

## Abstract

Osteoporosis is a disease in which low bone mass and microarchitectural deterioration of bone tissue lead to increased bone fragility and a consequent increase in fracture risk. The objective of this paper is to develop and validate a new method to assess bone microarchitecture on radiographs. Taking into account the piecewise fractal nature of bone radiograph images, an appropriate fractal model (piecewise fractional Brownian motion) is used to characterize the trabecular bone network. Based on the Whittle estimator, a new method for calculating the Hurst exponent  $H$  is developed to better consider the piecewise fractal nature of the data. Different estimators are used and compared to the proposed method to discriminate two populations composed of healthy controls and osteoporotic patients. Our findings demonstrate that the new estimator proposed here provides effective results in terms of discrimination of the subjects and is better adapted to bone radiograph image analysis