Enabling human-relevant data for actionable clinical insights

Organ on chip technologies: their potential and their future applications in the biotech and pharmaceutical framework

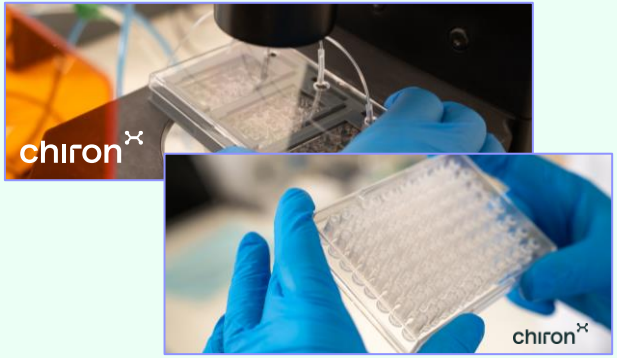
chiron

Overview

1) What do we do at chiron
2) Distinction between ISO standardization and EMA
3) What are the standard requirements from the EMA side (ITF – innovation task force)
4) Example of disease we worked on with pharma and medical devices that was used for dossier
5) Conclusion

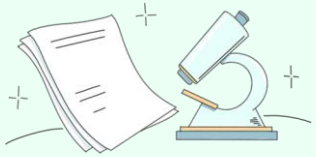
Our solutions to the industry's challenges

Re-plate™ and µMass™

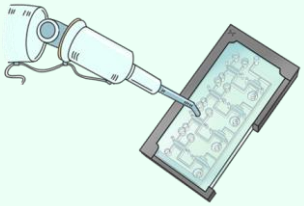


Human-based
advanced in-vitro technologies
recreating life-like motion
using proprietary,
active mechanical stimulation, with
real-time visualization unlocking
invaluable insights
for potency studies

WHAT WE OFFER



Contract Research Services

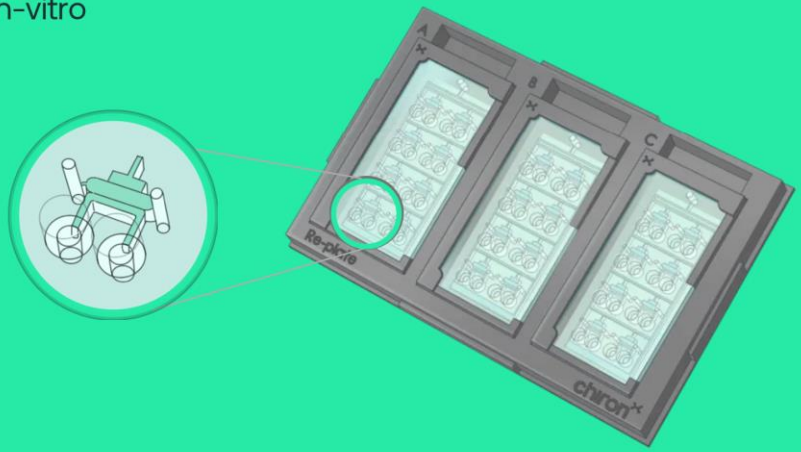


In-vitro Model Manufacturing and Custom Design

The Challenge	Our Solution
Claims & MoA (Regulatory Approvals) *MoA: mechansism of action	Cartilage-on-Chip models with "walking motion" • Enhance mechanistic understanding
Manufacturing Consistency	Potency assays with 3D in-vitro models • Secondary "lot release" assay • Low consumption of therapy
Lack of predictive animal models	Human-based on-chip models with primary cells • Better recapitulate human pathology

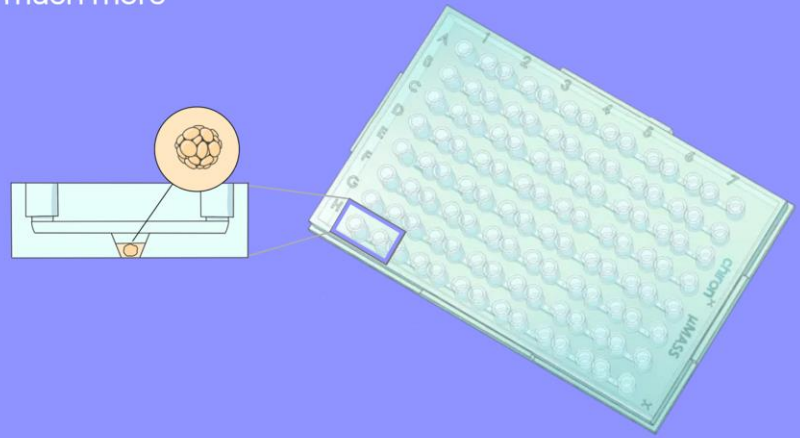
Enabling arthritis applications using Re-Plate™

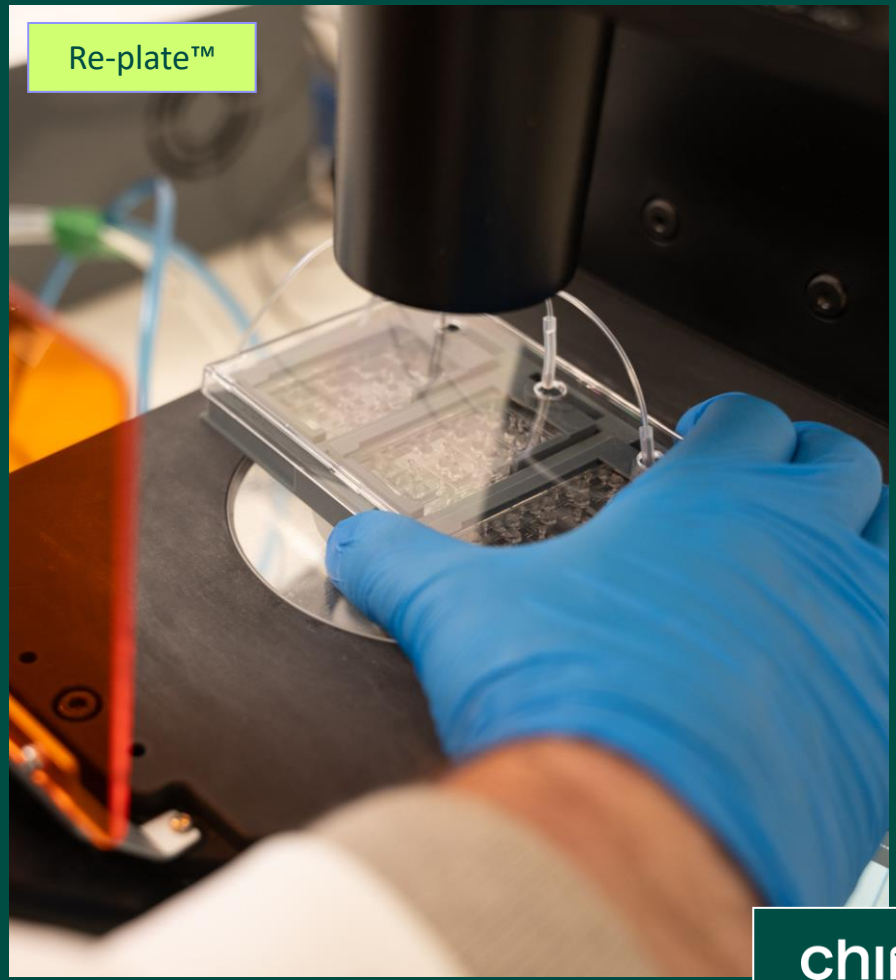
A next-generation, organ-on-chip platform that recapitulates human-like movement in-vitro



Enabling oncology applications using µMass™

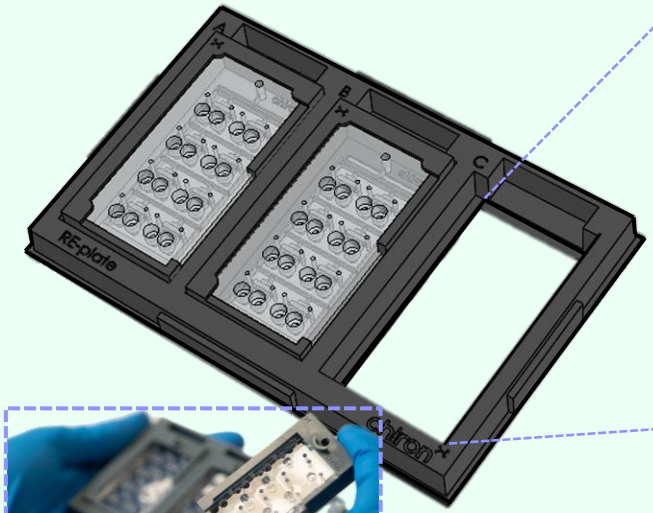
Designed for optimized, user-friendly culturing of 3D solid tumours; capable of so much more

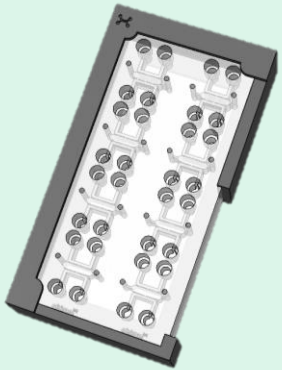




chiron

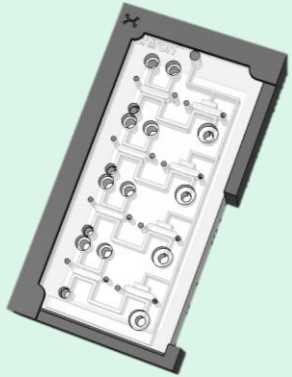
Re-plate™: a reusable platform for our systems





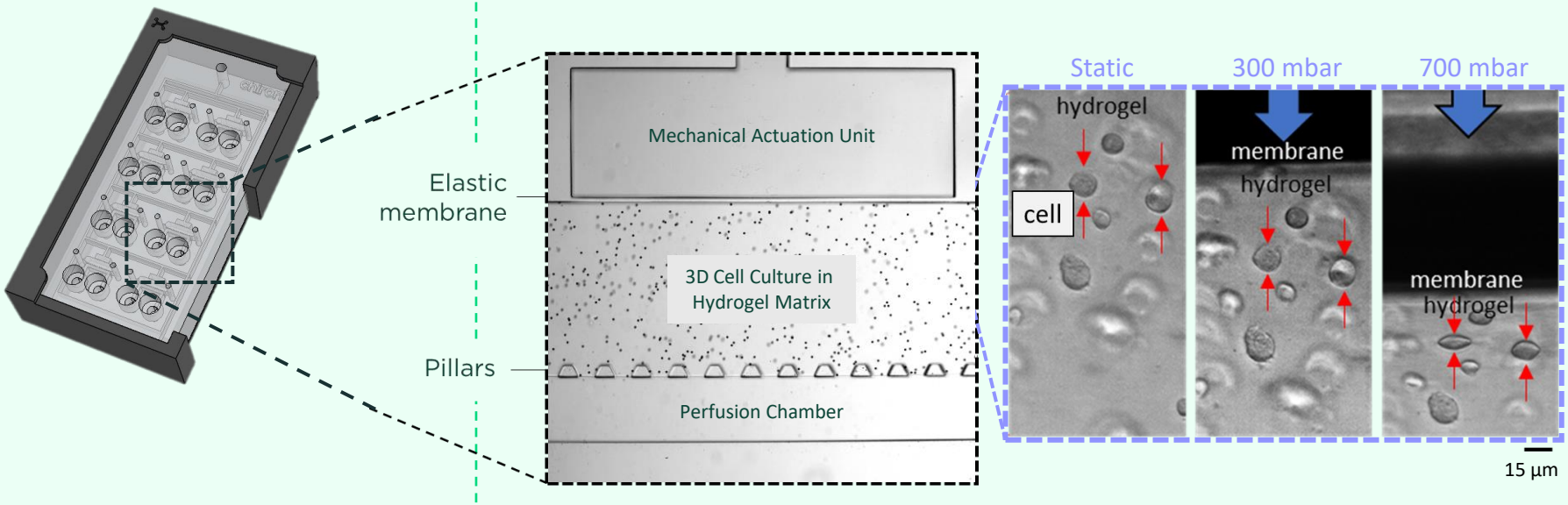
3D Tissue Unit

Multi-compression



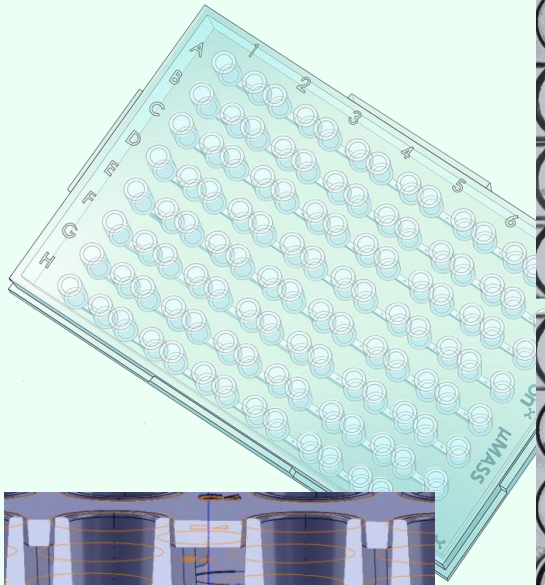
Multi-tissue

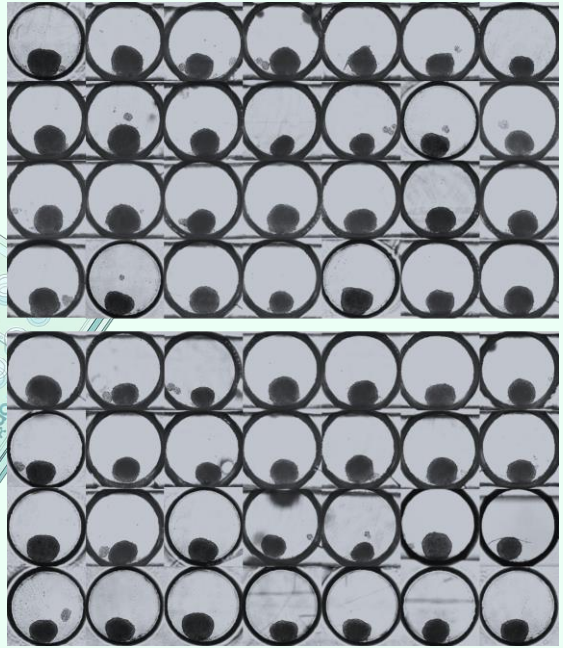
How does it work?

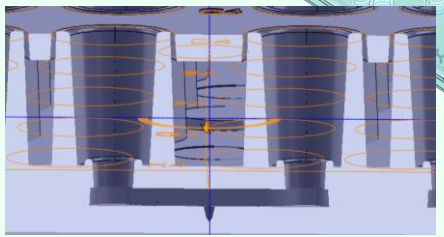


Mechanical stimulation with pressure applied to flexible membrane, via connected air pump, and real-time visualization under the microscope during experiments

chiron's Core Technologies: µMass™ the microplate



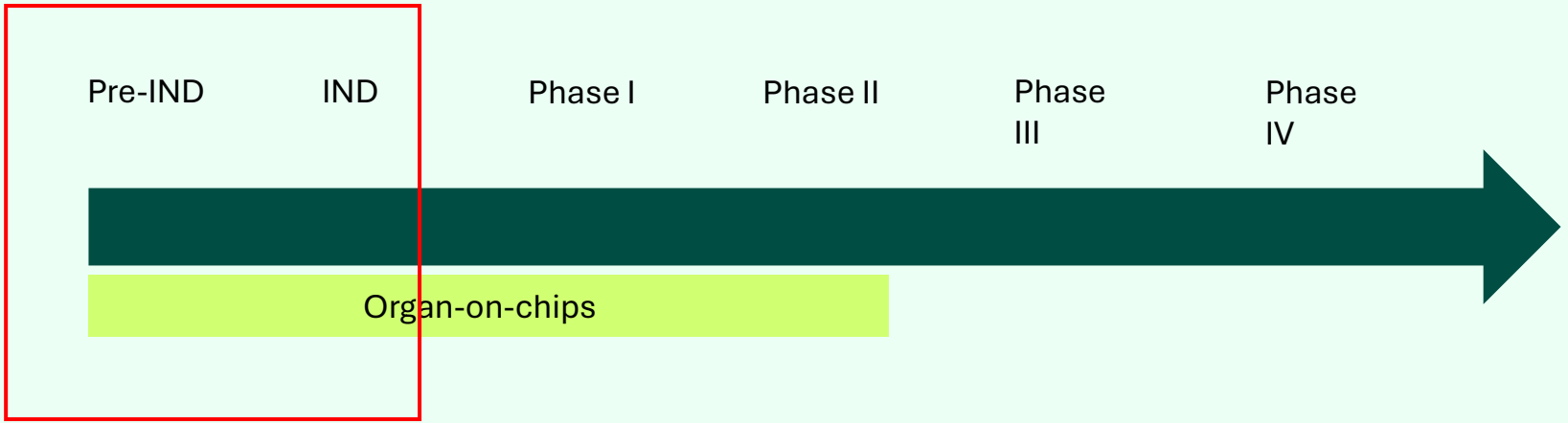




- 56 independent aggregates/organoids
- Easy medium removal
- Up to 3 days before medium change
- Multichannel compatible
- Non adherent cell compatible

Can be used for different organoids, cell aggregates or multi-cell systems

Putting organ-on-chip in a context of regulatory process



Distinction between ISO standardization and EMA

Dutch regulatory body

International Organization for Standardization (ISO)

- **What it is:** An independent, non-governmental organization with members from national standards bodies around the world.
- **Purpose:** To develop and promote standards that ensure products, services, and systems are safe, reliable, and of high quality.
- **Examples:** ISO standards are used in many sectors, such as health, energy, and information security. You might see a certification like **ISO 9001** (quality management) or **ISO 27001** (information security).
- **How it works:** Experts from member countries collaborate to develop standards, which are then voted on and published by the organization.

EUROPEAN MEDICINES AGENCY
SCIENCE MEDICINES HEALTH

The **European Medicines Agency** (**EMA**) is an agency of the European Union (EU) in charge of the evaluation and supervision of pharmaceutical products. Prior to 2004, it was known as the **European Agency for the Evaluation of Medicinal Products** (**EAEMP**) or **European Medicines Evaluation Agency** (**EMEA**).[4][5]

Innovation Task Force briefing meetings

Share

The Innovation Task Force (ITF) briefing meetings offer developers early dialogue with the European Medicines Agency (EMA) on innovative medicines. They address regulatory, technical and scientific concerns.

Human | Veterinary | Innovation

Distinction between ISO standardization and EMA

Standardization of your **hardware**:

1) Sterility
2) Geometry
3) Etc.

Standardization of your **application**:

1) Robust
2) Reproducible
3) Does it answer the right question?
4) Etc.

Two routes to integrate organ-on-chip devices in the regulatory process

Regulatory relevance — mapping to IND requirements
•**Safety / toxicology** (e.g. liver, kidney, cardiovascular) using OoC to predict human-specific adverse events, reduce candidate risk before first-in-human.
•**PK / ADME**: using multi-organ chips to better estimate human clearance, metabolism, and dosing.
•**Efficacy / disease models**: for e.g. cartilage degeneration (arthritis) or tumour microenvironments (oncology), providing human-relevant proof-of-concept.
•**Mechanism-of-action / biomarker studies**: allow controlled, human-cell–based mechanistic insight to support pharmacology modules.

Route 1: enter in a dossier already existing with data

- Your data will be added as part of the package provided to the EMA for assessment

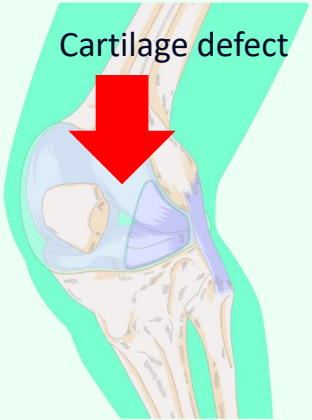
Route 2: validate one of your platform for a specific application

- Provide sufficient data to substantiate your claims on the application developed

EXTREMELY DIFFICULT

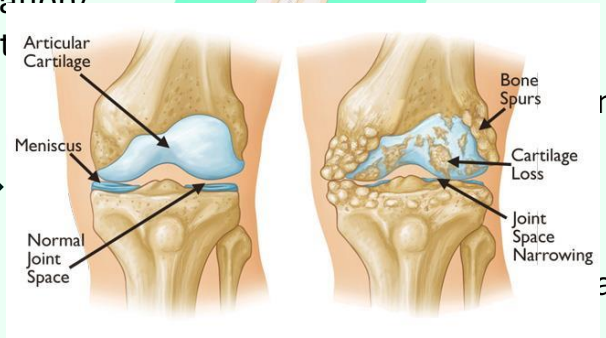
Osteoarthritis – what is it?

Normal cartilage



Diseased joint (OA)

Joint degradation/ restruct



mation

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/ Immune activation

Osteoarthritis (OA) is a degenerative joint disease characterized by the **breakdown of cartilage**, the protective tissue at the ends of bones, **leading to pain, stiffness, and reduced mobility in the affected joints**. It's the most common form of arthritis, and while it can affect any joint, it most frequently impacts the **knees, hips, hands, and spine**.

Drug development: what went wrong?

[1]

Biosplice, once the most valuable biotech startup, sees a pair of osteoarthritis trials fail

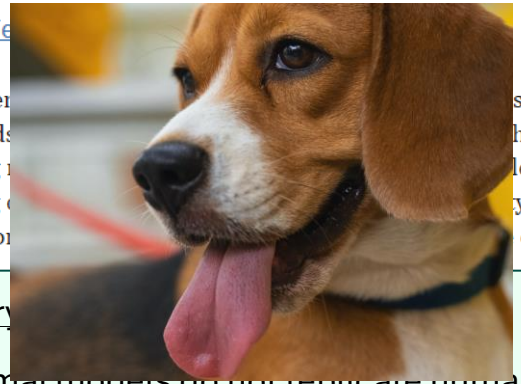
By Jonathan Wosen Nov. 18, 2022 Reprints

Biosplice's bid to transform the treatment of everything from arthritis to cancer ran into a snag this week, with the San Diego biotech announcing that its experimental osteoarthritis drug failed to benefit patients in a pair of Phase 3 clinical trials.

[2]

Challenges for Osteoarthritis Trials

David T. Fe



s, making decisions about which
ht. For example, preclinical models chosen
lecting efficacy in human OA. Potentially
y issues despite promising efficacy signals,
efficacy:safety signal may not be pursued.

imal models do not replicate human physiology

ong patient cohort selection leads to failure in phase II and III

NO current treatment for osteoarthritis

[1] https://www.statnews.com/2022/11/18/biosplice-once-the-most-valuable-biotech-startup-sees-a-pair-of-osteoarthritis-trials-fail/
[2] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6105531/

Closing Remarks

By integrating chiron's OoC platforms at the *preclinical stage*, sponsors can better anticipate human responses, reduce failure risk, and streamline the path to IND / clinical trials.

For difficult therapeutic areas (arthritis with mechanical loading; solid tumours with complex microenvironment; substances with potential organ toxicity), the human-relevant, microphysiological nature of chiron's systems offers a competitive advantage.

Using chiron may not fully replace traditional models yet — but it significantly strengthens a submission, supports ethical and cost-efficient development, and positions a sponsor at the forefront of regulatory innovation.

The entire world is shifting towards these technologies
500+ initiatives

Thank You

The organizers
The collaborators
The people the believe
in these technologies

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Europees programma voor transitiegedreven innovatie

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