

ALTERATIONS IN PROTEIN METABOLISM DURING SPACE FLIGHT AND INACTIVITY

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Space flight and the accompanying diminished muscular activity leads to a loss of body nitrogen and muscle function. These losses may affect crew capabilities and health in long duration missions. Space flight alters protein metabolism such that the body is unable to maintain protein synthetic rates. A concomitant hypocaloric intake and altered anabolic/catabolic hormonal profiles may contribute to, or exacerbate this problem. The inactivity associated with bed rest also results in reductions in muscle and whole-body protein synthesis. For this reason, bed rest provides a good model for the investigation of potential exercise and nutritional countermeasures to restore muscle protein synthesis. We have demonstrated that minimal resistance exercise preserves muscle protein synthesis throughout bed rest. In addition, ongoing work indicates that an essential amino acid and carbohydrate supplement may ameliorate the loss of lean body mass and muscle strength associated with 28 d of bed rest. The investigation of inactivity-induced alterations in protein metabolism, either during space flight or prolonged bed rest, is applicable to clinical populations and in a more general sense to the problems associated with the decreased activity that occur with aging.