

NOTABLE CANCER CENTER MEMBER

Kathleen Green, PhD



What do Ponderosa Pines have to do with medical research? For Kathleen Green, PhD, Joseph L. Mayberry Professor in the Departments of Pathology and Dermatology at Northwestern University Feinberg School of Medicine, the answer is ‘plenty.’ Dr. Green’s path to medical research began when she was an undergraduate student at Pomona College in California and wrote her undergraduate thesis on the physiological ecology of the Ponderosa Pine. While she studied it, Green says she was drawn to the activities taking place within the tree, at the microscopic level. “I was sitting outside, collecting data on photosynthetic rates, and I kept wondering what was happening inside the cells,” she says. “I wanted to know what was happening to their stomata, the parts of the cell, and how the respiration was occurring at a cellular level.”

Fortunately for Green, there were ample opportunities for students at Pomona to do research. “When I was an undergrad, I loved microscopes,” she says. “And even though it was a small college, we had access to both scanning and transmission electron microscopes.” It was her fascination, first with cell structure, and then with how the structural aspects of the cell function and lead to different behaviors of an entire organism, that drove Green to commit herself to a molecular level of analysis. “To me, the cell seems like the place where it’s all at.”

Dr. Green’s fascination with cell development and behavior coincided with what was then a new direction in science education — integrated studies. While enrolled in the Cell & Developmental Biology (Division of Biology and Biomedical Sciences) doctoral program at Washington University in St. Louis, Green’s

research in a lab that spanned both plant and cellular biology worlds formed the foundation of her work today. Her focus was on the early development of *Volvox*, an alga that is used as a model system for higher (even mammalian) development. Green was interested in the early portion of *Volvox* development, especially in the role its cytoskeleton played in cell adhesion. (Unlike humans, whose cells are joined by complex junction molecules, physical bridges connect cells in *Volvox* embryos.) She studied how these bridges formed, and what role they played in the development process. “I didn’t even realize it at the time, but I think I was always attracted conceptually by how cells interact with each other,” she explains. “And I was interested in how the cytoskeleton collaborated with these adhesions in development and cell behavior.”

After completing her PhD, Green did her postdoctoral work with Dr. Robert Goldman, a well-known expert in the cytoskeleton and the current Stephen Walter Ranson Professor and Chair of the Feinberg School of Medicine’s Department of Cell and Molecular Biology. When Goldman was recruited by Northwestern in the early 1980s, he encouraged Green to join him and continue her work there.

Current Research – Adhesion Biology

Today, a principal focus of Green’s research is adhesion biology, the science of how cells stick to each other and the role this plays in crucial biological processes, such as embryogenesis, adult cell differentiation, and wound healing.

Green’s lab also studies how adhesion molecules regulate signaling pathways. By collaborating with Growth Factor Receptors, adhesion receptors can affect crucial biological processes like cell proliferation, motility, and cell survival.

Cell adhesion plays a role in many diseases, including cancer. When epithelial cells lose their attachment to each other, for example, invasion and metastases can occur. In addition to its cancer research, Green’s lab is also exploring the part cell adhesion plays in many other diseases, including cardiac and dermatologic illnesses. “The heart is a major area that we’re getting into,” says Green. “We believe there may be common threads in adhesion molecule pathways of epithelial and cardiac tissues and we’re interested in how those may be manifested to cause heart disease.”

Bringing Basic Science and Clinical Work Together

Dr. Green says one of her most important goals these days is bringing clinicians and researchers together. “This is a crucial time for translational work,” she says. “There are a lot of important projects going on right now that bring together basic scientists and clinical researchers in an effort to make discoveries manifest in more effective patient treatments.”

Dr. Green was recently elected president of the Society for Investigative Dermatology (SID) and says she looks forward to the many opportunities she will have to facilitate these connections in her new role. “I have the privilege of being one of three PhDs who’ve been elected president of this organization,” she says. As president, her mission will be to increase engagement of young investigators and PhDs in SID. She also holds leadership positions with The American Society for Cell Biology (ASCB) and other professional organizations.

At the Lurie Cancer Center, Green is Co-Director of the Tumor Invasion, Metastasis, and Angiogenesis Program. To facilitate translational research there, basic scientists like herself have been granted greater access to patient materials. In addition, the Green lab has benefited from establishment of a new NIH-funded Skin Disease Research Center. Green says that growing the cells she’s received from them in vitro, trying to understand what is wrong with them, and working to devise effective therapeutic strategies has been very satisfying. “Even though my heart is into reductionist, mechanistic approaches—figuring out how things work—it’s important that researchers like myself apply ourselves to translational research so we can help more patients,” she says. “And we need to reach out to clinicians, as well as to young physicians-in-training, in order to do that.”

Down Time

While she spends much of her time in her lab or travelling for work, when Green has time to relax, she enjoys playing the piano. She prefers classical composers, such as Beethoven, Brahms, and Chopin, and is sometimes accompanied on violin by one of her MD/PhD students. Her husband Rex Chisholm, Dean for Research at Feinberg, also enjoys music and plays the guitar in his off hours.