[1145] Resistive Vibration Exercise Prevents Bone Loss During 8 Weeks of Strict Bed Rest in Healthy Male Subjects: Results from the Berlin BedRest (BBR) Study.

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Introduction: Muscle atrophy and bone loss pose problems in clinical immobilisation, but also during space flight. No effective countermeasure is available. For space flight, this restricts the possibility to perform long term missions. Bed rest studies are recognized as ground based models for microgravity. We hypothesized that vibration exercise (VbX), combined with progressive resistive training is an effective countermeasure to prevent bone loss from the lower body half during prolonged bed rest.
Method: 20 young healthy males were reqruited and randomly assigned to either the control group (Ctrl) or to the exercise group (Vbx). All subjects completed 8 weeks of strict bed (BR) rest under video surveillance. Bone mineral content (BMC) and muscle cross sectional area (mCSA) were measured by quantitative computed tomography in the calf and the forearm, and leg muscle volume by MRI. Jumping height and power were assessed along with peak isometric torque in knee extension and foot dorsiflexion and plantarflexion before and after BR. Exercise was performed in supine position in 4 bouts of 1 minute twice per day on 6 days/week. Vibration frequency was 19-23 Hz, and peak forces during squat exercise were around 2000 N.
Results: Since the last 4 subjects will be re-ambulated on 16/05/2004, this abstract is based on 16/20 subjects only. An interim analysis, however, shows that the final results will be very similar to these.

Percent Changes in the Left Calf; mean (SD); Different from Ctrl: * = p<0.05, *** = p<0.001		
	Ctrl	VbX
Calf mCSA	-16.5 % (3.9 %)	-8.6 % (3.9 %) ***
BMC Tibia Epiphysis	- 4.0 % (1.7 %)	-0.5 % (0.9 %) ***
BMC Tibia Metaphysis	-1.2 % (1.0 %)	-0.2 % (.7 %) *
BMC Tibia Diaphysis	-1.3 % (0.4 %)	-0.4 % (0.5 %) *

Significant group differences were found in all BMC and mCSA variables, with the VbX group having smaller changes than the Ctrl group. Bone loss from the tibia was non-significant in the VbX group. Results in the right limbs were equivalent to those obtained in the left limbs. Immediately after reambulation, jumping height had decreased by 31.4% (SD 19.8%) in the Ctrl and by 13.1 % (SD 4.2%) in the VbX group ($p<0.01$), and peak power declined by 26.2 % (SD 11.6 %) in the Ctrl and by 10.5 % (SD 6.4 %) in the VbX group ($p<0.01$).
Conclusion: Resistive vibration exercise, as applied here, appears to completely prevent bone loss from the tibia during prolonged bed rest. It is thus the first effective countermeasure found.
Disclosures: **J. Rittweger**, ESA Grant 14431/02/NL/SH 2.

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