

## **Vector analysis of porosity evidences bone loss at the epiphysis in the BTX rat model of disuse osteoporosis**

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## Introduction

Botulinum toxin (BTX) injected in a muscle causes paralysis with a subsequent bone loss. It represents a model of disuse osteoporosis. Although bone loss has been regularly evaluated at the metaphysis of long bones, little is known concerning the bone changes occurring in the epiphysis.

## Animals and methods

Ten Copenhagen male rats received a single BTX injection in the Mus quadriceps femoris on the right side and unilateral paralysis developed in the following days. Animals were euthanized after 28 days; femur and tibia were harvested and analyzed by microCT. Vector analysis of porosity was applied to the 2D sections and produced a frontal image with mapping in pseudo-colors. This allows quantitative analysis at the epiphysis and metaphysis. "Hot spot" were evidenced and indicated bone loss. Quantitative analysis of these images was done by decomposition of the R, G and B planes and deriving the ratio of R + G pixels on the whole pixel number.

Résumé en  
anglais

## Results

At the metaphysis, this ratio was correlated with measurement of the bone volume obtained by microCT. At the epiphysis, which has a complex shape in 3D, the method easily identified the bone loss.

## Discussion

Paralysis of a unilateral quadriceps induces bone loss at the metaphysis of the long bones. However, the epiphysis, having a reduced bone remodeling is also concerned by disuse. MicroCT analysis of this part of the bones is difficult due to its complex shape in 3D. Vector analysis is a new and robust method to quantify bone loss in such complex areas.

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