

LIFE LONG JOINTS

"THE VIRTUAL PATIENT"

*– ADVANCES IN COMPUTATIONAL
METHODS AND THEIR IMPACT ON
TREATMENT STRATEGIES*

lifelongjoints.eu

30 October 2017

Imperial College London

Charing Cross Campus

Glenister Hall Seminar Room 1&2



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no NMP-310477

LIFELONGJOINTS "SILICON NITRIDE COATINGS FOR IMPROVED IMPLANT FUNCTION"

A seminar for clinician and clinical researchers

LifeJongJoints is a project in the area of nano-materials aiming to improve the lifespan and performance of implants used for joint replacement. Funded by the European Commission's 7th Framework Programme, LifeJongJoints is a large scale project being undertaken by 15 European partners from academia, research and industry large and small coordinated by the University of Leeds. Aside from addressing the use of silicon nitride as a coating on hip implants to extend their lifespan, the project has done a significant amount of work in the area of simulation and testing.

This work is to be presented in the seminar "The Virtual Patient" aimed at informing the clinical audience of the potential and limitations of computer simulation as applied to future developments of hip implants.

More on the project itself and a list of publications can be found on the website www.lifelongjoints.eu.

“THE VIRTUAL PATIENT” ADVANCES IN COMPUTATIONAL METHODS AND THEIR IMPACT ON TREATMENT STRATEGIES

**Prof. Stephen Ferguson, Institute for Biomechanics,
ETH Zurich**

Computational methods have already established themselves as an essential and indispensable part of clinical diagnosis, decision making and treatment planning in orthopaedics. For example, computer driven, semi-automated image analysis methods allow the rapid extraction of extended information from conventional x-ray, MR and CT imaging datasets. Computer-assisted navigation methods facilitate the precise execution of complex surgical procedures in a minimally invasive fashion. Generic biomechanical simulations have extended our knowledge of the typical response of an orthopaedic implant in an average patient, subjected to selected, representative loading cases.

Recent advances in computer simulation methods, the nearly exponential growth of computational power and the universal adoption of content-rich medical data storage have opened the door to ever more sophisticated applications of computer models in orthopaedics. We have entered the era of the “Virtual Patient”.

Now, with a manageable effort, it is possible to create a series of simulation models which capture the variation of essential morphological, health and lifestyle parameters across an entire patient population.

Such models can be applied to explore the pathomechanics of musculoskeletal disorders and the potential outcome of new treatment strategies with a breadth and depth not before possible, either in the research or clinical environment.

The seminar given by Prof. Stephen Fergusson, Institute for Biomechanics, ETH Zurich and the work package leader for Computational Modelling and Simulation of Hip Joint Mechanics and Wear, will cover the following topics

- 1. Population-based musculoskeletal modelling of activities of daily living**
- 2. Simulation based predictions of surgical outcome**
- 3. Accelerated Pre-Clinical Testing through Computer Simulation**

