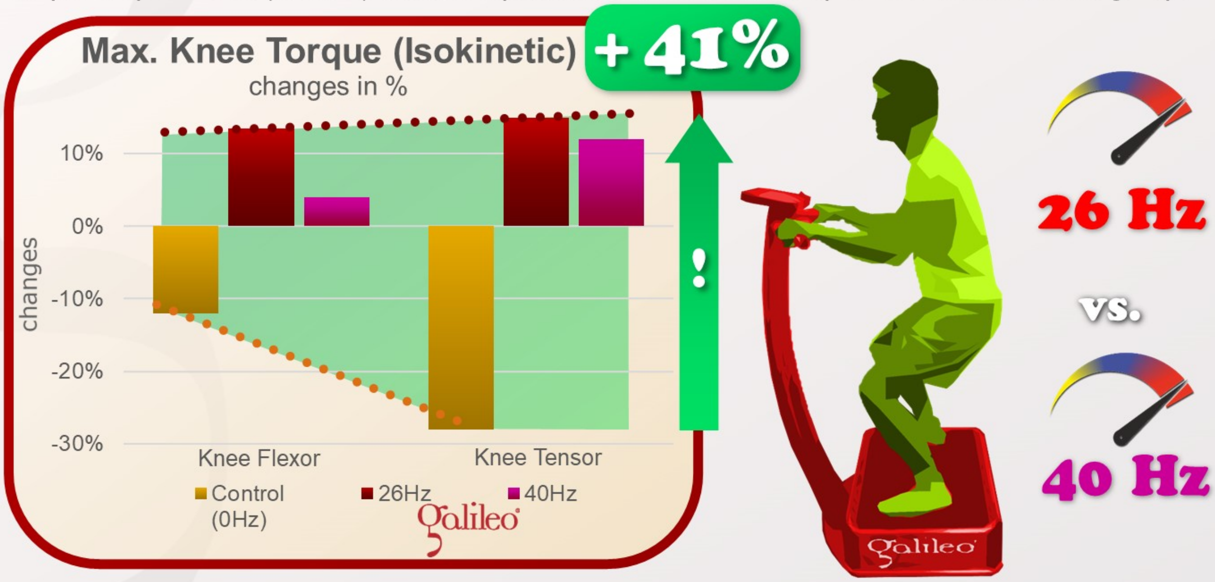
Can Galileo Training at high frequencies increase isokinetic eccentric knee torque?

The answer is: YES

This study investigated short-term effects of Galileo Training at high frequencies (26Hz & 40Hz) on the max. isokinetic torque at the knee (0Hz, 26Hz (Pos.4), 40Hz (Pos.1.5), 90° knee angle (static), 10x60 s). The control group performed identical exercises without vibration. The Galileo group showed higher isokinetic eccentric knee torque of up to +14% (at 26Hz) which is equivalent to a difference of up to 41% vs. the control group.



Siu PM, Tam BT, Chow DH, Guo JY, Huang YP, Zheng YP, Wong SH: Immediate effects of 2 different whole-body vibration frequencies on muscle peak torque and stiffness.; Arch Phys Med Rehabil, 91(10):1608-15, 2010; PMID: 20875522; GID: 3100

Galileo Research Fact Sheet #110 Common: High Frequency www.galileo-training.com

This study investigated the short-term effects of Galileo Training at (very) high frequencies of up to 40Hz on isokinetic eccentric knee torque in young health men.

The study compared 3 groups: Galileo at 26 and 40Hz versus a control group performing identical exercises without vibration (10 times 60 seconds, 90° knee angle).

The group at 26Hz used position 4 the one at 40Hz position 1.5 – the reason for this difference was to keep the acceleration in both groups identical. Each person performed all three training types on different days with at least 3 days of rest in-between.

Pre and post measurements on each day where compared. The Galileo groups showed higher results with significant effects in the 26Hz group compared to control with an increase of 14% and a difference vs. control of 41%.

Interestingly the 40Hz group showed slightly smaller effects – even though research showed that increasing frequencies between 5 and 30Hz showed increasing muscle activation /#GRFS3, #GRFS109).

There are two obvious possible explanations: one that the much smaller amplitude of the 40 Hz group (Pos. 1.5 vs. 4) limited the effects at the higher frequencies and second that there is an individual maximum frequency where no additional muscle activation can be generated by increasing frequencies – in our experience this seems to be the case depending on physical abilities and age.

This is one of the reasons why current Galileo devices for home use are limited to 33Hz, for Fitness use up to 36Hz and for athletes up to 40Hz, simply because not everybody can profit of the very high frequencies.

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Immediate effects of 2 different whole-body vibration frequencies on muscle peak torque and stiffness.

Siu PM[1], Tam BT, Chow DH, Guo JY, Huang YP, Zheng YP, Wong SH.

OBJECTIVE:
To examine the immediate effects of 2 vibration protocols with different vibration frequencies that yielded the same maximum acceleration (106.75ms(-2)) on muscle peak torque and stiffness of knee extensor and flexor.

DESIGN:
Randomized crossover study with repeated measures.

SETTING:
Laboratory setting.

PARTICIPANTS:
Recreationally active male adults (N=10).

INTERVENTION:
Participants performed 10 bouts of 60-second static half squats intermitted with a 60-second rest period between bouts on a platform with no vibration (control) and a vibration frequency of 26Hz or 40Hz.

MAIN OUTCOME MEASURES:
Concentric and eccentric peak torques of knee extensor and flexor were examined within 5 minutes before and after vibration by isokinetic test. Young's modulus as an index of tissue stiffness was determined at quadriceps and hamstring pre- and postvibration by using an ultrasound indentation method.

RESULTS:
The 2-way repeated-measures analysis of variance indicated a significant interaction effect between vibration and vibration frequency for knee extensor concentric peak torque (P=.003). The vibration-induced changes of knee extensor concentric peak torque in vibration frequency of 26Hz (14.5Nm) and 40Hz (12.0Nm) were found to be significantly greater than that in controls (-29.4Nm) (P<.05).

The change in eccentric peak torque of knee flexor after vibration tended to be greater in 26Hz of vibration frequency when compared with controls (26Hz of vibration frequency vs controls: 13.9±7.1 vs -11.4±5.3Nm, P=.08). No statistically significant differences were obtained in tissue stiffness in the quadriceps and hamstring with any of the conditions.

CONCLUSIONS:
Our data suggest that whole-body vibration at a frequency of 26Hz and 40Hz preclude the decline in concentric peak torque of knee extensor observed after 10 bouts of 60 seconds of static half squats. A change in muscle mechanical stiffness property as induced by whole-body vibration is not supported by our data.

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