

## **USER CONSULTATION**

### **To Update ESA's Strategy for the Spaceflight Analogue "Bed Rest"**



Image: CNES/S. Levin



Image : ESA/Vista S.T.I.

Deadline for submissions: **February 27<sup>th</sup>, 2012**

## 1 BACKGROUND

The spaceflight environment induces numerous changes in the physiological systems of the human body. Currently employed preventive measures against these adaptations, usually called “countermeasures” in the human spaceflight context, have proven insufficient. Especially considering the strong interest and visions for human space exploration of most space agencies around the world, there is an urgent need to develop better countermeasures and/or obtain basic knowledge that can help to improve countermeasure concepts. Those novel countermeasures must be validated on the ground, before scarce space resources are committed for final in-flight validation on the International Space Station. One of the spaceflight analogues used for ground-based validation are bed rest studies involving healthy volunteers, which simulate a number of important physiological changes seen in spaceflight. Previous investigations have led to new concepts in human physiology that are also relevant for medical treatment of bed-ridden patients or elderly / sedentary populations on Earth.

The European Space Agency (ESA) has very successfully organised and supported a number of bed rest studies in the past. These bedrest studies thus form an integral part of ESA’s European programme for Life and Physical Sciences (ELIPS) programme and serves as an important platform to prepare for future human exploration activities. In order to facilitate longer-term planning and overall higher efficiency, ESA initiated an effort in 2005 to outline a 5-year strategy for this spaceflight analogue. This strategy included two main elements:

- **General issues:** These focussed mainly on the need for standardisation of bed rest conditions (e.g. duration of bed rest studies, need for standardised measurements, approach for screening of new concepts vs refining of protocols etc.).
- **Priorities for countermeasures to be tested:** A roadmap was outlined, that gave highest immediate priority to the investigation of artificial gravity, vibration exercise and nutrition as countermeasure principles,

Following these recommendations, an ESA standardisation document for bed rest study conditions was developed, as well as Bed rest Core Data (BCD) defined, a detailed list of measurements that will be collected in standardised fashion in each ESA supported bed rest study.

ESA’s bedrest roadmap was updated after a user consultation in 2009, during which further priorities for upcoming studies were discussed (see Annex).

In line with the strategy,

- **Artificial Gravity** protocols have been screened in two short-duration (5d) studies. Two more, medium-duration (21d) AG studies are planned. The modifications necessary to make the foreseen AG protocols feasible are currently under study.
- **Vibration exercise** was further investigated in the frame of a long-duration (60d) bed rest study performed in 2008.

- **Nutritional aspects** were studied in a medium-duration bed rest study in 2010 and are the subject of two more medium duration studies during 2011/12.

Thus, the priorities formulated in the past either have been or are in the process of being addressed, and the time is deemed right to elaborate the next steps and directions that ESA's bed rest activities should take.

## **2 OBJECTIVE OF THIS USER CONSULTATION**

The objective of this user consultation is to provide input for an update of ESA's bed rest strategy.

To this end, contributions are solicited for

- new, promising countermeasure devices and/or concepts,
- the refinements of countermeasure protocols and/or
- new combinations of proven countermeasures

that can and should be evaluated using bed rest studies, and that will benefit the ultimate goal of eventually leading to a more efficient and effective countermeasure concept for long-duration spaceflight.

The contributions will be used for two functions:

- From the submitters, ESA will select up to 20 persons who will be invited to a workshop on April 26th and 27<sup>th</sup>, 2012, where in-depth discussions regarding the update of ESA's bed rest strategy will take place.
- The contributions themselves will be distributed to the workshop participants to serve as direct input for the discussions.

## **3 PREPARATION AND SUBMISSION OF CONTRIBUTIONS**

- Please use the form (see associated document) to describe your contribution.
- The completed form should be sent as email attachment to the dedicated address **bedrest@esa.int**
- To facilitate further processing of the contributions, please leave the form in MS Word (.doc) format and do not use Adobe Acrobat (.pdf) format.
- Deadline for submissions is **February 27<sup>th</sup>, 2012**.
- For questions or clarifications related to this consultation, please contact

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# Annex: Updated Bedrest Roadmap

