BIOMIMETIC GUT-LIVER INTEGRATED DEVICE FOR PHARMACOKINETIC SCREENING

Tech ID: 33151 / UC Case 2023-132-0

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Reference for National Filings	WO2024/258998	12/19/2024	2023-132

Patent Pending

BRIEF DESCRIPTION

Developing accurate models of human organ interactions is essential for predicting drug efficacy and toxicity without relying solely on animal testing. To meet this need, UC Berkeley researchers have designed a compact microfluidic integrated chip that mimics the physiological relationship between the gut and the liver. The device features distinct chambers for gut and liver physiologies, which are fluidly connected by a shared vascular system. A key innovation of this platform is the use of a porous micropillar membrane structure to divide the vascular system into gut and liver vascular chambers. This integrated architecture allows for the precise study of nutrient absorption, first-pass metabolism, and the complex biochemical signaling that occurs between these two critical organs.

SUGGESTED USES

» Pharmacokinetic (PK) Profiling: Assessing how drugs are absorbed through the intestinal barrier and subsequently metabolized by liver tissue.

» Toxicity Screening: Identifying potential hepatotoxic metabolites produced after a compound passes through the gut epithelium.

» Metabolic Disease Modeling: Studying the progression of conditions like Non-Alcoholic Fatty Liver Disease (NAFLD) by manipulating the gut microbiome or nutrient input.

» Nutritional Research: Evaluating the bioavailability of nutrients or probiotics and their long-term effects on liver health.

» Personalized Medicine: Utilizing patient-derived cells within the chip to predict individual responses to specific therapeutic regimens.

ADVANTAGES

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OTHER INFORMATION

CATEGORIZED AS

» **Biotechnology**
» Health
» Proteomics
» **Medical**
» Devices
» Diagnostics
» **Research Tools**
» Screening Assays
» **Sensors & Instrumentation**
» Medical

RELATED CASES

2023-132-0

Physiological Connectivity: Provides a more realistic representation of the enterohepatic circulation compared to isolated organ-on-a-chip models.

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Innovative Membrane Design: The porous micropillar structure offers robust mechanical support while maintaining high fluidic connectivity and molecular exchange.

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Compact and Scalable: The streamlined design allows for higher throughput in laboratory settings and easier integration with standard imaging equipment.

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Reduced Animal Dependency: Offers a sophisticated in vitro alternative that can reduce the costs and ethical concerns associated with animal models.

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Enhanced Real-Time Monitoring: Facilitates the continuous sampling and high-resolution observation of cell-to-cell interactions across the gut-liver axis.

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- InferBiome: Inferring Gut Microbiome States from Stool Microbiome Data
- Metabiome: Metabolic Network And Biofilm Modeling Of The Gut Microbial

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