

The Cyprus Institute of Neurology & Genetics (CING) | Bioinformatics Department

Research context: Spaceflight Biology, Space Medicine and Spaceflight Health Analytics

The [Bioinformatics Department](#) at [The Cyprus Institute of Neurology & Genetics \(CING\)](#) has an active research line in **Spaceflight Biology, Space Medicine and Spaceflight Health Analytics**, developed also through the participation in the nationally funded **Cyprus Space Research and Innovation Centre (C-SpaRC)**. The group's work focuses on the computational investigation of the molecular and health effects of spaceflight and altered gravity, with particular emphasis on integrative omics and systems bioinformatics.

Overall, our aim is to transform complex spaceflight molecular data into interpretable biological knowledge relevant to astronaut health, precision medicine and future long-duration human exploration.

Core expertise:

- Integration and analysis of spaceflight transcriptomic, proteomic and other omics datasets;
- Investigation of molecular responses to microgravity and altered-gravity conditions at gene, protein and pathway levels;
- Identification and interpretation of dysregulated biological pathways and molecular signatures associated with spaceflight;
- Analysis of spaceflight and postflight molecular plasticity in relation to human health, including cardiovascular mechanisms;
- Systems and network bioinformatics, pathway and disease/phenotype association analysis, and biological knowledge-graph approaches;
- Computational identification and prioritisation of candidate countermeasures, including drug-repurposing strategies;
- Development of reusable resources for space-health research, exemplified by H-SPAR DB, our integrative omics database and analytical platform for human spaceflight health;
- Application of AI/ML and advanced computational analytics to integrate heterogeneous biomedical and spaceflight-related datasets.

Collaboration interests:

We welcome opportunities to join established or emerging research consortia under **Horizon Europe, EIC Pathfinder and other relevant European research programmes**.

We are particularly interested in collaborations that connect **space-environment exposures** - including microgravity, altered gravity and radiation-related stressors - **with molecular responses, disease-relevant mechanisms and potential countermeasures**.

Potential contribution to consortia:

Scientific co-development of collaborative proposals and leadership of relevant work packages in spaceflight omics, bioinformatics, systems biology, AI-enabled analytics and human-health interpretation.

Indicative recent publications in Spaceflight Health Analytics:

1. **H-SPAR DB: human spaceflight platform for analysis and research—an integrative omics database for space health.**
Tomazou M, Bourdakou MM, Nicolaidou E, Georgiou G, Savva K, Athieniti E, Menelaou S, Afxenti S, Spyrou GM.
Database (Oxford). 2026;2026:baaf083. doi: 10.1093/database/baaf083. PMID: 41537191.
2. **Plasticity of Gene Expression in Spaceflight and Postflight in Relation to Cardiovascular Disease: Mechanisms and Candidate Repurposed Drugs.**
Bourdakou MM, Loizidou EM, Spyrou GM.
Proteomics. 2025;25(11-12):e202400241. doi: 10.1002/pmic.202400241. PMID: 40223711.
3. **Exploring the Impact of Microgravity on Gene Expression: Dysregulated Pathways and Candidate Repurposed Drugs.**
Galčenko K, Bourdakou MM, Spyrou GM.
International Journal of Molecular Sciences. 2025;26(3):1287. doi: 10.3390/ijms26031287. PMID: 39941055.

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