Acronym: VPHOP

Title: Osteoporotic Virtual Physiological Human
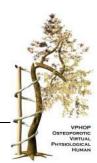
Contract #: FP7-223865

Coordinator: Istituto Ortopedico Rizzoli, Bologna, Italy

Coordinator: Marco Viceconti

e-mail: viceconti@tecno.ior.it

Phone: +39 051 6366863   fax: +39 051 6366863

Project abstract

Nearly four million osteoporotic bone fractures cost the European health system more than 30 billion Euro per year. This figure could double by 2050. After the first fracture, the chances of having another one increase by 86%. We need to prevent osteoporotic fractures. The first step is an accurate prediction of the patient-specific risk of fracture that considers not only the skeletal determinants but also the neuromuscular condition. The aim of VPHOP is to develop a multiscale modelling technology based on conventional diagnostic imaging methods that makes it possible, in a clinical setting, to predict for each patient the strength of his/her bones, how this strength is likely to change over time, and the probability that the he/she will overload his/her bones during daily life. With these three predictions, the evaluation of the absolute risk of bone fracture will be much more accurate than any prediction based on external and indirect determinants, as it is current clinical practice. These predictions will be used to: i) improve the diagnostic accuracy of the current clinical standards; ii) to provide the basis for an evidence-based prognosis with respect to the natural evolution of the disease, to pharmacological treatments, and/or to preventive interventional treatments aimed to selectively strengthen particularly weak regions of the skeleton. For patients at high risk of fracture, and for which the pharmacological treatment appears insufficient, the VPHOP system will also assist the interventional radiologist in planning the augmentation procedure. The various modelling technologies developed during the project will be validated not only in vitro, on animal models, or against retrospective clinical outcomes, but will also be assessed in term of clinical impact and safety on small cohorts of patients enrolled at four different clinical institutions, providing the factual basis for effective clinical and industrial exploitations.