

brief communications

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Anabolism: Low mechanical signals strengthen long bones

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Although the skeleton's adaptability to load-bearing has been recognized for over a century, the specific mechanical components responsible for strengthening it have not been identified. Here we show that after mechanically stimulating the hindlimbs of adult sheep on a daily basis for a year with 20-minute bursts of very-low-magnitude, high-frequency vibration, the density of the spongy (trabecular) bone in the proximal femur is significantly increased (by 34.2%) compared to controls. As the strain levels generated by this treatment are three orders of magnitude below those that damage bone tissue, this anabolic, non-invasive stimulus may have potential for treating skeletal conditions such as osteoporosis.

