



\$4,034,066

has been invested in promising cancer research projects since 2003. But \$6,096,895 has been requested.

Biologist's cell movement research could pave way to new brain cancer treatment

By Marcia Locke

One of the biggest problems with cancer cells is that they move away from their original location and invade other parts of the body. This spreading of cancer cells, called metastasis, can be devastating for patients.

Jocelyn McDonald, associate professor of biology at Kansas State University, is working to understand how cells break off from tumors, move through the bloodstream and invade distant organs. She is using the fruit fly as a model organism to identify the genes that drive this process. Fruit fly genes are similar to those in human cancers.

"Tumor cells invade as single cells and as cell groups, or collectives," McDonald said. "We're investigating the mechanisms that drive them to invade collectively, which accelerates disease progression."

Currently, her team is focusing on glioblastoma, the most common malignant brain tumor. According to McDonald, expression of the adhesion gene α -catenin in glioblastoma patients correlates with poor survival. Her team is investigating whether, and how, α -catenin promotes collective invasion and metastasis. They are doing this in both the fruit fly and cultured human glioblastoma cells.

"We believe that α -catenin and associated proteins could be potential therapeutic targets for developing drugs to treat glioblastoma," McDonald said. "This is important because there are very few treatments for glioblastoma and standard care has a very low rate of survival beyond five years."

The Johnson Cancer Research Center provided a \$25,000 Innovative Research Award for this work in fall 2019. These awards provide seed money for preliminary investigations that hold great promise for garnering future extramural funding.

McDonald has already leveraged her award into a \$938,885 National Science Foundation grant. She and co-principal investigator Brad Olson, associate professor of biology, are conducting the study, "Coordination of collective cell migration in complex tissues." The award also supports science workshops for secondary school girls and a project with K-State engineering students to design and create a tissue-altering device and study its effect on cell group movement.

Training students is important to McDonald. She has mentored 12 undergraduate students and three graduate students since coming to Kansas State University in 2015. This includes three undergraduate JCRC Cancer Research Award recipients and one JCRC Graduate Student Summer Stipend recipient.

"I love working with students and am proud that almost all of mine have continued on to medically related or science-related careers."

"We're really appreciative of the cancer research support," McDonald said. "It helps us to work on projects that initially are difficult to get funded because they need preliminary data. It's also been wonderful to have support to train more undergraduate and graduate students in the lab."