

sanofi

#01 Validation of Materials and Hydrogels for Pharmaceutical MPS Applications



EXPECTED DELIVERABLE

Indicative duration: 6 - 9 months

The primary objective of this project is to establish a standardized and decision-oriented framework for selecting the optimal thermoplastic material and hydrogel matrix required to build microfluidic organ-chips to be used in pharmaceutical industry and more specifically BBB and lymphoid-organ models. A central expectation is that the applicant will perform a systematic benchmarking of both microfluidic plastics and extracellular matrices, comparing their physicochemical, biological, and operational performances. This benchmarking will lead to a decision-tree which ultimately can be used by the scientific teams to choose the appropriate model they may need. In addition, this benchmarking phase will lead to a final recommended material-matrix composition that fulfils the biological and pharmacological constraints of both BBB and Lymphoid models.

Thermoplastics in MPS will be biocompatible, xeno-free, and exhibit low adsorption to maintain stable drug and nutrient concentrations. They also need high reproducibility, optical transparency, and appropriate surface properties for reliable microfluidic flow. Importantly, the material will support adequate oxygen availability, either through controlled gas permeability or microfluidic delivery, to sustain proper cell respiration in 3D cultures. Hydrogels will be xeno-free, biomimetic, and biocompatible, offering a 3D matrix that supports cell organization and signaling. Their mechanical properties, crosslinking behavior, and batch consistency are essential. They will also allow efficient oxygen and nutrient diffusion, ensuring that co-cultured tissues maintain physiological respiration within the MPS microenvironment.



LONG-TERM COLLABORATION POTENTIAL

Subject to scientific and strategic alignment

The primary focus is the technical validation of the microfluidic architecture and its constitutive materials. The project is designed as a foundational step toward a sustainable, long-term collaboration. Our ultimate objective is to extend this partnership into a second phase focused on the biological functionalization of the validated platform. This would involve the integration of complex biological components, such as:

- iPSC-derived endothelial cells, pericytes, and astrocytes, to transition from a structural prototype to a fully operational, high-fidelity human BBB model
- Features of a lymphoid Organ with follicle-like clusters, including a perfusion compartment with nutrients and antigens and a tissue-like department with isolated B/T cells or PBMCs in ECM. Readouts are evaluated through flow cytometry, microscopy, cytokines and Abs measurements.

By establishing robust engineering standards now, we aim to create a reliable baseline for future collaborative research dedicated to advanced barrier physiology and pharmacological screening.



CANDIDATE SELECTION

Initial eligibility check by MPR. Selection by the challenge provider based on fit, relevance, readiness, innovation potential.



Completion of EDUCATE

Core Module



Company status

SME under EU criteria



Maximum number of supported companies

10



Minimum required TRL

3 (Experimental Proof of Concept)



Number of employees

> 5

Additional selection criteria

- The 9-month project aims to transition the technology to TRL 4
- Material Characterization: Formal validation of non-adsorptive properties and optical clarity of the chosen thermoplastics.
- Structural Integration: Successful embedding of hydrogels within the non-PDMS channels without structural failure or shrinkage.



Geographic area

SME from across EU are welcome. SMEs from Interreg NEW are prioritized, particularly partner regions



APPLICATION

Application directly via the STEP4NAMs Moodle platform



<https://step4nams.moodlecloud.com/>



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SUPPORT



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