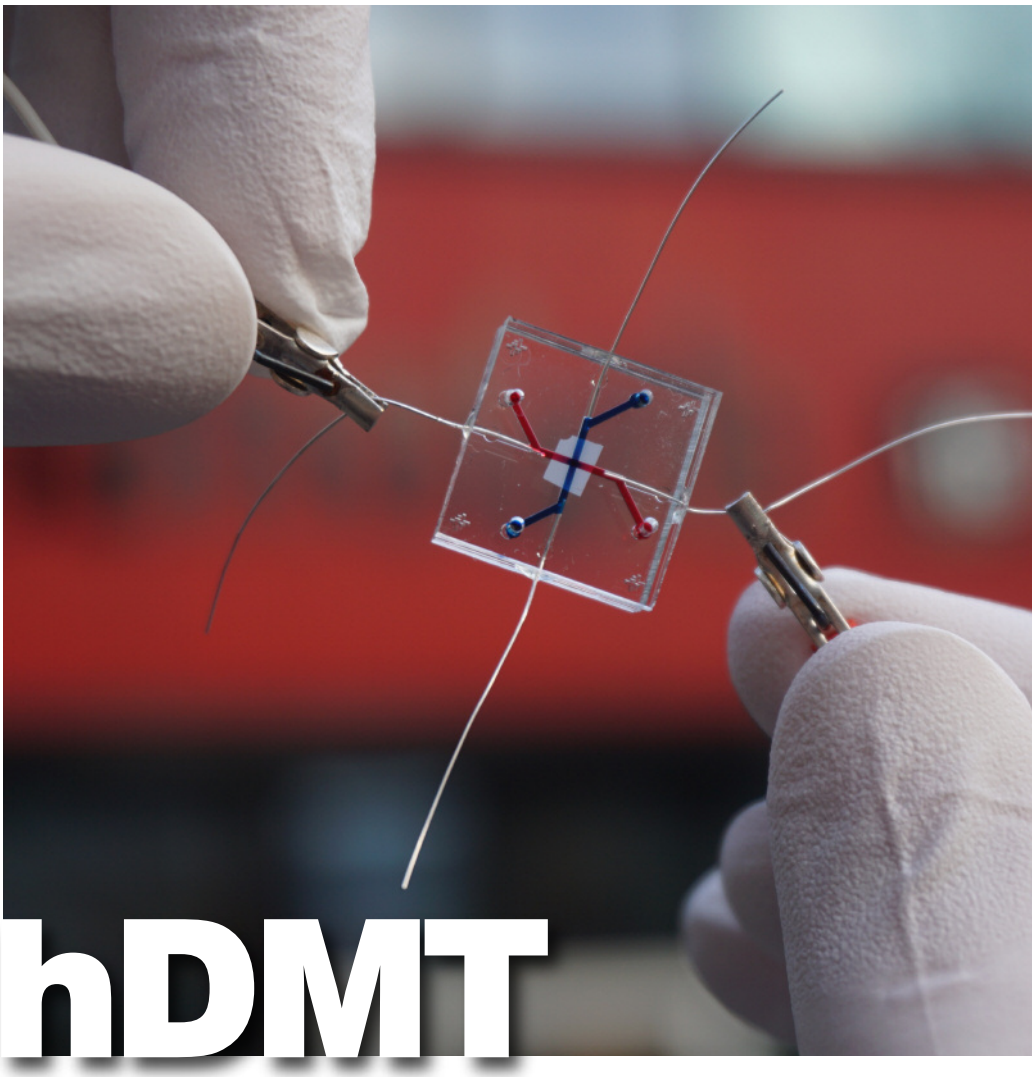


hDMT

ORGAN-ON-CHIP CONSORTIUM

hDMT

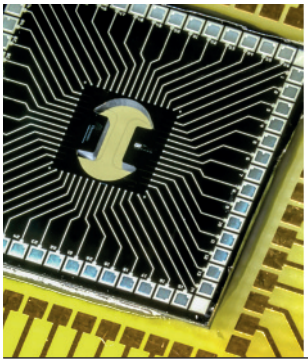
HUMAN ORGAN AND DISEASE MODEL TECHNOLOGIES

‘Organs-on-chips’ are three-dimensional human living cell cultures that are grown in a dynamic microchip environment under controlled conditions. These engineered cell structures mimic the minimal functional units of human organs and tissues. The chips allow biological, chemical or physical manipulation and analysis – through microfluidics, mechanical and electrical stimulation, microelectronics, nanosensors, imaging and other high-tech methodology.

hDMT is a consortium of renowned scientists from the fields of engineering, biology, physics, chemistry, pharmacology and medicine. They share knowledge, expertise and facilities to develop organ-on-chip models, by integrating state-of-the-art human stem cell technologies and top level engineering with a wide variety of other disciplines.

hDMT is a precompetitive, non-profit technological R&D institute. hDMT researchers work in academic research institutions, university medical centers and biotechnology companies in the Netherlands. Its partners refer to hDMT as ‘a laboratory without walls’. hDMT aims to disseminate models and data through open access publication and valorization.

The microfabricated equivalent of the cardiologist’s bicycle test. On this dog bone-shaped membrane (4 mm) with electrodes, heart muscle cells can be strained simulating exercise, to test the effect of new medicines. The photo shows the silicon-based device before it is assembled into a microfluidic culture well. (Device fabrication and photo: Saeed Pakazad, TU Delft)



HDMT’S OBJECTIVE

To develop validated cultured cell models of healthy and diseased human tissues and organs through organ-on-chip technology, and enable their valorization, implementation and availability to interested users for a wide variety of applications.
An advantage of this technology could be the reduction of animal experiments.

POTENTIAL APPLICATIONS OF ORGAN-ON-CHIP MODELS

- Mechanistic insights
- Drug development (target discovery & screening)
- Drug toxicity
- Personalized medicine
- Exploring technology for regenerative medicine
- Personalized food
- Environmental contaminant screening
- Cosmetic safety testing

POTENTIAL STAKEHOLDERS OF ORGAN-ON-CHIP TECHNOLOGY

- Patient groups
- Medical centers
- Health foundations
- Insurance companies
- Pharmaceutical companies
- Biotechnology companies
- High-tech companies
- Agrifood companies
- Cosmetics companies
- Environmental institutes
- Regulatory agencies
- Advocacy groups

CURRENT RESEARCH PROGRAMS

- Human organ and disease models
  Brain-on-chip
  Cancer-on-chip
  Heart-on-chip
  Vessels-on-chip
- Organ-on-chip technology platforms

PARTNERS

- Amsterdam University Medical Center
- Delft University of Technology
- Eindhoven University of Technology
- Erasmus University Medical Center
- Genmab BV
- Hubrecht Institute
- Leiden University
- Leiden University Medical Center
- Maastricht University Medical Center+
- Radboud University Medical Center
- TNO
- University of Groningen
- University of Twente
- University Medical Center Groningen
- Wageningen University and Research Institute

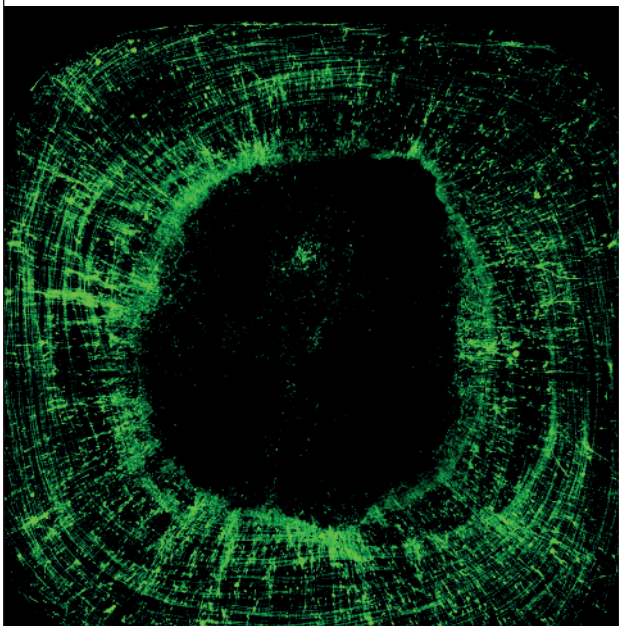
With more partners to come…

hDMT's DREAM

Imagine: Organ-on-chip models that mimic any part of the human body, to study human sickness and health, for personalized disease treatment or even prevention – available and affordable for everyone.

Coverphoto: Organ-on-chip device (PDMS-based) with two microfluidic channels (red and blue), separated by a porous membrane. The blood-brain barrier is recapitulated inside this device and its barrier function is measured using the four wire electrodes. (Device: Marinke van der Helm/Michaela Hällevall. Photo: Paul ter Braak/Marinke van der Helm; BIOS Lab on a Chip group, UTwente)

Image of a three-dimensional (3D) human brain organoid-on-a-chip. This model recapitulates several key aspects of early human brain development, including the layered architecture of the cerebral cortex and scaffold of radial glia, and is suitable as an advanced cellular platform for investigating the pathophysiology and therapeutic development of neurological and psychiatric disorders using patient-derived induced pluripotent stem cells. (Image: Mark van der Kroeg/Femke de Vrij; Laboratory of Steven Kushner, Erasmus MC



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