

Trimming cancer

Biochemist discovers protein involved in normal and abnormal cell growth

By Marcia Locke

Cancer is a group of many diseases in which some of the body's cells grow out of control and spread throughout the body. Instead of dutifully dying when they're old or damaged so that new cells can take their place, they keep growing and multiplying. These cells may form tumors, spread and invade other parts of the body.

Erika Geisbrecht, professor of biochemistry and molecular biophysics, studies how cells develop and move. According to Geisbrecht, the ability of cells to change shape and move around is important for the formation of many body tissues, including muscles and nerves. Cell movement is also required for the immune system to work properly.

"Unfortunately, sometimes cells lose the ability to function and move normally and this may result in birth defects or cancer," Geisbrecht said. "We want to better understand this phenomenon so we can help treat diseases like cancer that result from abnormal cell growth and movement."

Geisbrecht's research focuses on signal transduction pathways involved in tissue development and maintenance. That is, she studies how chemical or physical signals are transmitted through a cell to cause molecular events that influence cell behavior. While studying a particular developmental process, she and her team discovered a new protein that influences cell growth.

The protein, encoded by a gene called TRIM32, is mutated in people with a type of muscular dystrophy. Research in the fruit fly, an important model organism for studying genes in humans, showed that mutation or loss of this gene causes muscle degeneration. Later research also surprisingly showed decreased cell and brain size. This implied that, in addition to promoting healthy muscle tissue, TRIM32 likely had a role in regulating normal cell growth.

Geisbrecht's group set out to determine if TRIM32 also regulates uncontrolled cell growth. Using fruit flies again, they found that removing this gene did indeed result in less tumor growth. The study, published in the journal *eLife* in March 2020, was supported

by the National Institute of Arthritis and Musculoskeletal and Skin Diseases, part of the National Institutes of Health.

"TRIM32 is expressed in all cells of the human body and therefore may be a regulator of growth in normal and cancerous tissues," Geisbrecht said. "A better understanding of TRIM32's function could help find therapies to limit the growth of cancers that overexpress it."

Geisbrecht always includes students on her research team. Growing up, she assumed she would attend medical school, but after

working in a lab during her first semester of college, she changed her plans to pursue graduate school. Mentoring undergraduate students is her way of exposing them to the importance of research, whatever their career path may be.

Geisbrecht has served as a mentor to eight Johnson Cancer Research Center undergraduate student award recipients. She has also received center funding to help purchase laboratory equipment.



K-State is one of the largest funders of cancer research in the state of Kansas, thanks to private gifts.