

Help For Simulation-tools And Stroke Patients

ScienceDaily (May 29, 2008) — Jörg Willems has made an important contribution to our understanding of multi-scale problems in fluid mechanics and thermodynamics. The effects of a stroke can now be significantly alleviated with a stem cell therapy based on umbilical cord blood.

Simulation is an important tool for computer-based development and pretesting of materials, helping eliminate expensive, dangerous mistakes. Computer-based testing is a specialized field of the Fraunhofer Institute for Industrial Mathematics ITWM in Kaiserslautern, not least because materials simulation is a complex process involving a great deal of mathematics. This is especially true of multiscale materials modeling, the mathematical description of materials across multiple spatial and time scales.

Graduate mathematician Jörg Willems has significantly improved our understanding of multiscale problems associated with flow dynamics and thermodynamics. His diploma thesis has greatly facilitated the use of numerical simulation in the development of filter media, insulating materials, composite materials and fuel cells. He has been awarded 2nd place in the Hugo Geiger Prize for his work.

When a stroke is diagnosed, every minute is of high value for limiting its impact. Existing treatment protocols only take effect after three to four hours. Physicians are therefore looking for effective alternatives such as stem cell therapy.

Johannes Boltze of the Fraunhofer Institute for Cell Therapy and Immunology IZI in Leipzig is one of them. In his doctoral thesis he established a model for examining strokes in rats, and managed to show that treatment with stem cell containing populations shows promising results.

“The ability of untreated animals to move after the infarct is severely impaired,” explains Johannes Boltze. “In behavioural tests, for instance, they have difficulty balancing well enough to run across a bar. Not so in the case of the animals we treated with cells. They nimbly run across again after only a fortnight.”

The stem cells promote endogenous healing and organizational processes in the brain. As a result, the surviving nerve cells are probably more resistant to the damage if the treatment is begun within 72 hours after stroke onset. Thus, cells from umbilical cord blood and bone marrow could be used for the stroke trials – an uncontroversial method that avoids any ethical concerns.

The cell therapy procedure is ideal for further clinical usage in a stroke unit. Dr. Johannes Boltze received the 3rd place in the Hugo Geiger Prize for his research work.

Adapted from materials provided by [Fraunhofer-Gesellschaft](#).

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Fraunhofer-Gesellschaft (2008, May 29). Help For Simulation-tools And Stroke Patients. *ScienceDaily*. Retrieved May 30, 2008, from <http://www.sciencedaily.com/releases/2008/05/080529105316.htm>