

TESTOSTERONE SUPPLEMENTATION AS A COUNTERMEASURE AGAINST MUSCULOSKELETAL LOSSES DURING SPACE EXPLORATION: CFT70 PRELIMINARY RESULTS

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INTRODUCTION

Long term space flight results in gradual declines of skeletal muscle and bone. Ground-based clinical evidence from healthy and diseased ambulatory populations suggests that low-dose testosterone therapy could improve the effectiveness of existing exercise and nutritional countermeasures. We hypothesize that cycled testosterone treatment (weekly testosterone enanthate for two weeks, followed by two weeks off, etc.) in conjunction with exercise will have an additive effect in improving maintenance of muscle mass, muscle strength, and bone metabolism in men representative of the astronaut population compared to exercise with placebo testosterone.

METHOD

During the ongoing 70-day 6° head down tilt bed rest study (CFT70) men are randomized into groups that are either sedentary (control) or perform regular exercise with or without a testosterone supplement (Exercise A and B, testosterone treatment double-blinded until completion of the final subject).

RESULTS

Preliminary DEXA results suggest that exercise groups A and B appear protected against the bed rest-induced loss of lean body mass (LBM, total and legs) and increases in fat mass. Exercise A, but not B, significantly increased LBM during bed rest (mean ± SEM = -3.7 ± 2.3, 3.3 ± 1.4, and -1.3 ± 0.8 % change in total LBM for Control (n=6), Exercise A (n=6) and Exercise B (n=6) respectively). Effects of exercise A and B on bone (BMC: total, BMD: total, spine, pelvis) were not significant.

CONCLUSION

Development of a battery of exercise and/or pharmacologic countermeasures that preserve or promote gains in muscle and bone health and strength of NASA astronauts is crucial for the safety and success of long term space exploration missions. Once unblinding occurs, if testosterone supplementation proves efficacious as a pharmacologic countermeasure along with exercise, then testosterone supplementation should be considered as part of future countermeasure strategies.

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