

Diane Harper, M.D., M.P.H.: Dream work

By Jennifer Durgin

On Thanksgiving Day, 1981, when Diane Harper was a graduate student in engineering at the Massachusetts Institute of Technology (MIT), she phoned her dad in Kansas. “Okay, Dad,” she remembers saying to him, “I’m sitting in the lab breaking these little pieces of sheet molding compound, and the only person in the world who cares is my advisor, who wants the work done, and you, because you’re my dad. I can’t do this anymore,” she told him. “This isn’t where my heart is.”

Her heart, not to mention her dad’s, was still with her mother, who had died in July of that year from aggressive breast cancer. Harper had watched the person she admired most be “torn apart,” she says, by fragmented medical care. “It was very much body-part care” that her mother received, she recalls. “I did the surgery so I’ll take the stitches out.’ You have to go to PT for your arm. Don’t talk to me about that.’ ‘Oh, you’re depressed; well, go find a psychologist.’ . . . [My mom] really felt like she wasn’t a person,” Harper remembers, like “nobody was listening to her anymore.”

One day, when the nurses, residents, and doctors had left the hospital room, Harper looked at her mother and said, “I can do a better job than that, Mom. I know I can.”

“Yeah, you can,” her mom agreed, “but that’s not what you’re trained for.” Harper had an undergraduate degree in chemical engineering from MIT and was pursuing a master’s in the same field. Her decision to go into engineering had no doubt been influenced by her father, an electrical and mechanical engineer whom she greatly admired. But at her mother’s bedside that day, Harper suddenly felt a different calling.

It wasn’t until several months later, in the lab at MIT on Thanksgiving, that she officially made the decision to change career paths. “I want to go to medical school,” she told her father.

Twenty-five years later, Diane Harper is an accomplished physician-scientist at Dartmouth Medical School and an unofficial ambassador for an extraordinary advance in women’s health—two brand-new vaccines that protect against 70% of cervical cancers. The vaccines target the strains of human papillomavirus (HPV) that cause most cervical cancers, abnormal Pap smear results, and genital warts,

Grew up: Kansas City, Kansas

Education: Massachusetts Institute of Technology (B.S. and M.S.) and University of Kansas Medical School (M.D. and M.P.H.)

Residency: University of Kansas Medical Center

Former career path: Chemical engineering

Number of countries visited in the last year: More than 60

Hidden talent: Rowing—she was a member of the 1978 U.S. National Women’s Crew Team and a finalist for the 1980 U.S. Olympic Women’s Crew Team

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plus a number of other cancers and additional diseases besides.

Although cervical cancer is no longer a major killer in the U.S., more than 250,000 women die from it each year worldwide, according to the World Health Organization. The decline in the disease in the U.S. is due to the widespread use of Pap smears, which detect abnormal cells in the cervix so they can be treated before they turn into cancer. But in developing countries, women don’t have access to Pap smears or to effective treatment. So while the HPV vaccines’ primary benefit in the United States will be to reduce abnormal Pap results, worldwide the vaccines could save hundreds of thousands of lives.

Harper was a principal investigator for clinical vaccine trials for both Merck and GlaxoSmithKline—each of which has developed an HPV vaccine. She first became involved with the trials in the early 1990s because she had been developing self-collection methods for HPV and Pap smears. Having a method for women to collect cervical samples themselves would be an important component of the trials, so both companies sought her expertise. Her long-term involvement with the studies—and the fact that neither company paid her—have made her a credible spokesperson on the subject. Last year, she traveled almost non-stop, to more than 60 countries, to educate health-care workers and policy-makers about HPV and the new vaccines.

“I’m one of the very few people who can give a balanced talk because I’ve been in both trials,” says Harper. She discusses each vaccine as a scientific, public-health advance rather than as “a product from a particular company,” she explains. “I think that’s a real advantage. . . . It allows you to bring out multiple ideas.”

In August 2006, she helped teach a course in Bangkok, Thailand—to around 70 health officials from around the world—on HPV, the vaccines, and cervical cancer. In fact, Harper is spending the entire 2006-07 academic year on sabbatical, advising the World Health Organization and helping develop and implement vaccine policies in the U.S. and abroad. In recognition of her work on HPV, as well as her clinical excellence, she was recently named the 2006 New Hampshire Family Physician of the Year.

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One might easily mistake Harper for an artist or an actress—almost anything but the serious physician-scientist that she is. She loves to wear bright colors, gauzy fabrics, and bold jewelry. At six feet, three inches tall, she attracts attention just by walking into a room. And she’s funny, too. When she reminisces about what it was like to attend male-dominated MIT in the late 1970s, she says, “The guys at MIT—some of them don’t shower, and when they talk about curves, it’s all sine waves.”

Harper chose MIT in part to jump out of the nearly all-female environment she had come from.

She has one sister and no brothers and since pre-kindergarten had attended an all-girls private school in Kansas City, where she grew up. “I think I probably over jumped” by going to MIT, she confesses. But Harper did meet her husband of 24 years there. She describes him as “a computer geek [but] a good guy.” He followed her from MIT to the University of Kansas Medical School, where she earned her M.D., did her residency in family medicine, and joined the faculty. In 1996, when Harper was offered a faculty post at Dartmouth, she and her husband moved with their two sons to Hanover, N.H.

Harper’s jazzy, outgoing exterior and analytical, scientific mind make her a sought-after speaker. She charms audiences with her enthusiasm and challenges them with her broad knowledge of HPV and the HPV vaccines. In the U.S., she tells them, about 10% of the population has a high-risk anogenital HPV infection at any given time. However, she explains, the individuals who make up that 10%—men and women alike—change continuously, as some naturally clear the virus and others become infected. HPV prevalence rates vary dramatically worldwide, she continues, from less than 5% in some countries to 30% or more in others. Scientists don’t understand all the ways that HPV is spread, although most of the research has focused on the virus as a sexually transmitted infection. But “we need to look at other skin-to-skin methods of transmission,” Harper argues. Doing so could open up “a whole new area of epidemiology.”

With regard to the vaccines, Harper is simultaneously their biggest proponent and biggest critic. “If every single woman had this vaccine,” she says, “we could eliminate HPV-associated diseases, which include cervical cancer, penile cancer, anal cancer, vaginal cancer . . . and external genital warts.” But in her next breath she says, “It’s



DMS faculty member Diane Harper exudes enthusiasm, whether she’s discussing treatment options one-on-one with a patient, conferring with other researchers about human papillomavirus, or delivering a lecture to health officials from around the world.

not a panacea. It has its caveats.”

For instance, the vaccines do not work in anyone who is currently infected. Their efficacy has been proven only in 16- to 26-year-old women, although Merck’s vaccine is approved for 9- to 26-year-olds. It is not known if the vaccines’ effect lasts more than five years. And even with a widespread, mandatory vaccination program, there’s “a maximum worst-case scenario of [a] 50% failure” to prevent cervical cancer because of population characteristics of HPV and of cancers caused by other strains, Harper says.

Yet despite the limitations of the new vaccines, Harper sup-

ports their widespread use and believes that insurance companies should cover them. The vaccines—Merck’s requires three shots that cost about \$120 each—will be cost-effective, she says, “not necessarily in reducing the numbers of cancers in the U.S., but in reducing the whole abnormal Pap smear” cycle of follow-up tests and treatments. “All of that becomes extraordinarily expensive,” she explains.

Harper’s concern extends beyond economics, too. She sees the vaccines as a way to spare her own patients, plus thousands of other women, the psychological trauma of learning they have HPV—usually assumed to be a sexually transmitted infection—not to mention the physical pain of follow-up tests and treatments. Cervical biopsies, for example, can be painful for women. “I walk out of the room doubled over” after performing biopsies, says Harper, “because I have such sympathetic pain for these women.”

The compassion that Harper feels for her patients—and that she felt many years ago for her mother—is part of what drives her efforts to improve women’s health around the world. (Go to http://dartmed.dartmouth.edu/fall06/html/faculty_focus_we.php for several **WEB EXTRA** videos in which Harper discusses HPV infection, as well as the benefits and limitations of the new vaccines against it.)

When she looks back on the “tiny, detailed work” that she did back when she was a graduate student at MIT, she marvels at where she is today. While she imagines that her master’s thesis on polymers is collecting dust on a shelf somewhere, a vaccine that she helped to develop may soon prevent suffering in hundreds of thousands of women around the world. “It is really a dream,” she says, “to be able to know that what you worked on really is going to matter.” ■