

**News Archive 2009**

**From Charité into space: ThermoLab experiment starts on the ISS**

*15 October 2009*

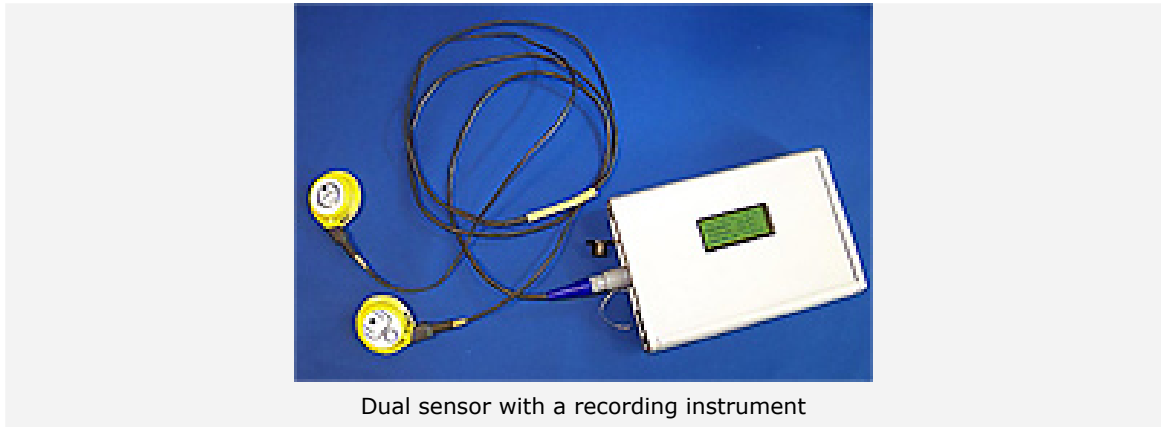


Test subject with a measuring device

**New sensor facilitates measurement of internal body temperature**

On Thursday, 15 October 2009, at the same time as the 300th anniversary celebrations of Berlin's Charité university hospital began, the ThermoLab experiment was launched on the International Space Station (ISS). Scientists from Charité want to use the experiment to study changes in the heat balance and the circulation of people who are in zero gravity conditions. A new sensor that was jointly developed on behalf of the German Aerospace Centre (Deutsches Zentrum für Luft- und Raumfahrt; DLR) by Charité and Draegerwerk Lübeck is being used.

When astronauts enter zero gravity conditions, some of their bodily fluids, such as blood and lymph, flow from the lower part to the upper part of the body very quickly. Changes in their heat balance are also linked to this fluid movement. In order to accurately record these changes and then to counteract them, it is important to measure the body's core temperature - the temperature of the vital internal organs. To date, this has been measured in clinics and surgeries by means of a probe inside the body. However, this procedure cannot be used with astronauts.



Dual sensor with a recording instrument

### Monitoring people in extreme situations

With the ThermoLab experiment, the scientists are using a new non-invasive measuring procedure in the form of a dual sensor that records the heat flow at the head and at the breastbone. The heat flow quantities are then converted, using special mathematical procedures, to obtain core body temperature, which, together with cardiovascular data, will be used to evaluate the subject's state of exhaustion.

As a result, dangers can be recognised early and appropriate countermeasures can be taken for people in special work situations – for example, in the case of astronauts working outside a spacecraft. The procedure is expected to be used on Earth as well, for instance in jobs involving the fire brigade, during hospital operations or for monitoring babies in incubators.

The measuring device was taken to the space station in February 2009 on a Progress supply ship, in order to study the longer-term changes in the body's core temperature in zero gravity conditions. As part of further experiments to be carried out by the American space agency NASA, ThermoLab will be combined with physical fitness activities in order to investigate in greater detail the regulation of the cardiovascular system and the heat balance. The test programme is planned to take place over several years.



Taking part in the experiment: Commander Frank De Winne

### First tests under zero gravity conditions on parabolic flights

The sensor was developed and tested by a workgroup centred around Prof. Gunga and Dr Werner at Charité in Berlin, in cooperation with Draegerwerk in Lübeck. The scientists tested the procedure for accuracy in 2007 and 2008, during brief periods of zero gravity conditions created by parabolic flights.

The measured values were very accurate and consistent with the values obtained using conventional procedures. DLR's Space Agency sponsored the project with funds from the German Federal Ministry for Economics and Technology (Bundesministerium für Wirtschaft und Technologie; BMWi). The costs for the development and construction of the sensor and the preparations for its use in space were around Euro 400,000.

The ThermoLab experiment is planned as a continuation of the series of successful space experiments performed by Charité that range from the first Spacelab mission in 1983 to the German Spacelab missions D-1 and D-2, the Russo-German MIR missions in 1992 and 1997, and finally the International Space Station (ISS).

The research work covers a broad spectrum, ranging from the field of molecular biology through to research on muscle and bone deterioration and on the balance system - up to an integrated view of human body.

## **Contact**

### **Prof. Hans-Günter Ruyters**

German Aerospace Center

Space Administration, Microgravity Research and Life Sciences

Tel: +49 228 447-214

Fax: +49 228 447-735

E-Mail: Guenter.Ruyters@dlr.de

---

*Contact details for image and video enquiries as well as information regarding DLR's terms of use can be found on the DLR portal imprint.*