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Effects of a six-month spaceflight on bone density and bone microstructure: A clinical microCT perspective

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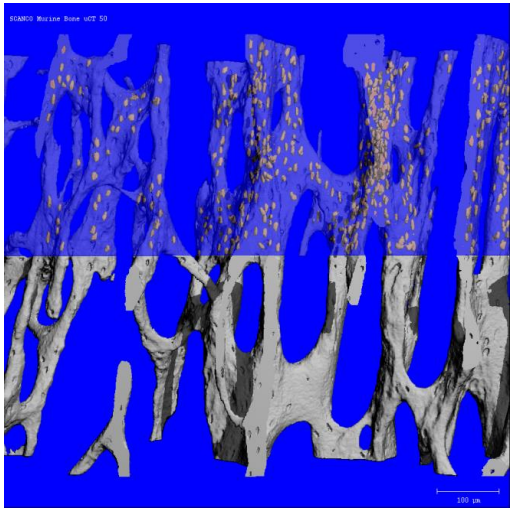
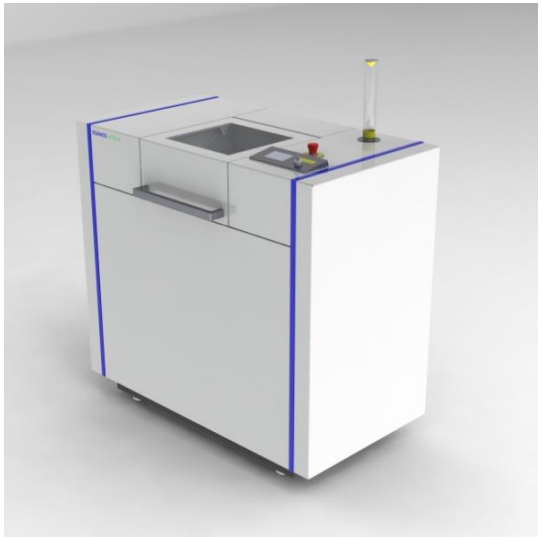


Scanco Medical – System Classes



Specimen microCT

< 2 µm @ 4 mm Ø
< 50 µm @ 100 mm Ø

Preclinical microCT

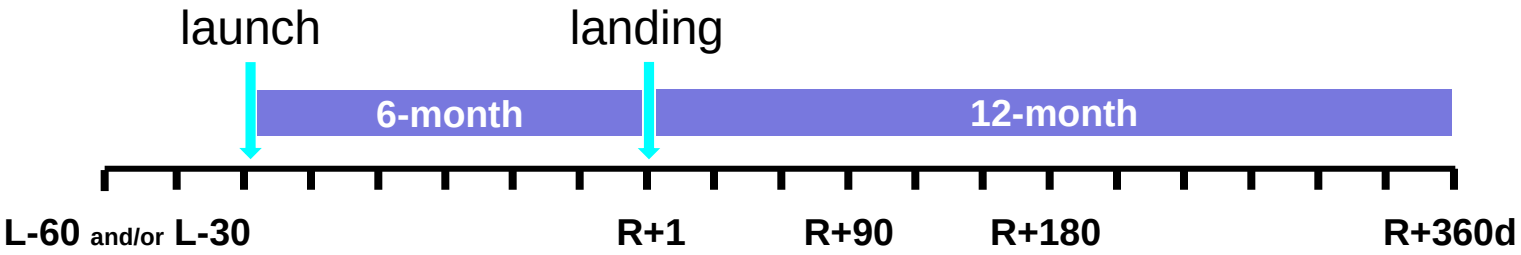
< 14 µm @ 32 mm Ø
< 40 µm @ 80 mm Ø

Clinical microCT

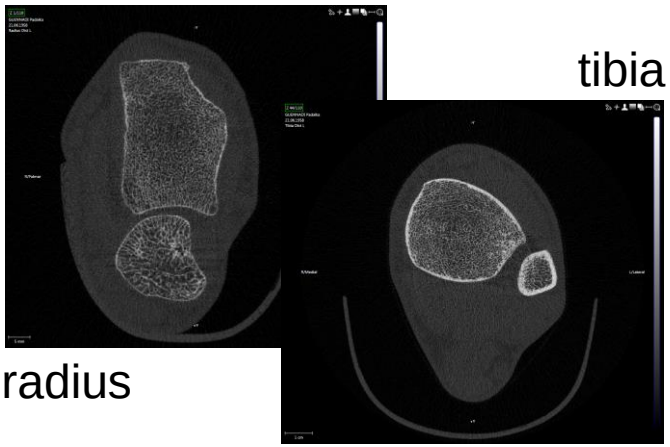
< 55 µm @ 140 mm Ø

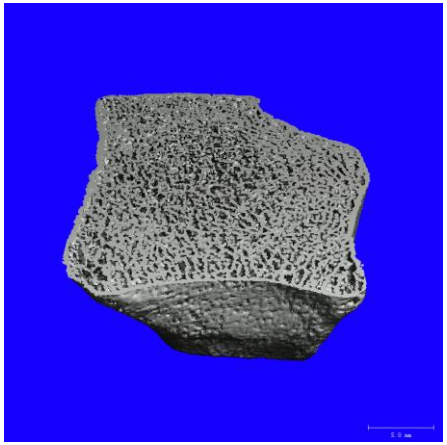
Estimated resolution 10% MTF

The EDOS Study



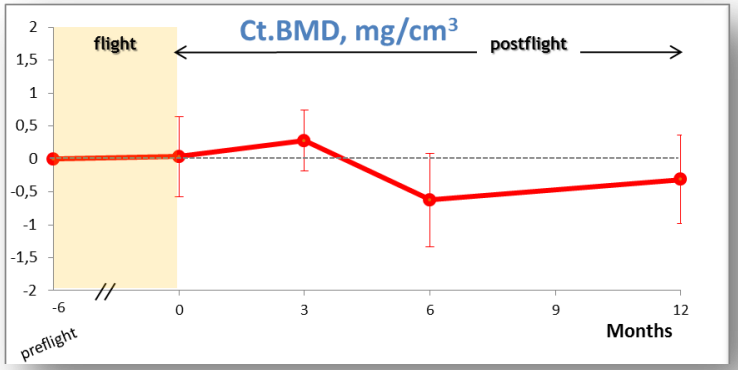
Thirteen spacemen scanned at radius and tibia with clinical microCT
Trabecular and cortical bone were evaluated as individual compartments

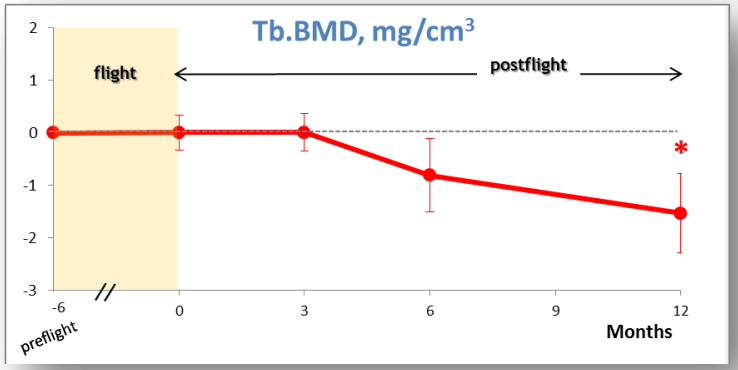




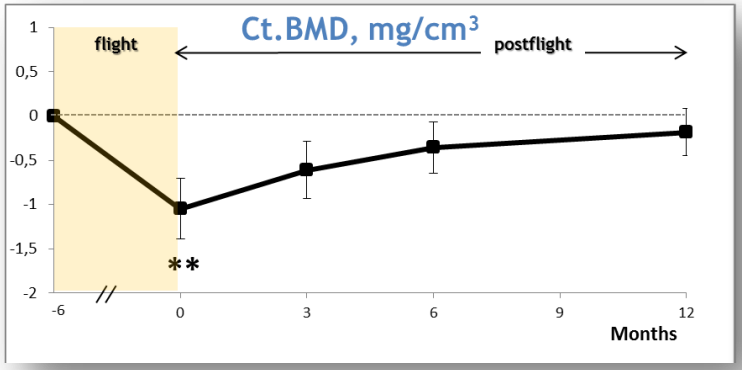
The Main Result

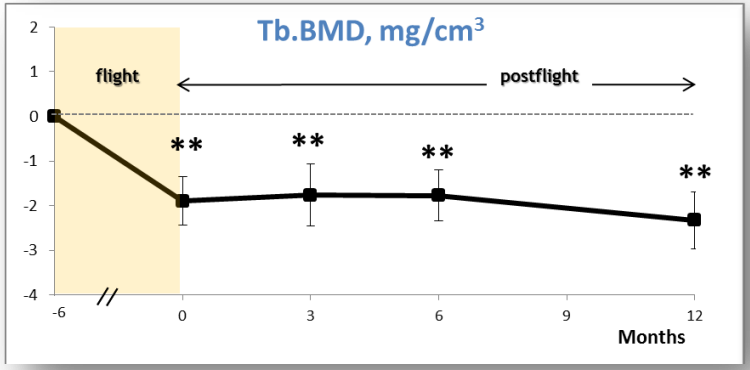
Radius





Tibia





Differences in % vs preflight (mean±SE), * $p<0.05$; ** $p<0.01$

The Main Conclusion

- During a six month space flight
  - ✓ Weight-bearing bone site (tibia) shows high bone loss
  - ✓ Non weight-bearing bone site (radius) remained intact
- During the twelve month recovery phase
  - ✓ While weight-bearing bones (tibia) partly recover, non weight-bearing bones (radius) show pronounced bone loss
  - ✓ ➔ Hypothesis: Compensation effect (radius to tibia)?
- Clinical microCT gives new insight in space-flight related changes in bone density and microstructure
- Results might be translated to long term bed-rest patients

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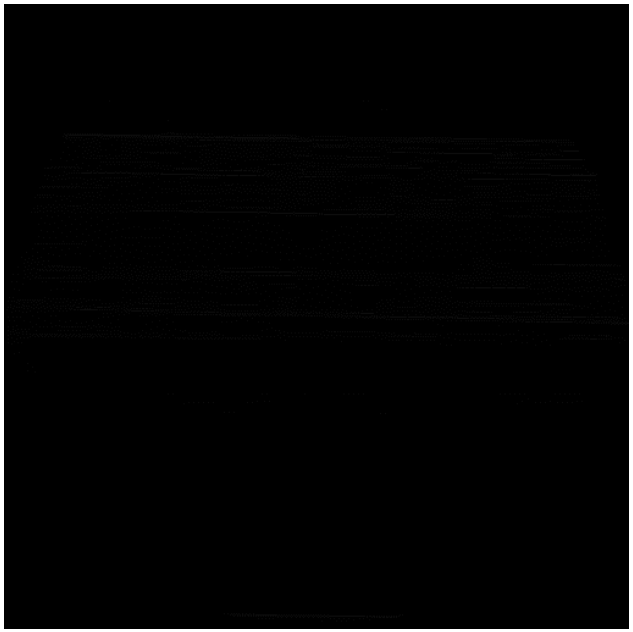

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