

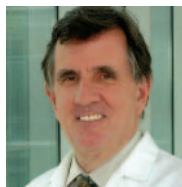


Gail Hecht, MD
From Country Roads to
International Recognition

The Journey

When Thomas Layden, MD, professor and head of the department of medicine, recruited Gail Hecht, MD, from Harvard in 1988, he saw potential in the then relatively unknown research gastroenterologist.

“Since coming here, Dr. Hecht has risen to national and international prominence,” says Layden with pride. “She is among the foremost research gastroenterologists in the country, a superstar in her field.”



She is also a great role model for women in medicine, says Layden, because she has been able to balance a family life that includes a husband and two children with the demands made by a career in research.

Hecht, professor of medicine, a microbiologist, an internist and a gastroenterologist, is chief of digestive diseases and nutrition and has a joint appointment in microbiology and immunology. She is also on the governing board of the American Gastroenterological Association, the premier gastrointestinal organization in the country.

The focus of Hecht’s research is on the analysis of two diarrhea-causing pathogenic *Escherichia coli* bacteria, enteropathogenic *E. coli* and enterohemorrhagic *E. coli*, and the different mechanisms by which they interfere with the function of the host intestinal epithelium that they infect. Hecht’s quest to unravel the mystery of how these bacteria cause the infection that leads to diarrhea is truly a matter of life and death because diarrhea is the major cause of death worldwide by any infectious organism.

“The intestinal epithelium has three major functions,” says Hecht. “It provides a tight junction barrier, transports solutes and ions, and produces an inflammatory response. In my lab we investigate the effect of these pathogens on all three functions and try to understand mechanistically how those changes are produced.”

Hecht is interested in tight junctions, that is, protein structures between intestinal epithelial cells that create a fence that limits diffusion of lipids and proteins, and establish cell polarity. They also create a physical barrier that regulates the paracellular transport of water ions, solutes and immune cells. Her research has shown that EPEC infection disrupts the tight junction architecture and barrier function by interfering with normal protein-protein interactions.

It also has shown how EPEC and EHEC alter the behavior of the intestinal epithelium at cellular, genetic and molecular levels.

An important paper in 2001 revealed that an EPEC protein, EspF, encoded in the bacterial pathogenicity island, was necessary for disruption of intestinal barrier function.

“Now we are looking at the amino-acid structure,” says Hecht. “We have discovered that proline-rich amino-acid sequences in the bacterial protein EspF are poised for interaction with host cell proteins that likely interfere with host cell function.”

Her Journey

Hecht’s journey to the top of the gastroenterological research world began ever so modestly with her childhood in LaRussell, Mo., a town near Joplin with a population of 128.

The entire town was comprised of a general store that Hecht’s grandparents owned, a feed store, a post office and a pump in the middle of the street. Her parents’ and grandparents’ houses were immediately adjacent. Farms surrounded the town. Hecht’s parents worked at the general store and the feed store.

“The town was my playground,” says Hecht. “Everybody knew everybody. I was free to roam. Everywhere was safe.”

Hecht has two memories that connected her to the world of science. “There was a slaughterhouse behind my grandparents’ home,” recalls Hecht. “I would watch them put hooks in the back legs of the animals and hoist them up. They would cut the jugular veins and split their abdomen open. The blood ran out. They then would remove liver, spleen and intestines. I watched it so many times, it didn’t seem gross to me.”

She also would collect frog eggs from the pond and put them in a jar of water that she placed in the window. Then came the excitement of watching the eggs hatch and become tadpoles. “I really thought that was amazing,” says Hecht. Through fifth grade she was educated in a two-room schoolhouse. Grades one to four were in one room and grades five through eight were taught in the other. There was one teacher per room and each row represented a grade.

In sixth grade her family moved to the town of Eldorado Springs, Mo., with a population of 2,500, and finally to Blue Springs, Mo., a suburb of Kansas City, in her junior year of high school.

Another key element that helped forge her value system was the work ethic of her parents and grandparents. “My mom always worked,” says Hecht. “She was talented with numbers and was a self-taught accountant, first doing accounting for the general store, then at a dairy and finally for a local newspaper before she retired at 76. She also cleaned the house and did the cooking.”

Because of her mother’s example Hecht always felt that a woman should have a career. “I never questioned that women were different than men in the workplace.”

After graduating from the University of Missouri at Columbia with a degree in psychology she enrolled in a master’s program in microbiology.

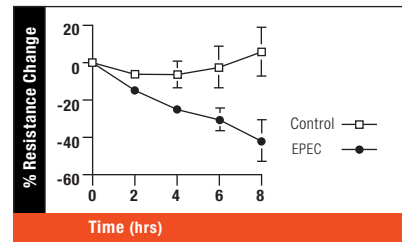
Hecht particularly was interested in

cellular microbiology, that is, the effects of bacteria and other microbes on the cell. It was here that she met her husband. “We were friends,” says Hecht, “and we liked dancing.”

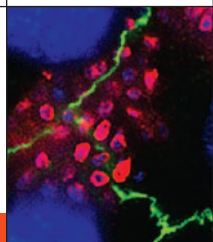
She attended Loyola University Medical School, followed by a three-year residency in internal medicine at the University of Minnesota and a three-year fellowship in gastroenterology at Harvard.

It was at Harvard, working in the lab of James L. Madara, MD, now dean of the biological sciences division and the Pritzker School of Medicine at the University of Chicago, that she became interested in the effects of bacteria on the tight junctions of intestinal epithelium.

“I liked the integration of two biological systems and investigating how one can impact the other,” says Hecht, who subsequently was one of the first researchers to put forth the idea of placing active bacteria into cell cultures to study.



BELOW
Infection of intestinal epithelial cells by EPEC disrupts tight junction barrier function (left panel), and perturbs the localization of the transmembrane tight junction protein occludin (green, right panel). Immunofluorescent image provided by microbiology graduate student Andrew Weflen.



When not involved in her research, Gail Hecht enjoys the company of her husband, David Hecht, MD, chief of infectious diseases at Loyola University Medical Center, and her sons Aaron, a student at Washington University in St. Louis, and Cameron, a junior at St. Ignatius High School. They share their home with a French Bulldog named Max, another dog named Vinny, and Missy, the family cat.

Hecht, who likes to listen to alternative rock and roll like the Pixies and Radiohead, also enjoys antiquing and gardening.