Abstract: We studied the effects of unilateral sciatic neurectomy (USN) on the development of the femoral shaft in the 30 growing Wistar-derived rats aged 5 weeks. Rats were allocated to three groups. One of these was immediately used for measurements, and the remaining 2 groups underwent USN of internal control. Specimens obtained from each group were divided into 2 subgroups: left femurs of each group served as the control subgroup (CONT) and right femurs from each group as the USN-operated subgroup (USN-OP). The bone mineral density (BMD), bone mineral content (BMC), bone area, periosteal circumference and endosteal circumference were measured by peripheral quantitative computed tomography (pQCT) and the mineral/matrix ratio was evaluated by Fourier transform infrared spectroscopy (FTIR). A three-point bending test was performed to analyze the biomechanical effects of sciatic neurectomy. USN-OP showed a significant decrease in cortical BMC, bone area, and periosteal circumference compared with CONT. The mineral/matrix ratio of cortical bone did not differ significantly between USN-OP and CONT. Strength and stiffness were significantly decreased in USN-OP compared with CONT. The results showed that USN inhibited periosteal bone formation, but has no significant effects on the mineral/matrix ratio of cortical bone in femurs. J. Med. Investig. 51: 96-102, February, 2004

Keywords: sciatic neurectomy, bone mineral density, pQCT, FTIR, bone strength
Animal care and Experimental Design

Peripheral Quantitative Computed Tomography (pQCT)

Fourier Transform Infrared Spectroscopy (FTIR)

![Graph](image)
Measurements of bone biomechanical parameters (bending test)

pQCT

Statistical analysis

Femoral length
Time responses of femur to sciatic neurectomy

(A) Strength (N)

(B) Stiffness (N/mm)

(C) Energy absorbed (N ⋅ m) ⋅ 10³
in vivo
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Time responses of femur to sciatic neurectomy