



## MEDICAL BREAKTHROUGHS WE LIVE BY

Drugs that prevent certain breast cancers by blocking estrogen receptors, treat depression by regulating brain chemicals, and control HIV—all began from seemingly esoteric discoveries of basic research. Such discoveries have made the difference between life and death for many. And the average American is living six years longer than in the 1970s. Here are some recent medical breakthroughs we live by:

**HIV is no longer an automatic death sentence.** Since identifying HIV in 1983, scientists have deduced the entire life cycle of the virus and probed its structure. As a result, today there are 22 licensed drugs and a diagnostic blood test, most of these developed in the past decade. Many who would have succumbed to the disease now lead productive lives.

**Heart disease deaths are down 63%, and deaths from stroke are down 70% from the 1970s.** Ground-breaking laboratory research has made a huge difference in reducing mortality. It has led to the development of cholesterol-lowering therapies; the issuance of evidence-based guidelines for management of blood pressure; and a new understanding of diabetes as a vascular disease.

**Stopping childhood killers.** Rotavirus, a diarrheal disease that kills 600,000 children a year worldwide, is now being stopped with two safe and effective vaccines, one of which was approved in 2006 in the United States. A vaccine for *Pneumococcus* became available in 2000. That bacterium causes pneumonia, meningitis, and acute ear infections and kills up to one million children worldwide every year.

**Predicting risk for type 1 diabetes.** Researchers have learned volumes about the biology underlying autoimmune, or type 1, diabetes, and they can now predict who is at high risk. Very recently, researchers found a region of the human genome that accounts for half the increased risk for the disease. This knowledge allows diagnosis and treatment of diabetes before life-threatening complications can develop.

**Preventing cervical cancer.** In 2006, women gained a potent weapon against cervical cancer: a vaccine that can stop the human papillomavirus (HPV), the major cause of this deadly cancer that claimed more than 200,000 lives worldwide last year.

**Public-private partnerships.** Between 1998 and 2005, U.S. research institutions brought 3,114 new technologies to market, often in partnership with private industry.

**“Physicists, chemists, mathematicians, and biologists are integrating their expertise, devising totally unique approaches and technologies. We’re going to be able to probe diseases in ways that were unfathomable to us.”**

Joan Brugge, Ph.D.  
*Harvard Medical School*

**“I do science because I believe I can better the lives of patients.... Have you seen the bellies of patients who inject themselves with insulin? Or the skin of women with multiple sclerosis? They have so much scar tissue that each new injection is terribly painful. We owe it to our patients to come up with solutions.”**

Nicholas Peppas, Sc.D.  
*The University of Texas at Austin*

**“The doubling brought in a cohort of research ‘baby boomers.’ These new investigators suddenly have to compete heavily against each other and against senior investigators for grants. Many of them are leaving. This is a crisis for the research community. What is going to happen to the future of health research in the U.S.?”**

Lee Riley, M.D.  
*University of California, Berkeley*

**“The inherent risk taking—the driving engine for research—that’s the heavier toll of flat funding. People don’t take as many risks. You can’t afford to swing the bat and miss too many times.”**

Jerry Chi-Ping Yin, Ph.D.  
*University of Wisconsin-Madison*