

DRIVEN.
ADVOCATE.



Dr. Molly Carnes is championing the need for more diversity and less bias in the STEMM fields.

In the early 1970s, Molly Carnes, M.D., dropped out of college and took up a waitressing job. After experiencing sore feet and not much money, she began to rethink her decision.

Her father encouraged her to go back to school to study medicine, and here she is today, a professor in the Departments of Medicine (Geriatrics), Psychiatry and Industrial & Systems Engineering at the University of Wisconsin-Madison, a strong proponent for advancing women in STEMM careers, trailblazing in a predominantly male field, and earning honors and awards regularly. (STEMM is a commonly used acronym for science, technology, engineering, mathematics, and medicine.)

At the University of Wisconsin, she also directs the Center for Women's Health Research, the Advanced Fellowship in Women's Health, and the Women Veterans Health Program.

In 2002, Dr. Carnes co-founded the Women In Science & Engineering Leadership Institute with an ADVANCE Institutional Transformation Award from the National Science Foundation. The institute focuses on developing, studying, and implementing evidence-based strategies to increase the participation and advancement of women faculty in academic science, medicine, and engineering. It provides an effective, legitimate means of networking women faculty across departments, decreasing isolation, advocating for and mentoring women faculty, and linking women postdoctoral fellows in predominantly male environments with a variety of women faculty.

Dr. Carnes believes the same glass ceiling that is present in healthcare careers is also present in women's healthcare rights. She sees a link between the advances in women's health with women's leadership in academic medi-

Dr. Molly CARNES

Breaking the Glass Ceiling

DRIVEN TO INNOVATE BY IMPATIENCE

cine, making the case that deeply embedded, unconscious gender-based biases and assumptions underpin the stalled advancement of women on both fronts.

"Women's healthcare rights are being challenged and eroded, and women still do not earn equal pay for equal work," she says.

Dr. Carnes believes mentoring is very important, especially for women in the STEMM fields.

"I would ask how to do something when I was a fellow or assistant professor and no one ever seemed to be able to help me," she says. "Now that I know what to do it just makes sense to want to save others the work I had to do. I can help by telling them what the rules are and suggest the best way to do something."

She also acts as a mentor because she wants to increase the participation and advancement of women in academic science and engineering and she wants to provide the necessary information and encouragement for women to accomplish their goals.

She has a mentor in colleague Dr. Joanne Robbins. As the most senior women faculty members in the Department of Medicine, they are still the only two of only three full professors with tenure.

"We have professionally mentored each other through many situations over the years and celebrated each other's accomplishments along the way," she says.

Using UW-Madison as a "living laboratory," Dr. Carnes hopes to develop, test, and implement effective strategies to increase the gender and race diversity of faculty. Dr. Carnes initially began conceptualizing STEMM workforce diversity issues from an epidemiological perspective — why women and minorities were dropping out of the profession early on — and she has progressively moved toward an organizational change approach.

For the past decade, she has been studying ways in which unconscious assumptions infiltrate decision-making processes and conspire

Getting to Know...

Molly Carnes, M.D.

TITLE: Professor, Departments of Medicine, Psychiatry, and Industrial & Systems Engineering

ORGANIZATION: University of Wisconsin-Madison

EDUCATION: B.S., University of Michigan; M.D., State University of New York at Buffalo; M.S., Epidemiology, University of Wisconsin-Madison

FAMILY: Husband, Bennett Vogelman; son, Paul; daughter, Lindsey, dog, Charley

HOBBIES: Game of Thrones series

BUCKET LIST: Have a first or senior-authored paper published in Science

AWARDS/HONORS: NIH Director's ARRA Funded Pathfinder Award; Jean Manchester Biddick Professor of Women's Health Research; Addis Costello Internist of the Year Award; Wisconsin Chapter of the American College of Physicians-American Society of Internal Medicine; Madison YWCA's Woman of Distinction Award

ASSOCIATIONS: Academy of Women's Health; Association of Women in Science (AWIS)

unintentionally against STEMM workforce diversity. She teaches a course annually on Women and Leadership in Medicine, Science and Engineering.

Her current research, funded by the NIH, aims to effect institutional change by promoting "bias literacy" among STEMM faculty and developing a variety of tools to help faculty "break the bias habit."

The winner of various awards, Dr. Carnes says her career highlight was receiving the NIH Director's ARRA-funded Pathfinder Award in 2010, which allowed her to fund the development of an interactive tool that will help faculty recognize and self-correct implicit, stereotype-based bias that affects the participation and advancement of groups underrepresented in STEMM fields.

Going back to Dr. Carnes' early waitressing "career" — we're not sure if it's related, but she says she can play a mean set of spoons. **PV**

Dr. Yvonne PATERSON

Life-Saving Discoveries

At just 42, Yvonne Paterson, Ph.D., was diagnosed with breast cancer. Now, 30 years later, she is on the leading edge of cancer research and is developing immunotherapeutics that target women's cancer, specifically cervical and breast cancers.

In the mid-1990s, when the tumor immunology field was starting to mature, Dr. Paterson was working with *Listeria monocytogenes*, a bacteria commonly found in dairy products and one of the most virulent pathogens to date — with 20% to 30% of clinical infections resulting in death.

Dr. Paterson built upon the well-known fact that when *Listeria* is introduced into the body, it has an extremely powerful, direct stimulatory effect on the activities of immune killer T-cells.

Together with her team, she noticed that *Listeria* is capable of living within a cell's cytosolic compartment (the liquid inside the cell). Linking this work to the concept of the immune system's CD8+ T-cells (killer T-cells) being able to recognize a piece of protein processed in the cytosol of cells, including tumors, Dr. Paterson made an exciting revelation — and the T-cell generating vector was born.

Recognizing the potential of her discovery, Dr. Paterson quickly patented the new technology. Without any safety or efficacy data in humans, she knew that large companies would not be attracted to her invention. However, because of its potential for a variety of clinical diseases, she knew it was an attractive candidate, so in 2002, with the support of the University of Pennsylvania, she started Advaxis Inc.

Advaxis has had positive results using its scientific founder's discovery — a live, attenuated (weakened) *Listeria* cancer vaccine that is modified to preferentially infect the antigen presenting tumor cells.

The immune system then launches a strong response to eliminate the *Listeria*-infected cells, thereby causing the immune system to directly attack the cancer.

The vaccine is currently in development for the treatment of HPV-related cervical, head and neck, and anal cancer, as well as breast, osteosarcoma, and prostate cancers.

In addition, Advaxis is filing the IND for a Phase III trial and getting through that trial and clinical approval would be the culmination of Dr. Paterson's professional ambition.

Starting Advaxis was her most challenging assignment, since she had to balance being an

DRIVEN TO INNOVATE BY IDEAS

academic, the scientific founder of a company, and an entrepreneur.

"Managing conflict of interest issues is a pain," she says. "It puts a lot of academics off commercializing their know-how. Yet it is so important if one wants to get the promising therapies one has invented out to the public where they would actually do some good."

A true career highlight was seeing the immunotherapy for cancer that Dr. Paterson developed in her academic lab go into clinical trials for osteosarcoma for canine companion animals and for cervical cancer in humans.

"It's just so awesome knowing that there are women alive today that would not be without my work — yes, and dogs too," she says.

In addition to serving as a scientific advisor for Advaxis, Dr. Paterson continues her work as a professor at the University of Pennsylvania, where she created a biotechnology commercialization class specifically geared toward scientists, rather than business majors, to encourage further progress in scientific innovations.

Dr. Paterson says she feels lucky to have had a varied career. She started out in grad school and as a postdoc as a biophysical chemist, then she got her first faculty position in an immunology department and had to learn immunology. When recruited by Penn, she turned herself into a microbiologist and entrepreneur.

"I now straddle the world of academics and biotechnology," she says. "As an academic, I have taken on some significant administrative duties as an associate dean in the School of Nursing, which provides an outlet for my passion to mentor other young scientists, particularly minorities and women."

Dr. Paterson has a natural empathy. She is a good listener and non-judgmental. She simply listens carefully and gives suggestions that she thinks they are capable of following.

Dr. Paterson says because she is paid to "think" she just gets good ideas, today she has about 20 issued U.S. patents and another 30 undergoing prosecution.

Dr. Paterson likes to donate to charities that give people a "leg up," for example FINCA International, an international micro-finance institution offering financial services and products to small-scale businesses; Heifer International, which works to end hunger and

DRIVEN. EMPATHETIC.



Dr. Yvonne Paterson is on the leading edge of cancer research and is developing immunotherapeutics that target women's cancers.

Getting to Know...

Yvonne Paterson, Ph.D.

TITLES: Professor and Associate Dean, University of Pennsylvania; Scientific Founder, Advaxis Inc.

COMPANIES: University of Pennsylvania and Advaxis Inc.

EDUCATION: Ph.D., Biochemistry, Melbourne University; B.A., Australian National University; M.Sc. Biochemistry, University of Manchester; BSc. Biochemistry, University of Manchester

FAMILY: Husband, Milton David Rossman, M.D., Professor of Critical and Pulmonary Medicine, UPENN; two sons, two stepdaughters, and nine grandchildren

HOBBIES: Live theater; listening to live and recorded jazz, reading; fine wine and dining; collecting art; movie junkie; spending time with her grandchildren

BUCKET LIST: Curing cancer, she hopes to live long enough to see her immunotherapy approach being used in the clinic; travel to Egypt, Brazil, cruise the South Seas

AWARDS/HONORS: Therapeutic Vaccine of the Year by the vaccine industry and the editors of Expert Reviews of Vaccines at the Vaccine Industry Excellence awards, 2012; Elected Fellow of the American Academy of Microbiology; Elected Fellow of the American Association for the Advancement of Science

ASSOCIATIONS: American Association for Cancer Research (AACR); American Association of Immunologists (AAI); American Society for Microbiology (ASM); Association for Women in Science (AWIS)

SOCIAL MEDIA:

poverty around the world by providing live-stock and training to struggling communities; Habitat for Humanity; Plan International, which works to improve the quality of life of deprived children in developing countries; and the United Negro College Fund, which provides operating funds for 37 member historically black colleges and universities, scholarships, and internships for students.