

# Seminar

Friday, 4<sup>th</sup> December 2009

11 am – [Rutherford Building](#), Room 701

## [Professor Rainer Brucher](#)

Department Medical Engineering and Mechatronics at [Ulm University of Applied Sciences](#),

### ***Stroke: Diagnosis and Treatment using Ultrasound***

Brain strokes happen when the arteries leading to the brain are blocked or rupture. Such acute events have to be promptly treated within a three hour window after onset of symptoms: "time is brain". Therefore patients admitted to an acute stroke hospital have to be both diagnosed and treated promptly as well as being monitored during medication. Also, stroke prevention with respect to recognising and reducing risk factors like hypertension and arteriosclerosis is a high priority. Furthermore, during heart and vascular surgery the number of embolic events should be reduced as far as possible to improve outcomes and increase the benefits for the patient.

One method for monitoring acute stroke patients or to improve risk management in prevention and surgery is by means of ultrasound Doppler instrumentation. This helps to record blood flow to the brain and to detect emboli, which are stuck in or are just entering the cerebral arteries. Even more, as a non-invasive application such ultrasound equipment can accelerate the thrombolytic treatment for embolysis. In parallel this insonation allows the possibility to control the effectiveness of the medical treatment by drugs.

After a short introduction to basic anatomy in cerebral circulation new ultrasound instrumentation techniques are presented including automatic transducer positioning to allow long-term monitoring of the cerebral basal arteries in the Circle Willis in acute stroke patients. In addition, the application of multi-frequency-signals processed by special short-term spectral analysis can differentiate between more or less dangerous emboli entering the cerebral circulation. These new features help e.g. to improve operation techniques during open heart and bypass surgery. Reducing the number of emboli decreases the risk of cognitive deficits or even a stroke. Furthermore, in patients with artificial heart valves the monitoring of dangerous emboli allows for better and optimal doses of medication. Such instrumentation techniques developed in cooperation with university hospitals are just being transferred from research settings to clinical routine in order to increase the benefits for patients.

***All Welcome***

#### Contact Details

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