

The use of Space technology to ground applications

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The short-arm human centrifuge 'GRACER1 European patent # 1009812/13/09/2019 is located at Joan Vernikos' Human Centrifuge and rehabilitation lab and was found in October 2019 as the joint action of the a) Greek AeroSpace Medical Association – Space Research (GASMA-SR), and b) Medical Physics and Digital Innovation Lab, Medical School, Aristotle University of Thessaloniki.



It is comprised of a 4m long centrifuge which can reach a +3.5 Gz load at the feet, and it consists of two beds with possibility of 4 beds connected to the central axis along with a variety

of devices dedicated to continuous monitoring of the participants as well as to evaluating the effects of centrifugation on human physiology. The SAHC infrastructure is also equipped with several exercise systems located on the bed extremities. Aerobic training is performed through a bicycle at one end, while resistance training is facilitated through a horizontal rowing device at the other. The whole infrastructure was constructed according to both national and international safety regulations, while being applicable to patients with mobility disabilities. The first steps towards the use of SAHC were taken by trying to establish dose-response frameworks for administering G-loads on healthy population. More recently, a study examining the use of SAHC in physical rehabilitation in Multiple Sclerosis was performed, showing promising results in terms of neuroplasticity and brain reorganization. Furthermore, the effects of centrifugation in stroke have been and continue to be examined through a very extensive and well-adapted protocol, followed by a variety of evaluation methods, like neurophysiological, neuropsychological, physical health and biological evaluations. Up until now, the SAHC has proven to be promising new rehabilitation tool, with the evidence pointing towards neuroplasticity effects due to this intervention.

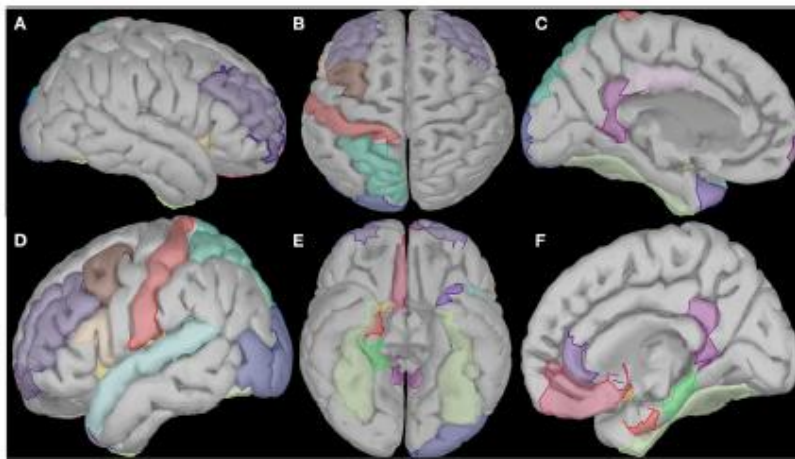


FIGURE 6 | Visualization of the cortical regions that changed linearly (either increased or decreased) from the beginning to the end of the intervention period for all frequency bands (delta, theta, alpha, beta and gamma). These regions diffuse in several cortical and subcortical areas such as right prefrontal and temporal areas (A), central and posterior areas (B), temporal and subcortical areas of the left hemisphere (C), prefrontal, temporal and occipital areas of the right hemisphere (D), and several subcortical areas of both hemispheres (E,F).

Future collaborations

TRANSNATIONAL ACCESS FACTSHEET

SCOPE OF TRANSNATIONAL ACCESS

VITALISE project grants **Free Transnational Access** to applicants from multiple disciplines to the project's Living Lab Research Infrastructures and to their databases. **Transnational Access (TA)** applicants (either individually or in research realms) may apply to conduct research studies in one of the participating Living Lab Infrastructures. Access can be granted in 3 modes: **(i) Fully in-person, (ii) Partially remote, (iii) Fully remote**. During TA, applicants will receive support from the facility's staff to conduct their research project.

JOINT RESEARCH ACTIVITIES

All the Living Labs involved in VITALISE are conducting collaborative research projects that will lead to some joint results. The final goal is to create innovative testbeds for three different research areas in the Health & Wellbeing domain: **(i) Rehabilitation, (ii) Transitional care, (iii) Everyday living environments**. Applicants may apply for TA with a research proposal that addresses one of the 3 JRAs of the project or they may submit an application in a different domain.

WHO CAN PARTICIPATE

People of the following profiles can apply for TA and VA:


- Academia Researchers
- Industrial researchers
- Living Lab practitioners
- Entrepreneurs
- Master's students

Further eligibility criteria can be found in the Application Manual

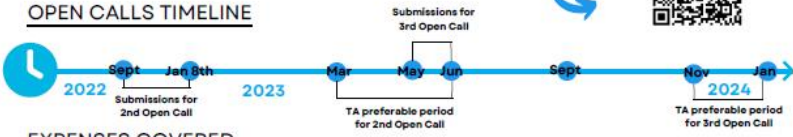
HOW TO PARTICIPATE

An application toolkit is available on the project's website (<https://vitaliseproject.eu/open-calls/>) that allows applicants to submit their proposal for TA and VA.

SCAN HERE FOR MORE



OPEN CALLS TIMELINE




EXPENSES COVERED

The VITALISE project funding covers travel costs and daily subsistence for each day of in-person TA at the selected research facility (no reimbursement is provided during remote TA). The funding covering TA visits has the following limits per person (average flat rate):

- Travel costs: max. 500€
- Housing and subsistence: max. 100 €/day

There could be exceptions to these limits. However, each exception should be discussed with the Research Infrastructure Leader (RIL) after the publication of the application results. No reimbursement is provided for Virtual Access



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Publications related

Rehabilitation Supported by Technology: Protocol for an International Cocreation and User Experience Study.

Bernaerts S, De Witte NAJ, Van der Auwera V, Bonroy B, Muraru L, Bamidis P, Frantzidis C, **Kourtidou-Papadeli C**, Azevedo N, Garatea J, Muñoz I, Almeida R, Losada R, Fung J, Kehayia E, Lamontagne A, de Guise E, Duclos C, Higgins J, Nadeau S, Beaudry L, Konstantinidis E. *JMIR Res Protoc.* 2022 Mar 10;11(3):e34537. doi: 10.2196/34537.

Gravity Threshold and Dose Response Relationships: Health Benefits Using a Short Arm Human Centrifuge.

Kourtidou-Papadeli C, Frantzidis CA, Gilou S, Plomariti CE, Nday CM, Karnaras D, Bakas L, Bamidis PD, Vernikos J. *Front Physiol.* 2021 May 11;12:644661. doi: 10.3389/fphys.2021.644661. eCollection 2021. PMID: 34045973

[Therapeutic Benefits of Short-Arm Human Centrifugation in Multiple Sclerosis-A New Approach.](#)
Kourtidou-Papadeli C, Frantzidis CA, Bakirtzis C, Petridou A, Gilou S, Karkala A, Machairas I, Kantouris N, Nday CM, Dermitzakis EV, Bakas E, Mougios V, Bamidis PD, Vernikos J. *Front Neurol.* 2022 Jan 4;12:746832. doi: 10.3389/fneur.2021.746832. eCollection 2021. PMID: 35058870

CHRYSOULA Kourtidou-Papadeli, Frantzidis, C., Machairas, I., Giantsios, C., Dermitzakis, E., Kantouris, N., Konstantinidis, E., Bamidis, P., & Vernikos, J. (2023). Rehabilitation assisted by Space technology—A SAHC approach in immobilized patients—A case of stroke. *Frontiers in Physiology*, 13. <https://doi.org/10.3389/fphys.2022.1024389>