



Incomplete Bone Recovery at the Distal Tibia in Astronauts with Elevated Markers of Bone Turnover

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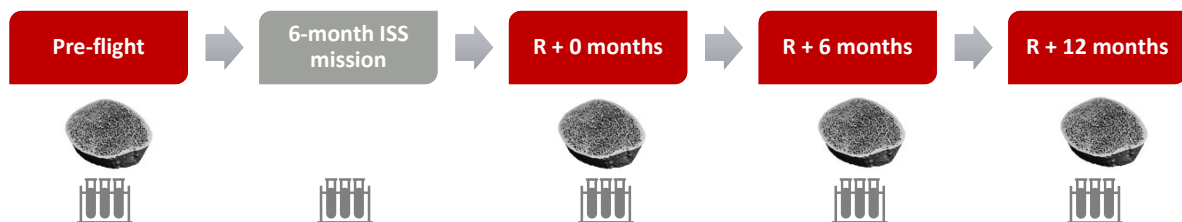
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TBone Study



Objectives:

1. Examine recovery of bone microarchitecture, density, and strength after long-duration spaceflight
2. Examine relationship between mission duration and biomarkers of bone turnover on bone recovery

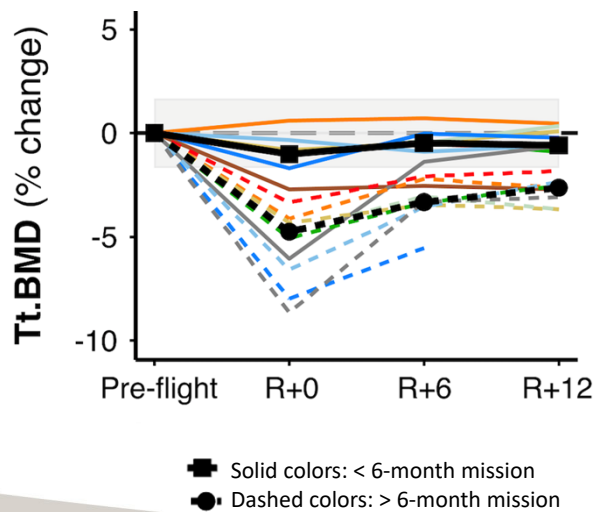


n=17 (3 ♀ ; 14 ♂)
170 days (n=8 > 6-months; n=9 < 6-months)

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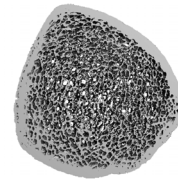
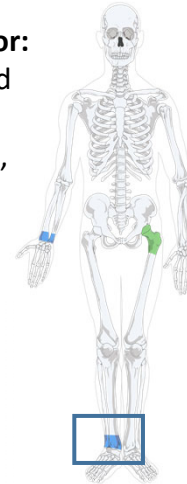
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Results: Distal Tibia Total Bone Mineral Density (Tt.BMD)



Incomplete recovery for:

- Total, trabecular, and cortical BMD; trabecular thickness, and bone strength (failure load)
- Group median loss: -1% to -2%

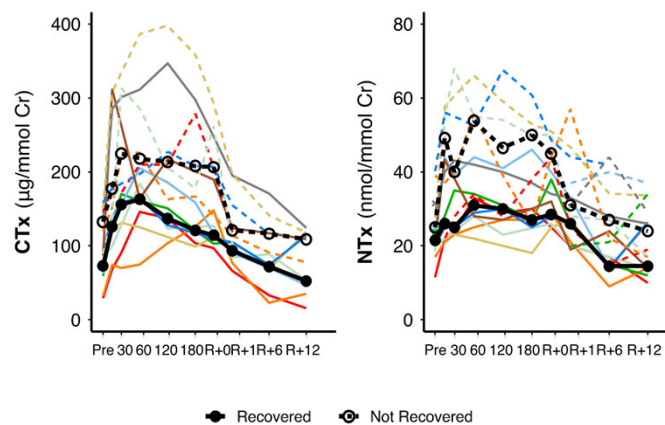


Gabel et al., submitted

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Results: Biochemical Markers of Bone Turnover by Bone Recovery



Astronauts with incomplete bone recovery had:
elevated CTx, NTx, and osteocalcin and **lower** sclerostin at all measurements

Gabel et al., submitted

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Discussion and Implications



- 1-year after return from long-duration spaceflight, most astronauts did not recover bone density and strength at the distal tibia
 - More pronounced in astronauts on > 6-month missions
- Bone turnover was greater at all time points in astronauts whose bone did not recover
 - Pre-flight measures of bone turnover may identify astronauts at greatest risk of bone loss who would benefit most from additional countermeasures
- Identifying relationships between biomarkers of bone turnover and skeletal recovery provides insight into optimizing strategies for mitigating loss and enhance recovery of the skeleton.

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