In vivo assessment of bone interventions in preclinical mouse models

Abstract: *Musculoskeletal diseases such as osteoporosis and osteoarthritis have huge impact on the life quality of millions of patients every year. Novel interventions for these diseases have to be tested preclinical in animals before clinical trials and the mouse models are commonly used thanks to their limited cost, and the possibility of performing high-resolution images in vivo. In this seminar, I will present recent results about the development of techniques to measure in vivo bone changes over time in the mouse tibia, including microstructural parameters, densitometric analyses in different portions of the bone, and non-invasive biomechanical assessment with subject-specific finite element models. Part of the talk will focus on the validation of the outputs of the biomechanical models against ex vivo experiments, on the assessment of the effect of interventions to induce accelerated bone resorption, typical model of osteoporosis, and on the effect of bone anabolic treatments. Finally, a model to predict bone changes over time due to mechanical stimuli will be presented.*

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Dr Dall'Ara holds a PhD in Biomechanics from the Vienna University of Technology and a Master degree in Mechanical Engineering from the University of Bologna. He joined the University of Sheffield in 2013 as Marie Curie Fellow at the Department of Mechanical Engineering. In 2015, he was appointed as Lecturer in Musculoskeletal Multiscale Imaging at the Department of Oncology and Metabolism. He has been Senior Lecturer since 2019 and part of the Insigneo Institute for in silico Medicine since 2013.

Dr Dall'Ara's research interests are related to better understanding the properties of musculoskeletal tissues across the space and time scales, by using imaging, experimental and computational methods. In particular, the main goal of his research is to develop and validate subject-specific computational models for the prediction of bone strength, bone remodelling and risk of fracture in healthy subjects and in patients with musculoskeletal diseases, applied to both preclinical and clinical studies.