. Over the last 8 years, venture capital investment in life sciences jumped from 13 percent to 28 percent of total venture capital investment.



In particular, venture capitalists have invested heavily in biotechnology and the medical devices and equipment sector. In the biotechnology sector, more than 420 deals received venture capital financing, totaling \$4.5 billion in 2006, compared to \$3.2 billion in 2002 and \$1.6 billion in 1998. Additionally, the venture capital industry invested \$2.7 billion in some 300 deals in the medical devices and equipment sector in 2006, compared to \$1.8 billion in 2002. The amount of venture capital invested in the medical devices and equipment sector

alone increased by nearly 60 percent between 2004 and 2006.

"The talent, intellect, and entrepreneurial spirit of the American people have made this nation a leader in biotechnology and life sciences advancements."

Representative Nancy Pelosi
(D-CA), Speaker of the U.S.
House of Representatives

"Over the last half century, improvements in health have been as valuable as all other sources of economic growth combined."

—Kevin Murphy, Ph.D. and Robert Topel, Ph.D., University of Chicago economists

Average Cost to Develop One Medicine (in millions of 2000 dollars)



"The venture capitalists allowed us to think six or twelve steps ahead, instead of two or three."

–Steve Gillis, Ph.D., Chairman and CEO, Corixas (co-founder of Immunex)

Venture Capital Investment in Life Sciences by Sector for 1998, 2000, 2002, 2004, and 2006

	Biotechnology		Medical Devices and Equipment	
Year	Deals	Venture Capital Investment	Deals	Venture Capital Investment
1998	280	\$1.6 Billion	280	\$1.2 Billion
2000	351	\$4.3 Billion	284	\$2.5 Billion
2002	302	\$3.2 Billion	227	\$1.8 Billion
2004	362	\$4.3 Billion	245	\$1.7 Billion
2006	423	\$4.5 Billion	308	\$2.7 Billion

Source: PricewaterhouseCoopers/National Venture Capital Association MoneyTree™ Report. Data provided by Thomson Financial.

Life Sciences Companies Rely on Venture Capital to Thrive

Young life sciences companies are dependent on venture capital investors to grow their businesses. Because their capital needs are so large and their path to market is so long and risky, it is difficult for life sciences startups to access bank financing or other more traditional sources of capital. For example, it is estimated that the average cost of bringing a new drug to market exceeds \$800 million and the entire drug discovery, development, and review process takes, on average, 15 years to complete.² Large successful companies such as Genentech, Amgen, and countless smaller innovative life sciences companies may never have gotten off the ground if not for the venture capital support received in the early stages of their development. Since 2005, there have been more than 100 venture backed life sciences initial public offerings. These are the Genentechs of tomorrow.

Venture Capital Backed Life Sciences Companies Contribute to U.S. Economic Growth

Venture investment in life sciences companies is extremely beneficial to the U.S. economy. Employment at venture capital financed life sciences companies reached almost 494,000 workers in 2006, up from nearly 381,000 in 2003, representing 54 percent of total life sciences employment in 2006, according to the latest data from Global Insight, the economic research firm. The importance of venture capital investment in the biotechnology sector is underscored by the fact that 40 percent of total biotechnology industry employment in 2006 was tied to companies that got their start with venture capital. In the medical devices and equipment industry, venture financed companies represented 83 percent of total industry employment in 2006.

The dynamism of venture capital backed life sciences companies, particularly venture financed biotechnology companies, is reflected in the employment growth rates. Venture backed biotechnology companies increased their employment base by 9.2 percent between 2003 and 2006, significantly outpacing the 4.3 percent total compound annual employment growth for the entire biotechnology industry.

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Venture Backed Life Sciences Employment, 2003 and 2006

	2003 Venture Capital Backed Life Sciences Employment	2006 Venture Capital Backed Life Sciences Employment	2006 Total Life Sciences Employment	2006 Venture Capital Backed Share of Total Life Sciences Employment
Biotechnology	190,600	247,900	627,600	40%
Medical Devices and Equipment	190,200	245,900	294,900	83%
Life Sciences Tota	al 380,800	493,800	922,500	54%

Source: Global Insight

The Milken Institute found that the biopharmaceutical industry has an enormous ripple effect throughout the economy. It projects that for every job within biopharmaceuticals, an additional 6.7 jobs are created in other sectors of the economy.³ Indeed, the Milken Institute study expects total employment to increase to over 3.6 million in the biopharmaceutical industry by 2014.

Venture Capital Backed Biotechnology Employment Growth vs. Total Biotechnology Employment Growth CAGR* 2003–2006



*Compound Annual Growth Rate Source: Global Insight

Case Study I: Cancer

Cancer is the second leading cause of death in the United States, causing one of every four deaths in the country. Over 18 million new cases of cancer have been diagnosed since 1990 and approximately 1.4 million new cancer cases were expected to be diagnosed in 2005.⁴

The National Institutes of Health estimates overall costs for cancer in 2005 at \$210 billion in health care expenditures and lost productivity: \$74 billion for direct medical costs (total of all health expenditures); \$17.5 billion for indirect morbidity costs (cost of loss of productivity due to illness); and \$118 billion for indirect mortality costs (cost of lost productivity due to premature death).⁵

The Venture Capital Contribution

In the last 20 years, the venture capital community has invested close to \$15 billion in more than 1,600 deals that have developed, or are developing, new treatments and detection methods for all forms of cancer. Key venture capital backed innovations include Doppler Ultrasound, minimally invasive biopsy, PSA, MRI, Herceptin, and Avastine.



A drug that can reduce the risk of breast cancer in high-risk women costs approximately \$1,050 per year. The average cost per year for surgery or other invasive methods of treating breast cancer is \$14,000.

U.S. Breast Cancer Statistics

Number of women diagnosed with breast cancer per year	212,920
Number of women estimated to die from breast cancer in 2006	41,430
Annual cost of breast cancer in the United States	\$7 Billion
Source: AdvaMed	



Section II: Venture Capital Saves Lives and Money by Funding Revolutionary Medical Breakthroughs

Disruptive Technologies

Disruptive technologies are revolutionary discoveries that "change the way people do things." Any technology that "rapidly leapfrogs over the competition" by performing the tasks of an existing technology, but in a much improved manner, can be considered a disruptive technology.

"Without the support of our venture capital investors, we would not have had sufficient resources to develop, and ultimately produce and support, the pulse oximeter."

—Jack Lloyd, co-founder and former President and Chief Executive Officer of Nellcor

Venture Capital Funds Disruptive Innovation

he venture capital industry looks to fund only those companies that provide truly fundamental innovation. As a result of such high criteria, many of these venture backed discoveries are so revolutionary that they disrupt markets and industry segments. In fact, many large pharmaceutical and life sciences corporations consider young, venture backed companies to be their de facto research R&D pipelines. For this reason, venture backed companies often are acquired for their disruptive technologies by these larger organizations. From 2002 to 2006, close to 200 venture backed life sciences companies were acquired for their innovations.

While some of these venture financed life sciences companies have disrupted entrenched industries, others have spawned entirely new ones, and in doing so, have even permanently changed the landscape of health care. For example, angioplasty not only has impacted the medical industry's approach to heart surgery, but it also has spawned multiple cardiac delivered therapies and drug delivery systems. Venture backed medical technologies, including Magnetic Resonance Imaging and ultrasound diagnostic imaging, have virtually eliminated exploratory surgery for countless conditions. Other examples of venture backed breakthroughs include implantable defibrillators, spinal implants, and glucose self-monitoring devices for diabetes. An example of one of the most significant contributions from a venture backed company is the pulse oximeter developed by Nellcor. This device makes all of the approximately 25 million annual surgical procedures completed under anesthesia safer and has dramatically reduced anesthesia-related deaths.

Venture Capital Investment Combats America's Leading Causes of Death

There were nearly 2.4 million deaths in the United States in 2004, according to the most recent available data from the National Center for Health Statistics.⁶ The leading cause of death in 2004 was heart disease, followed by cancer and stroke, all of which are treatable with medical innovations developed by venture capital backed life sciences companies.

According to recent research by Andy Stolis, Managing Director of Pacific Bridge Life Sciences, and David Goodman of the Weinberg Group on the vital role of venture capital in life science innovation, more than 100 million (1 out of 3) Americans have been positively impacted by innovations developed and launched by venture capital backed life sciences companies during the past 20 years. Each year, 25 million Americans see this benefit. In fact, most major innovations since the mid-1980s have been enabled by the monetary and non-monetary contributions of venture capitalists to the companies that develop these products.⁷

Revolutionary Innovations of Venture Backed Medical Startups

Disease	Innovative Treatment Examples
Heart Disease	Angioplasty, Aortic Aneurysm Stent Grafts, Atherectomy,
	Minimally Invasive Bypass, Electro-Ablation, Implantable
	Defibrillators, Integrilin, and ReoPro
Cancer	Doppler Ultrasound, Minimally Invasive Biopsy, Prostate-specific
	Antigen (PSA), MRI, Avastin, Erbuitux, Gliadel, Herceptin, Rituxan,
	and Velcade
Stroke	MRI and Tissue Plasminogen Activator (TPA)
Respiratory Disease	FluMist and Ventilators
Diabetes	Glucose Self-Monitoring Devices and Recombinant Human Insulin
Spinal Injuries	Kyphoplasty, Artificial Spinal Discs, and Spinal Fusion Cages

Diabetes, breast cancer, and end-stage renal disease are just some of the diseases treated with products developed with venture backing. A large portion of the patients with these diseases have an improved quality of life due to products such as human insulin (diabetes), Herceptin (breast cancer), and EPOGEN (anemia).

"Drugs already developed have brought tremendous benefits: preventing hospitalizations, eliminating surgeries, or getting a patient out of an institution. And even more important are the benefits of these medicines in terms of saved lives, reduced suffering, and more productive and fulfilling lives."

—Scott Gottlieb, M.D., Deputy Commissioner for Medical and Scientific Affairs, Food and Drug Administration, March 2006.



Section III: Venture Capital Backed Life Sciences Investment Depends Upon a Predictable and Efficient Path Within the Regulatory Environment

enture capital backed life sciences companies operate in one of the most highly regulated U.S. industries. This presents special challenges for small startup venture backed life sciences companies who alone do not possess the financial means to complete these long and uncertain processes. Often, venture capital is the only viable source of funding to support these companies.

The top priority of NVCA's Medical Industry Group is to study the regulatory barriers to innovation and work with government officials on methods to improve the regulatory process to ensure the advancement of medical innovation. This effort is critical for NVCA since venture backed technologies in the life sciences are key to continued medical innovation and advancement. Removing unnecessary uncertainties from the investment equation will encourage ongoing venture investment in these promising young companies.

According to a recent survey conducted by NVCA, there are significant regulatory issues facing venture backed life sciences companies, in particular those developing novel technologies and therapies. The biggest regulatory hurdles these businesses face include FDA approval, patent protection, the Centers for Medicare and Medicaid Services Payment, and Sarbanes-Oxley compliance.

FDA Approval and CMS Coverage Process

Access to effective health care requires access to the latest advances in technology. One of the major obstacles to the acceptance and incorporation of a new technology is the uncertainty associated with the FDA approval process and subsequent pricing of that technology by CMS. As venture backed life sciences companies break down scientific barriers, they often develop novel therapies and technologies that no longer fit within the old categories. This dynamic increases the complexity of the approval processes and makes them much more unpredictable in terms of length of time to approval and outcome. Given today's highly advanced medical technology environment, it is critical that FDA and CMS keep pace with the advancement of novel therapies and technologies and design a reliable and predictable path to approval for these types of innovations.

Regulatory Hurdles to Building a Successful Life Sciences Company

- Food And Drug Administration (FDA) Approval
- United States Patent and Trademark Office (USPTO)
- Centers for Medicare and Medicaid Services (CMS) Payment
- Sarbanes-Oxley Compliance

Intellectual Property/Patent Reform

No other industry is as dependent on developing and protecting intellectual property as the life sciences industry. Due to the enormous investment that life sciences companies make in research and development, the intellectual property accumulated as a result of that research is often the most valuable asset of a company. Patents protecting intellectual property allow scientists and companies to secure their ideas and innovations. Small life sciences companies must have the tools necessary to defend their intellectual property from infringers of all sizes—at a reasonable cost. As Congress explores reforms and improvements to the patent system, it is imperative that small companies are protected and that overall patent quality improves.

Sarbanes-Oxley

The Sarbanes-Oxley Act of 2002 (SOX) was passed to address massive corporate fraud that took place at large U.S. publicly traded companies. With its passage came significantly increased liabilities for boards of directors, executives, and accountants. While most will agree that SOX provided much needed controls, there have been unintended consequences associated with the law. While aimed at the misdeeds of public companies, SOX has impacted small, private companies as the cost of compliance is extremely burdensome. The result is that small life sciences companies are forced to spend valuable capital resources on accounting work that otherwise would be spent on research and development for cures and life-saving treatments. It is important that these companies are not unnecessarily strapped with compliance costs at a time when their limited resources should be directed to bringing innovation to market.

"We're closing in on the ability to protect and fight against a range of illnesses, including cancer, HIV, and heart disease. Our biotechnology industry is the strongest in the world and we need to keep it that way."

—George W. Bush, June 2003

Case Study 2: Diabetes

Diabetes is a group of diseases characterized by high levels of blood glucose resulting from defects in insulin production, insulin action, or both. There are 20.8 million people in the United States, or 7 percent of the population, who have diabetes. Diabetes was the sixth leading cause of death, contributing to 72,800 deaths in 2005. The risk of death among people with diabetes is about two times that of people without diabetes.

The current economic costs associated with diabetes total \$132 billion. Of this, \$92 billion are associated with direct medical costs, \$40 billion are indirect costs through disability, loss of work productivity, and premature mortality.⁸

The Venture Capital Contribution

The venture capital community has invested almost \$5.0 billion in close to 600 deals with companies specializing in controlling diabetes during the past 20 years. Key venture capital backed innovations include human recombinant insulin and glucose monitoring devices like FreeStyle and One Touch.





Section IV: Venture Capital Contributes to Medical Innovation

The Heart Attack Drug, Integrilin

ntegrilin was developed by COR Therapeutics (purchased by Millennium Pharmaceuticals in 2002) and launched commercially in May 1998. The company was founded by Lee Douglas, with a team of three scientists from the University of California at San Francisco and one individual from Genentech.

Integrilin is a life-saving drug that prevents platelets from clumping together, reducing the likelihood of blood clotting, and therefore, the risk of acute myocardial infarction (heart attack). A key outcome from the introduction of Integrilin has been a dramatic shift in the safety of angioplasty, with shorter hospital stays, and fewer surgical complications.

Venture capital has played a significant role in supporting and developing COR Therapeutics, leading to the successful introduction of this life-saving therapy. In combination with angel investors, three venture capital firms raised approximately \$10 million to provide COR with the financing needed to explore the viability of its technology, including IIb-IIIa receptor technology that evolved into Integrilin.

Blood Glucose Self-Monitoring

As there is no cure for diabetes, the most effective way to control the disease and prevent complications is regular testing of blood sugar levels. Until the early 1980s, testing for blood glucose levels was painful, expensive, and not highly accurate. In 1983, Lifescan introduced the first meter, with a digital read-out, that reduced the pain and increased the accuracy of glucose self-monitoring. As a result, millions of Americans with this condition could more effectively and more regularly check their blood sugar levels.

Subsequently, products have been developed that reduce the pain even further, while maintaining or improving accuracy. In mid-2000, Therasense (now a subsidiary of Abbott Laboratories) launched the FreeStyle blood glucose self-monitoring system. This system allows for blood to be taken from parts of the body that feel less pain, such as the forearm, upper arms, thighs, and calves. This improvement was made possible because the FreeStyle system does not require as large a blood sample as other glucose self-monitoring systems.

Blood glucose self-monitoring allows millions of diabetics in the United States and around the globe to manage their blood sugar more effectively, reducing or eliminating the many complications of diabetes.

Minimally Invasive Breast Biopsy

Twenty years ago, biopsies typically were done with an open surgical procedure. Today, there are many effective venture backed treatments that ease the burden for the patients. For instance, minimally invasive breast biopsy offers an effective, low-cost alternative to surgical tissue sampling. While mammograms and physical exams can point to an area of concern, only biopsy—a removal of tissue—can definitively confirm the presence or absence of cancer. Minimally invasive breast needle biopsy uses advanced imaging to help the physician guide a special probe to the exact area of concern. Unlike traditional surgical biopsy, the minimally invasive approach is quick and does not involve a major incision and the potential risks and complications that arise from surgery.

In addition to the benefits to patients, minimally invasive breast biopsy helps health care payers contain costs. One recent study showed that minimally invasive biopsies offer a cost advantage over traditional surgical biopsies in every health care setting where either procedure can be performed.

Medical Technology Revolutionizes Breast Biopsies

	Open Surgical Biopsy	Minimally Invasive Biopsy Procedure
Incision Size	1.5-2''	0.12-0.2"
Procedure Time	2-4 hours	30-60 minutes
Recovery Time	Several hours	Immediate
Scarring	Substantial	Minimal
Cost	\$1,169-\$1,360	\$517-\$855

Source: AdvaMed

Osteoporosis

Kyphon was founded in 1994 to develop a minimally invasive treatment for vertebral compression fracture (VCF) caused by osteoporosis. This novel technology has changed the practice of medicine. Multiple studies have documented the devastating impact of VCF on patient function and quality of life, costing the U.S. health care system more than \$18 billion a year—a figure that is expected to grow dramatically as the population ages—as well as an increased risk of death that exceeds the mortality from hip fractures. Every year, there are 700,000 new cases of VCF that mostly affect elderly women. This is the fracture of the spine that causes "Dowager's Hump."

Karen Talmadge, one of Kyphon's co-founders, pursued the development of a novel technology that would allow physicians to perform what became known as kyphoplasty. Prior to the development of this treatment, patients suffering from VCF received conventional therapy (which was mainly bed rest, back braces, and strong pain killers). In 1996, Kyphon received startup venture capital. The improvement in treatments of compression spinal fractures has resulted in significant health cost savings. The recovery time from the minimally invasive procedure is less than seven days compared to four to six weeks for traditional back surgery, with a hospital stay of one to two days for the procedure, compared to three to four days for traditional back surgery. Also, the procedure costs on average \$9,000 to \$14,000 compared to the procedure cost for traditional back surgery of \$12,000 to \$20,000. Today, Kyphon employs over 1,000 workers and posted sales of over \$400 million.

Case Study 3: Cardiovascular Disease (Heart Disease and Stroke)

Cardiovascular disease affects the lives of more than 70 million Americans.⁹ Over 650,000 Americans died of heart disease in the United States in 2004, according to the National Center for Health Statistics.¹⁰ Yet, heart disease is also the leading preventable chronic disease in the United States, outpacing all other preventable conditions, according to the National Institutes of Health.

The entire field of minimally invasive transcatheter therapeutics was launched by a small number of venture capital backed entrepreneurial companies in the 1980s, with the invention of the field's first major product, coronary balloon angioplasty. The initial huge success of these vanguard companies inspired more entrepreneurs, again backed by risk-taking venture capitalists, who progressively developed more efficacious later generation products, including coronary stents. Stents in particular provide a less invasive, safer, more reliable, and more cost effective treatment, while dramatically shortening patient recovery time compared to the previous therapeutic option of coronary bypass surgery.

According to one study, the initial cost of stent implantation was 29 percent less than bypass surgery. Medical costs more than a year after the stent procedures, when adjusted for patient differences in extent of coronary disease and diabetes, were 21 percent less. In all, stents save lives, reduce pain and complications for patients, and offer cost-effective therapy.¹¹

Despite this, cardiovascular disease remains America's number one killer and is also the costliest disease in terms of annual medical expenses. The estimated direct and indirect cost of cardiovascular disease in 2006 was \$432 billion.¹²

The Venture Capital Contribution

The venture capital community has invested almost \$15 billion in more than 2,000 deals specializing in cardiovascular diseases over the last 20 years. Key venture capital backed innovations include such medical devices as stents, angioplasty, minimally invasive bypass, and implantable defibrillators, as well as drugs such as Integrilin.



current success of Kyphon and kyphoplasty, in the early days, the vision almost died as we vainly sought funding for this radical new idea. When I met with our venture capital backers, I found more than money. They helped me start Kyphon and "do it right." There was no doubt that without the venture community, Kyphon and kyphoplasty would not exist." —Karen Talmadge, Ph.D., Executive Vice President, Co-Founder and Chief Science Officer, Kyphon

"Despite the enormous



Conclusion: Venture Capital Drives the Next Generation of Cures

ecent data confirm that patients are benefiting from new medical treatments produced by venture capital backed companies over the past 20 years. A review of the available research shows that between 1980 and 2000, there have been remarkable improvements in health care in the United States. For example, the data show that the number of deaths in the United States fell by 16 percent per 100,000 deaths between 1980 and 2000, while life expectancy increased by more than 4 percent, from 73.7 years to 76.9 years. The statistics also reveal that the number of hospital days fell by 56 percent between 1980 and 2000.¹³

Health Gains from 1980-2000

	1980	2000	Difference
Death Rate (per 100,000)	1,039	872	-16.1%
Number of Deaths	2.9 M	2.4 M	-16.1%
Life Expectancy	73.7	76.9	+4.3%
Hospital Days	365 M	159 M	-56.4%

Source: MEDTAP, The Value of Investment in Health Care

Yet challenges still loom large. As the U.S. population ages, the number of Americans with chronic diseases is projected to reach 157 million by 2020. By 2030, half of the U.S. population is projected to have one or more chronic condition.¹⁴ We must continue to accelerate innovation and keep pace with our country's needs.

The next medical frontier is tremendously exciting. In the next decade, venture capital backed life sciences companies will develop disruptive technologies in human genomics, gene cloning, and molecular biotechnology. Personalized medicine will become the norm. As a result, people will be regularly tested for presence of various diseases, and in the event of a problem or potential threat, a customized cocktail of therapeutics and nutrients that has the best chance to work for the individual patient will be delivered.

To realize this golden era of medical innovation, it will take more than dedicated scientists. It will require continued venture capital investment. A regulatory and legislative environment that is favorable to small, innovative companies is the best guarantee that the venture capital industry will continue to fund these breakthroughs and that Americans will benefit from the patient capital that has served them over time.



Venture Capital 101

What is Venture Capital?

Venture capital has enabled the United States to support its entrepreneurial talent and appetite by turning ideas and basic science into products and services that are the envy of the world. Venture capital funds and builds companies from the simplest form—perhaps just the entrepreneur and an idea expressed as a business plan—to freestanding, mature organizations.

Venture capital firms are professional, institutional managers of risk capital that enables and supports the most innovative and promising companies. This money funds new ideas that could not be financed with traditional bank financing, that threaten established products and services in a corporation, and that typically require five to eight years to be launched.

More Than Money

The U.S. venture industry provides the capital to create some of the most innovative and successful companies. But venture capital is more than money. Venture capital partners become actively engaged with a company, typically taking a board seat. With a startup, daily interaction with the management team is common. This limits the number of startups in which any one fund can invest. Few entrepreneurs approaching venture capital firms for money are aware that they essentially are asking for ½ of a person!

Active engagement is critical to the success of the fledgling company. Many one- and two-person companies have received funding, but no one- or two-person company has ever gone public! Along the way, talent must be recruited and the company scaled up. Ask any venture capitalist who has had an ultra-successful investment and he or she will tell you that the company that broke through the gravity evolved from the original business plan concept with the careful input of an experienced hand.

What Entrepreneurs Are Really Asking For!

An early stage venture capitalist sitting on six company boards has a huge workload.



Many technologies currently under development by venture capital firms are truly disruptive technologies that do not lend themselves to being embraced by larger companies whose current products could be cannibalized by this. Also, with the increased emphasis on public company quarterly results, many larger organizations tend to reduce spending on research and development and product development when things get tight. As a result, many talented teams have spun out of large companies and have turned to the venture capital process when their projects were turned down by their companies.

Economic Alignment of All Stakeholders—an American Success Story

Venture capital is rare among asset classes in that success is truly shared. It is not driven by quick returns or transaction fees. Economic success occurs when the stock price increases above the purchase price. When a company is successful and has a strong public stock offering, or is acquired, the stock price of the company reflects its success. The entrepreneur benefits from appreciated stock and stock options. The rank and file employees throughout the organization also do well with their stock options. The venture capital fund and its investors split the capital gains per a pre-agreed formula. Many college endowments, pension funds, charities, individuals, and corporations have benefited far beyond the risk-adjusted returns of the public markets.

Much of venture capital's success has come from the entrepreneurial spirit pervasive in the American culture, financial recognition of success, access to good science, and fair and open capital markets. It is dependent upon a good flow of science, motivated entrepreneurs, protection of intellectual property, and a skilled workforce.

About the Author and the National Venture Capital Association

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Michaela Platzer is president of Content First, LLC, a full-service public policy research services firm in Washington, DC that utilizes a unique process of melding solid research and analysis with presentation and communication to bring advocacy data, industry statistics, and policy research to life for trade associations, businesses, law firms, consulting firms, and the public affairs community.

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National Venture Capital Association

The National Venture Capital Association represents approximately 480 venture capital and private equity firms. NVCA's mission is to foster greater understanding of the importance of venture capital to the U.S. economy and support entrepreneurial activity and innovation. According to a newly released study by Global Insight, venture backed companies provided 10.4 million U.S. jobs and \$2.3 trillion in revenue in 2006. NVCA represents the public policy interests of the venture capital community, strives to maintain high professional standards, provides reliable industry data, sponsors professional development, and facilitates interaction among its members. For more information about NVCA, please visit www.nvca.org.

Endnotes

- 1. Life sciences refers to the scientific study of the living world as a whole. It is a new synthesis of several traditional disciplines, including biology, zoology, and botany, with newer, more specialized areas of study, such as biosciences, biochemistry, biotechnology, bio-informatics, genetics, pharmaceutical studies, food science and technology, and environmental science, <u>The Importance of Intellectual Property in Life Science Ventures and How It Impacts Capital Raising</u>, June 2, 2006.
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