
Le nanotecnologie e la medicina di precisione per lo sviluppo di nuovi modelli tumorali 3D

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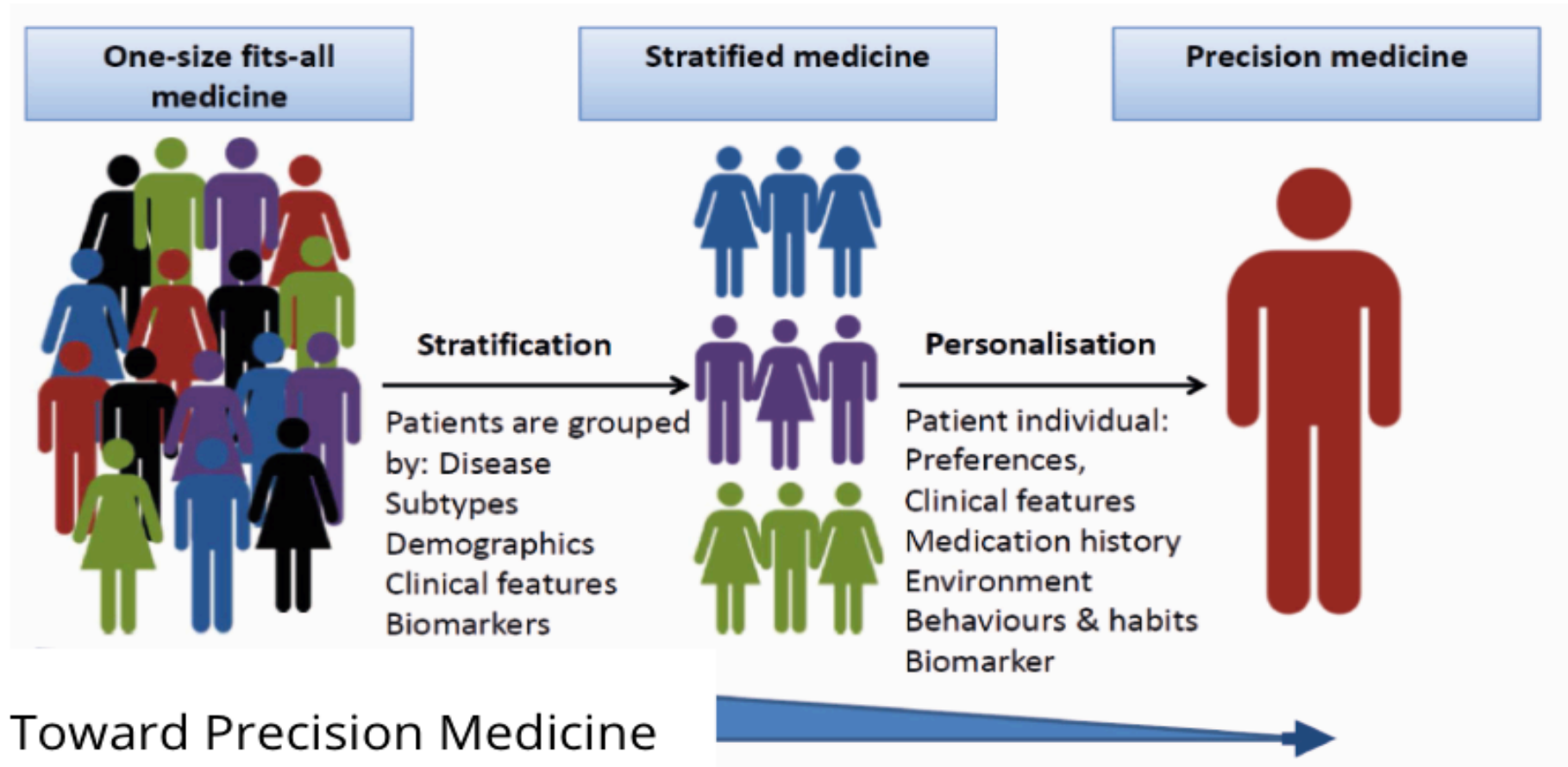
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Precision Medicine a new concept of individual healthcare



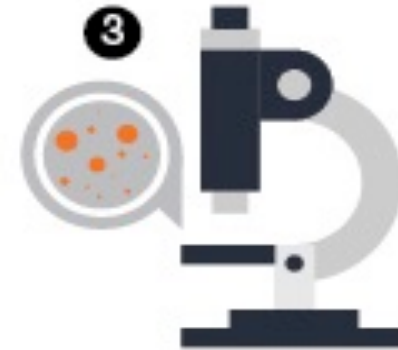
I want the country that eliminated polio and mapped the human genome to lead a new era of medicine. ... What if matching a cancer cure to our genetic code was just as easy, just as standard? What if figuring out the right dose of medicine was as simple as taking our temperature?—President Obama, January 30, 2015, State of the Union Address

What is Precision Medicine?



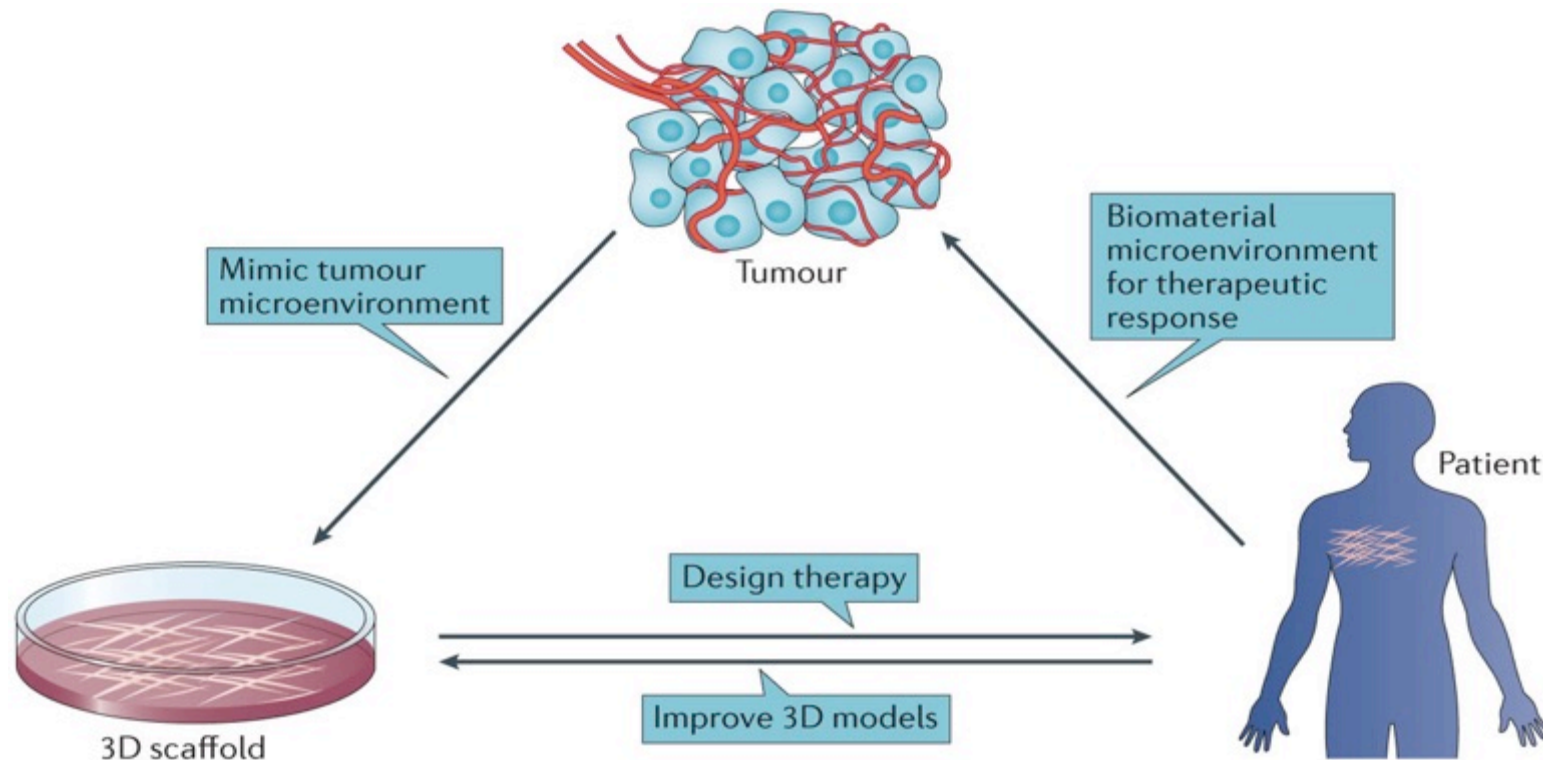
*To delivery the **right treatment** to the **right patient** at the **right time***

The challenges facing precision medicine:



<http://www.cancer.ca/en/research-horizons>

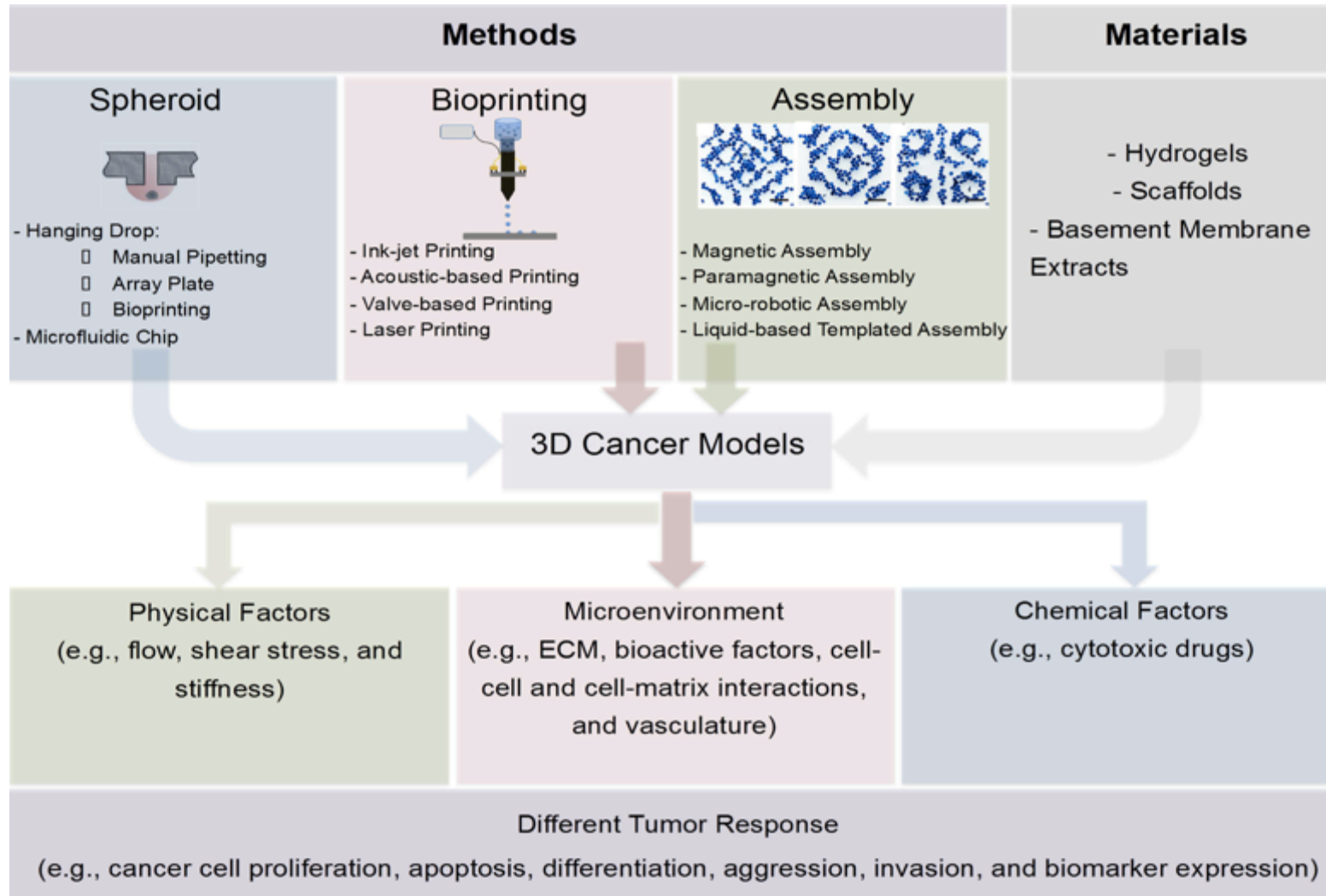
Relevance of 3D to Study Tumour



Nature Reviews | Cancer 2016

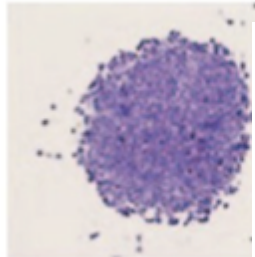
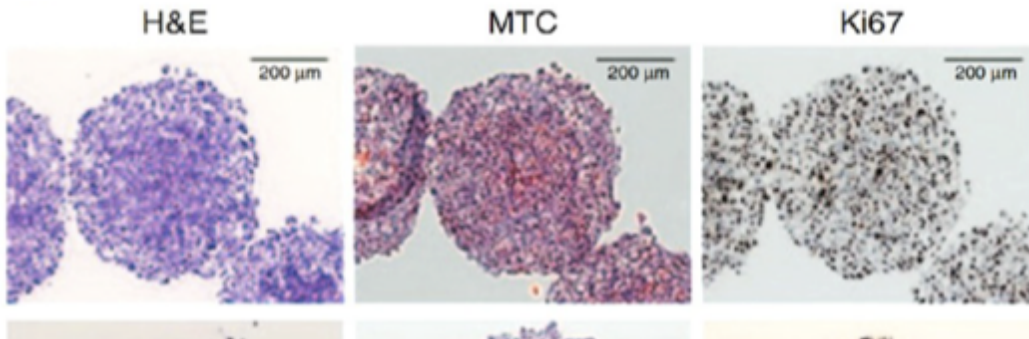
Growing cells in 3D reveals a more realistic drug response

Methods used to engineer 3D cancer models

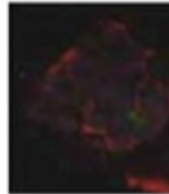
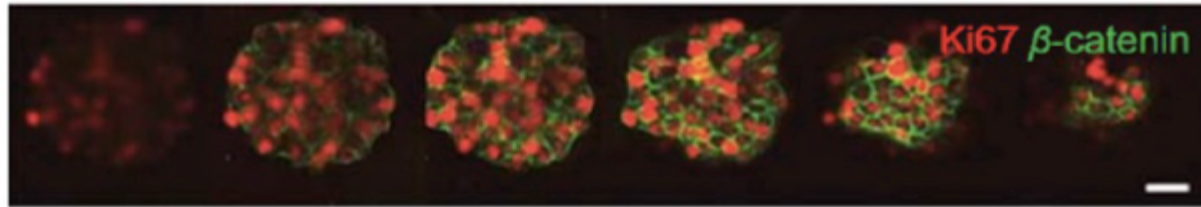


Some examples of 3D *in vitro* tumor models

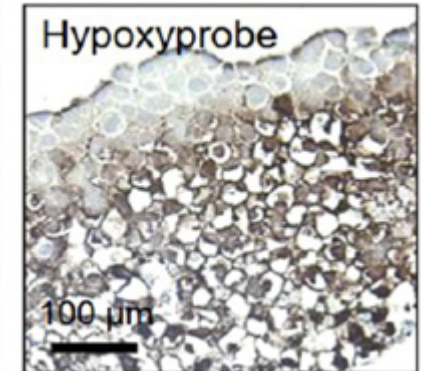
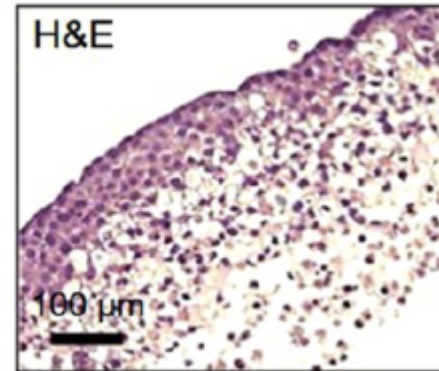
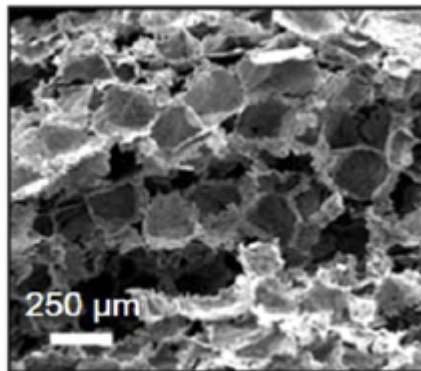
Spheroids



i Hydrogel matrix



ii Porous scaffold



Adapted by ACS Biomater. Sci. Eng. 2016

Motivation of INTERCELLMED

Tumor heterogeneity drives treatment resistance



*Every person is unique,
every tumor is unique,
every cell is unique*

[Nowell, *Science* 1997]

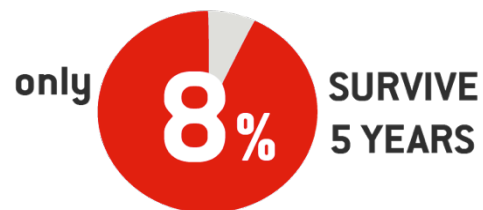


Therapy X - Therapy Y

Pancreatic cancer urgently need new solutions



*No time for trial-and-error
to find the best therapy*



[<https://www.cancer.org/cancer/pancreatic-cancer.html>]

STATE OF THE ART: Tumoroids as in vitro preclinical research tools



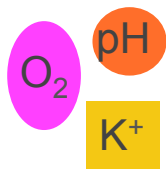
- **Invasive analyses**
(e.g., genomic profiling, fixation)
- **Low spatial information**
(e.g., bulk measurements
for metabolic profiling)



[Boj, *Cell* 2015]

Idea of INTERCELLMED

TOOLKIT



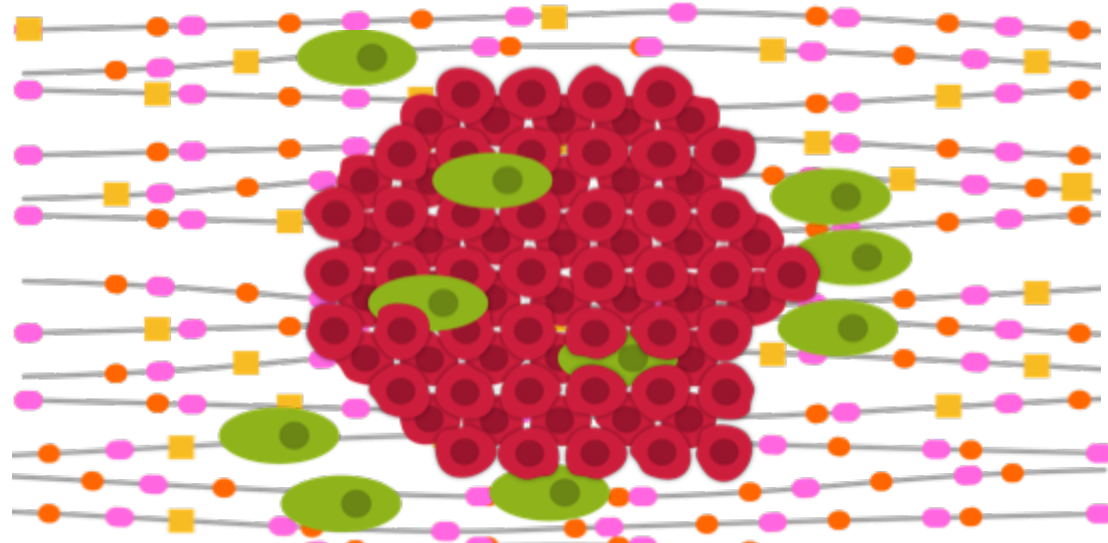
PARTICLES >
Sensors



SCAFFOLDS >
Biomimetic 3D
microenvironment



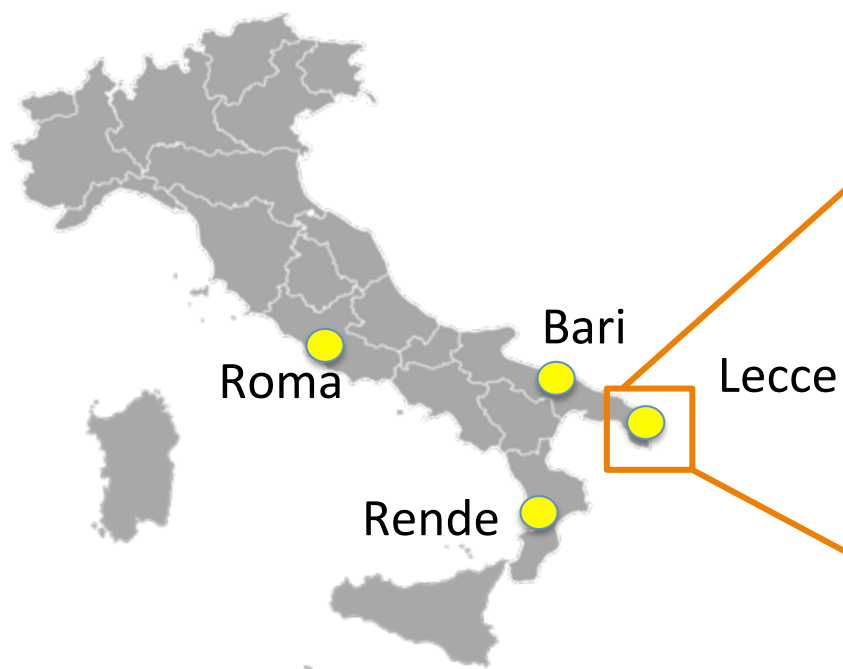
CELLS >
Tumoroids



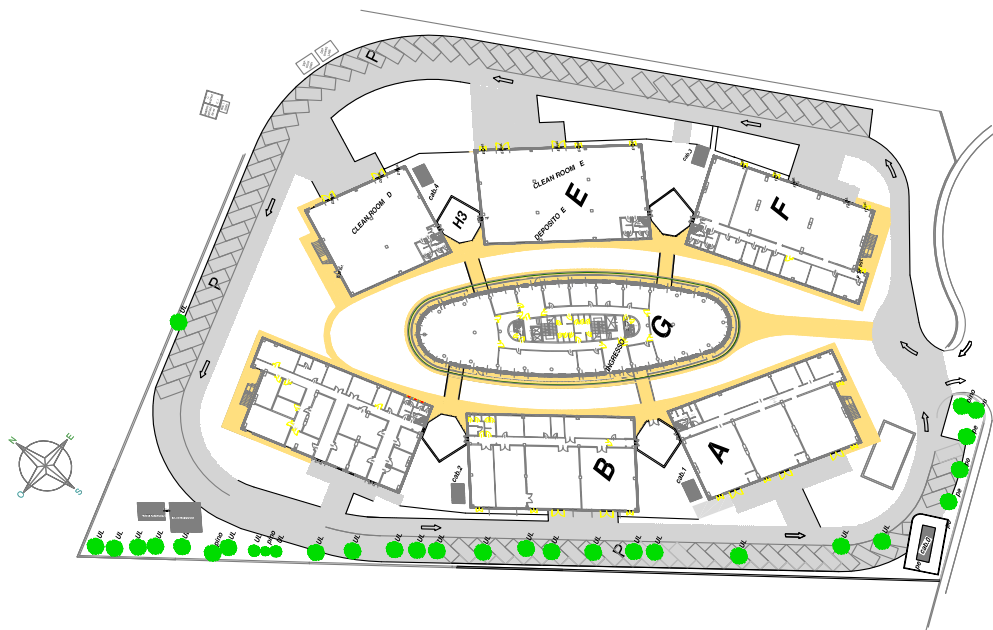
CHALLENGES:

Designing, developing and validating new sensing devices for faster and in situ multiparametric analysis of tumoroids dynamics in response to drugs

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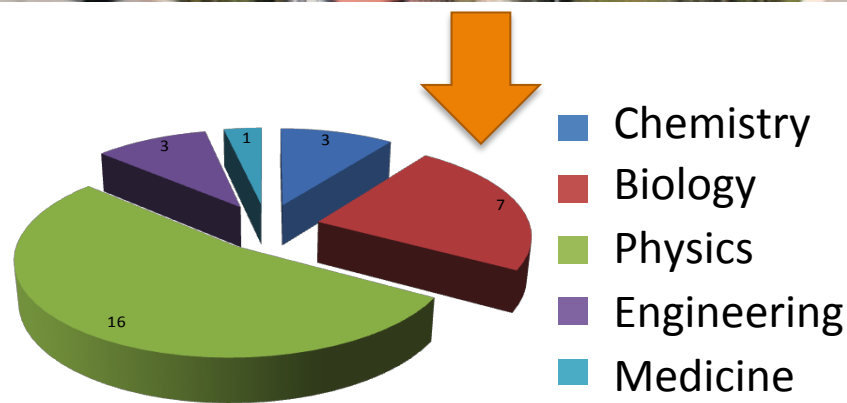



CNR-Nanotec@Lecce



12.000 mq Facilities & Laboratories (clean rooms, chemistry labs, cell labs, biology labs, device labs, photonic labs)

<http://www.nanotec.cnr.it/>





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AVRAI UN UOMO ISTRUITO.
SE ISTRUISCI UNA DONNA,
AVRAI UNA DONNA,
UNA FAMIGLIA
E UNA SOCIETÀ ISTRUITA.

Rita Levi Montalcini

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