

Les organes-sur-puces : des modèles pertinents pour mimer l'anatomie humaine

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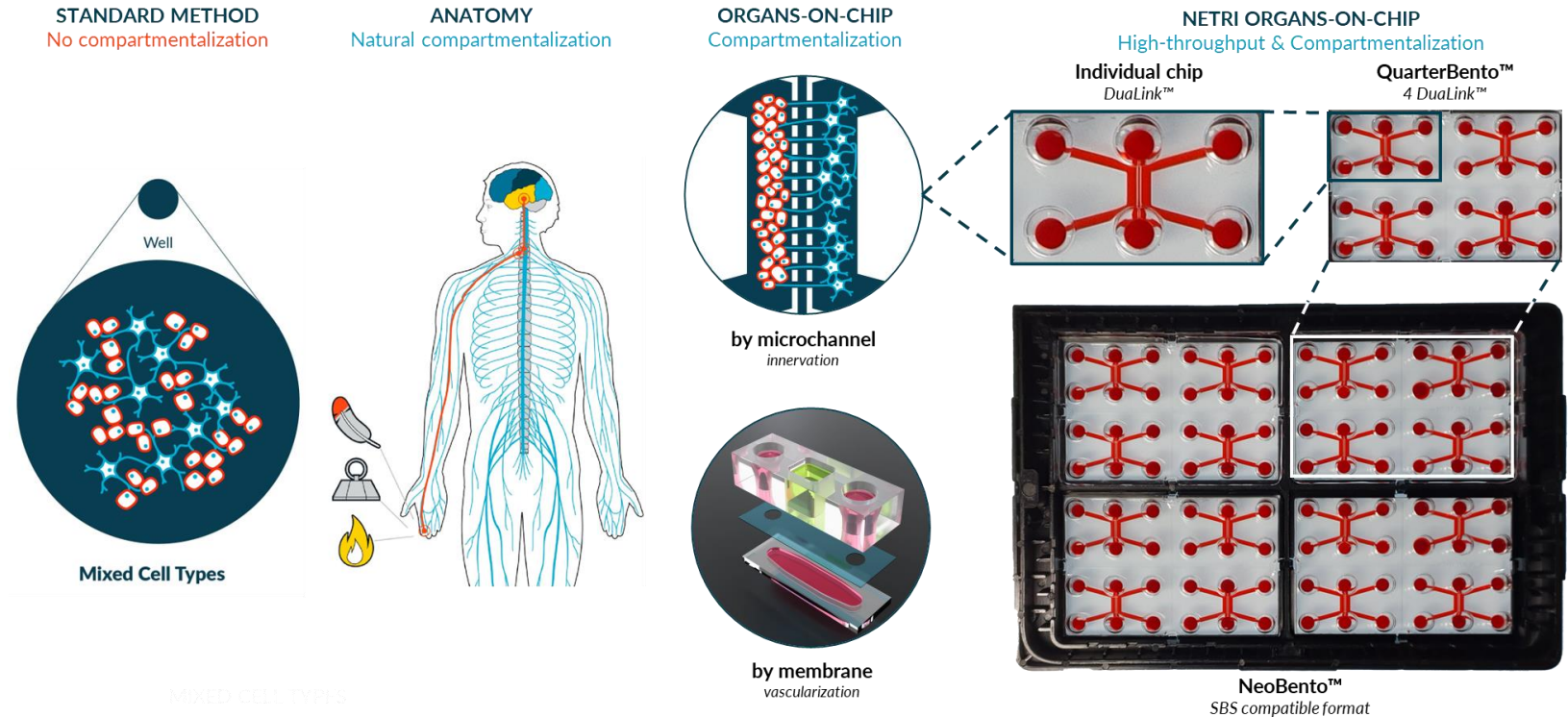
NETRI



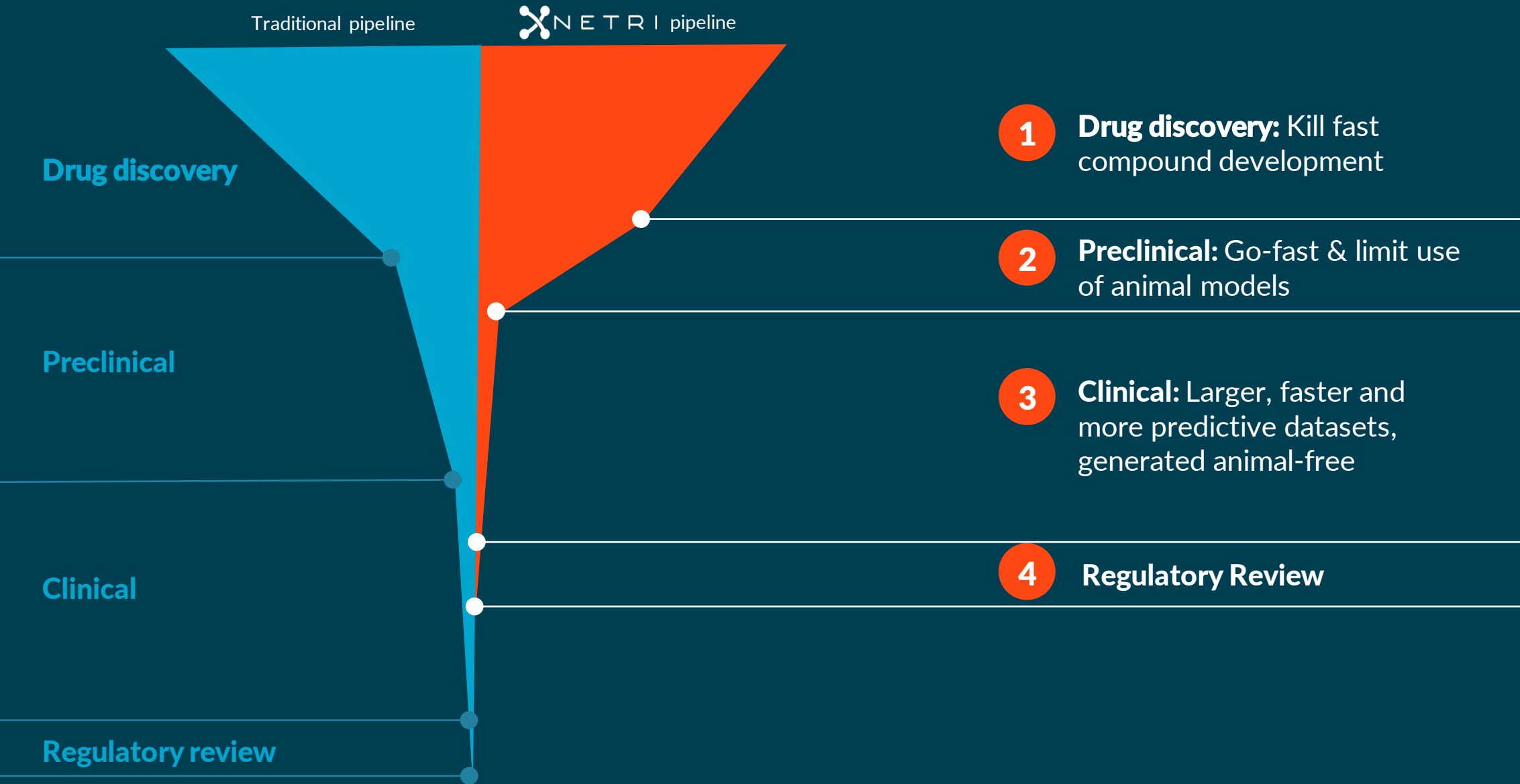
Les Organes-sur-Puces...
Qu'est-ce que c'est ?

Qu'est-ce que sont les Organes-sur-Puces ?

- Modèles microfluidiques *in-vitro* reproduisant finement l'anatomie humaine
- Peuplées par un ou plusieurs types cellulaires (primaires, dérivées d'iPSC)
- Architectures modulaires et adaptatives en fonction du type cellulaire utilisé et des readouts souhaités



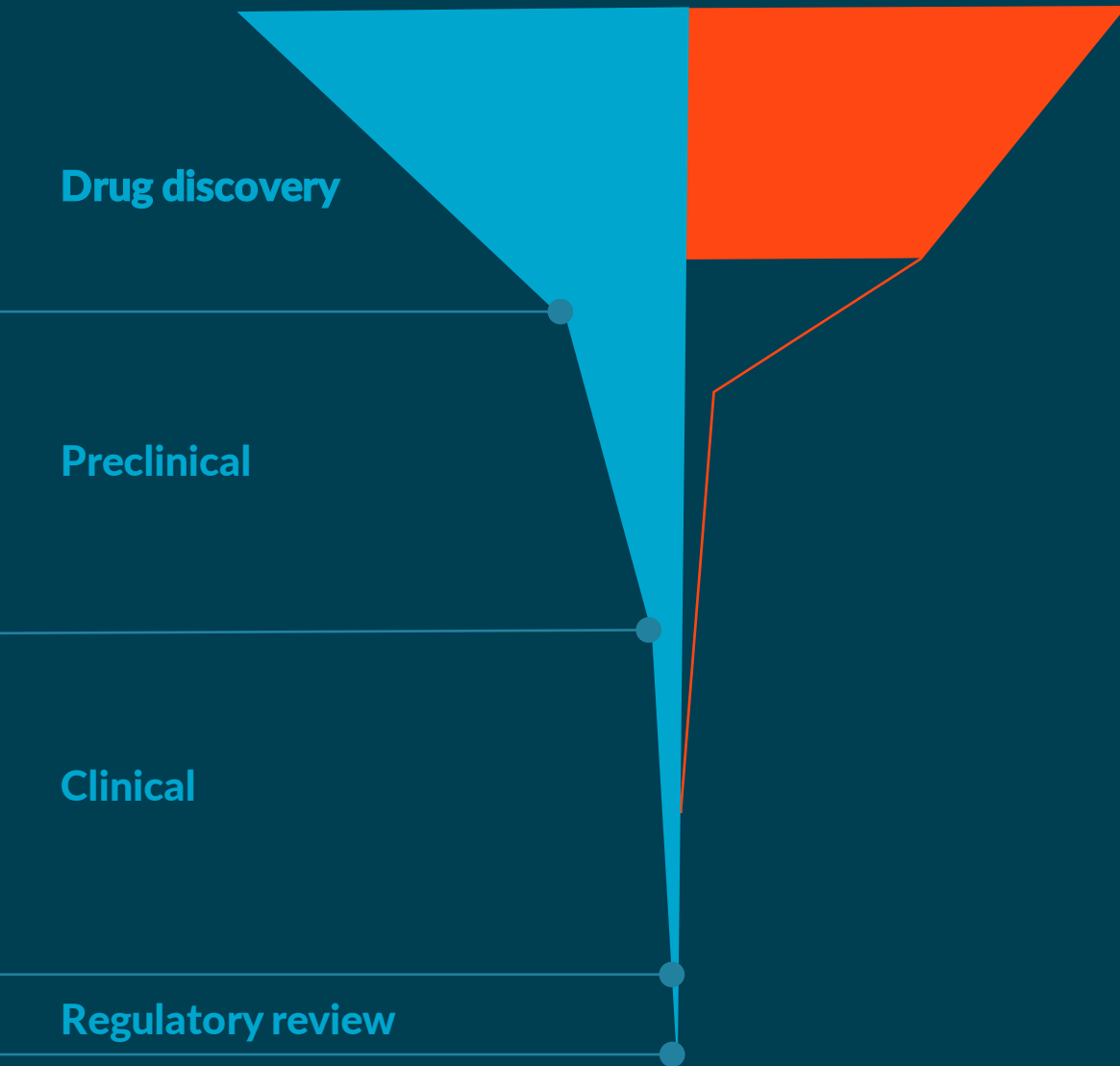
Better & Earlier decisions with OoC



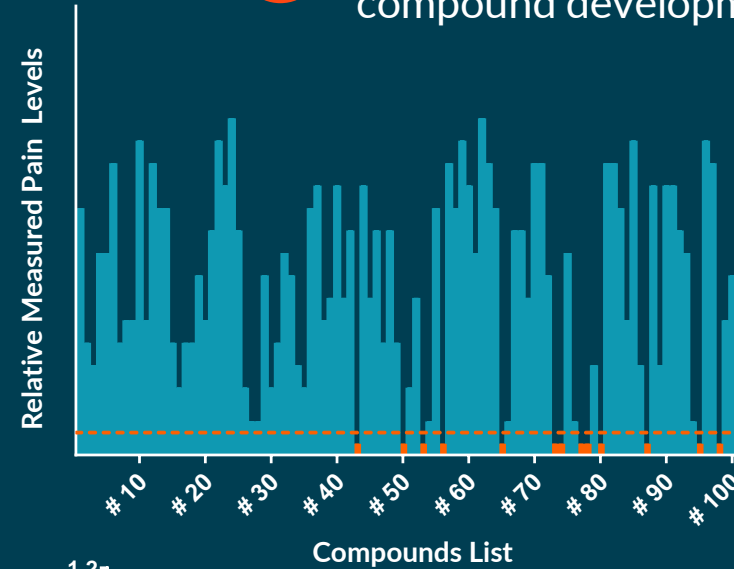
Better & Earlier decisions with OoC

Traditional pipeline

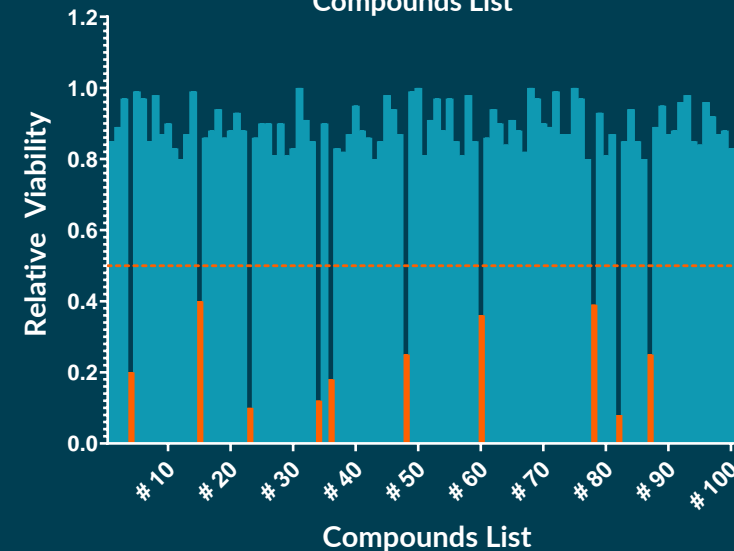
NETRI pipeline



1 Drug discovery: Kill fast compound development

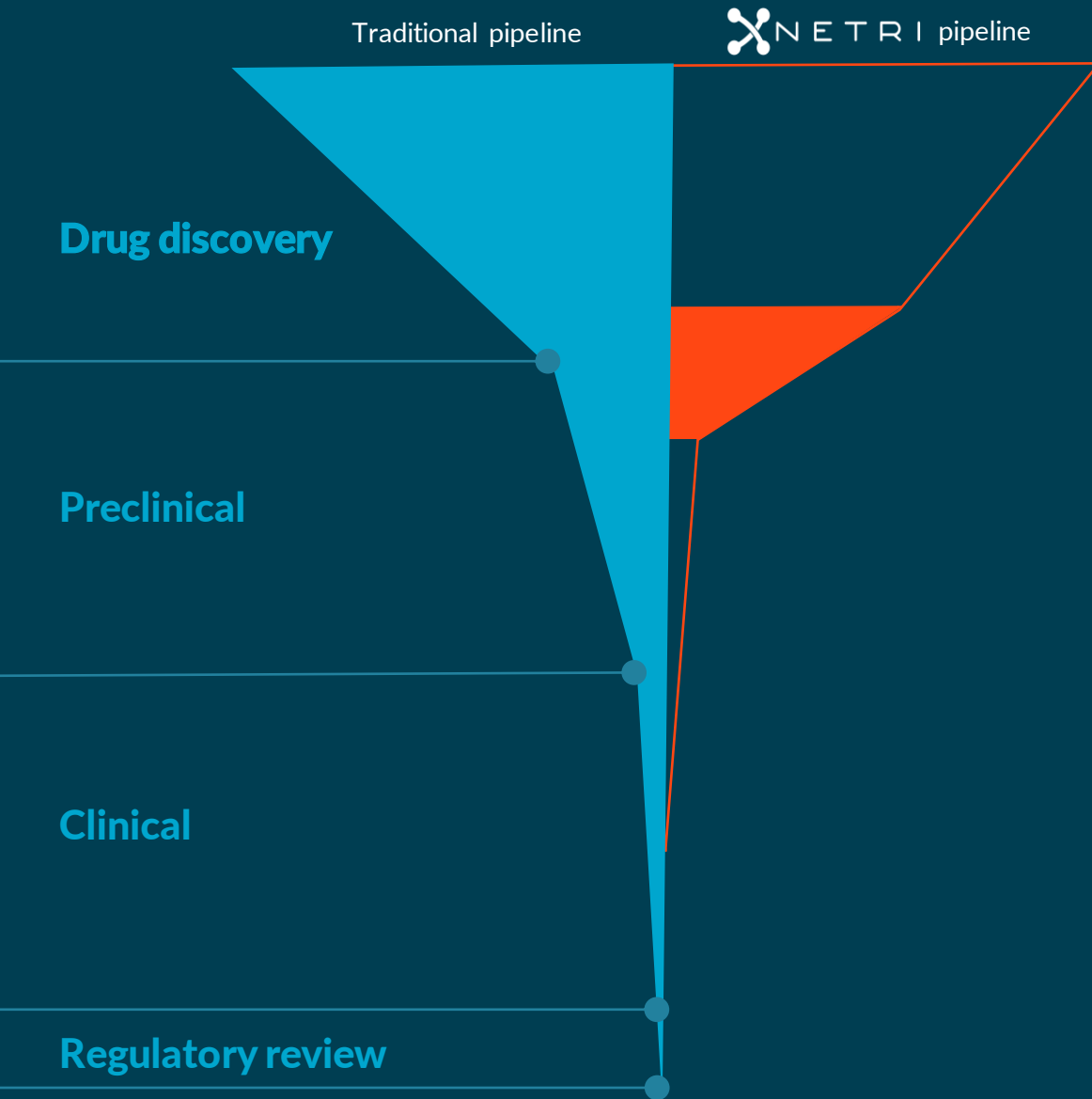


Early safety screen:
« 87/100 tested compounds induce pain
-> **Kill fast**, keep the remaining 13 »

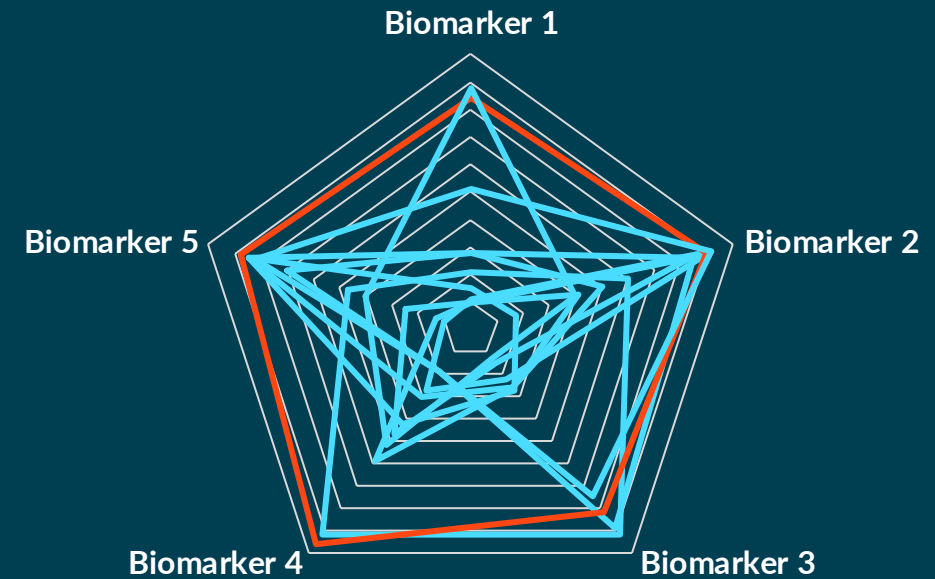


Early efficacy screen:
« 90/100 tested compounds do not kill cancer cells efficiently
-> **Kill fast**, keep the remaining 10 »

Better & Earlier decisions with OoC

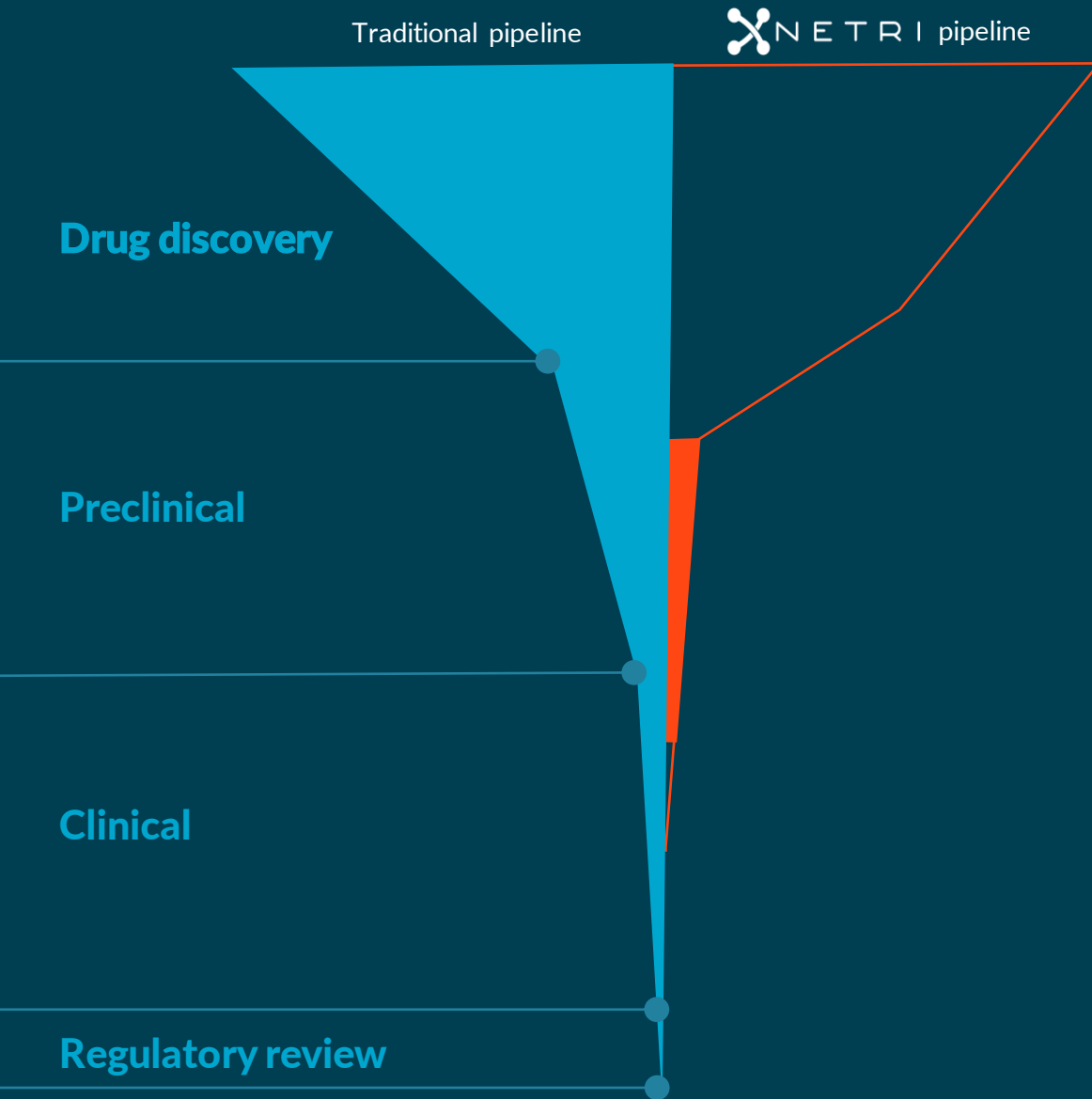


2 **Preclinical:** Go-fast & overcome limitations of animal models

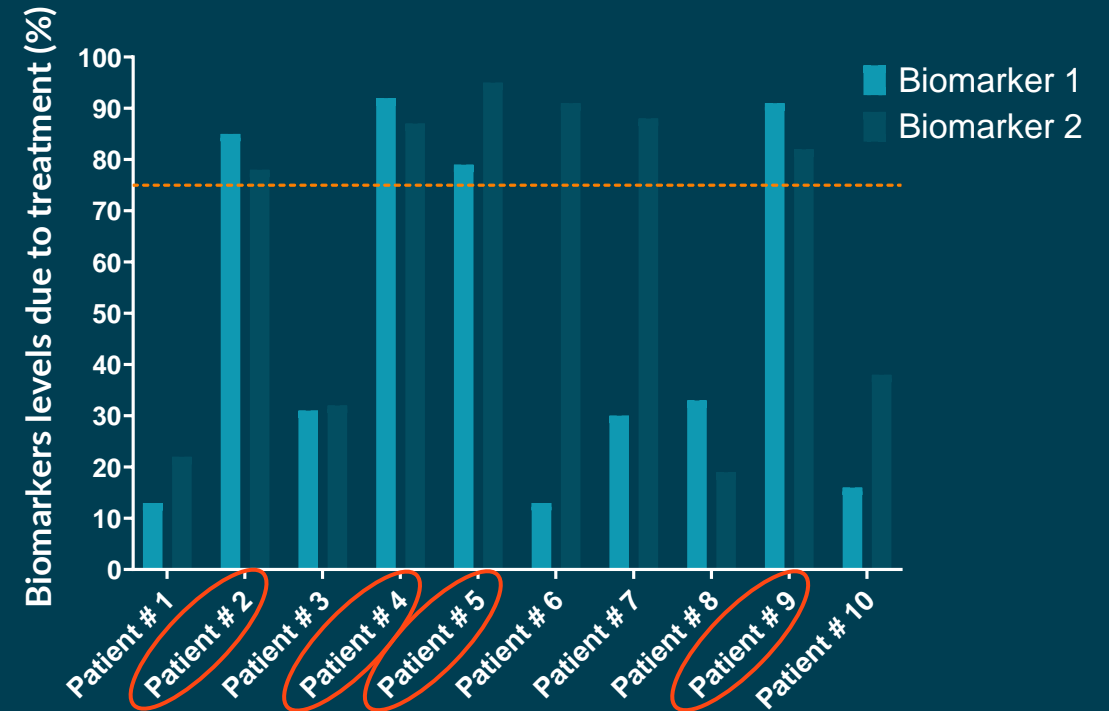


« Only 1/10 tested formulations induced acceptable levels of all human relevant biomarkers -> Move to clinical stage with this one »

Better & Earlier decisions with OoC



3 Clinical: Larger, faster and more predictive datasets, generated animal-free



Assessment of biomarkers of interest's response in patients derived OoC after compound addition to the media

"Only patients #2, 4, 5 and 9 are responsive -> include them in the clinical trial"



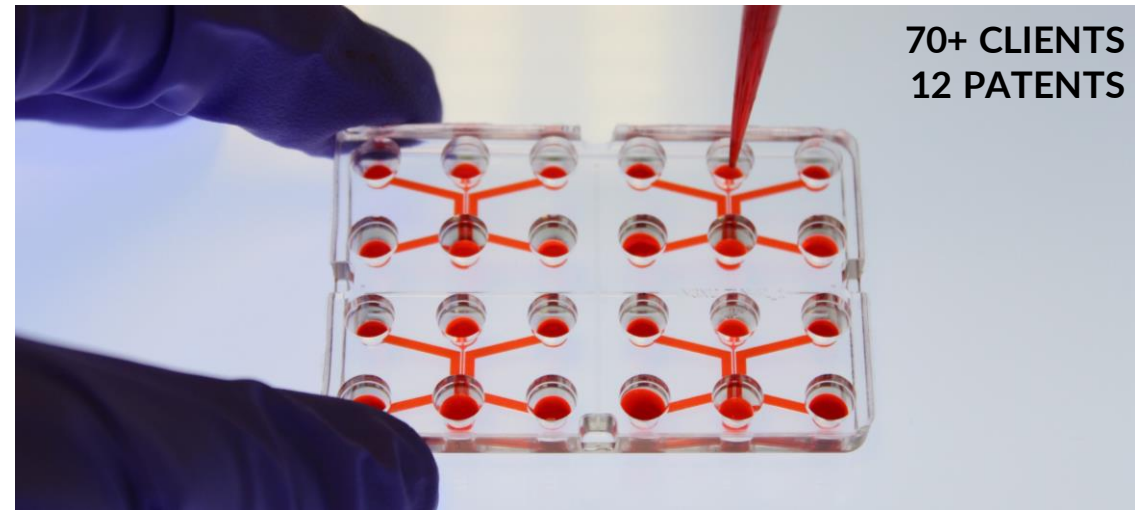
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DIGITIZING HUMAN BIOLOGY | 2018 FOUNDED | LYON, FRANCE

200 M² OF PRODUCTION FACILITIES



70+ CLIENTS
12 PATENTS

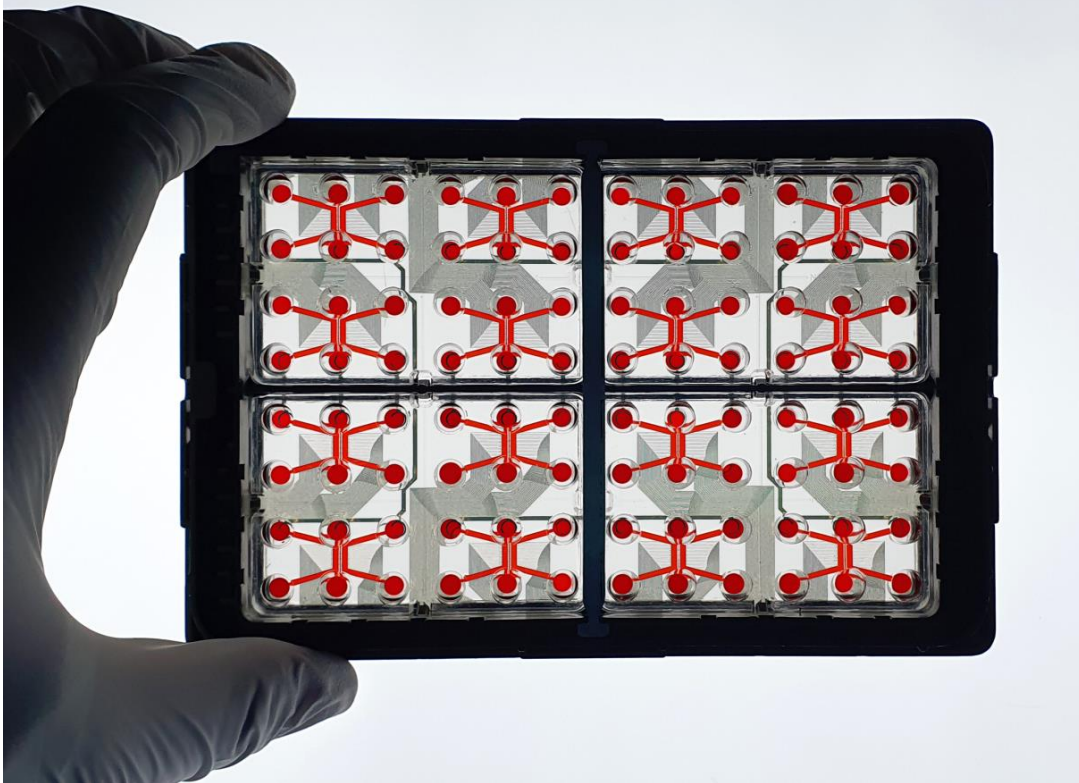


34 PEOPLE, 14 PhDs
MULTIDISCIPLINARY TEAM

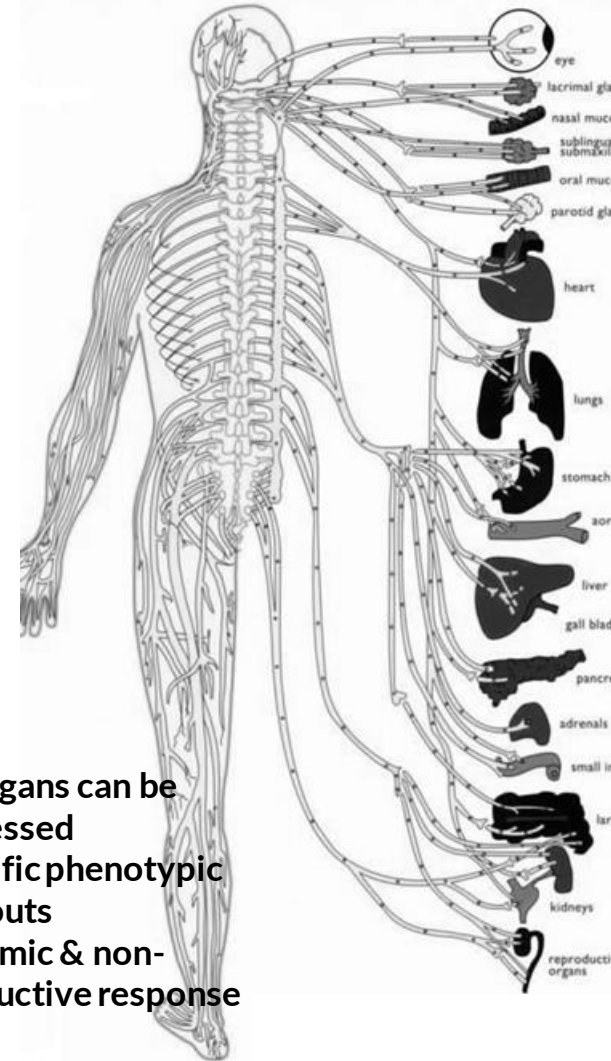


1 HIGH-THROUGHPUT & INTEROPERABLE SOLUTIONS

- Compartmentalization
- Pumpless and standalone devices
- Compatible with lab equipments



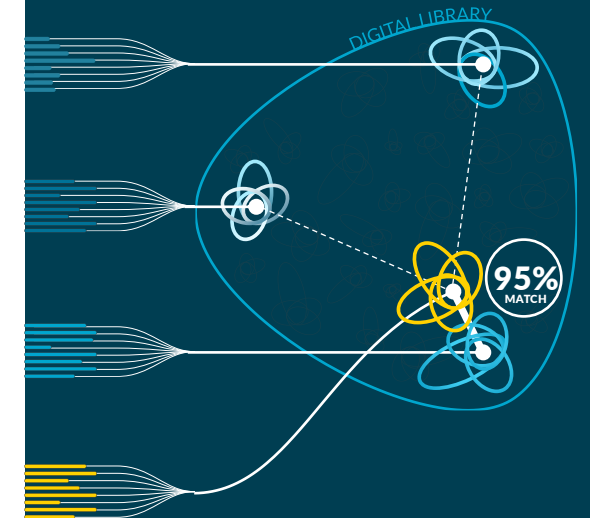
2 NEURONS AS BIO-DIGITAL SENSORS

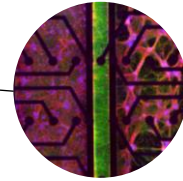
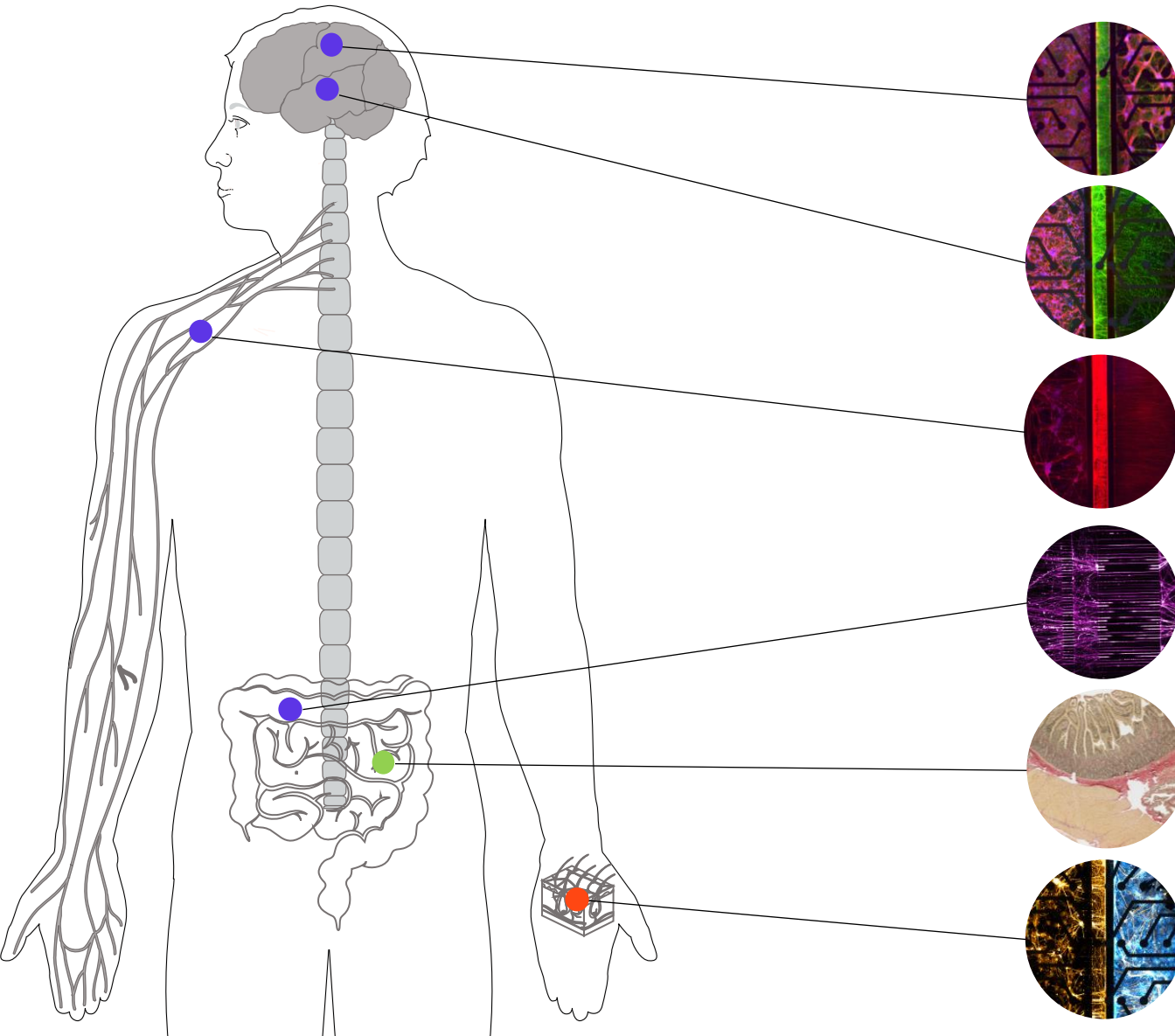


- All organs can be addressed
- Specific phenotypic readouts
- Dynamic & non-destructive response

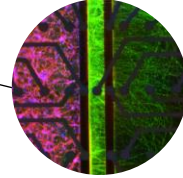
3 DIGITAL LIBRARY

- Predictive model
- Efficacy & toxicity
- Relative to reference compound

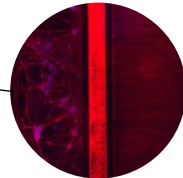




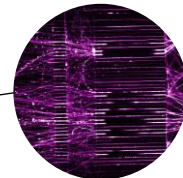
NEUROLOGICAL DISORDERS



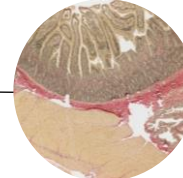
ONCOLOGY



PNS DISORDERS

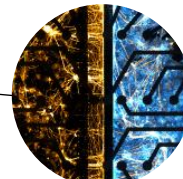


IMMUNOLOGY



GUT

<https://histologie.univ-nantes.fr/lintestin-grele/>



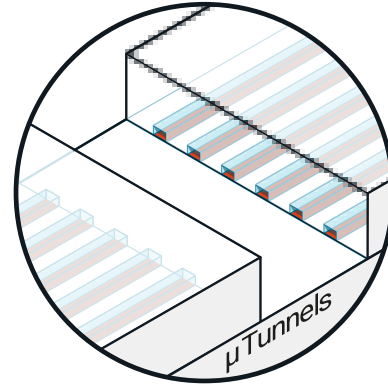
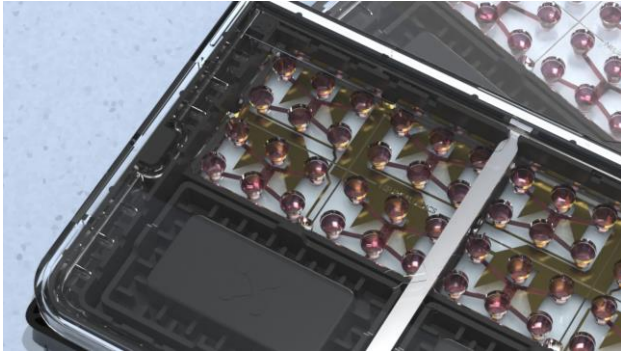
NEUROCOSMETICS



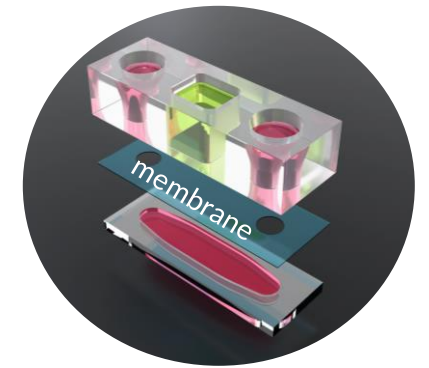
Multiple connection
between organs possible

La compartimentalisation...

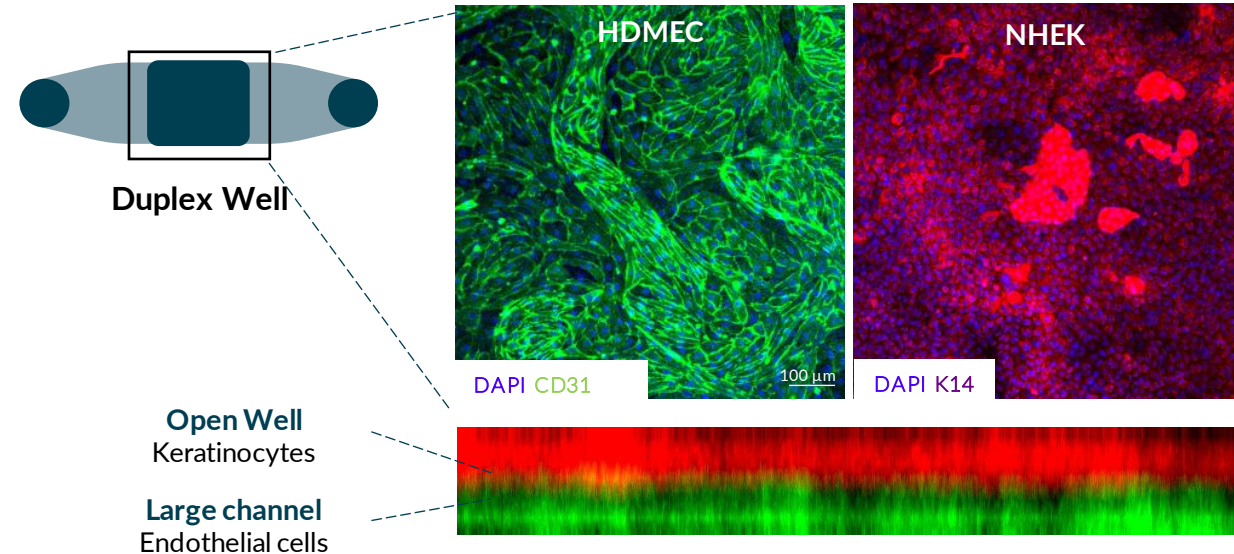
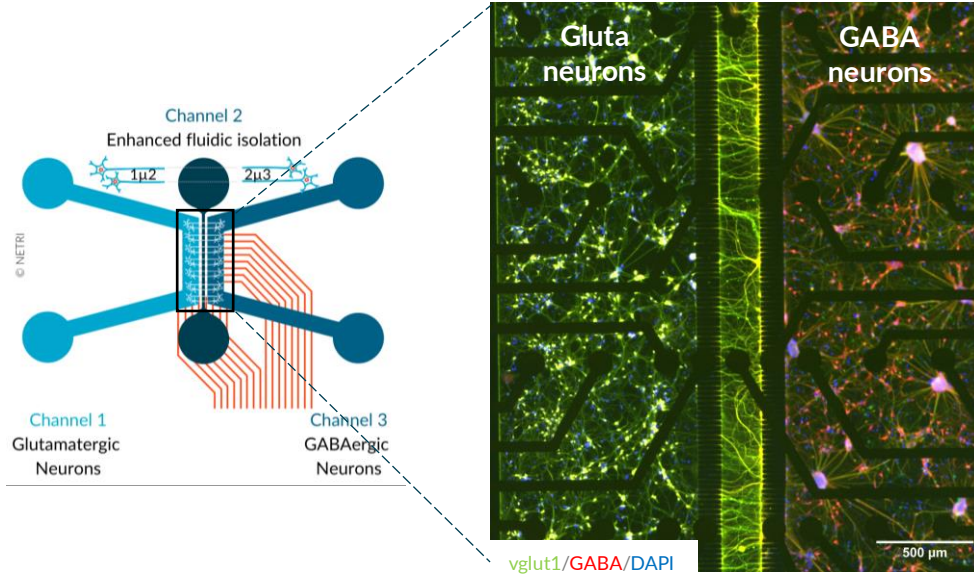
PAR MICROCANAUX



PAR MEMBRANE

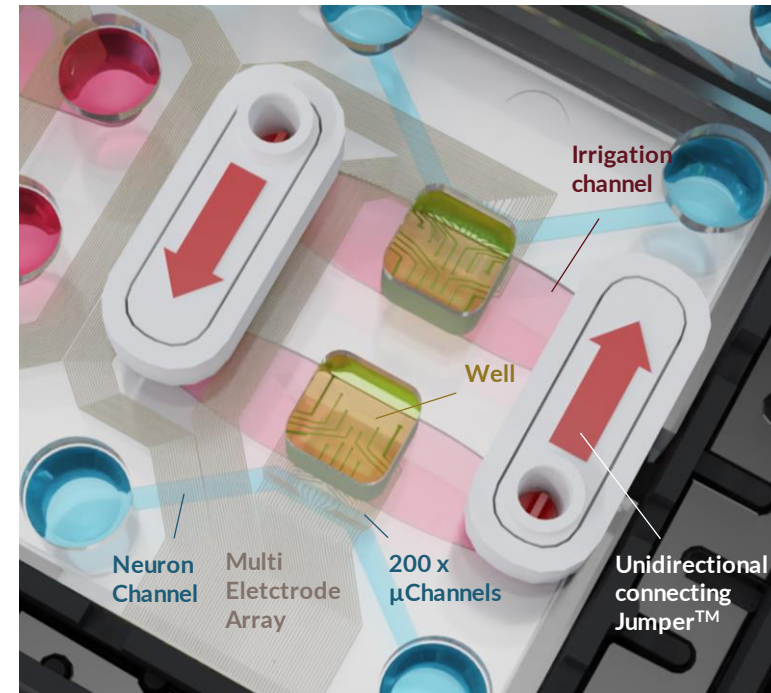
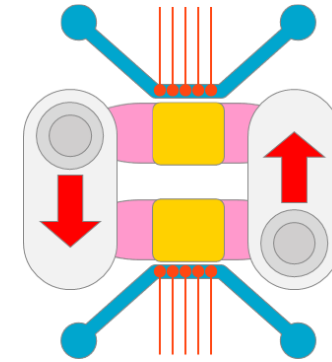
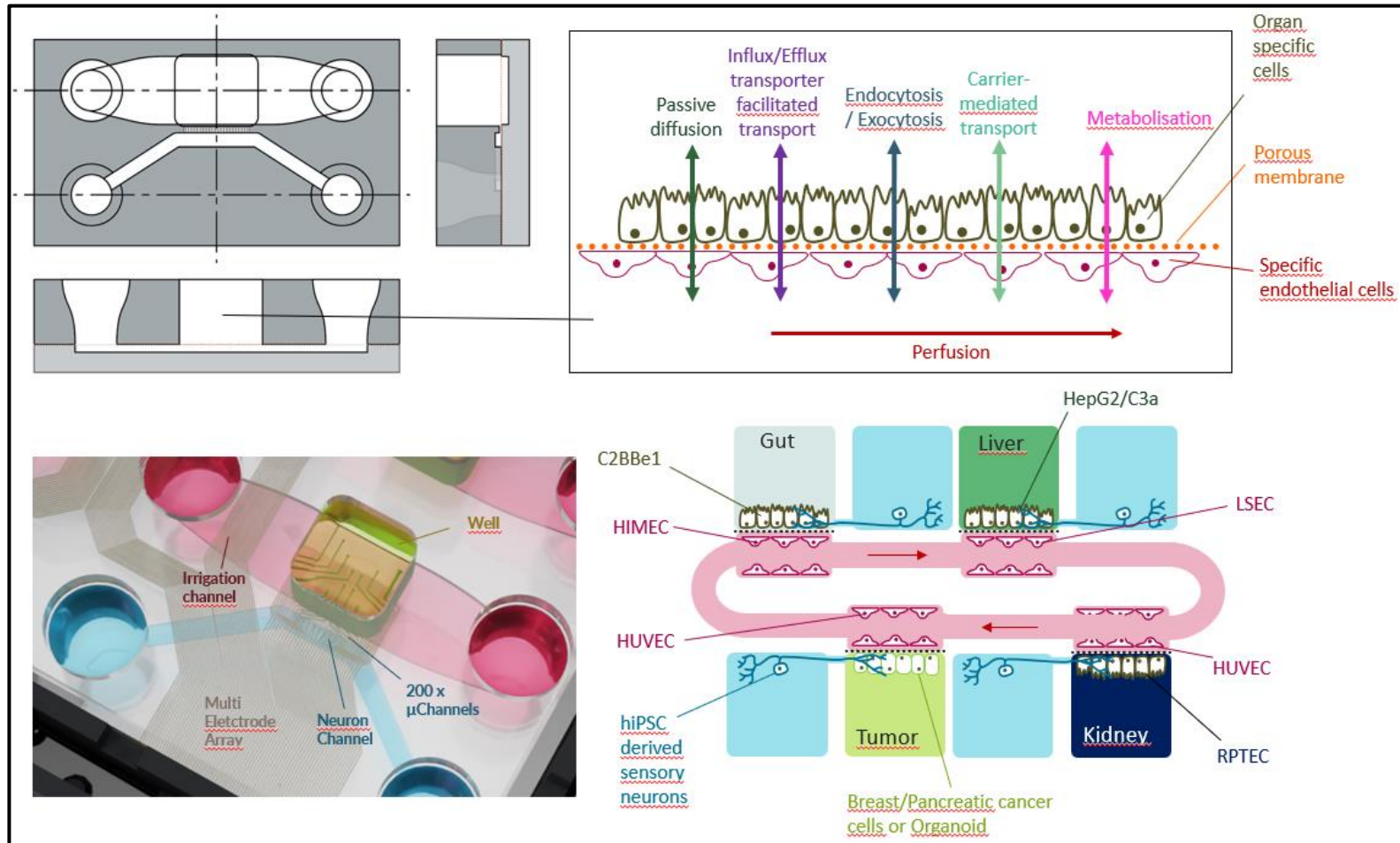


21 Days *in vitro*



En route vers le multi-organe

Grace à la compartimentalisation, la perfusion et l'innervation

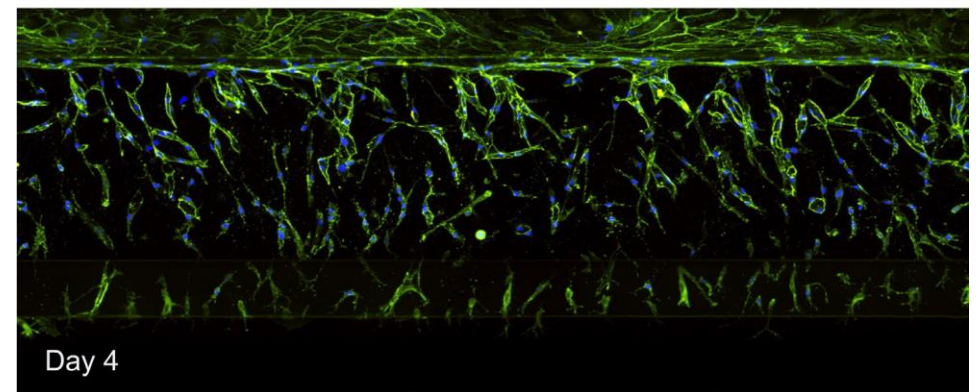
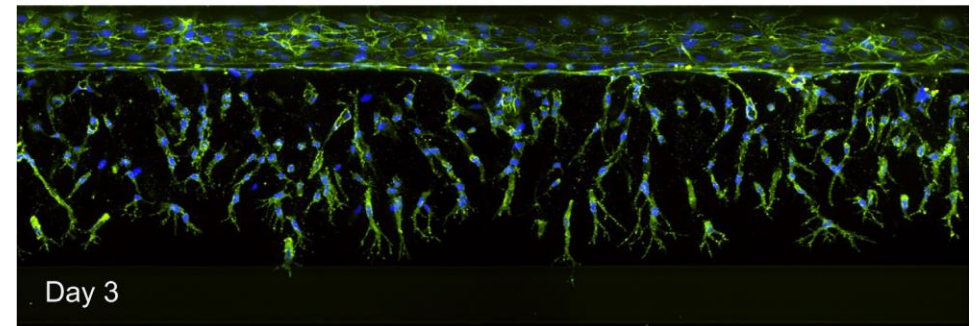
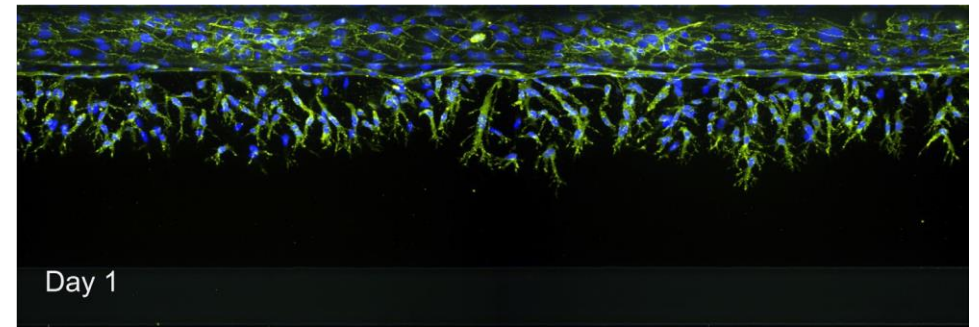
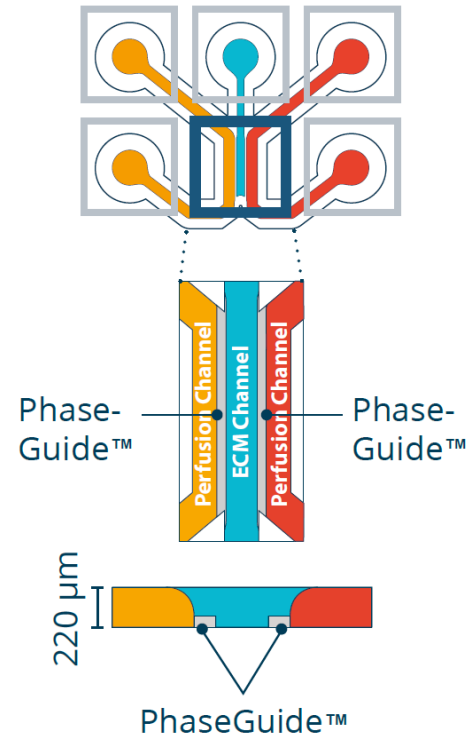
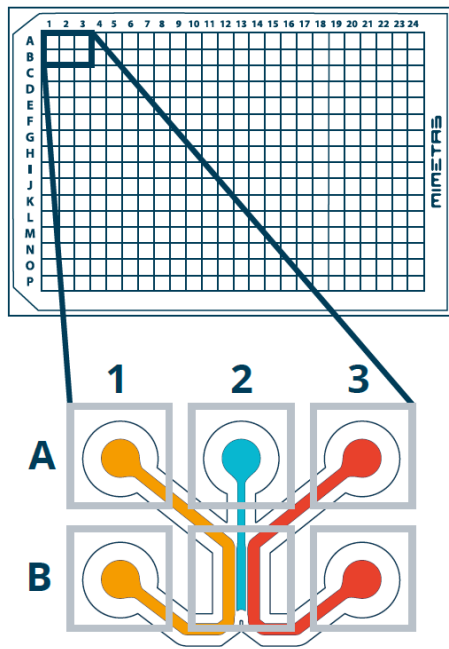




Les Organes-sur-Puces...

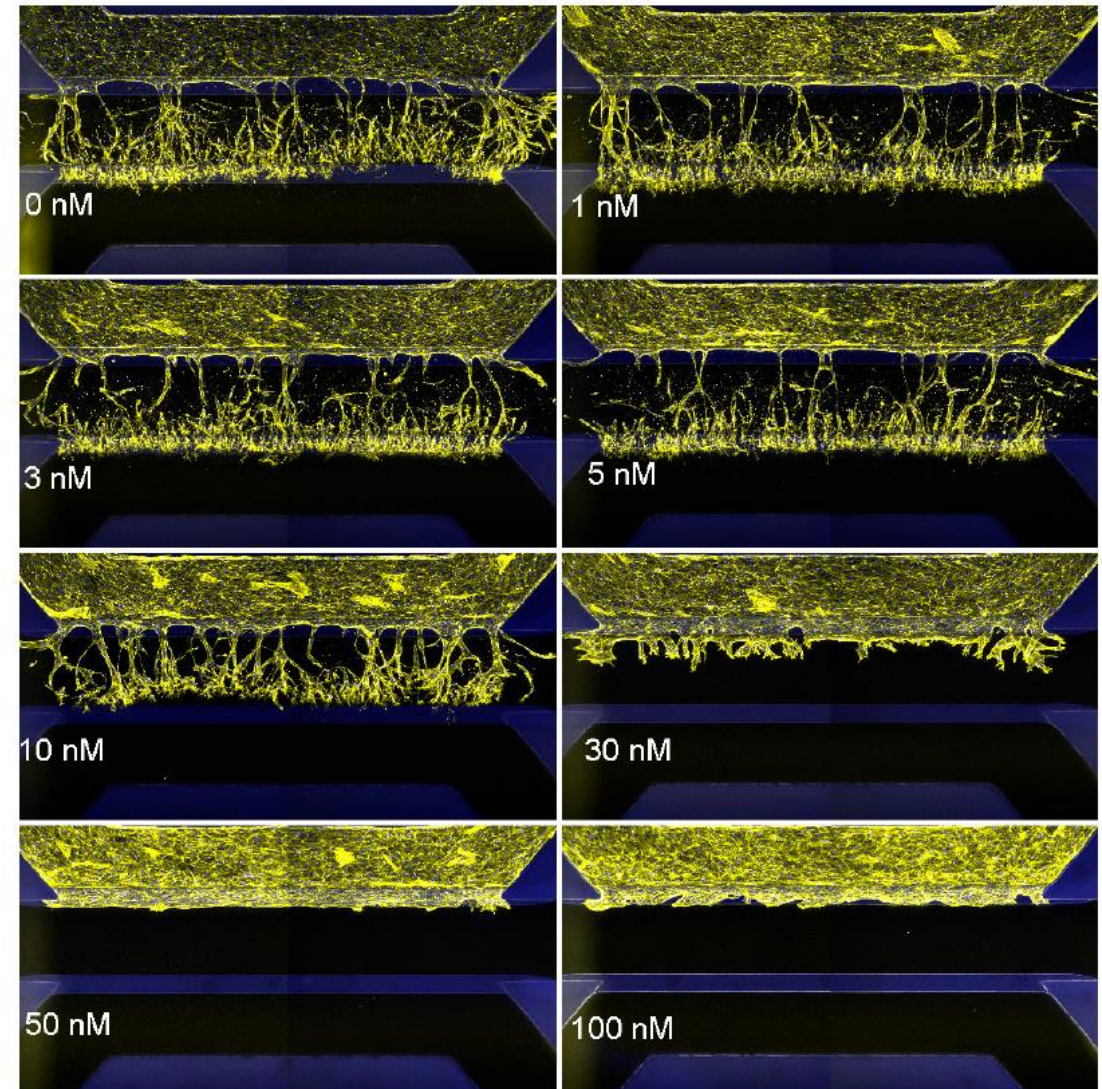
Et l'angiogénèse ?

Chip layout

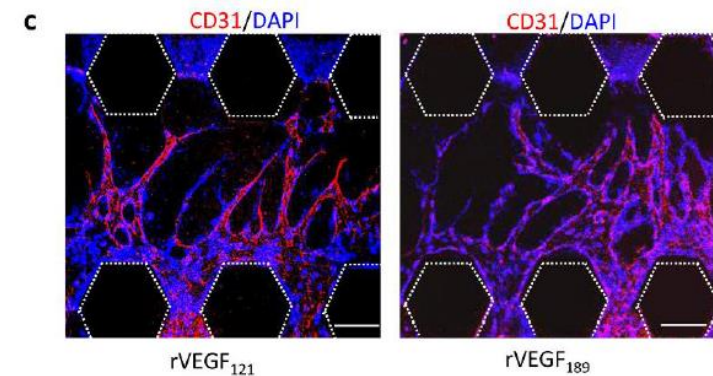
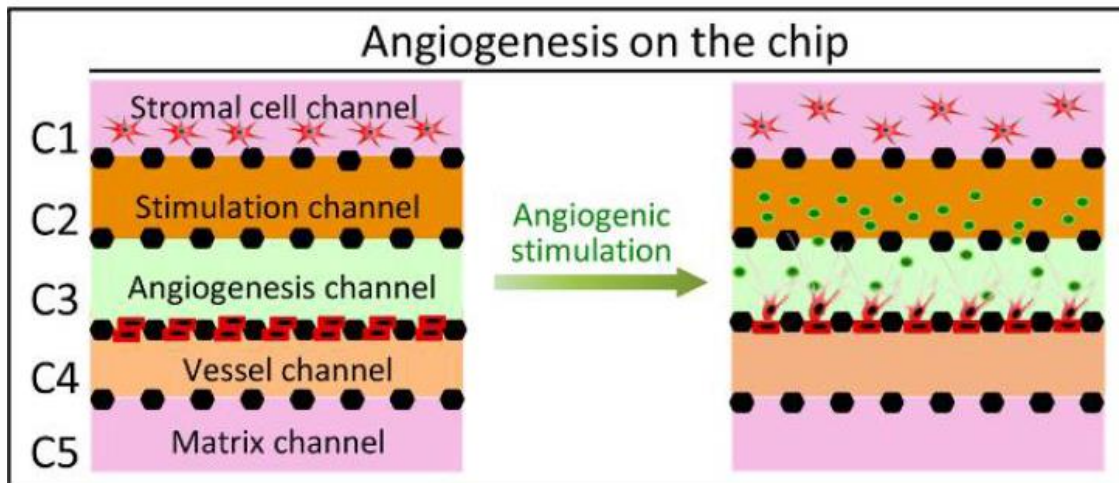
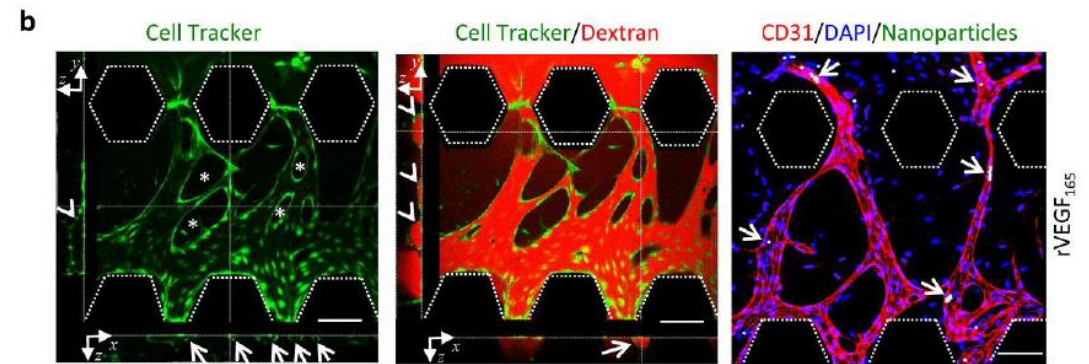
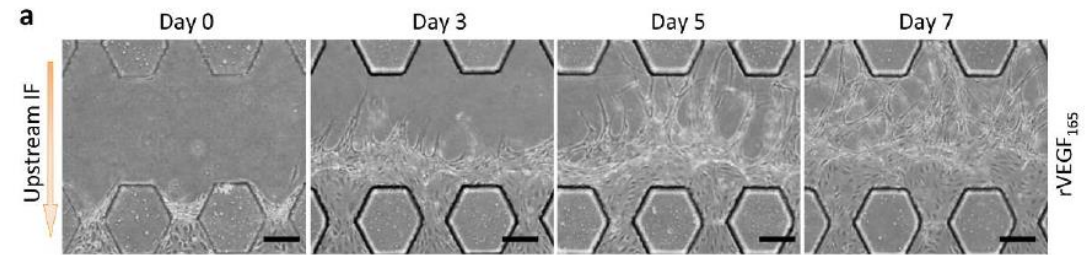
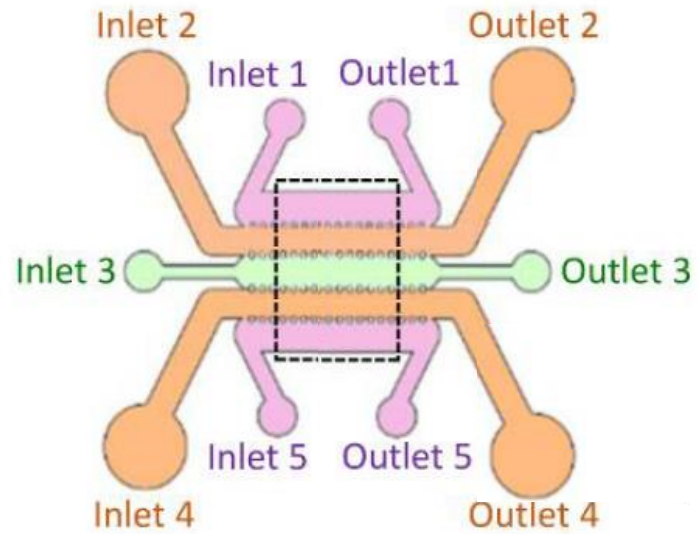


Cellules endothéliales dans un hydrogel de Collagène I

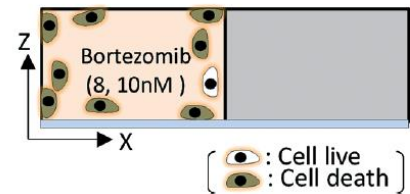
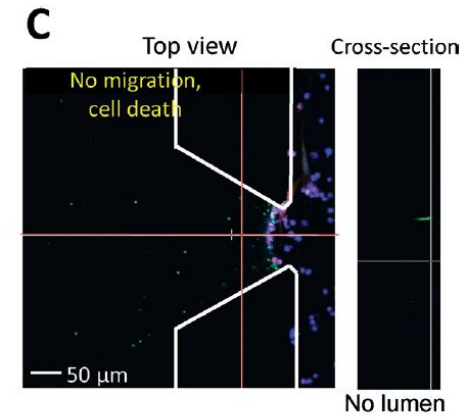
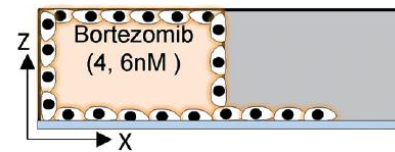
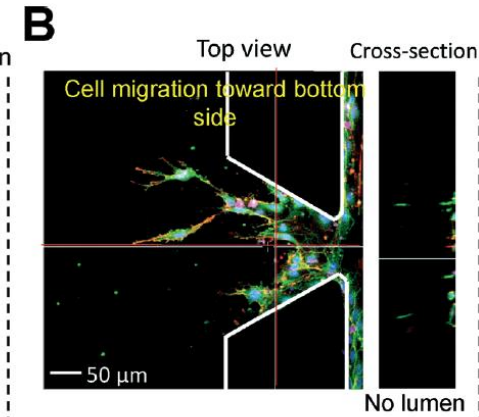
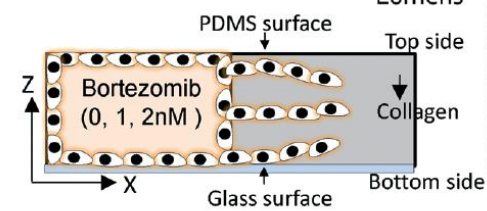
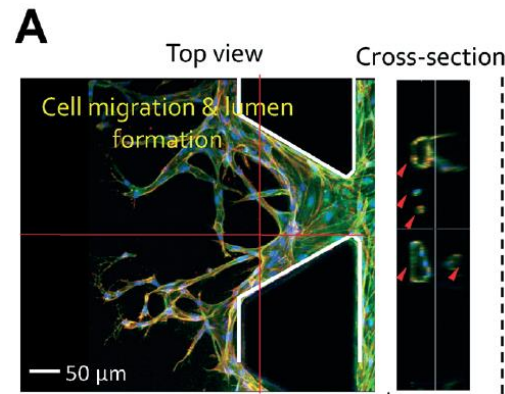
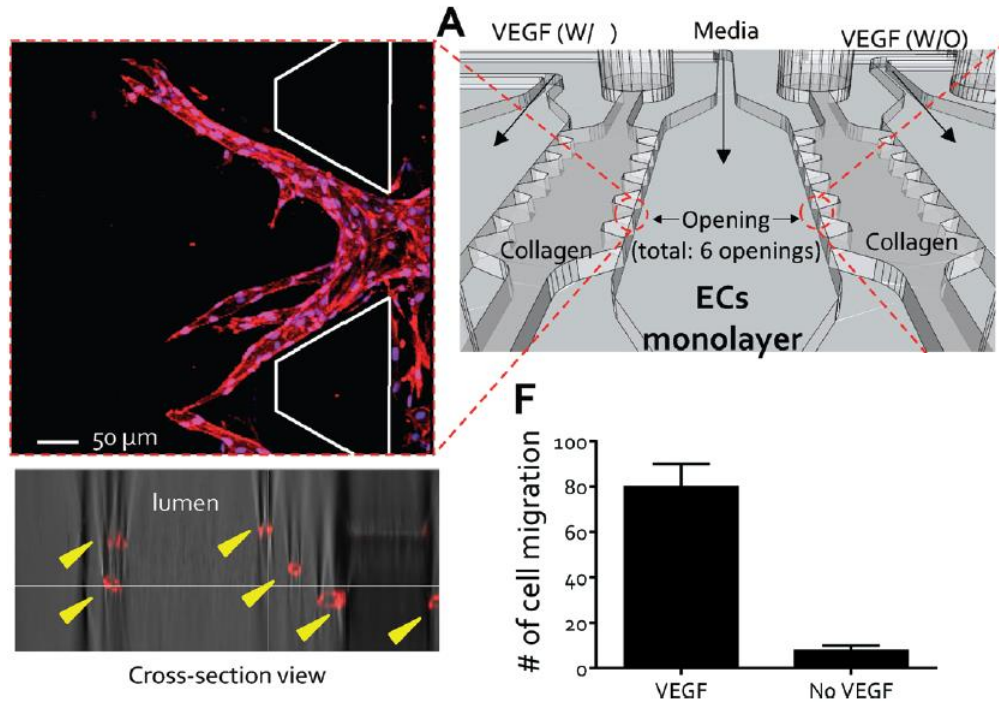
Influence de la concentration de sunitinib sur des cellules endothéliales dérivées d'iPSC



Des bases de travail existent...



Des bases de travail existent...



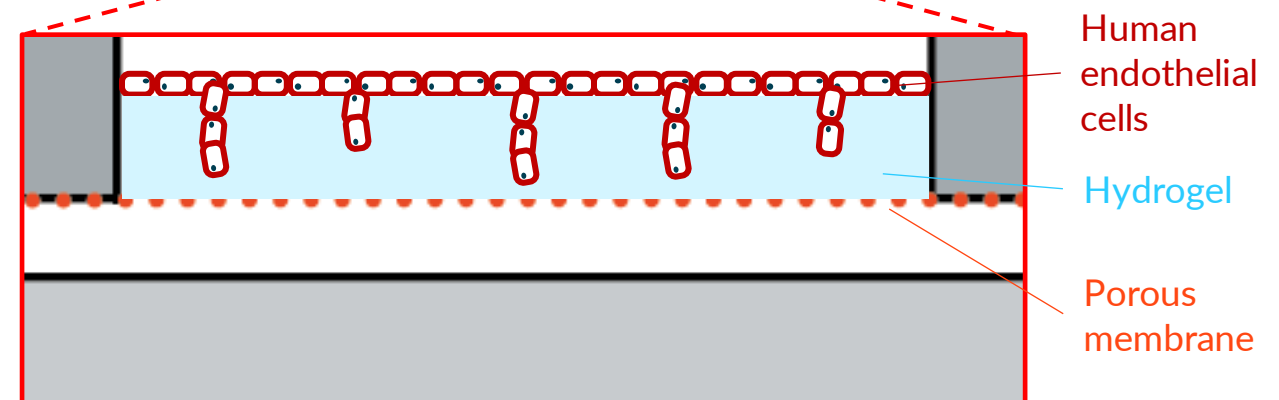
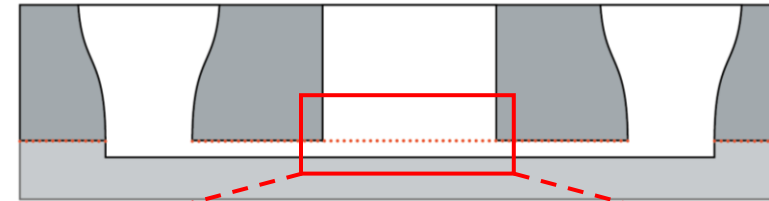
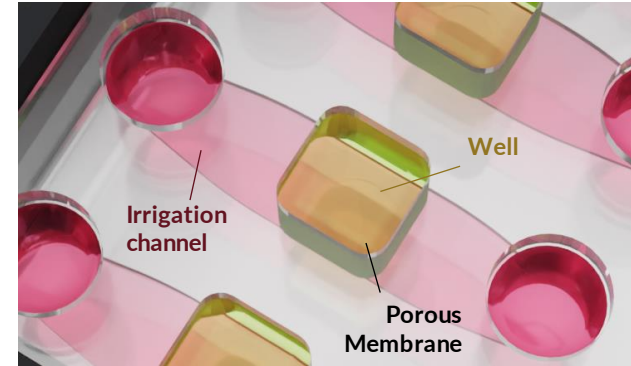
... Mais restent très préliminaires.

Les limites actuelles:

- Systèmes de pompes lourds et complexes
- Architecture compliquée sans bonne justification
- Manque de versatilité
- Contextes d'utilisation et d'applicabilité mal définis

Ce que nous pouvons apporter:

- Des architectures compartimentalisées
- Avec des écoulements contrôlés (laminaire gravitationnel, interstitiel)
- Avec des technologies intégrées (MEA, TEER)
- Pour des modèles humanisés pertinents
- Et adaptés à tous les labos



... Mais restent très préliminaires.

Discutons ensemble, et décrivez-nous vos besoins et contraintes !

Construisons les modèles qui seront non seulement efficaces sur le plan technique, mais qui s'intégreront également de manière fluide dans vos workflows de recherche existants.



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Merci

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