

# Effect of pulsed and continuous therapeutic ultrasound on healthy skeletal muscle in rats

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Ultrasound therapy is used to treat injuries in joints, nerves and tendons. Part of the radiation generated is absorbed by nearby undamaged tissues, such as muscles. The aim was to evaluate histomorphological changes in the healthy gastrocnemius muscle in rats irradiated with continuous ultrasound (CUS) and pulsed ultrasound (PUS). Healthy adult rats were used, separated into two groups: CUS and PUS. Both were irradiated in the gastrocnemius muscle for 10 days: the CUS group in continuous mode (3 MHz, 1.0 W/cm<sup>2</sup>, 1 min/session) and the PUS group in pulsed mode (3 MHz, 1.0 W/cm<sup>2</sup>, 100 Hz, 50% duty cycle, 1 min/session). The contralateral muscles were used as a control. Their histological characteristics were analyzed, and the area and perimeter of the muscle fibers were measured. The connective tissue showed no histological changes. The area of muscle fibers of the irradiated groups was significantly greater (CUS 1325.2±182.1 μm<sup>2</sup>, p=0.0278 and PUS 1019.4±125.3 μm<sup>2</sup>, p=0.0398) than the control, and the CUS area was greater than the PUS (p=0.0383). The perimeter of muscle fibers showed significant differences between the irradiated groups (CUS 148±11.12 μm, p=0.0178 and PUS 129.3±8.83 μm, p=0.0236) compared to the control, as well as differences between CUS and PUS (p=0.0319). The application of ultrasound on healthy muscle produces hypertrophy of the muscle fibers, greater when continuous mode is used. It is advisable to apply pulsed, focused ultrasound therapies with sound heads sufficient for the tissue or zone to be treated, thereby reducing the risk of altering the adjacent healthy tissue.

Continuous ultrasound

Health muscle

Muscle tissue

Pulsed ultrasound

Therapeutic ultrasound