

to replace today's fossil fuel-fired electric power plants with wind or nuclear plants.

Hydrogen cars are an attractive long-run

possibility, Keith and Farrell conclude, but not the only one—and not one America should wholeheartedly embrace anytime soon.

Trapped in the Lab

“Patients Have Been Too Patient with Basic Research” by Ralph M. Steinman with Maia Szalavitz, in *Cerebrum* (Fall 2002), Dana Press, 900 15th St., N.W., Washington, D.C. 20005.

Biomedical researchers, working in laboratories with rats and mice and tissue cultures, have made great strides in the theoretical understanding of human diseases—but benefits to the people suffering from those diseases have not kept pace. The reason? Not enough physician-scientists, who both treat patients and use them in research, contend Steinman, a professor of immunology at Rockefeller University, and Szalavitz, a science writer.

“Historically, medical research was conducted by physicians, but the molecular and cell biology revolution changed that dra-

matically by the early 1960s,” the authors observe. “Since then, even basic research on particular diseases has required specialized skills that most doctors never develop.” And most specialized researchers, working at the cellular and molecular levels, are far removed from the bedsides of patients.

Of the 700,000 physicians in the United States today, only 14,000 are scientists working to apply lab discoveries to human disease. Their numbers have declined since 1980, for manifold reasons. It can take 12 to 14 years to become both a physician and a

EXCERPT

Let Us Age

The case for ageless bodies seems at first glance to look pretty good. The prevention of decay, decline, and disability, the avoidance of blindness, deafness, and debility, the elimination of feebleness, frailty, and fatigue, all seem to be conducive to living fully as a human being at the top of one's powers—of having, as they say, a “good quality of life” from beginning to end. We have come to expect organ transplantation for our worn-out parts. We will surely welcome stem cell-based therapies for regenerative medicine. It is hard to see any objection to obtaining a genetic enhancement of our muscles.

[But what] if everybody lived life to the hilt, even as they approached an ever-receding age of death in a body that looked and functioned—let's not be too greedy—like that of a 30-year-old? Would it be good if each and all of us lived like light bulbs, burning as brightly from beginning to end, then popping off without warning, leaving those around us suddenly in the dark? Or is it perhaps better that there be a shape to life, everything in its due season, the shape also written, as it were, into the wrinkles of our bodies that live it? What would the relations between the generations be like if there never came a point at which a son surpassed his father in strength or vigor? What incentive would there be for the old to make way for the young, if the old slowed down little and had no reason to think of retiring—if Michael could play until he were not 40 but 80? Might not even a moderate prolongation of life span with vigor lead to a prolongation in the young of functional immaturity—of the sort that has arguably already accompanied the great increase in average life expectancy experienced in the past century?

—Leon R. Kass, a fellow in social thought at the American Enterprise Institute, in *The New Atlantis* (Spring 2003)

research scientist—far longer than it takes to become just one or the other. The time spent in research training after medical school makes it harder for physicians to pay off their student loans (typically more than \$100,000). Research on humans is more complicated and takes longer than research on animals and lab cultures, and is less likely to yield positive, publishable results. And managed care—by forcing physician-scientists to treat more patients and by cutting funding to teaching hospitals for patients in clinical trials—prompts many physician-scientists to drop their lab work.

But the payoff from the combination of treatment and clinical research, in ideas generated and tested, and ultimately in benefits to patients, can be great, say the authors. In his own work with colleagues, Steinman has shown that a type of immune cell called

a dendritic cell not only directs the immune system to attack enemies, but can switch off immune cells poised to attack the body's own tissues—a discovery made only when a study was done of humans who had a deadly form of blood cancer. Thanks to pressure from pediatric oncologists, some 60 percent of children with cancer now are enrolled in clinical trials combining research and care, compared with only one percent of adults with cancer—and today at least 75 percent of the young victims are cured, compared with only five percent four decades ago.

Some steps have been taken to create more physician-scientists, without success so far. “As with the big research initiatives against AIDS and breast cancer, the public will have to demand that this research be done,” write Steinman and Szalavitz. “From the patient's perspective, nothing is more urgent.”

Free the Mice!

“Can We Trust Research Done with Lab Mice?” by Barry Yeoman, in *Discover Magazine* (July 2003), Buena Vista Magazines, 114 Fifth Avenue, 15th Fl., New York, N.Y. 10011.

Rodents—those ancient instigators of shrieks, disgust, and bubonic plague—have always found acceptance in at least one human setting: the laboratory. Mice have long been the primary subjects of medical, drug, and learning studies, but some young scientists are challenging the scientific validity of lab experiments done with mice.

Led by the Swiss animal behaviorist Hanno Würbel, reports journalist Yeoman, these scientists aim to prove that the bare-bones environment of most lab mice—shoebox-sized cages with no amenities beyond food and water—have serious biological effects on the animals that may compromise findings that are applied to human conditions.

To gauge the consequences of this environment, Würbel set up 24-hour video cameras monitoring the behavior of lab mice. The after-hours conduct he found was comparable to that of a schizophrenic or autistic human: highly regimented, repetitive activities for no practical purpose. Mice did backflips for 30 minutes at a time, gnawed at cage bars ceaselessly, and ran in continual circles. Scientists call such movements “stereotypies.”



“Tough day at the labyrinth!”