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Sending Bone Cells into Space

STUDY COULD OFFER CLUES ON HOW TO TREAT OSTEOPOROSIS / BY ELIZABETH DOUGHERTY

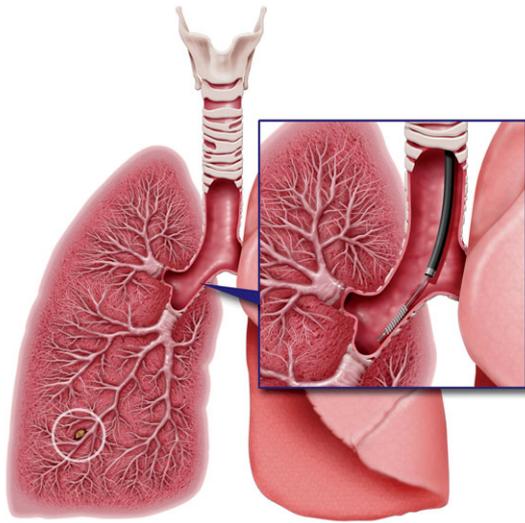
In May 2015, when the SpaceX Dragon spacecraft splashed down in the Pacific, it carried a briefcase-sized metallic container of bone cells that belong to BU researcher Paola Divieti Pajevic. The cells, which experienced the extremely low levels of gravity on the space station, could contain clues about better ways to treat osteoporosis and other conditions that cause bone loss, and also ways to support astronauts on longer missions, such as a trip to Mars.

"Everything has worked perfectly well so far," says Divieti Pajevic, a Henry M. Goldman School of Dental Medicine associate professor of molecular and cell biology.

By sending the cells, called osteocytes, into space, Divieti Pajevic hopes to get a better understanding of the basic biology of osteocytes. "Ultimately, we hope to identify novel genes that could someday lead to new therapeutics," she says.

Osteocytes are of particular interest to NASA since many astronauts have lost bone mass, at a rate of about one percent per month, during space voyages. While it is clear that microgravity causes bone loss, exactly how it affects bone cells at a molecular level isn't yet understood. The National Institute of Arthritis and Musculoskeletal and Skin Diseases of the National Institutes of Health funded the project, as did the Center for the Advancement of Science in Space and NASA's Kennedy Space Center.

Up in space, the cells were frozen to halt cellular functions and preserve a snapshot of the genetic activity. That will allow Divieti Pajevic to see which gene expression levels change with extended exposure.



THE PERCEPTA TEST uses a small brush to sample normal-looking cells in the upper airway. Genetic markers in cells indicate the likelihood of lung cancer.

Early Detection of Lung Cancer

NEW TEST MAY PREVENT INVASIVE PROCEDURES, SAVE LIVES / BY BARBARA MORAN

LUNG CANCER IS RESPONSIBLE FOR THE most cancer deaths in the United States. According to the National Cancer Institute, it will kill about 158,000 people in 2015, more than breast, prostate, and colon cancer combined. Because lung cancer grows and spreads so quickly, many healthy (and former) smokers undergo diagnostic screening CT scans of the chest, which can detect small lesions in the lungs that may be an early sign of the disease. But abnormal results often lead to painful, invasive, and often unnecessary biopsies. Avrum Spira has found a better path to diagnosis.

For more than a decade, Spira (ENG'02), Alexander Graham Bell Professor of Healthcare Entrepreneurship and a School of Medicine professor of medicine, pathology and laboratory medicine, and bioinformatics, has been developing molecular tests to detect lung cancer early, without invasive biopsies. The work has been done with Jerome Brody, a MED professor of medicine, and Marc Lenburg, a MED associate professor of medicine, bioinformatics, and pathology. In May 2015, the molecular diagnostics company Veracyte, Inc., released a new, noninvasive test for the disease based on biomarkers developed by Spira and his collaborators. The test, called Percepta, fared well in clinical trials and could be available to patients in less than a year.

During the Percepta test, which is performed at the same time as a bronchoscopy, the doctor uses a small brush to obtain a sample of normal-looking cells in the upper



VERNON DOUCETTE

airway and sends it to a lab for genetic testing. Spira discovered that these cells, while appearing healthy, contain genomic markers that signal a high likelihood of cancer elsewhere in the lung. The test, when used in conjunction with bronchoscopy, identified 97 percent of the lung cancers, compared to 75 percent for bronchoscopy alone.

The test is not yet widely available, nor is it covered by insurance. Veracyte has launched the test in an early access program, offering it in a limited number of medical centers in the United States to gather feedback on how the test is used and its clinical impact. If this trial launch is successful, the Percepta test could be made widely available in early 2016.