**Engineered tissue sent into space to test muscle loss drugs** By Helen Santoro

As people age, they gradually lose muscle mass and strength because of a condition called sarcopenia, which typically takes decades to progress. For astronauts in space, however, microgravity, or weightlessness, causes them to experience extreme muscle weakness over a significantly shorter period of time. To test whether microgravity can be a tool to better understand sarcopenia, a team of Stanford Medicine researchers sent engineered muscle tissue to the International Space Station. If the experiment works, scientists will be able to rapidly assess potential drugs that diminish muscle loss in advance of launching treatment clinical trials. The tissue was launched into space on Aug. 10.

"If one were to try to develop a drug to treat sarcopenia on Earth, that would be really hard because it would take decades to study the efficacy in patients," said Ngan F. Huang, PhD, principal investigator of this study. "Microgravity has been shown, in a lot of contexts, to accelerate a lot of different diseases. We thought: 'Well, maybe microgravity could be a way to accelerate the process of sarcopenia.'"

To create the engineered tissue, Huang and her colleagues layered human muscle cells onto scaffolding made from collagen. The cells fuse into organized strips of myotubes, or primitive muscle fibers. As the muscle cells mature, astronauts onboard the space station will collect microscopic images and tissue samples from them. The astronauts will also test whether two drugs that have been shown to induce the formation of myotubes work efficiently in microgravity. This could allow scientists to identify therapeutics for sarcopenic patients on Earth and for astronauts during long space missions. "Based on what we know from other works and from the astronauts themselves, we think microgravity will simulate muscle atrophy," said Huang. "If it works, this platform could be used to identify drugs over the course of a week or two."

**How A Former Retrovirus Contributes to Pulmonary Arterial Hypertension** By Adrienne Mueller, PhD

Pulmonary arterial hypertension (PAH) is a chronic disorder that progressively worsens over time. PAH is caused by narrowing of the arteries that supply blood to the lungs. Having narrower arteries forces the heart to work extremely hard to pump more blood to the lungs and supply more oxygen to our bloodstream. Over time, the heart muscle tires and eventually fails. The vessel narrowing seen in PAH is partly caused by the abnormal expansion of the cells that make up the vessel walls. One cause for this abnormal expansion of cells is the transformation of a specific lung blood vessel cell type - endothelial cells - into a different cell type. The loss of endothelial cells triggers inflammation, further exacerbating PAH. An important question for treating PAH is therefore, what triggers the transformation of endothelial cells?

Some viruses have been embedded in our DNA for so long that they are now an integral part of our genome, producing proteins that our cells have incorporated into their regular functioning. One such protein is HERV-K dUTPase. In a study recently reported in the journal *JCI Insight*, Shoichiro Otsuki, MD, PhD et al showed that when monocytes, a particular type of immune cell, have an excess of HERV-K dUTPase, they shed the protein via small packets called extracellular vesicles. The investigators further showed that shed HERV-K dUTPase, which mediates gene expression in lung endothelial cells, initiates signaling cascades that trigger the transformation of endothelial cells into a different cell type. This transition provokes inflammation and is therefore likely to ultimately cause the inflammatory responses underlying PAH.