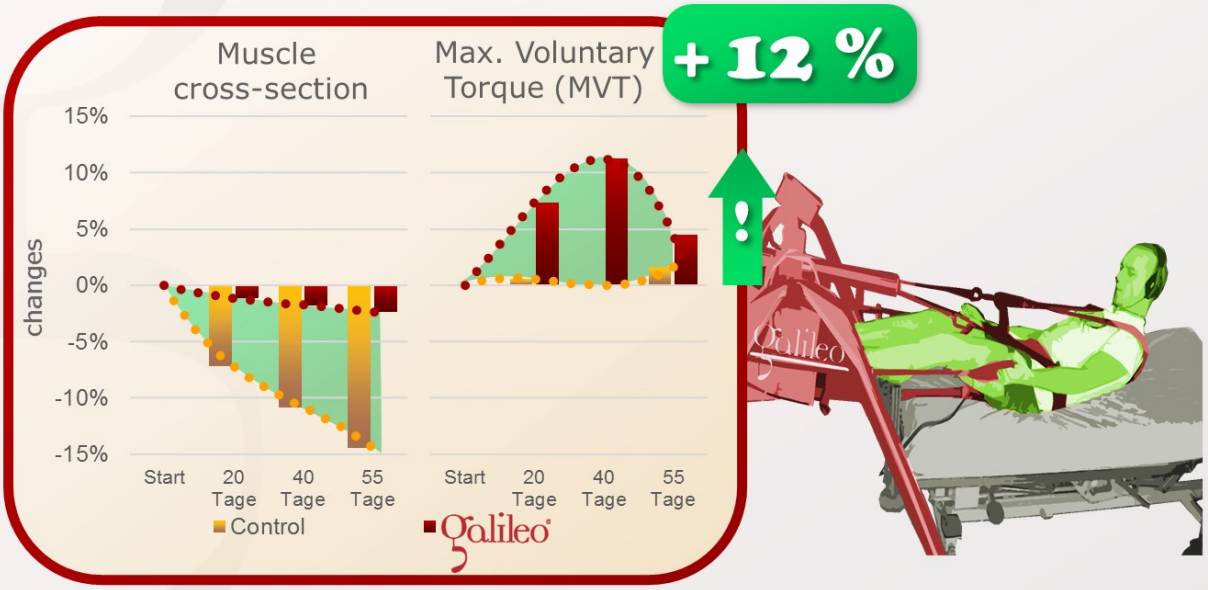
Can Galileo Training in artificial weightlessness prevent loss of muscle and muscle function?

The answer is: YES

The first Galileo Space-Study examined its effects on muscle and bone in simulated weightlessness (55 days bedrest, 10 min., 5 days/week 12-26Hz). The control group did not have any training. While the control group showed massive loss in muscle cross-section, the Galileo groups hardly lost any muscle and could even improve muscle function (max torque) by 12% (in strict bed-rest over 55 days without any other exercise!)



Mulder ER, Stegeman DF, Gerrits KH, Paalman MI, Rittweger J, Felsenberg D, de Haan A: Strength, size and activation of knee extensors followed during 8 weeks of horizontal bed rest and the influence of a countermeasure; Eur J Appl Physiol., 97(6):706-15, 2006; PMID: 16786354; GID: 307

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One of the first of many publications of the Berlin Bedrest Study (BBR) in 2003/2004 done by the group of Prof. Felsenberg of the Charite Berlin for the European Space Agency (ESA).

In Bedrest studies weightlessness is simulated by putting people in bed for 55 days, where they have for do everything lying in bed – including shower and toilet.

One half of the group did no training at all (control group) and lost up to 30% of muscle cross-sectional area. The other half had 5 times per week 10 minutes Galileo Training and could prevent almost completely muscle loss but could also improve muscle function (maximum voluntary torque) by 12%.

This is astonishing especially when considering that astronauts on the international space station (ISS) perform exercises 1 to 2 hours per day and still show muscle and bone loss.

Galileo training could prevent this in just 50 minutes per week (compared to currently 7 to 14 hours) –this proves the efficiency of Galileo Training once more!

Bone. 2010 Jan;46(1):137-47. doi: 10.1016/j.bone.2009.08.051. Epub 2009 Sep 2.

Prevention of bone loss during 56 days of strict bed rest by side-alternating resistive vibration exercise.

Rittweger J[1], Beller G, Armbrecht G, Mulder E, Buehring B, Gast U, Dimeo F, Schubert H, de Haan A, Stegeman DF, Schiessl H, Felsenberg D.

Abstract

Bed rest is a recognized model for muscle atrophy and bone loss in space flight and in clinical medicine. We hypothesized that whole body vibration in combination with resistive exercise (RVE) would be an effective countermeasure.

Twenty healthy male volunteers underwent horizontal bed rest for 56 days and were randomly assigned either to a group that performed RVE 11 times per week or to a group that underwent bed rest only (Ctrl).

Bone mineral content (BMC) was assessed by peripheral quantitative computed tomography (pQCT) in the tibia and the radius and by dual x-ray absorptiometry (DXA) in the hip and lumbar spine at baseline and at regular intervals during bed rest and a 12-month follow-up. RVE appeared to protect muscle size and function, and it also prevented bone loss (p-values between <0.001 and 0.01).

Bone losses were largest in the distal tibia epiphysis, where BMC declined from 421.8 mg/mm (SD 51.3) to 406.6 mg/mm (SD 52.7) in Ctrl, but only from 411.1 mg/mm (SD 56.6) to 409.6 mg/mm (SD 66.7) in RVE. Most of the BMC losses were recovered by 12-month follow-up. Analyses showed that the epiphyseal cortex, rather than spongiosa, depicted the most pronounced changes during bed rest and recovery.

These results suggest that the combined countermeasure applied in this study is effective to prevent bone losses from the tibia.

This underlines the importance of mechanical usage for the maintenance of the human skeleton.