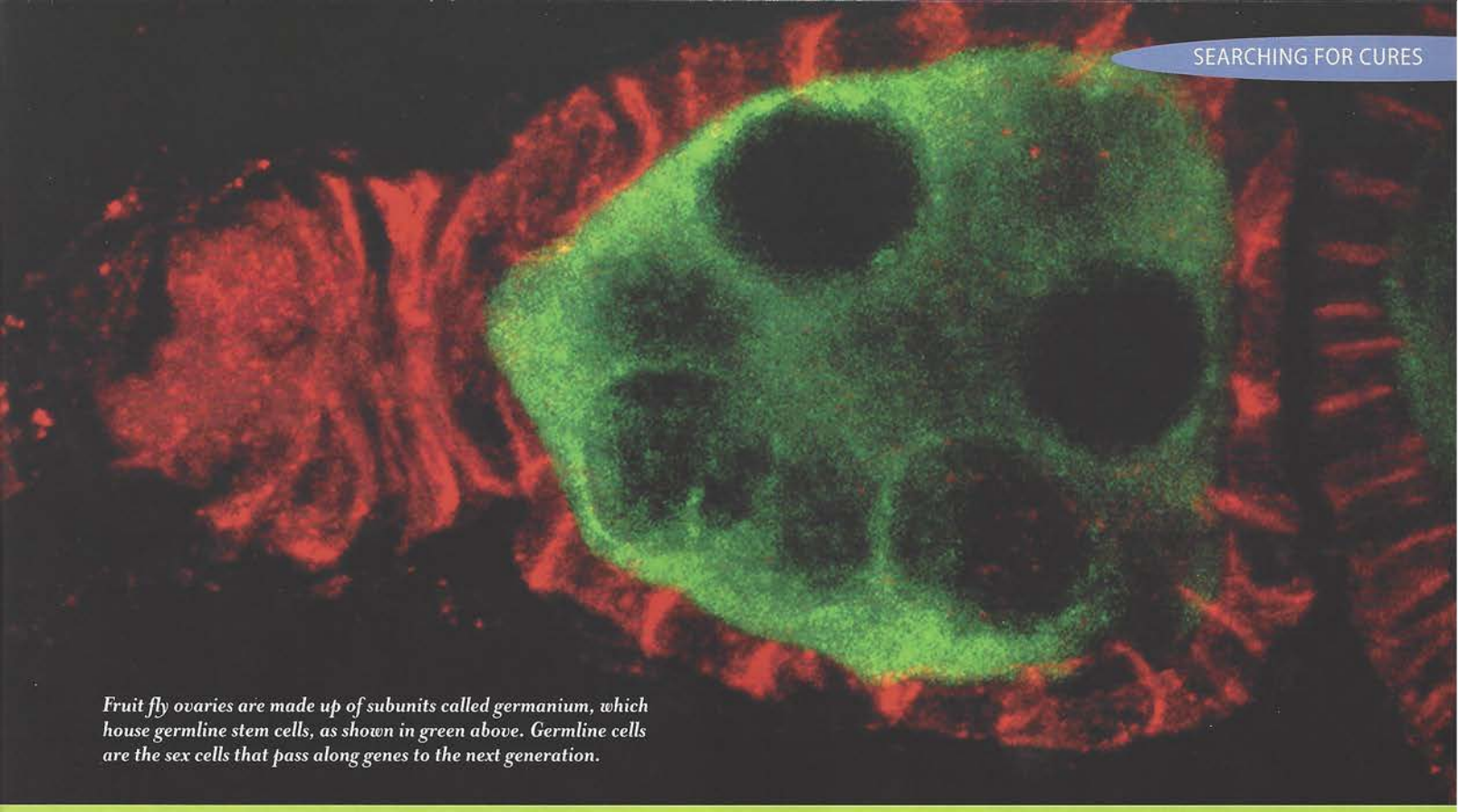

*Fruit fly ovaries are made up of subunits called germanium, which house germline stem cells, as shown in green above. Germline cells are the sex cells that pass along genes to the next generation.*

# Upstate researcher focuses on what a protein can teach about cancer

An Upstate scientist who conducts research in fruit flies is hopeful that her work will help our understanding of cancer and other diseases. Fruit flies are often used in research because their genome is similar to that of humans.

Francesca Pignoni, PhD, recently received a $161,000 grant from the Eunice Kennedy Shriver National Institute of Child Health and Human Development to support her research. She is an associate professor of ophthalmology, biochemistry and molecular biology; and neuroscience and physiology.

She is studying the function of a protein that was discovered in her laboratory at Upstate. The protein allows fruit flies to keep stem cells within its ovary where they divide to ensure the passage of genetic material to the next generation through reproduction. Cancer is one disease that can be explored through this research.

Pignoni says that the protein appears to play an important role in a type of molecular communication known as BMP signaling. BMP signaling is a major regulator of a cell's fate — including its ability to grow and multiply and to form more specialized cells. The BMP molecule is the same in the fruit fly as in the human, where it has been linked to colon cancer, breast cancer, lung cancer and some diseases of the bone. When the newly discovered protein is added in excess, the stem cells develop into tumors. Learning more about how the protein works at a cellular level can lead to a better understanding of how BMP dysfunction causes cancer.

"We clearly show in the flies that the level of this protein needs to be regulated in order for the stem cells to be under control," said Darin Dolezal, an MD/PhD student assigned to Pignoni's lab. "The proliferation of stem cells has to do with the growth of cancers. What we don't know is whether this protein does, as well."

Dolezal admits that as a boy growing up on Long Island, then attending Cornell University and aiming for a career in the medical sciences, he never imagined he would study ovaries in fruit flies. It's not because he is interested in insect biology. Rather, he wants to help determine if this protein can lead to a better way to diagnose or treat cancer.

"There are things that we can learn in the fruit fly ovary that can translate into human clinical medicine. If we figure it out in flies we can then move into more complex organisms and try to understand it there," said Dolezal.

Pignoni said she wants to understand if the protein helps cells receive or interpret only the BMP signal, or if it is part of a more general biologic process that impacts multiple signaling systems.

"In the latter case, its dysfunction would profoundly affect the ability of cells to communicate with each other," she said. Either way, determining how the protein works at a cellular level could help explain how dysfunction of BMP, and perhaps other signaling pathways, causes cancer and other human disorders.