

Stem Cell-Based Regenerative Health in Microgravity

The research of Dr. Almeida's Lab at NASA Ames focuses on the effects of microgravity mechanical unloading on stem-cell-based tissue regeneration. The research focuses on testing the broad hypothesis that mechanical load from gravity at 1 g is required for normal adult stem cell proliferation and differentiation during tissue regeneration. Research from the lab has provides evidence supporting the hypothesis in various biological models, including newt tail regeneration, mouse bone and bone marrow in whole animals, and mouse embryonic stem cells all exposed to microgravity during spaceflight. Using these models, the lab has identified overexpression of the cell cycle inhibitor p21/CDKN1a as a candidate molecular mediator mechanism of bone marrow mesenchymal and hematopoietic lineage tissue regenerative arrest in microgravity. The lab is currently focused on using p21/CDKN1a null mouse and cell culture approaches in microgravity to test the gravity tissue regeneration hypothesis.

Eduardo Almeida, Ph.D., NASA