



CEA-Leti Partnership for the call HORIZON-CL6-2022-COMMUNITIES-02-02-two-stage

Developing nature-based therapy for health and well-being (Research and Innovation Action)

CEA-Leti offers a unique added-value proposal for innovative solutions to **monitor physiological parameters of health and well-being in relation with various pathologies and exposure conditions**. This expertise ranges from the multi-parametric signal acquisition with wearable sensors (either existing or innovative ones) to the signal processing, which may include decision-making using artificial intelligence (closed-loop and coaching approaches).
For the call HORIZON-CL6-2022-COMMUNITIES-02-02-two-stage, **CEA Leti aims at providing quantified indicators measured in patients, citizens, or vulnerable groups to help clinicians understand the causal links between nature exposure and health, and move towards new prescriptions**.
CEA-Leti has the mission to innovate for clinicians and industrial partners, and can bring along relevant partners to enrich the consortium.

SPECIFIC CONTRIBUTION TO THE EXPECTED OUTCOMES

- Stronger evidence base for **the causal relationships between nature and health and well-being** for more effective nature therapy prescriptions

ADDED VALUE-PROPOSAL FOR A PROJECT

- **Provide more evidence of the causal relationships between nature and health and well-being with :**
 - Quantitative indicators for the evaluation of the causal relationships and notion of dose
 - Experience of the monitoring of various parameters related to stress and well-being (e.g. physical activity, heart rate, skin T°, sleep, stress biomarkers) using smart wearable devices
 - Strong expertise in portable electroencephalography (EEG) to monitor brain activity (application to sleep disorders, stress, mental health, mental load) – RELAX is a mobile prototype from CEA Leti
 - Identification of relevant parameters correlated to a specific situation
 - Advanced data analysis / model development based on multi-parametric monitoring (measured parameters and subjective data from patient evaluations)
 - Closed-loop decision making; management of physical activity and/or stress in relation with nature exposure
 - Access to case-studies in specific populations (firefighters, military, patients with mental disorders..)
- **Key technologies :**
 - Signal acquisition: optical/electrical methodologies, various types of sensors (electrochemical / electromechanical / optical / EEG), improved skin/sensor interfaces using innovative biomaterials
 - Adaptation to smartphone use
 - Signal processing: algorithm development, modelling, edge artificial intelligence
 - Standardized microfluidics (lead of ISO WG on Medical devices): from design, chemistry to packaging
 - Cybersecurity of personal data exchanges

RELEVANT BACKGROUND TO ADDRESS THE CALL

- Physiological stress monitoring : <https://www.sciencedirect.com/science/article/pii/S0925400515305827>
- Closed-loop medical devices: <https://eithealth.eu/project/d4kids/>, <https://eithealth.eu/project/d4teens/>
- Brain monitoring and training: <https://www.leti-cea.com/cea-tech/leti/english/Pages/Industrial-Innovation/Demos/relax.aspx>
- BIRTH Project (2021-2022, national funding) in collaboration with Grenoble Hospital : Modeling activity to predict thymic relapses.
- V. Hoareau, C. Godin, F. Dutheil, et M. Trousselard, « The Effect of Stress Management Programs on Physiological and Psychological Components of Stress: The Influence of Baseline Physiological State », *Appl Psychophysiol Biofeedback*, mai 2021, doi: [10.1007/s10484-021-09508-0](https://doi.org/10.1007/s10484-021-09508-0).

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