



ECONOMIC ENGINE: The Association of American Medical Colleges (AAMC) just released a study showing that federal- and state-supported research contributed almost \$45 billion to the nation's economy in 2009—and that research at AAMC member institutions supports 1 in 500 U.S. jobs.

THEN & NOW

A reminder of the pace of change, and of timeless truths, from the Winter 1991 *Dartmouth Medicine*:

“For a group of second-year students at DMS, ‘Have a HEART’ isn’t a plea for more humanitarianism in medicine but an eminently practical statement: they think everyone should learn CPR. . . . They’ve already had a HEARTening response to their fund-raising appeals: CIBA-Geigy donated a ‘Resusci-Annie,’ a rubber model for teaching CPR.”



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Number of high-tech manikins able to sweat, bleed, drool, and cry in the current 8,000-square-foot simulation center

20,000

Approximate number of individual encounters logged in the center in 2011

A bit of abracadabra yields better research mice

It takes hard work and intelligence to succeed in science—and a bit of magic doesn’t hurt. A case in point is a resource developed by Dr. James Gorham, a DMS pathologist.

Speed: In 2008, Gorham began offering a genetic analysis service—known as speed congenics—to other researchers involved in DMS’s Immunology Center of Biomedical Research Excellence, a collaboration funded by the National Institutes of Health. The service, called DartMouse, cuts in half the time it takes a scientist to develop mice with a specific genetic profile. Gorham says he and the other members of the DartMouse team call the high-tech machine that makes this possible the Nimbus 2000—a nod to the state-of-the-art flying broomstick in the Harry Potter series.

Gorham says it’s not easy to explain speed congenics to non-scientists, but the basic idea is that it’s a faster way for researchers to combine a strain of mouse that works well for their research with another strain that has a specific genetic trait.

Breed: He compares it to crossing two breeds of dogs. If, hypothetically, the high-pitched bark of a poodle was controlled by a single gene, and if, for some reason, you wanted to produce such a bark in a German shepherd, you could breed a poodle with a shepherd. Then you’d take a pup that looked like a shepherd but had the most high-pitched bark

and, again, breed it with a shepherd. Eventually, you’d get a dog very close genetically to a shepherd but with the gene for a poodle’s bark. Getting there, however, could take a long time. Speed congenics makes the process go much faster by comparing the genomes of the mouse pups from every generation.

The machine’s name is a nod to the flying broomstick in Harry Potter.

For example, Dr. Margaret Crane, an immunologist at DMS, is studying the effects of smoke and vitamin D deficiency on infection, a project relevant to the development of infections in people with chronic lung problems. A strain of mice called FVB is a good model for her work, but she is interested in finding out what happens when a gene called mindin is not functional, because it helps protect against infection.

Crane says that developing a

mouse with the traits she needs would not be possible without speed congenics because of the time and money involved. She calls DartMouse “an incredible asset . . . their turnaround time is really, really good.” Mice are essential to her work, she says, since it can’t be done on human lungs, but “one of our principles is that you should use the least number of mice possible.”

Demand: Researchers at more than 20 institutions outside of Dartmouth now use DartMouse, and Gorham expects demand to keep growing because a year or more of research time can be saved. “That’s a very valuable year for scientists,” he says. “They can begin to test their hypothesis sooner. They can get answers sooner. They can publish more quickly.”

So for Crane and others, DartMouse may be just as magical as a flying broomstick—and a great deal more practical.

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JUNIPER TRAILS



Two of Gorham’s colleagues—lab manager Matthew Ranson and lab technician Jane Smith—put the machine that they’ve dubbed Nimbus 2000 through its paces.