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

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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

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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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