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LABORATORY IN SILICO FOR SIMULATION OF INVESTIGATIONS IN MICRO AND MACROGRAVITY

Abstract

More than 50 years after the first human in space, it is surprising that the field of research in micro and macrogravity is very limited and extremely inaccessible as these investigations have a high cost and are not affordable for the world population. We are aware that space is a large laboratory extension, which has not been fully exploited, if the general population had access to research in space environments would take a huge leap and scientific findings would be accelerated.

We propose an in silico laboratory that simulates micro and macrogravity, to be used in scientific hypothesis testing or security analysis as a prediction tool in which virtual experiments and analyses can be carried out through any computer. A database of the NASA Human Research Pathway archive and data from the NASA Life Sciences archive was implemented, specifically based on research: Biochemistry of 3-D Tissue Engineering at the BTS (Bio3D). Where it is intended to obtain information on three-dimensional neuroendocrine constructions that may be useful as clinical replacement tissue in the treatment of neurodegenerative diseases. It is expected to check whether under microgravity in silico cultured PC12 cells/cell assemblies can be passed in series as in NASA research. The ANTHEPROT program was used to predict secondary structures and transmembrane domains, and the three-dimensional structures of the identified constructions were modeled by the ab-initio method, using the I-programTASSER combining mechanistic multiscale simulation modeling with artificial intelligence techniques.

The aim is to obtain virtual cells that reproduce the behavior and predict the responses of their living counterparts to pathogens, toxins, diet and drugs. The project aims to be validated with research exposed in NASA's human research path.

Our laboratory offers the promise of accelerating the pace and efficiency of scientific discoveries.