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Projects story12 June 2014

Smart treatment predictions for brain trauma

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Most people who suffer a severe brain injury take years to recover – if they recover at all. But the right treatment in the crucial hours following an accident can make all the difference. Now an EU project is building sophisticated new computer models potentially able to improve diagnosis and predict the outcome of treatments.
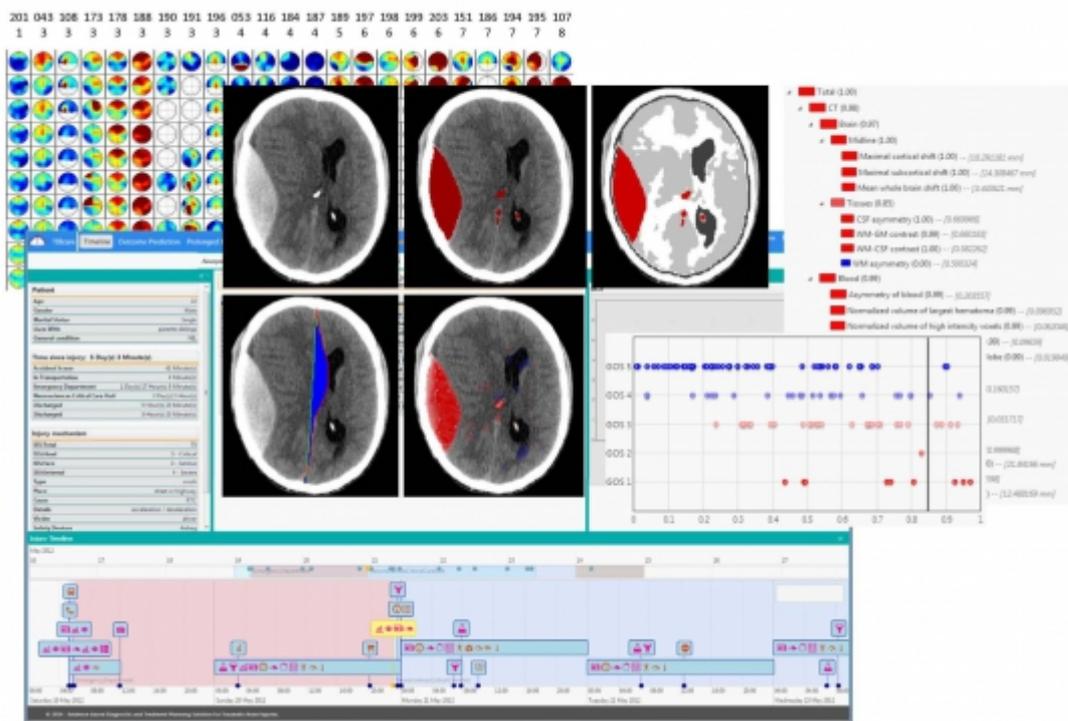
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In the EU, traumatic brain injuries (TBI) account for four times as many years of life lost as diabetes, and they cause more lost working years than cancer, stroke and HIV put together. Of the 1.6 million people who suffer a TBI in the EU every year, 70,000 are in a life-threatening situation and a further 100,000 will be left with a permanent disability. Yet treating TBI patients can be particularly difficult due to the complex nature of the brain, and the individual nature of each injury.

The TBICARE project [2] – a joint initiative between eight partners in Finland (VTT Technical Research

Centre of Finland [3], GE Healthcare Finland [4], University of Turku [5]), France (Complexio [6]), Lithuania (Kaunas University of Technology [7]) and the UK (Imperial College London [8], University of Cambridge [9], GE Healthcare UK [10]) – is collecting data from hundreds of TBI patients and using it to build a predictive model that will improve care. The system will allow doctors to enter data from tests in the emergency department and will predict the most effective course of treatment for each individual patient. The project is part of a wider drive to use ICT to help clinicians diagnose and treat more effectively using ICT tools that pool existing but fragmented data and knowledge on the human body and can be used to model outcomes – the concept of the 'Virtual Physiological Human' [11]

The project partners are hopeful that the predictions made by the model will lead to more accurate diagnoses and better treatment. While the prototype is still being validated, data from the recently-started EU Seventh Framework Programme [12] (FP7) CENTER-TBI project is expected to help optimise it. Equally, several versions of the prototype are under evaluation by doctors at the Turku University Central Hospital in Finland and the Addenbroke Hospital in the UK, for research purposes only, with a view to have a clinical tool in several years. Such tool will ease the day-to-day clinical work of doctors and will revolutionise the ER-care and treatment of traumatic brain injury.

According to Dr Mark van Gils [13], TBICARE's scientific coordinator, 'Improved diagnostics provided by our system can have a potentially tremendous impact on TBI and its aftermath. Costs related to TBI are not just the costs of care, but also costs from loss of productive years, reduced quality of life, even death – not forgetting the considerable impact on the family and friends of the injured ones... An improvement of 1% would mean yearly savings of EUR 1 billion in Europe alone.'

Increasing Knowledge – Improving Care

Dr Mark van Gils explains that under the project 'patients are tested for many different things when they arrive at an emergency department. Their care team would look their awareness and reactivity, and at how much oxygen is in their blood, for example. They also explore the potential of more sophisticated measurements – for example testing for proteins that indicate different types of damage to the patient's brain tissue in their circulation, and using imaging to look for internal bleeding. We want to see which tests give the best indicators of the patient's likely outcome.'

The TBICARE model will predict which injuries should be treated first, and how they should treat them, as well as helping guide the care team through the patient's stabilisation and recovery.

The EU's FP7 has provided EUR 3 million in backing over three years to help build the tool. TBICARE project will end in August 2014.

Read more
For translations in FR, IT, SP, DE or PL, please visit CORDIS website [14]
Project
Evidence based Diagnostic and Treatment Planning Solution for Traumatic Brain Injuries
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Project Acronym
TBICARE
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[14] http://cordis.europa.eu/result/story/rcn/13073_en.html

[15] http://www.euronews.com/2014/06/09/a-second-chance-for-injured-brains/