UNIVERSITÉ DE GENÈVE

PRESS RELEASE

Geneva | March, 29th 2012

FOCUS ON OUR JOINTS

The new European project MultiScaleHuman will develop a 3D multi-scale visualization of our joints

The Marie Curie Actions framework programme launches MultiScale-Human, a new European research project which aims to visualize in 3D the functioning of the human body from a dynamic multi-scale point of view. Coordinated by Nadia Magnenat-Thalmann, professor and director of MIRALab, the virtual reality lab of the University of Geneva (UNIGE), this project will lead to a better understanding of joint-related diseases in order to diagnose and treat patients more efficiently.

Musculoskeletal diseases (MSD) and related disorders are often considered as an inevitable consequence of aging, accounting for the largest fraction of temporary and permanent disability. Many MSD lead to joint pain, stiffness and limited motion, affecting all human body articulations. So far, doctors have been using scans to diagnose a patient. Today, the MultiScaleHuman project aims to recreate a patient's leg on a computer so that doctors have the possibility of examining in 3D the functioning of joints. For the first time, researchers will create a predictive 3D simulating model - starting from the knee, which is one of the areas most affected by MSD - from various levels: molecular, cellular, organic, metabolic and behavioral. This is what we call multi-scale visualization.

Multi-scale visualization of the knee. MIRALab

When technology meets medecine

The synergy of ICT (Information and communications technologies) and medecine paves the way to predictive medicine to better prevent and treat illness. The MultiScaleHuman project will combine the recent technological progress, in terms of organs reconstruction from MRI and motion simulations, with multi-scale research to better diagnose and treat patients suffering from MSD.

The need for multi-scale research and its benefits are clearly exemplified with a case study of osteoarthritis (OA) which is one of the leading causes of MSD: OA is a chronic (behavioural) and progressive condition of the cartilage in joints (tissue), where the water content (molecular) of the cartilage (cellular) increases and the protein makeup (molecular) of cartilage degenerates, until the cartilage breaks down and bones (tissue) rub against each other (organ) resulting in tissue and bone damages. To comprehend such a complex disease, a multi-scale analysis of biological data and their visualization and simulation in 3D are essential. This is the objective of the project coordinated by professor Magnenat-Thalmann.

A European collaboration coordinated by the UNIGE

This 4 year project supported by the European Commision (3.5 million

euros) will bring together seven European scientific teams.

The Hospitals of the University of Geneva (HUG) and the School of Medicine of Hannover in Germany (LBB-MHH) will be in charge of acquiring MRI in high resolution of bones, muscles, tendons etc. From these images, MIRALab will perform modeling of 3D mechanical models of the patient's leg joints, starting with the knee.

MIRALab and the LBB-MHH will also analyze the patient's motion through motion capture equipments and force measurements. These equipments will register both joint motion and the specific forces impacting the joints such as pressure, gravity or elasticity. Scientists will then be able to recreate the patient's leg virtually, taking into account the physical parameters of motion.

The University of Minho Braga in Portugal (UMINHO) will provide, for its part, cellular data and mechanical properties of tissues to allow the 3D visualization of the patient's articulations. This visualization will provide doctors with the ability to navigate through the human body. It will be managed by the Welfenlab Laboratory from the Leibniz University Hannover in Germany.

The National Council for Research of Genoa in Italy (CNR-IMAT) will then implement a management system of biological and medical data related to the project. Doctors will then have access to a knowledge base by consulting reconstructed organs images or analyzing the 3D motion simulation of joints.

contact

Nadia Magnenat-Thalmann
079 328 13 13
thalmann@miralab.ch

http://multiscalehuman.mirilab.ch

UNIVERSITÉ DE GENÈVE
Service de communication
24 rue du Général-Dufour
CH-1211 Genève 4

Tél. 022 379 77 17

media@unige.ch
www.unige.ch