IHI Call Days | Call 12

Next-Generation Human Niches-on-Chip for Understanding Disease Determinants and Therapeutic Response

Contact person name: Mariam Bayoumi

Organisation: KUL University-Belgium

E-mail:Mariam.bayoumi84@outlook.com

Link to the IHI brokerage platform:

- Proposal sharing tool

Challenges and objectives

What problem(s) are we trying to solve

•Lack of predictive, human-relevant models to study disease determinants.

•Poor translation of preclinical data → high drug attrition and R&D costs.

•Fragmented tools unable to integrate genetic, environmental, and lifestyle factors.

🎯 **Which IHI specific objective(s) we address**

•*"Contribute towards a better understanding of the determinants of health and priority disease areas."*

•Support systems-level modeling of human health and disease.

•Advance cross-sector innovation for reliable, ethical preclinical solutions.

❤️‍🩹 **Which unmet public health need we address**

•Reliable, human-based models for early disease prediction and therapy testing.

•Reduction of animal experimentation through validated organ-on-chip systems.

•Faster, safer, and more cost-effective drug discovery benefiting patients across multiple disease areas.

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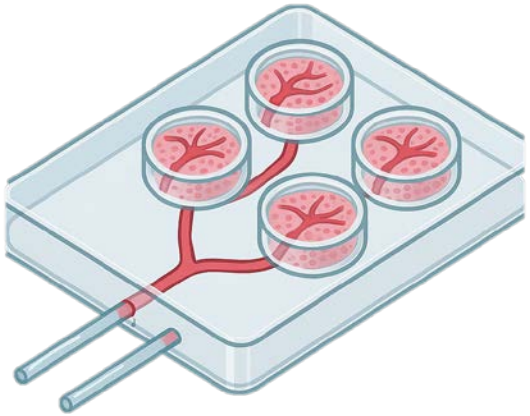
Your approach to solve the problem

MIMIC-CHIP will develop advanced **human tissue niche-on-chip models** that capture the cellular and molecular complexity of human diseases. These micro engineered platforms will enable real-time investigation of how intrinsic (genetic) and extrinsic (environmental, metabolic) determinants shape disease trajectories and drug responses. Combining **biofabrication, microfluidics, and AI-based data analytics**

MIMIC-CHIP will deliver new mechanistic insights into disease determinants and offer a scalable tool for precision drug testing.
Through strong cross-sector collaboration between academia, industry, and regulators, the project will define **standardized methodologies** for model validation and data interoperability, fostering regulatory acceptance of disease-on-chip platforms in preclinical workflows.



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Is your project suitable for IHI?

- Essential for translation – bridges fundamental academic discovery with industrial scale-up and regulatory readiness.
- Combines complementary expertise: Academia → biology, microengineering, mechanistic modelling.
- Industry → manufacturing, standardization, quality control, and market alignment.
- Enables early regulatory dialogue and valorization strategy for clinical and industrial adoption.
- Builds a sustainable European ecosystem for validated organ-on-chip technologies

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Outcomes and Impact

- Validated multi-organ “niches-on-chip” platform with integrated biosensing and AI-driven analytics.
- Mechanistic insights into determinants of health and disease across cancer, neurodegeneration, and metabolic disorders.
- Reduction in animal testing through predictive, human-relevant models.
- Accelerated drug discovery and toxicity screening, lowering R&D costs and failure rates.
- Translation to the Healthcare Ecosystem Co-development with industrial and clinical partners ensures early adoption and scalability.
- Standardized protocols for validation and interoperability support regulatory qualification (EMA, FDA).
- Establishment of data pipelines and digital twins enabling integration into pharmaceutical R&D and hospital innovation units.
- IP protection and spin-off creation ensure long-term sustainability and exploitation.

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Expertise and resources

- We have:
- Academic and clinical excellence in microfluidics, vascular biology, and tissue engineering.State-of-the-art infrastructure for chip design, soft lithography, biofabrication, and live imaging.
- We are looking for: Pharma and biotech partners for drug validation, screening, and mechanism-of-action testing.Medical device manufacturers for scalable chip production and automation.AI/data analytics experts for multi-omics integration and predictive disease modeling.Diagnostic and imaging companies for real-time sensing and high-content analysis.

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