



clue medical

The State of HeArt –  
in TeleMedicine

Presse Press

Start of the  
105 day isolation  
in Project Mars 500  
Moscow, March 31,  
2009

Mars 500, Part 1

## 105 Days of Stress.

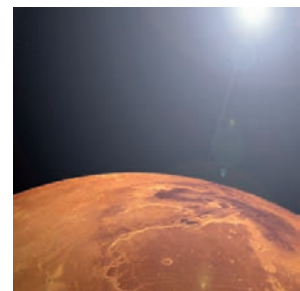
**The day has 24 hours and there is no night. Six people are left completely on their own in close quarters. That is the test and that is the stress.**

**A telemedicine device only the size of the palm of your hand, which originated in Austria, will supply crucial data on what is most likely the greatest weakness of a Mars mission: the condition of the people on board.**

The device that was developed in Vienna, which will be used as part of Mission 105, is called clue medical. The manufacturing company TELOZO selected by IMBP for the "Mars 500" project is a recognised high-tech specialist in the field of telemedicine. **clue medical** is a telemedicine measuring device developed to determine the medical parameters and data of a human body and then to transmit them to where they can be analysed and evaluated. It is used as a diagnostic tool in clinics and hospitals and during the course of therapies and telemedicine monitoring.

### Stress as a Risk Factor.

Besides all the thirst for knowledge and the excited expectations of what will happen, the people who voluntarily subject themselves to the simulated extreme conditions of a long-term mission will have stress above all. Stress will arise in almost all situations during the course of the day from the start until the landing on Mars, during the docking manoeuvres, the routine monitoring of the functions, and above all if a problem arises to which the crew has to react immediately and fix or resolve. The lives of the crew in space will depend on how the astronauts react to psychological pressure. **clue medical** is also on „board“ in order to evaluate this, and in this case to test it. It is a mobile cardiac complex analyser to record, process and transmit signals that are derived from an electrocardiogram, i.e. an ECG.



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The goal of the test is to determine the possibilities and limits of the tele-cardiological system for monitoring the cardiovascular system as well as the stress level of the six-person team under the given isolation conditions. The tests will be conducted continuously before, during and after the 105-day isolation.

**clue medical** is in contact with the surface of the skin in the mid-third of the sternum, and it is switched on by pressing a button. A recording takes only 2 minutes, however it makes a sampling rate of 1 kHz possible. The data is immediately transmitted to the memory of the computer-based workstation, i.e. the computer or the team doctor where it is then transferred to the medical database. Therefore, it is possible to analyse the data immediately as well as at a later time.

The **clue medical** will be tried out in a set cycle during the course of the 105 days.

**And this is the data, values and information that are available to the analytical scientists:**

The data includes highly accurate recording and analysis of the RR intervals of the heart (beat-to-beat), information of diagnostic quality on the heart rate variability (HRV) as well as on the influence of the autonomic nervous system on heart activity and the cardiovascular system. In detail, the small device establishes and provides a surprisingly large amount of criteria, data and values during the short two minute recording. This includes the complete single-channel ECG section over 2 minutes, a signal-averaged ECG with the characteristic time values, the average cardiac cycle as well as the heart rate, the heart rate variability, a tachogram of the cardiac cycle (including the cardiovascular evaluation) and a spectral analysis (FFT) including the derived square measures for sympathetic and parasympathetic activity as well as their balance.

The new procedure reflects psychological changes and their control much more accurately and in a much more complex way. Hence, it is possible to detect symptoms like stress, recovery and their balance much better, and to actually quantify and correlate them. These factors are of decisive importance for a long-distance space mission like the flight to Mars.

**The heart rate variability HRV shows the ability of the heart to adapt to changing circumstances.**

The HRV analysis created by **clue medical** makes it possible to show the state of cardiac health and the state of the autonomic nervous system, which is responsible for regulation of heart activity. Hence, **clue medical** is an important diagnosis and monitoring tool for such a mission.

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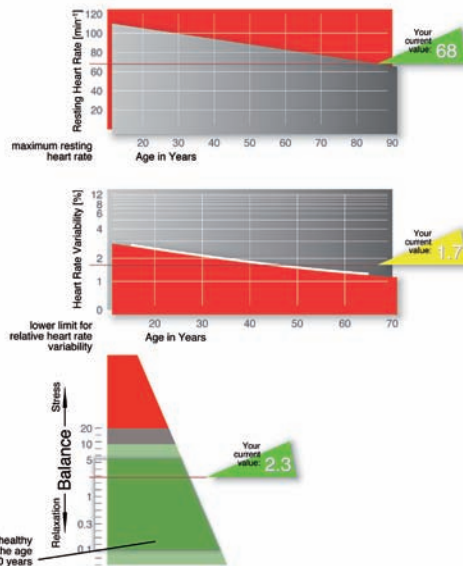
The following content is found on the enclosed USB stick:

- press text in German and English in PDF format
- sample analysis from **clue medical**
- artwork on **clue medical**
- some more in-depth information on the scientific background of **clue medical** and its possibilities



By the way, the sister device of **clue medical** called **clue** works in a similar way. Technically speaking, this device is the same as the one for the Mars mission, it establishes the same values and data, but they are then converted into an graphic display that is understandable to laypersons. The device displays the stress level, the HRV value and the balance.

Hence, **clue** helps to identify and evaluate the complex interplay between heart activity and the autonomic nervous system. It doesn't matter whether we are dealing with a manager under performance pressure, someone who loves to do sports, or someone who is currently undergoing therapy, **clue** is a diagnostic instrument that helps to monitor health and to provide an early warning if that person is about to overtax himself.



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**clue**, the sister device of **clue medical** and the analysis that laypersons can also understand.

You can order a personal press specimen with the card accompanying the USB stick.

According to scientific calculations, a real Mars mission would take 520 days there and back and three weeks on Mars itself. The greatest challenge here, however, is not the reliability of the technology, but the human factor, i.e. the behaviour of the crew. During the 105-day test, **clue medical** will be a very important direct connection and provide findings on the interplay between the psyche and the physical.

And in the process, it will prove its own technical reliability before the miniature unit travels to the red planet.

More information at: [www.cluemedical.com](http://www.cluemedical.com)

If you have any questions, please contact Prof. Joachim Schlund at telephone number +43 (0)1 7007-32551 and Email [j.schlund@telozo.com](mailto:j.schlund@telozo.com)



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