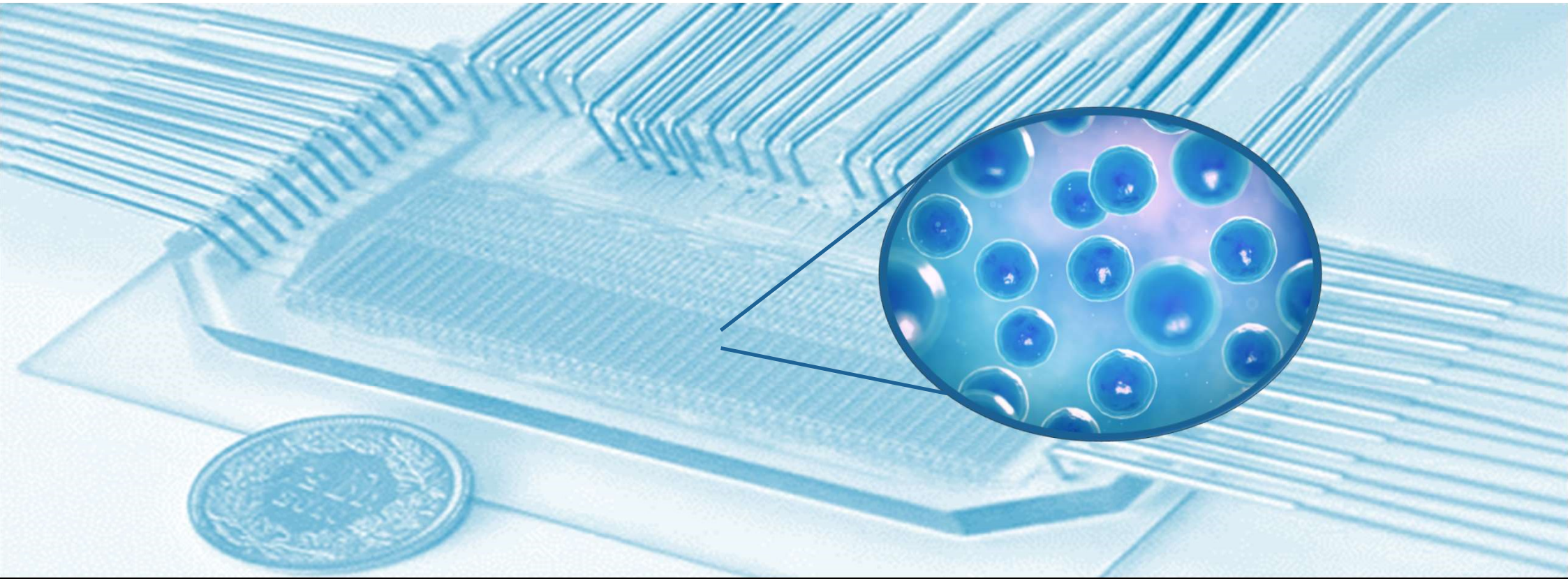


HOW TO FIND THE RIGHT TREATMENT, AT THE RIGHT TIME: MICROFLUIDICS CAN HELP!

Prof. Gabriele Dubini | Politecnico di Milano

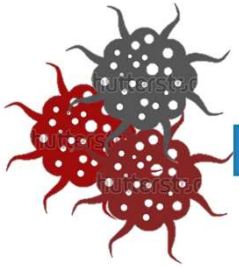
DIGESTIVE CANCERS EUROPE

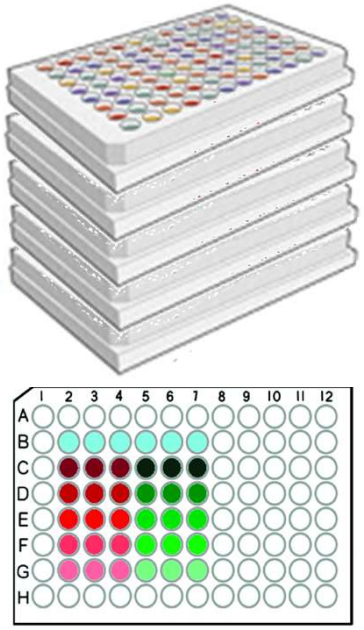
MASTERCLASS SERIES
2020 VIRTUAL EXPERIENCE

AIRC CANCER RESEARCH UK

DRUG SCREENING

Drug screening is the process by which potential drugs are identified and optimized before selection of a candidate drug to progress to clinical trials





Drug n°

Drug n°2

...

Drug n°50

!!!

Cancer patients

Tumour biopsy

Cells from biopsy

***In vitro* tests on EFFICACY**

DRUG SCREENING

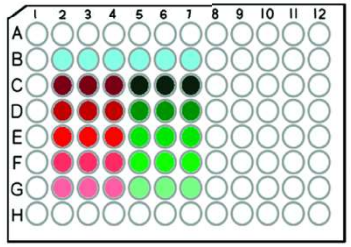
Single drug

Drug n°1

Drug n°2

…

Drug n°50



***In vitro* tests on EFFICACY**

DRUG SCREENING

Single drug

Drug n°1

Drug n°2

…

Drug n°50

Comb. of 2 drugs

…

Multiple combinations

Diff. timing of administration

Dosages

X 10…

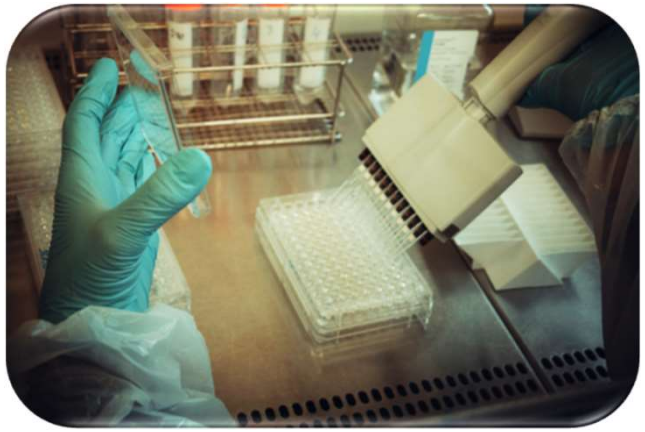
X 100…

X 1000…

***In vitro* tests on EFFICACY**

DRUG SCREENING

Common laboratory practices



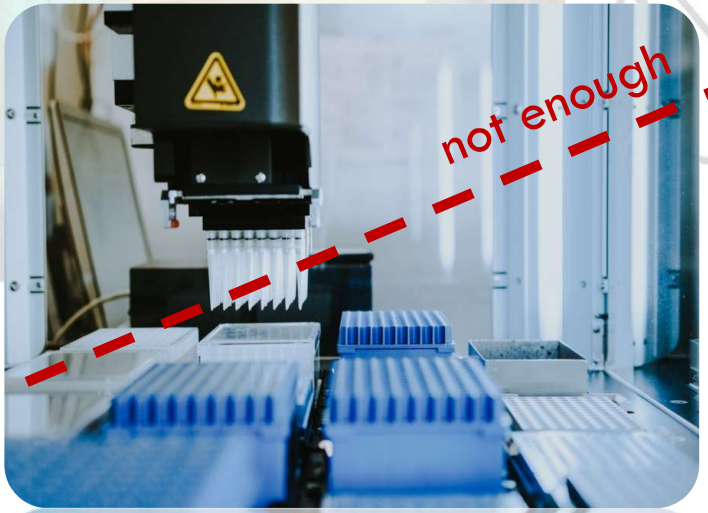
!!!

They are **Time consuming**

DRUG SCREENING

Common laboratory practices

Automation for high-throughput management

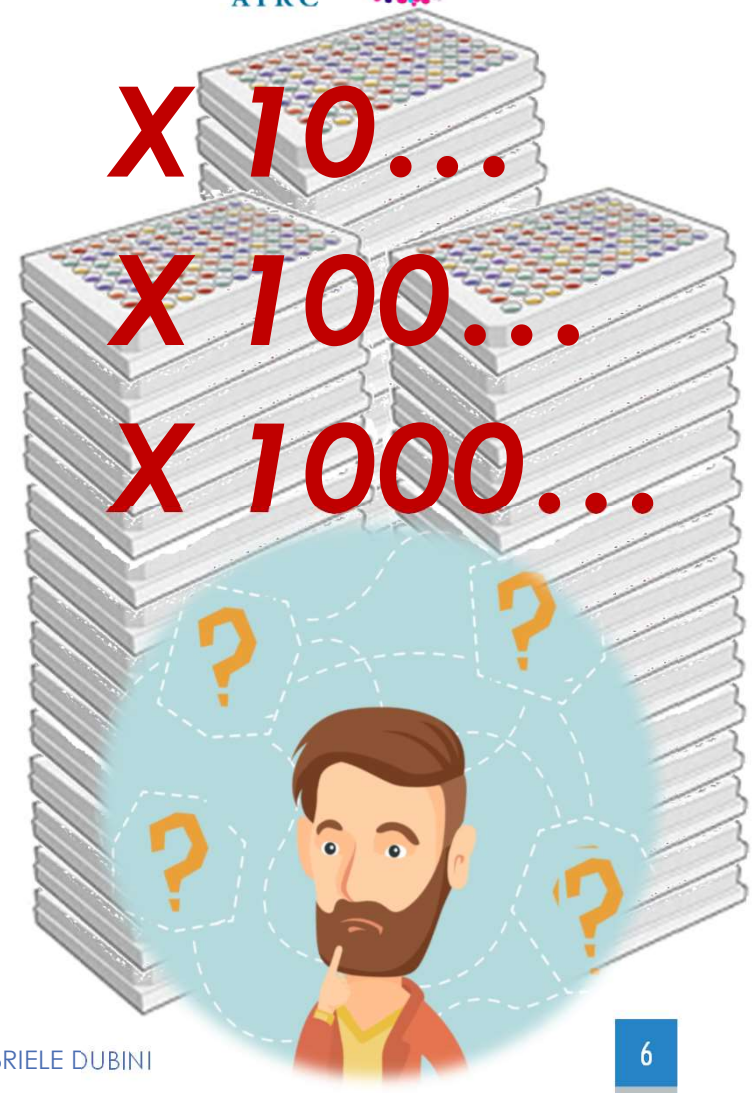


Cannot manage efficiently jelly components such as **biological matrices**

!!!

Cannot directly manage any **flow**

!!!



DRUG SCREENING

To screen the efficacy of the treatment
and build up
-PATIENT SPECIFIC-
models or predictions to overcome current limitations

WHAT DO WE NEED?

DRUG SCREENING

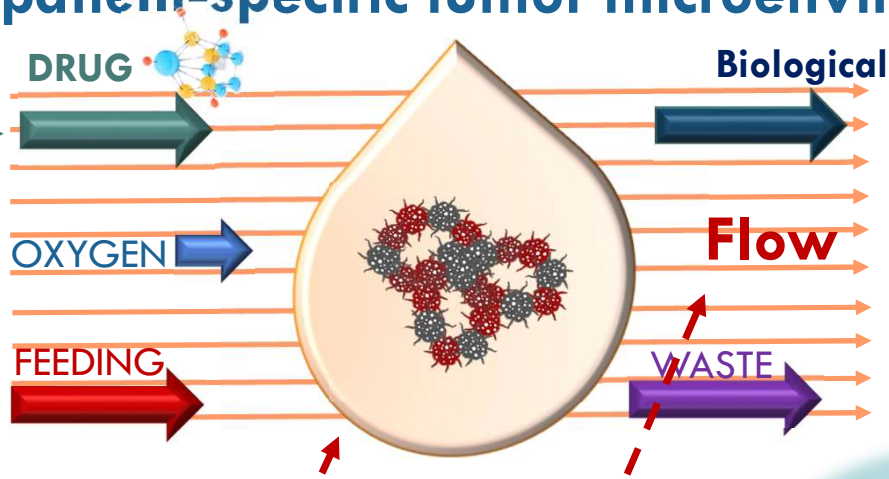
What do we need?

Multiple combinations

Diff. timing of administration

Dosages

A patient-specific tumor microenvironment



biological matrices

!!!

flow

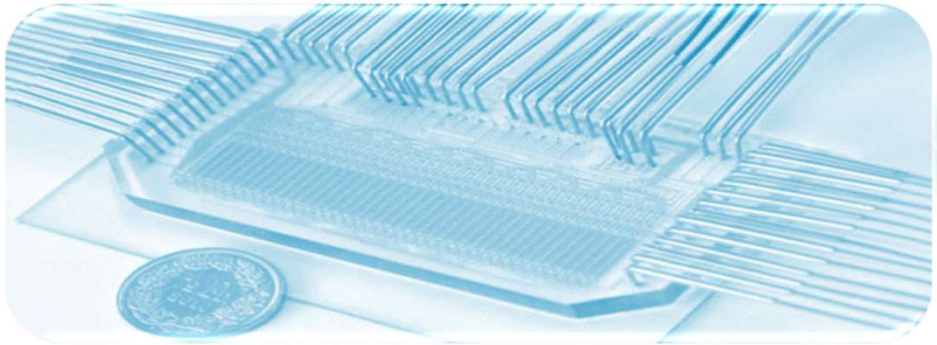
!!!

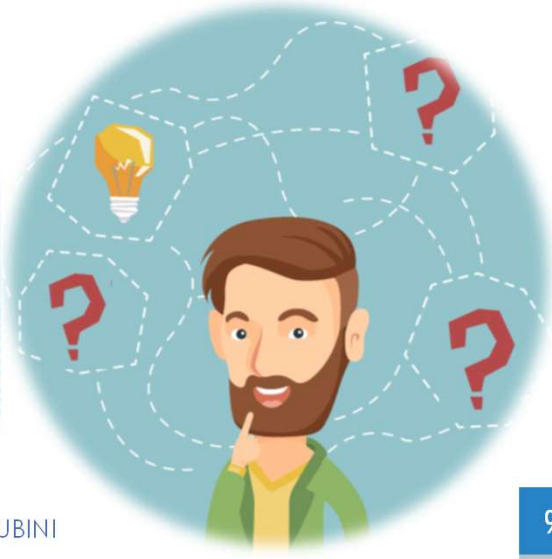
DRUG SCREENING

Common laboratory practices

High-throughput robots

Microfluidics can help!





DRUG SCREENING

Common laboratory practices

High-throughput robots

Microfluidics can help!

HOW?

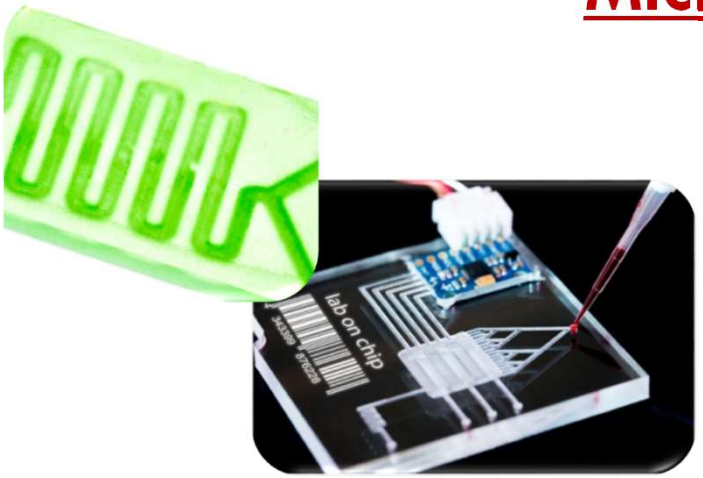
DRUG SCREENING

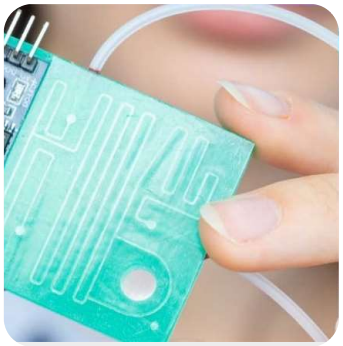
Common laboratory practices

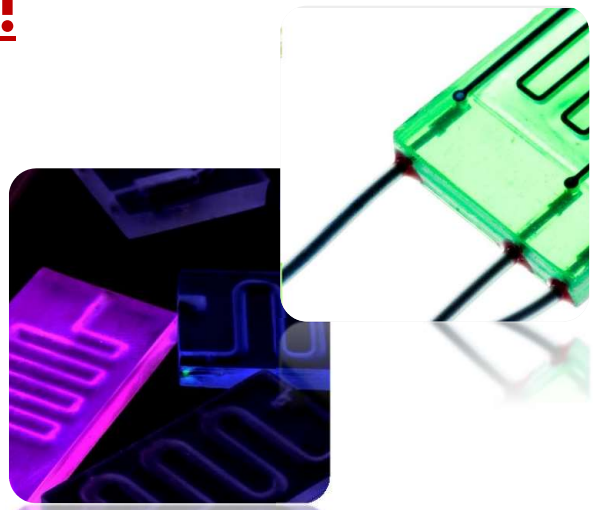
High-throughput robots

HOW?

Microfluidics can help!







DRUG SCREENING

Common laboratory practices

High-throughput robots

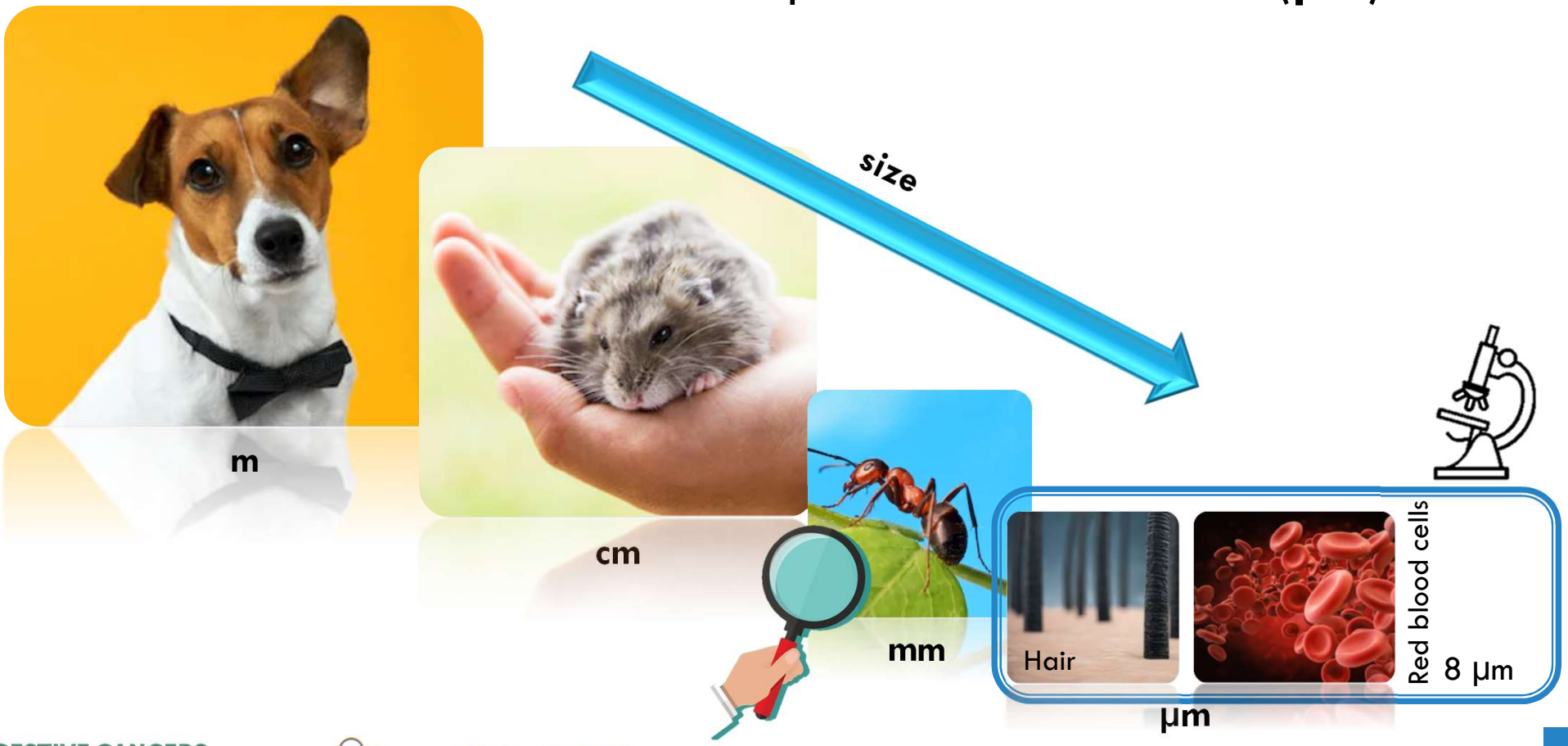
HOW?

Microfluidics can help!

- Miniaturization
- Reduction of experiment time
- Reduction of overall costs
- Improvement of experiment precision
- Reduction of sample and reagent consumption

MICROFLUIDICS

Microfluidics is the science of fluids manipulation at the **micron** (**µm**) scale



MICROFLUIDICS

Microfluidics is the science of fluids manipulation at the **micron** (**µm**) scale

Microfluidics

can be found in nature

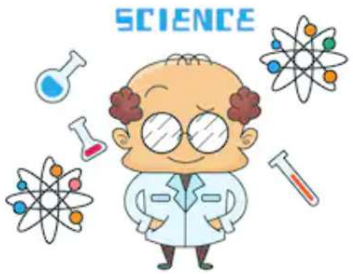
WHAT IS BEHIND?

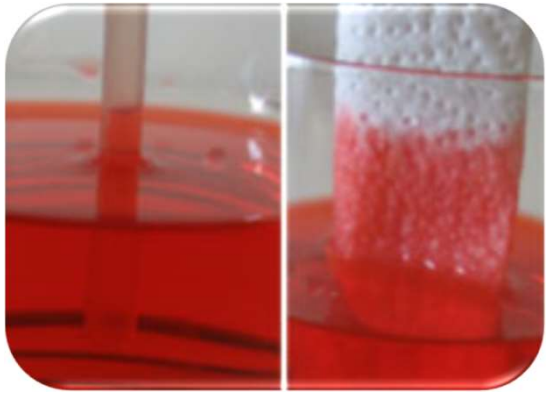
MICROFLUIDICS

Microfluidics is the science of fluids manipulation at the **micron** (**µm**) scale

WHAT IS BEHIND?

Surface tension

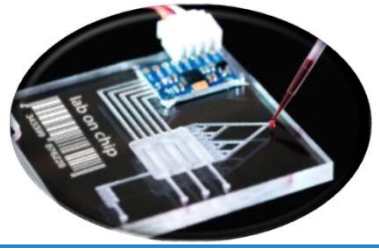




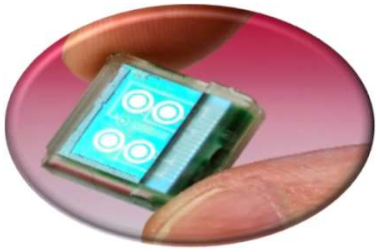
Capillarity

MICROFLUIDICS APPLICATIONS

Lab-on-chips



Drug delivery systems (e.g. insulin)



Analytical devices

EVERYDAY LIFE & LAB TOOLS

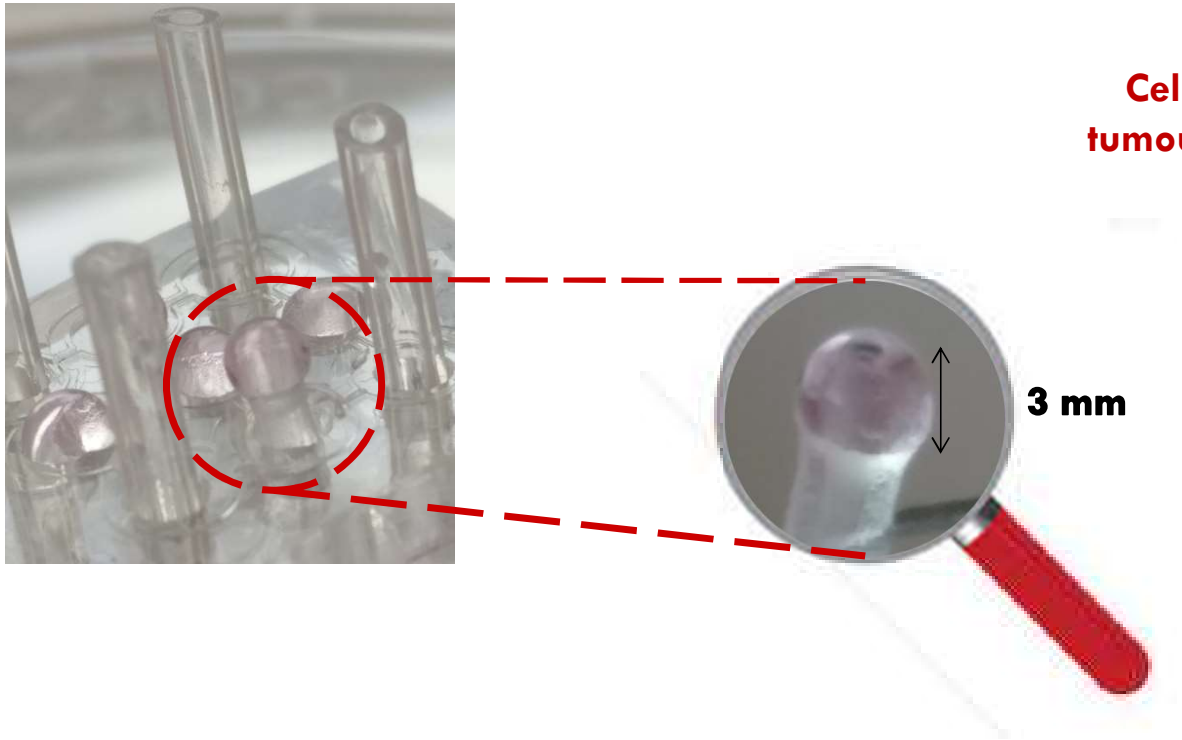
Glycaemic tests

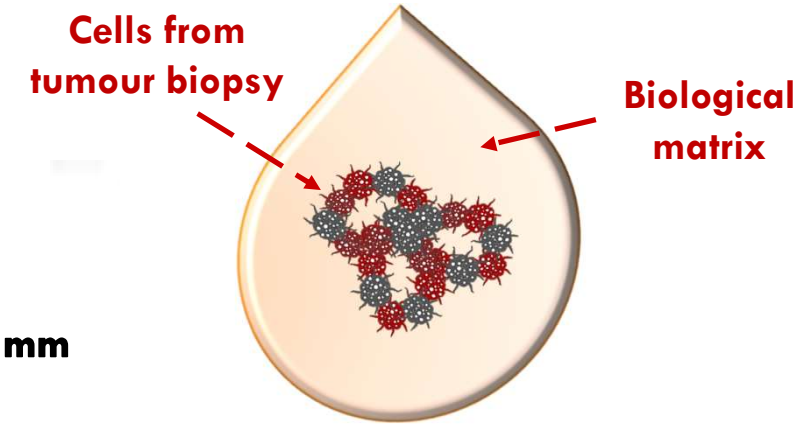
Point of care diagnostics (e.g. COVID19)

Pregnancy tests

ACCELERATOR PROJECT ACCELERATOR AWARD A26819

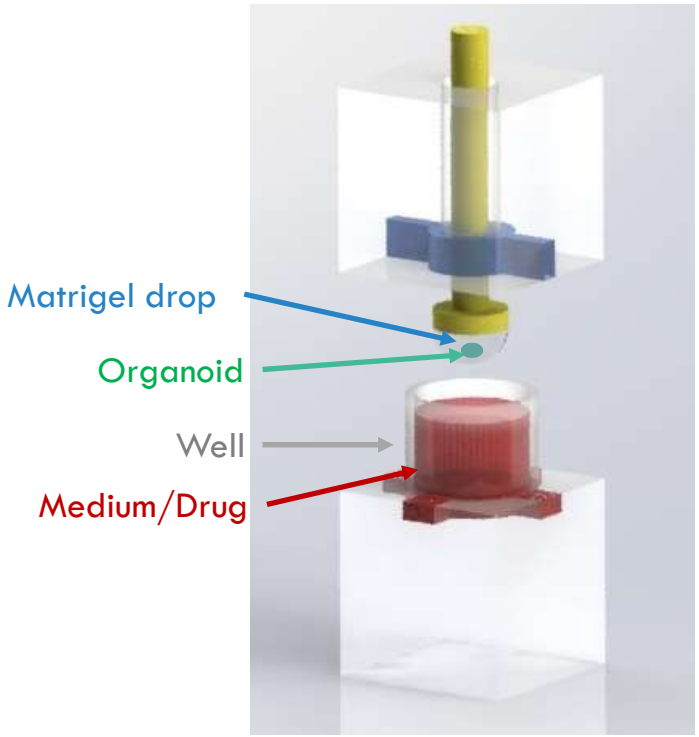
Objectives: study of drug-resistance mechanism and identification of the best therapeutic treatments for drug-resistant patients using a novel microfluidic platform

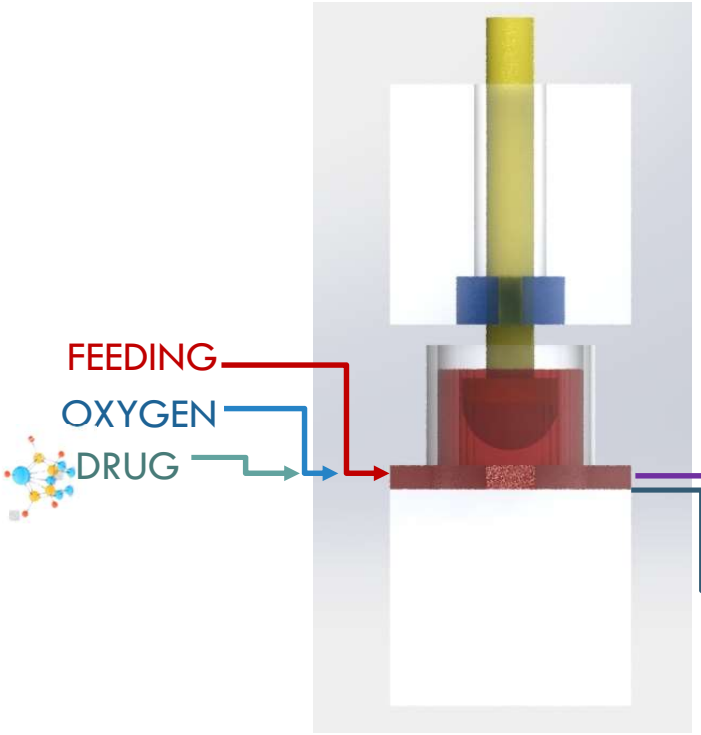


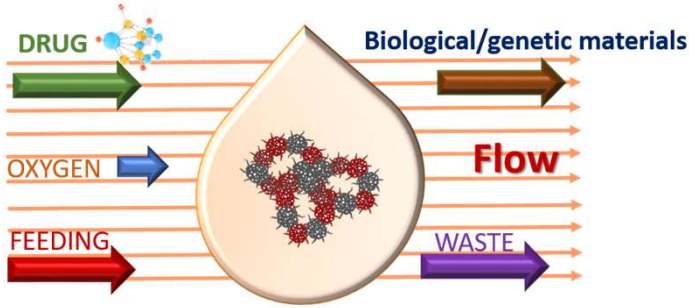


PATENT PENDING

MICROFLUIDIC PLATFORM
DROPS FOR DRUG SCREENING



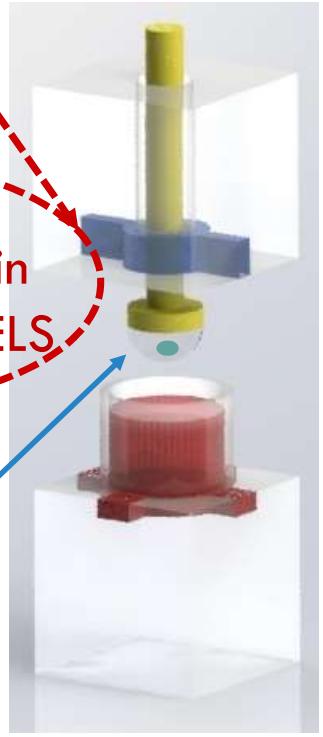


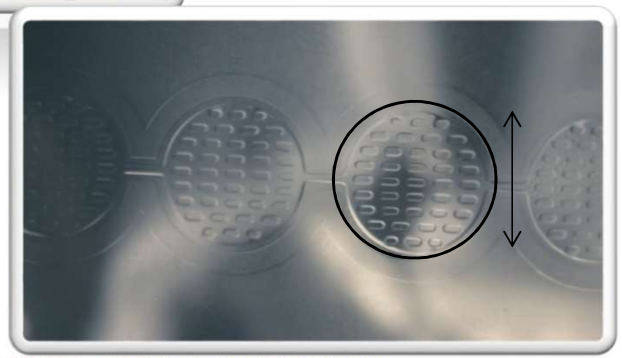


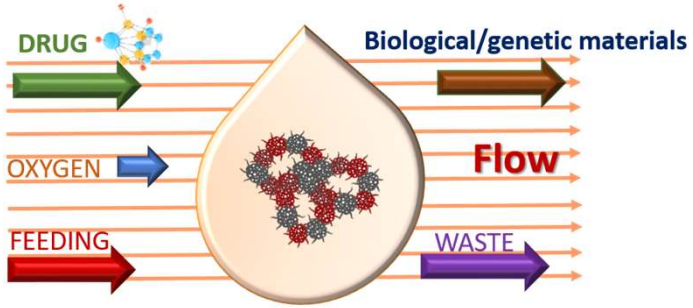
PATENT PENDING

MICROFLUIDIC PLATFORM - DROPS FOR DRUG SCREENING

DROPS GENERATION in MICROCHANNELS







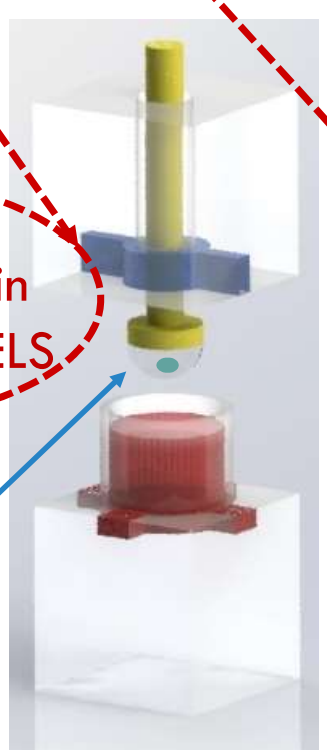
3 mm

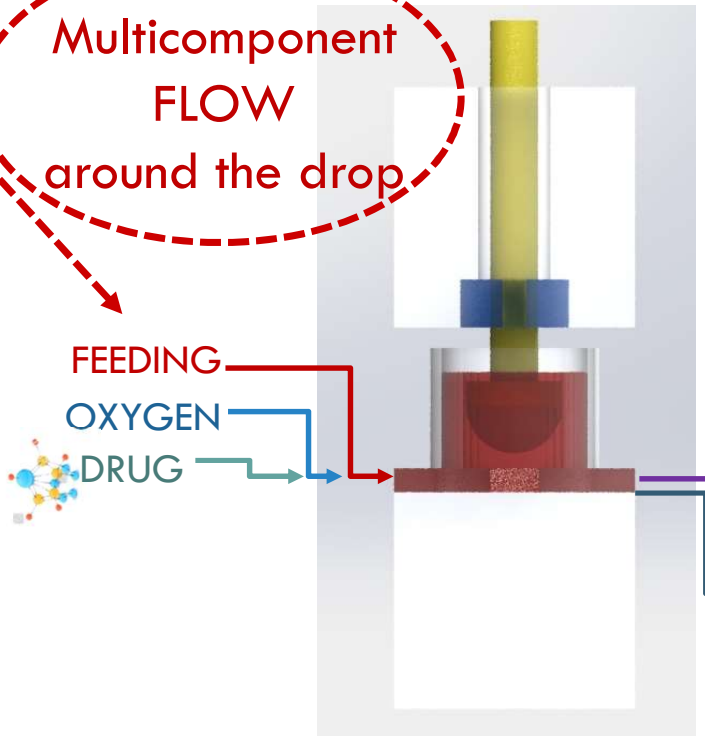
PATENT PENDING

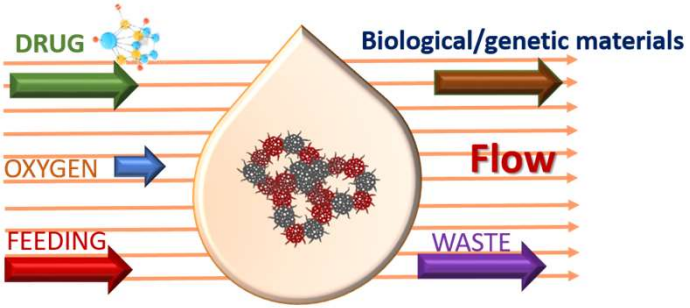
MICROFLUIDIC PLATFORM - DROPS FOR DRUG SCREENING

DROPS GENERATION in MICROCHANNELS

Multicomponent FLOW around the drop

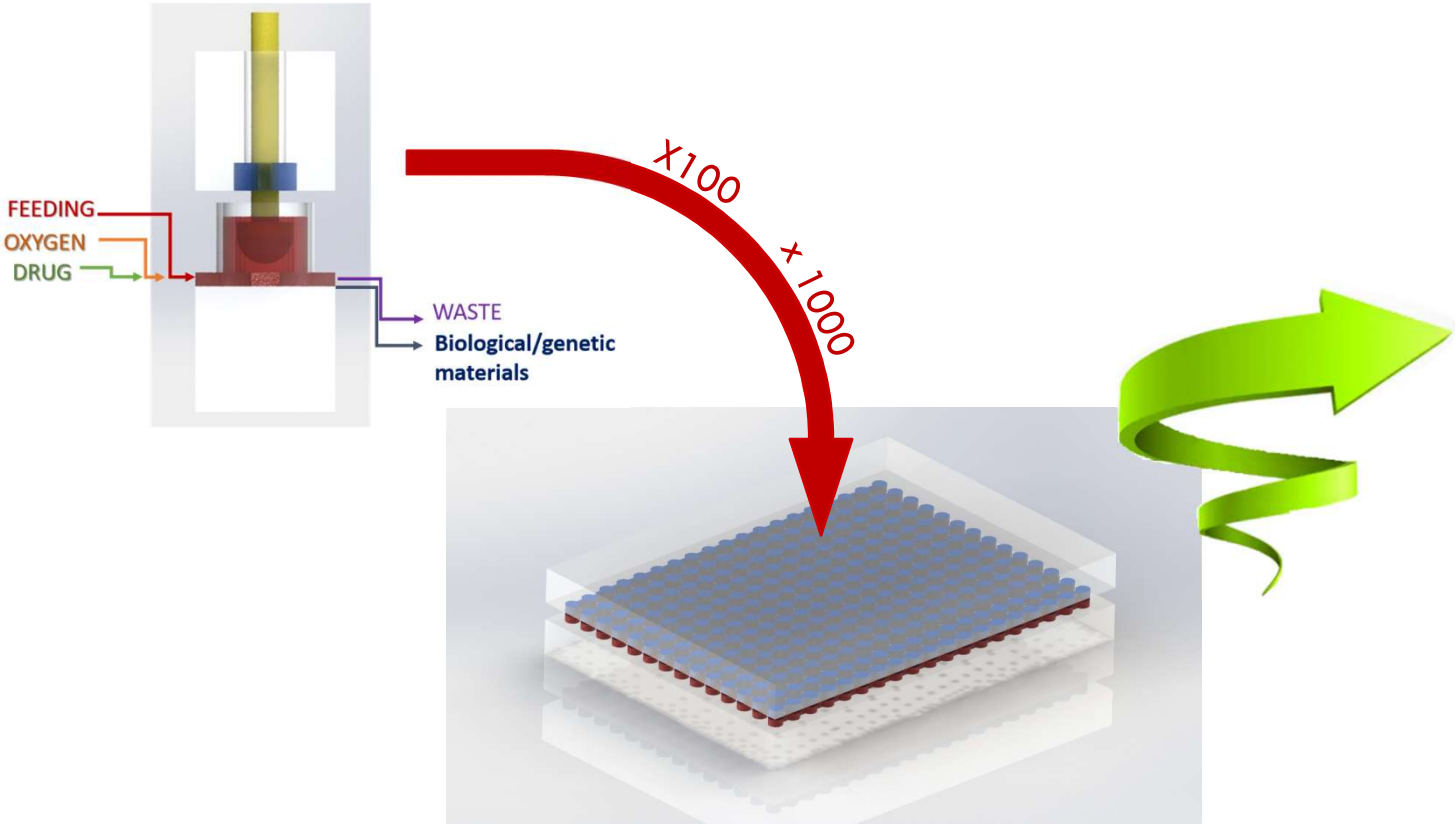






PATENT PENDING

MICROFLUIDIC PLATFORM
DROPS FOR DRUG SCREENING



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ACCELERATOR AWARD A26819

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AIRC

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POLITECNICO MILANO 1863

ICR The Institute of Cancer Research

FCSR Fondazione Centro San Raffaele

THANK YOU