

MIRO: Micro Immuno Response On a Chip

Challenge

Immunotherapies have been considered the most relevant improvement in oncology of this century. However, within 2021-2022, new immunology breakthroughs have been drastically slowed down for various reasons:

- New targets have not shown the promise that was hoped for
- Long-lasting response rates remain around 20–40%
- Better biomarkers to guide treatment decisions remain undiscovered

The **tumour microenvironment (TME)** is a highly complex ecosystem found to be heterogeneous across patients, which can influence prognosis and outcome of immunotherapy. Immune cell composition and organisation within the TME are tightly associated with the **clinical outcome of cancer patients**. Current studies on the **impact of TME composition in immunotherapy resistance** offers a glimmer of hope to all clinicians and patients, who strongly trust the potential of immune system modulation for cancer treatment. Nevertheless, the absence of models that allow analysing the complex scenario of tumour composition is clearly **limiting the progress** on this area.

Market

The global cancer immunotherapy market size reached **US\$ 96.6 Billion in 2021**. It comprises drug development, but also platforms and models for meaningful drug testing. MIRO technology is interesting for **companies that test immunotherapy drugs** or commercialise models for drug testing. Its micro structured insert is also useful for cell co-culture and allows **expansion of the portfolio of micro structured cell culture gadgets or even microfluidic chips for cell co-culture**.

Asset

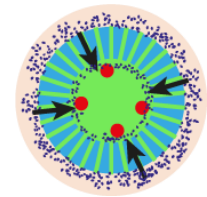
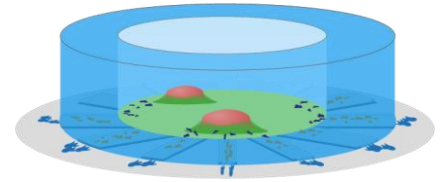
IBEC researchers have developed a **micro structured insert for cell co-culture coupled with cell infusion** with direct application in cancer research. It allows the study of tumour cells or complex tumour structures such as tumoroids, that could be derived from patients, in a multicellular context. Tumour cells can be co-culture with any relevant cell type, especially **cancer-associated fibroblasts (CAF)** allowing infusion of any other relevant cell type, especially **peripheral blood mononuclear cells (PBMC)**. MIRO is a highly flexible platform that can be competitive in tumour therapy testing for virtually all cancer types.

The method comprises the microfabrication of the inserts and the application of the system as a platform to test immunotherapy drugs by culturing a monolayer of CAF cells combined with tumoroids seeded on-top, inside of the micro structured insert, infusing PBMC cells from the periphery of the insert.

Asset Value

- ❖ Multicellular platform for drug testing **emphasising the interface between tumour cells, TME components and immune cells**
- ❖ Versatile setup that allows testing of **different tumour types**
- ❖ **Flexible co-culture system** allows culturing modulable cell types

A platform for immunotherapy drug testing that resembles tumour complexity



Uses

- ❖ Immunotherapy drug testing in complex system mimicking tumor microenvironment
- ❖ Multicellular complex platform for cancer drug testing focusing on tumor/microenvironment interface
- ❖ Basic research on tumor/microenvironment interactions
- ❖ Platform for personalised medicine

Team

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Stage of Development

- Protocol for insert microfabrication
- Setup test with Breast cancer models
- Pilot testing with immunomodulatory drugs

Intellectual Property Status

A priority European patent application was filed in November 2022. Patent owned by IBEC and IMIM.

Exploitation Plan

Patent available for licensing with technical cooperation or technical co-development

Contact

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