

## **Researcher to examine health impacts of space travel in NASA twin study**

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Seeing double! Susan Bailey is one of just a few scientists nationwide picked to lead unprecedented investigation of the effects of space travel on twin astronauts.

When NASA sends an identical twin to the International Space Station next year, a Colorado State University researcher will be among just a few hand-picked scientists studying him and his brother to measure impacts of space travel on the human body.



Susan Bailey, an associate professor in CSU's Department of Environmental and Radiological Health Sciences, is heading one of only 10 projects selected last month to receive funding from NASA for a three-year study of astronauts Scott and Mark Kelly.

Bailey's research focuses on chromosomal features, called <u>telomeres</u>, which help protect the body from aging and the cancer-causing effects of <u>radiation</u>. Radiation exposure is a particular concern during <u>space</u> flight – and therefore of special interest to NASA – because astronauts are bombarded by subatomic particles from the sun and other sources.

Starting in March 2015, Scott Kelly will spend 12 months on the space station, while Mark remains on Earth as an experimental control. Scientists will conduct tests on the genetically identical twins to isolate the effects detected in Scott's body that can be attributed to life in space.

In the CSU project, the first study of its kind, Bailey will use blood tests taken before, during and after the flight to focus on the twins' chromosomes. Each chromosome has a protective end-cap called a telomere, which Bailey compares to the plastic tip on a shoelace that keeps the lace from unraveling. As cells divide and replicate during the course of human life, the chromosomes divide as well, and the telomeres gradually erode, eventually leading to the natural death of cells.

Bailey says the erosion rate of these end-caps reveals a lot about a person's aging process and health. For instance, studies have shown that nonsmokers who get regular exercise often have longer telomeres than those who have unhealthy lifestyles. In her NASA research project, Bailey plans to gather baseline data on the twins' telomeres, then examine how the various demands of life in space – like exposure to radiation, limited diet, and physical and psychological stress –¬ affect those caps on Scott's chromosomes.



"Taking care of your telomeres is an important thing to do, and having a healthy lifestyle is a big part of that," she says, adding that previous studies have shown radiation can deteriorate the end caps in as little as five days. "Can you imagine a more stressful thing than strapping yourself in a rocket or living in space for a year?"

Bailey will also study the 50-year-old twins' levels of telomerase, an enzyme that restores telomeres and extends the life of cells. The substance is not typically active in the body after birth, with a few exceptions – like in <u>cancer cells</u>, which have a competitive advantage over regular cells because telomerase gives them "immortal" status.

Bailey says that while some researchers have studied the concept that activating telomerase in healthy cells could actually improve health and possibly extend life, it's a double-edged sword because stimulating telomerase could also feed cancer cells. Clinical trials are being conducted with drugs that reduce telomerase levels as a cancer-fighting strategy.

"The fact that <u>telomerase</u> gets turned off after birth is truly a tumor suppressor," she says.

Bailey, who received her bachelor's degree in biological sciences from CSU in 1980, returned to campus 21 years later to study the effects of radiation on chromosomes with CSU professor Joel Bedford.

"It was full circle," she recalls, adding that she immediately became fascinated with the field. "I caught the bug. It was contagious."

Bailey's project, which netted \$150,000 from NASA, is the latest of many in the CSU Department of Environmental and Radiological Health Sciences to attract funding for the study of radiation and cancer. A team led by Michael Weil, a professor in the department, has long received



NASA grant money to study the degree to which astronauts face elevated cancer risks from space radiation.

Provided by Colorado State University

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