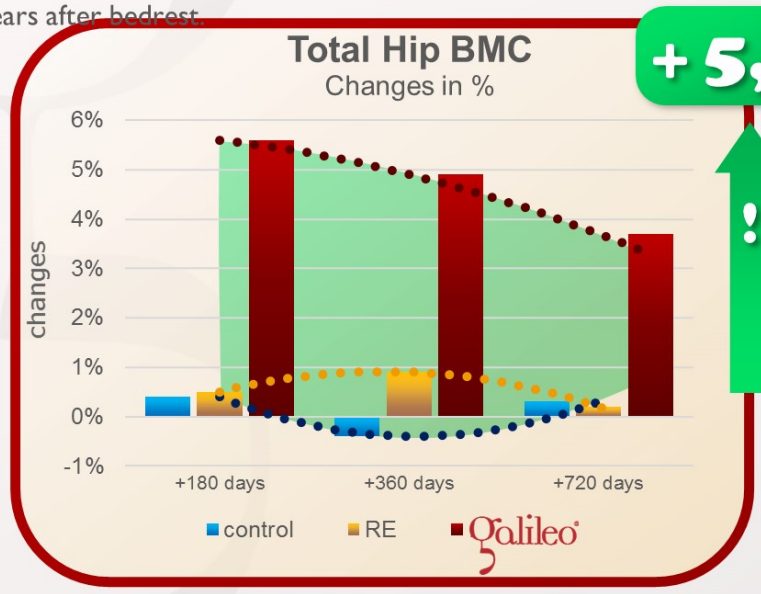
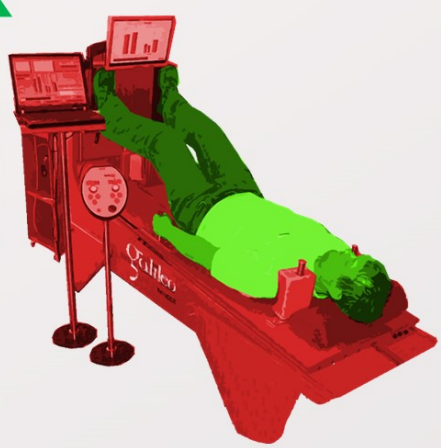
Can Galileo Training during 55 days bedrest improve long-term bone mass?

The answer is: YES

In the 2nd Berlin Bedrest Study (BBR2) the effects of Galileo Training against the expected bone loss was tested (55 days, 24Hz, 6x1 min. exhaustive, 3/week). The control groups receive no training or identical training with-out vibration (RE). Galileo showed in almost all bone parameters improvements vs. control and e.g. in total hip BMC even vs. RE with improvements of up to +5.6% after half a year and still +3,7% after 2 years after bedrest.





Belavy DL, Baecker N, Armbrecht G, Beller G, Buehlmeier J, Rittweger J, Roth HJ, Heer M, Felsenberg D, et al.: Serum sclerostin and DKK1 in relation to exercise against bone loss in experimental bed rest.; J Bone Miner Metab, 34(3):354-65, 2016; PMID: 26056021; GID: 4356

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Like the first Berlin Bedrest Study (BBR1) also the second (BBR2) not only showed that Galileo Training can prevent bone loss in bedrest but also that it can very efficiently compensate the negative effects of bed rest on muscle function (as measured e.g. in jumping or chair rising).

Some aspects of muscle function could even be improved during bed rest.

This is quite astonishing when considering that the Galileo training time was reduced from 50 minutes per week (BBR1) to 3*6 minutes per week (18 minutes!).

When further considering that current training time on the ISS is at least 60 minutes per day and muscle and bone loss cannot be compensated in many Astronauts, then this shows the extreme efficiency of Galileo Training

– maximum result in a minimum of time.

J Bone Miner Metab. 2016 May;34(3):354-65. doi: 10.1007/s00774-015-0681-3. Epub 2015 Jun 9.

Serum sclerostin and DKK1 in relation to exercise against bone loss in experimental bed rest.

Belavý DL[1,2], Baecker N[3,4], Armbrecht G[5], Beller G[5], Buehlmeier J[3,4], Frings-Meuthen P[4], Rittweger J[4], Roth HJ[6], Heer M[7], Felsenberg D[5].

Abstract

The impact of effective exercise against bone loss during experimental bed rest appears to be associated with increases in bone formation rather than reductions of bone resorption. Sclerostin and dickkopf-1 are important inhibitors of osteoblast activity. We hypothesized that exercise in bed rest would prevent increases in sclerostin and dickkopf-1.

Twenty-four male subjects performed resistive vibration exercise (RVE; n = 7), resistive exercise only (RE; n = 8), or no exercise (control n = 9) during 60 days of bed rest (2nd Berlin BedRest Study). We measured serum levels of BAP, CTX-I, iPTH, calcium, sclerostin, and dickkopf-1 at 16 time-points during and up to 1 year after bed rest. In inactive control, after an initial increase in both BAP and CTX-I, sclerostin increased. BAP then returned to baseline levels, and CTX-I continued to increase. In RVE and RE, BAP increased more than control in bed rest ($p \leq 0.029$). Increases of CTX-I in RE and RVE did not differ significantly to inactive control. RE may have attenuated increases in sclerostin and dickkopf-1, but this was not statistically significant. In RVE there was no evidence for any impact on sclerostin and dickkopf-1 changes.

Long-term recovery of bone was also measured and 6-24 months after bed rest, and proximal femur bone mineral content was still greater in RVE than control ($p = 0.01$).

The results, while showing that exercise against bone loss in experimental bed rest results in greater bone formation, could not provide evidence that exercise impeded the rise in serum sclerostin and dickkopf-1 levels.