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## Effect of whole-body vibration on bone metabolism: Experimental study

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Chronic mechanical vibrations combined with the physical attributes of the human body can amplify the incoming energy and present the potential for negative health effects. The aim of our study was to determine the effect of vibration oscillations of various frequencies upon the process of bone tissue remodeling. Experimental research was conducted on 30 pubescent male rats with weight range of 180-220 g. The animals were distributed into 5 groups, 6 rats in each. Experimental animals of 4 study groups were exposed to heavy vibration oscillations of the frequencies of 15, 25, 50 and 75 Hz correspondingly twice a day for 20 minutes, 5 days a week during 28 days. Then we conducted CT scan of lumbar spine and blood sampling. Mineral density of lumbar vertebrae of the control group was from  $311.90 \pm 5.44$  to  $334.00 \pm 8.08$  mg/cm<sup>3</sup>. Maximum loss of bone mass of vertebral trabecular layer was observed in the III and the IV groups of experimental rats, which was decreasing to 12% ( $p < 0.05$ ) and 14% ( $p < 0.05$ ) correspondingly in comparison with the control group. In the first and the second groups, the parameter decreased to the values of  $\leq 4\%$  ( $p > 0.05$ ) and 8% ( $p < 0.05$ ) correspondingly, compared to control group. Level of free oxyproline in control group of animals made up  $5.50 \pm 0.20$  mcg/ml. In the I study group the parameter made up  $5.84 \pm 0.14$  ( $p > 0.05$ ), in the II study group the parameters increased in relation to the control group by 19.3%, in the III group they increased by 65.3%, and in the IV group they doubled, making up  $6.54 \pm 0.35$  mcg/ml,  $9.09 \pm 0.19$  mcg/ml and  $11.04 \pm 0.39$  ( $p < 0.05$ ) correspondingly. Thus, the results obtained by us suggest that with the increase in vibration acceleration  $> 0.51$  g (50 Hz, amplitude 2 mm) the velocity of bone tissue metabolism grows. It is accompanied by acceleration of the process of collagen catabolism and loss of bone mineral mass, which further lead to osteoporosis.

## Biography

N M Kostyshyn graduated from Danylo Halytsky Lviv National Medical University in 2014. He is currently a Post-graduate student at the Department of Normal Physiology. He is the author of 15 scientific publications in Ukrainian and foreign journals. His direction of activities and interests include bone adaptation to extreme exogenous factors

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