



## **Vivometrics® Lifeshirt® System to be Utilized Aboard the International Space Station in a Study to Help Improve Astronauts' Quality of Sleep**

European Space Agency to Fund Researchers in Irish Universities Who Hope to Determine Sleep Quality While in Space

VENTURA, Calif. — February 28, 2006— VivoMetrics, Inc., in partnership with the University of Limerick and sponsored by the European Space Agency (ESA), will be conducting a study to evaluate and determine the quality of sleep while in orbit with the ultimate goal of providing a healthier sleep environment for astronauts in the future. As part of the study, German astronaut, Thomas Reiter, is set to wear the VivoMetrics LifeShirt System aboard the International Space Station (ISS), after traveling there on the Discovery Space Shuttle later this year.

The VivoMetrics LifeShirt is the first non-invasive, ambulatory monitoring system that continuously collects, records, and analyzes a broad range of cardiopulmonary parameters. In the experiment, astronauts will wear the lightweight, machine washable garment with embedded sensors to record their sleeping activity. The LifeShirt will detect sleep activity and disturbance by assessing cardiac activity from an electrocardiogram (ECG) and other physiological parameters. At the same time, astronauts will use an integrated PDA to answer a series of sleep related questions as part of a subjective "sleep diary." Analysis software will then produce a sleep spectrogram that researchers will use to measure the astronaut's stability of sleep.

"Without the LifeShirt System, much of the proposed work would be impossible to complete," said Dr. Derek O'Keefe, Biomedical Researcher at the University of Limerick. "The LifeShirt System not only enables a study that will investigate and lead to countermeasures that will improve the quality of sleep in space, but it also does so years before other technologies could be developed to produce the same results in such an accurate, non-invasive, and comfortable setting."

"The use of the LifeShirt by the Project CASPER team heralds the start of an exciting new development and collaboration for all involved. The LifeShirt represents the cutting edge of life sciences monitoring which will be applied to provide both significant benefit to astronauts and lead to further improvements for those who have trouble sleeping here on earth," said Marc O'Griofa of University College Dublin.

Astronauts typically average six hours of sleep per night in orbit and must also endure an orbital dawn every 90 minutes making poor quality of sleep a major issue for the National Aeronautics and Space Administration (NASA) and the ESA. Insomnia is a prevalent symptom among astronauts with up to half of the crew taking hypnotic medication for several days in flight during some shuttle missions. In addition, previous research has shown that approximately 25% of crew members experience dramatic impairment in the quantity and/or quality of sleep during both short and long missions.

"This experiment is expected to provide important data for the monitoring of sleep disturbance during space flight," said Elena Grifoni, Head of ISS Utilization Strategy, ESA.

"Though it is extremely important for astronauts to be well-rested and alert in space, previous studies have shown that this is not always the case," said Paul Kennedy, CEO of VivoMetrics. "We are proud that our technology will help the University of Limerick and the ESA determine how extensive the sleep problem truly is."

The study, funded by the ESA, will be conducted by Marc O'Gríofa from University College Dublin and Dr. Derek O'Keefe from the University of Limerick.

#### **About the LifeShirt System**

The LifeShirt System is the first non-invasive, ambulatory monitoring system that continuously collects, records and analyzes a broad range of cardiopulmonary parameters. Users wear a lightweight, machine washable garment with embedded sensors that collect pulmonary, cardiac, posture and activity signals. Data collected by integrated peripheral devices measure blood pressure, blood oxygen saturation, EEG/EOG, periodic leg movement, temperature, end tidal CO<sub>2</sub> and cough. An electronic diary captures subjective user input and all physiologic and subject data are correlated over time. The LifeShirt System has received FDA clearance and EMEA approval (CE Mark).

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