

IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)  
Life and Physical Sciences under reduced Gravity (7)

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PROTEIN UNFOLDING – REDEFINING THE FUTURE OF PROTEINS IN SPACE AND AS A CURE  
FOR VARIOUS CANCEROUS DISEASES

**Abstract**

The future of space exploration largely depends upon the biology that can sustain human life. Proteins are not just a vital but necessary source of survival for humans. The mystery behind Protein folding is questioned extensively, where a misfolded protein can lead to disastrous diseases like cancer. To track back the mystery of misfolded proteins, this paper proposes to test the behavior of folded and misfolded proteins under the influence of microgravity. An unfolded protein can answer many questions as it gives a clear idea as to how the protein misfolded in the first place and reverse engineering of this protein could provide vital information concerning cancerous cells that contain misfolded proteins. The absence of gravity is enormously helpful for the unfolding of a protein and understanding its core structure with its amino bonds. With the help of Infrared Spectroscopy, we assess the vibrations arising from the protein molecules that paints a fair picture of the protein structure and its dynamics. The process of unfolding these proteins is by sending nanoparticles around the edges of the protein and probing these particles to move in different vectors in space. This would detangle the protein in different vectors in three-dimensional space, which is not easy to achieve on earth due to the huge gravitational forces. Decrypting the structure of misfolded proteins gives major insight into what causes these irregularities, by studying these irregularities we can derive patterns for a tangential perspective, which will help us find a cure to many cancer-causing diseases. This experiment can define the future of pharmaceuticals developed in space, which have amplified functionality. It will also help in the production of evolutionary proteins, which can maintain the efficiency of human muscles and health in microgravity. The larger picture for such experiments is to enhance life sustenance during inter-stellar space exploration.