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New "Virtual Liver" Technology Helps Detect Liver Tumours

Scientists and surgeons from France, Germany, United Kingdom and Switzerland have developed a "virtual liver", using EU research funding, which will help surgeons better plan and carry out tumour operations and ensure quicker patient recovery. The PASSPORT project (Patient-Specific Simulation and Pre-Operative Realistic Training) makes a uniquely accurate "virtual liver" available to physicians based on medical images sent by the radiologist to a PASSPORT online service, which helps surgeons decide whether they should operate or not . Surgeons can now see more precisely where a tumour is and where they will have to operate to safely remove it.

European Commission Vice President Neelie Kroes said: "Liver cancer claims hundreds of thousands of lives in Europe and the world. The technology developed in the EU-funded PASSPORT project is a breakthrough that will improve diagnosis and surgery, and help to save lives."

The liver performs more than 100 vital functions in the human body. Liver diseases, including cancer and sclerosis of the liver, kill thousands of people every year. Liver transplants are only an option for a very small proportion of patients with liver disease. Another option is to remove the infected part of the organ and allow the liver to regenerate. To do so, surgeons need to know the tumour's precise location, the volume of the functional liver which would remain, and the patient's overall health in order to accurately assess the chance of a successful intervention. Under current practices, less than 50% of patients undergo surgery. PASSPORT's virtual liver could considerably increase this percentage.

The virtual software being used in the project is based on open source technology available online making it easier for surgeons to collaborate and share their analysis.

Background

Using EU-research funding to help improve citizens' lives, medical knowledge, and enable high-tech industries are among the goals of the Digital Agenda for Europe (see IP/10/581, MEMO/10/199 and MEMO/10/200).

First results of the project clearly demonstrate the cost effectiveness and benefits of patient-specific surgical planning. The next step is making the software commercially available. This commercialisation will be a first step towards the routine clinical use of PASSPORT results. In practice, this means that a surgeon based anywhere in the world will be able to use this model, adjust it to the needs of each patient and considerably lower the cost of each patient's operation.

The PASSPORT project started in June 2008 and ended in December 2011. The total cost was €5,457,174 of which €3,635,049 came from EU funding. PASSPORT is part of the "Virtual Physiological Human" Network of Excellence (VPH NoE). The VPH NoE is a project which aims to help support and advance European research in biomedical modelling and simulation of the human body. It allows the surgeon to zoom in from the body to the

organ, from the organ to the tissue, from the tissue to the cell. It thus allows a "multi-layered" approach so specialists can track the disease and see the way in which the disease propagates through the different levels of the body.

PASSPORT Project co-ordinator: IRCAD (France)

Partners:

Eidgenössische Technische Hochschule • Zürich (Switzerland)Technische Universität München (Germany)
Imperial College London (UK)Institut National de Recherche en Informatique et en Automatique (France)
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