UNIVERSITY OF OSTRAVA

FAKULTNÍ NEMOCNICE OSTRAVA

Microfluidics in organoid systems

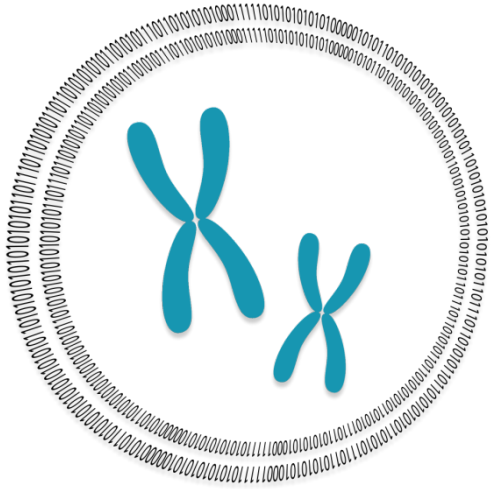
Juli R Bago

Blood Cancer Research Group

CELL THERAPY TEAM

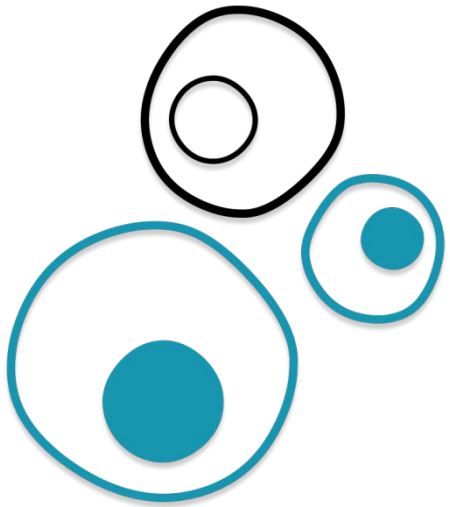
BCRG

Genomic and bioinformatics team

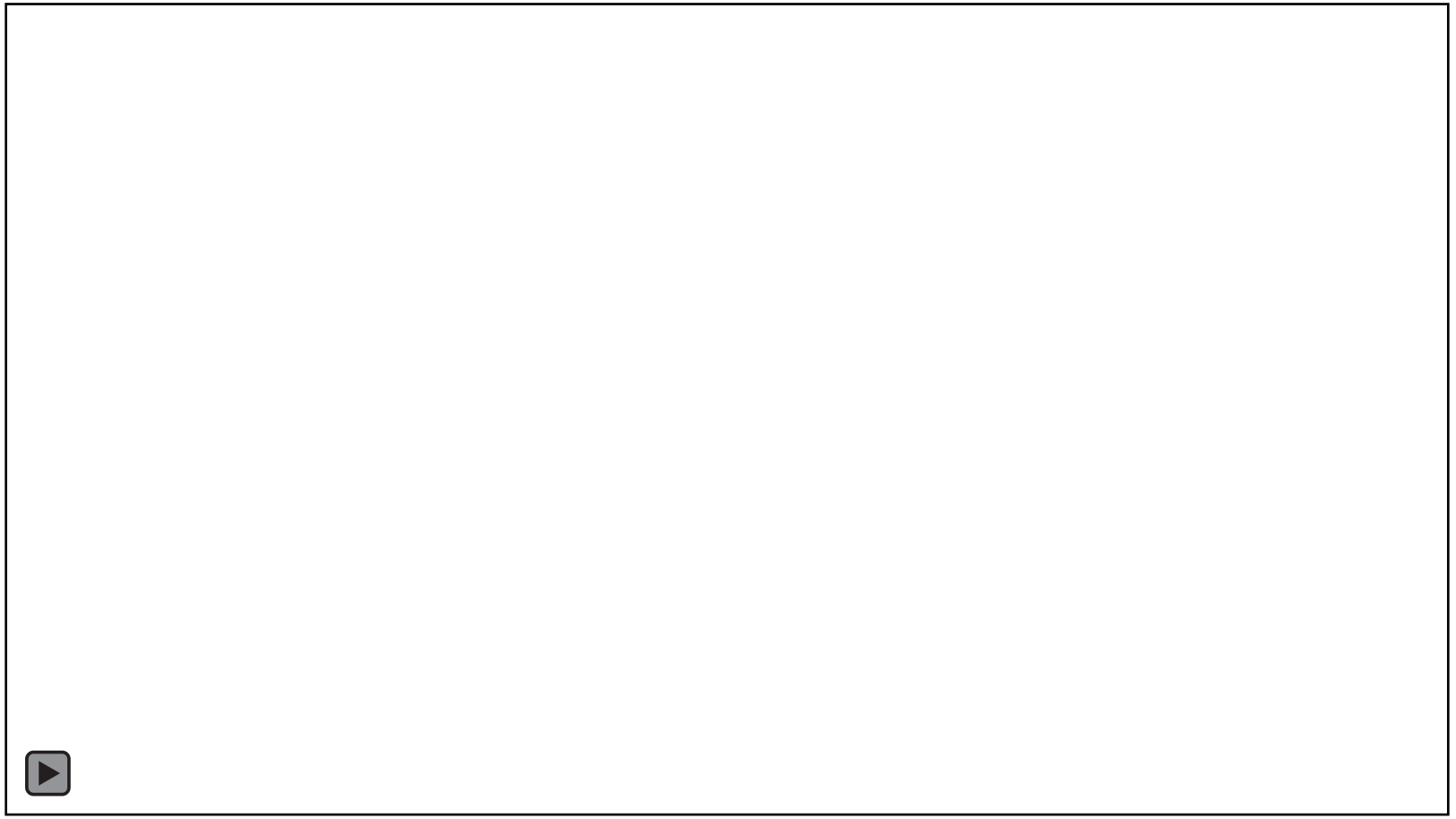


Cell and molecular biology team

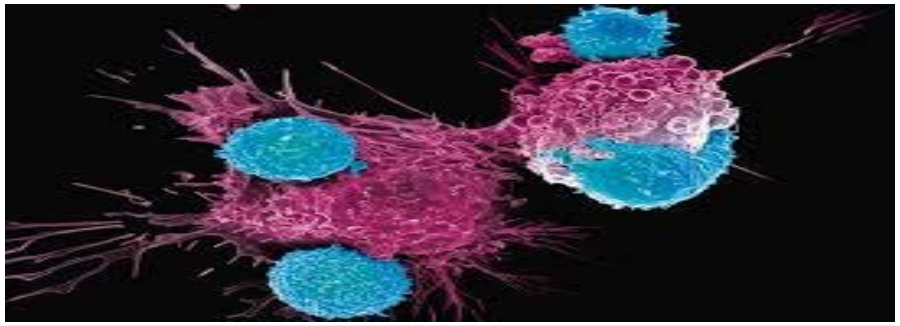
Cell therapy team



Cell based-immunotherapy: CAR-T cells



Cell based-immunotherapy: NK cells

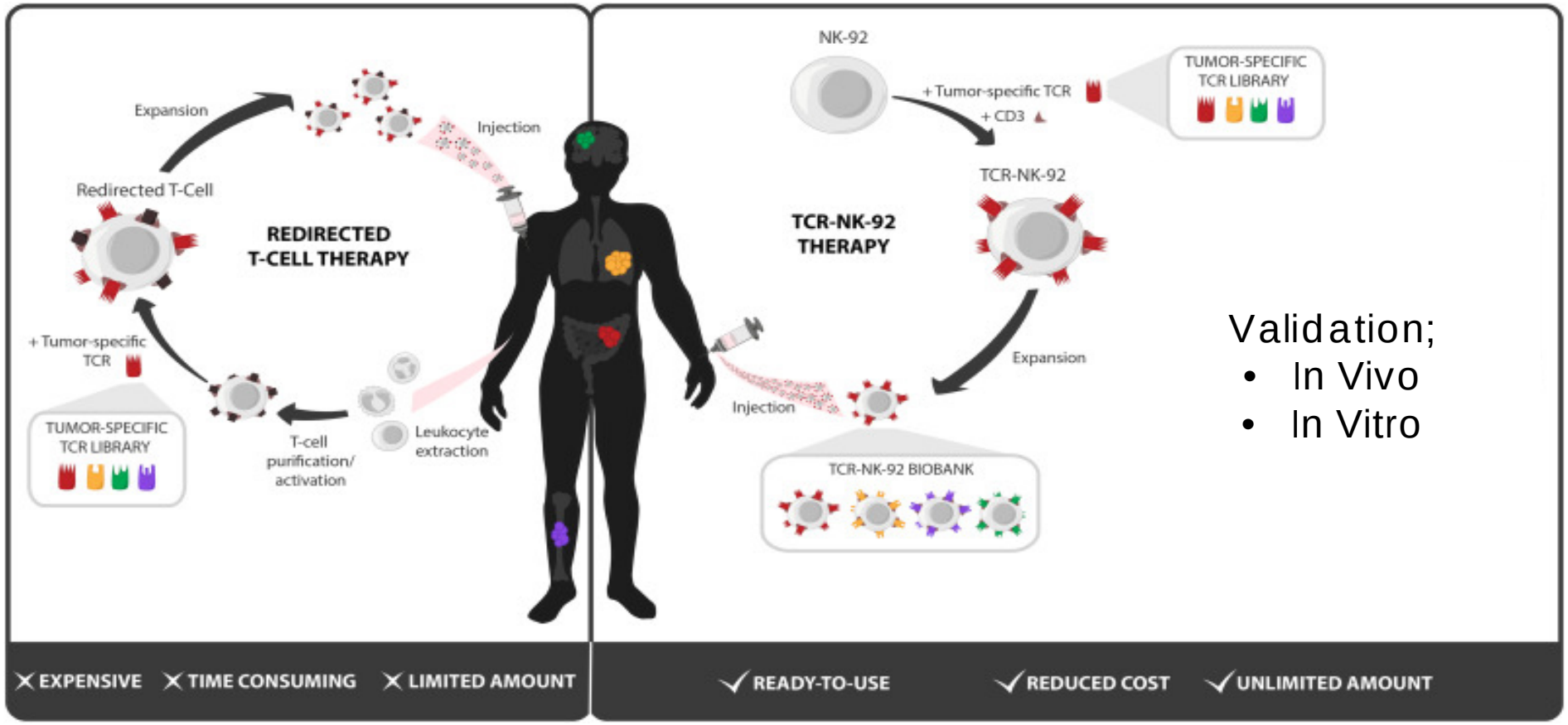


CART-CELL THERAPY

Expensive=400K $. Autologous to avoid GvHD

CAR T cells exert immune reaction towards a specific tumor antigen.

Cell based-immunotherapy: NK cells



Validation;
- In Vivo
- In Vitro

Mensali N, et al. NK cells specifically TCR-dressed to kill cancer cells. 2019. EBioMedicine

Cell based-immunotherapy: Validation

IN VIVO

Mouse models of hematological cancer

- Ethical issue
- Differences in physiology and genetics between animals of experimentation and humans.

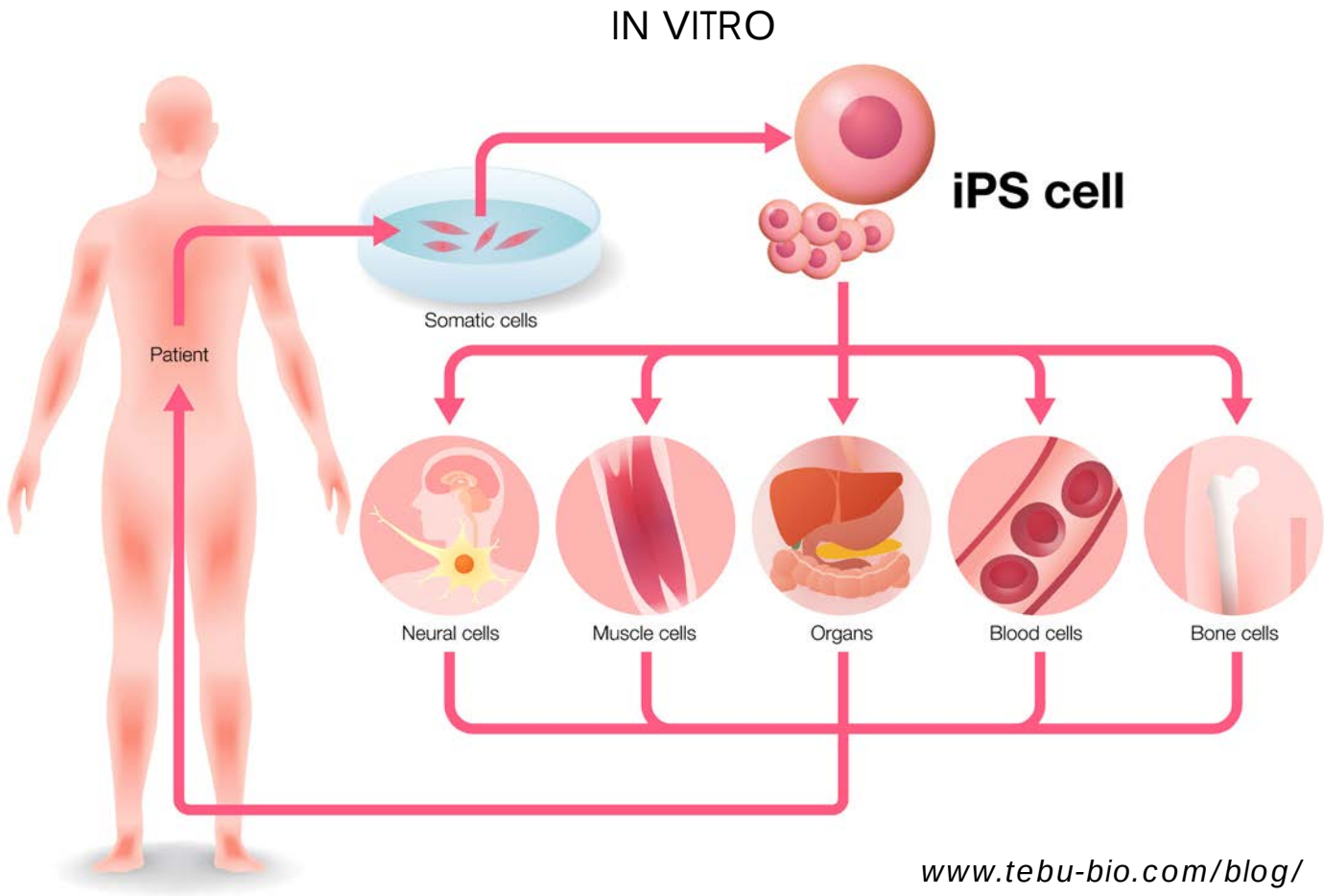
Cell based-immunotherapy: Validation

IN VITRO

Culture model	Advantages	Disadvantages
2D cell culture 	Methodology well established Simplicity to work with cell monolayer	Static conditions Uniform concentration of nutrients and drugs Lack of 3D environment Large reagent volumes

Valente et al. Microfluidic technologies for anticancer drug studies. 2017. Drug discovery today.

Cell based-immunotherapy: Validation

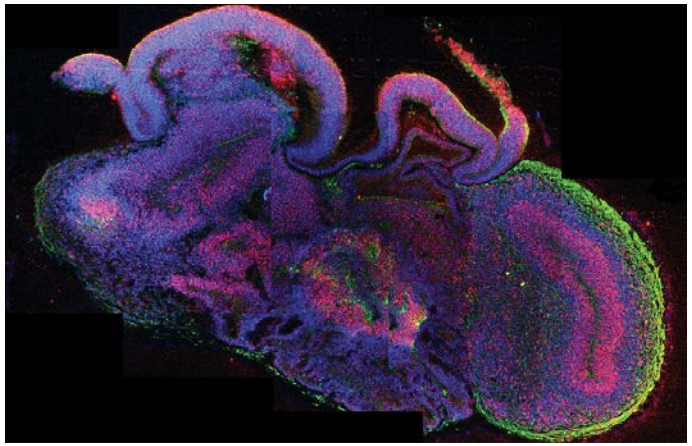


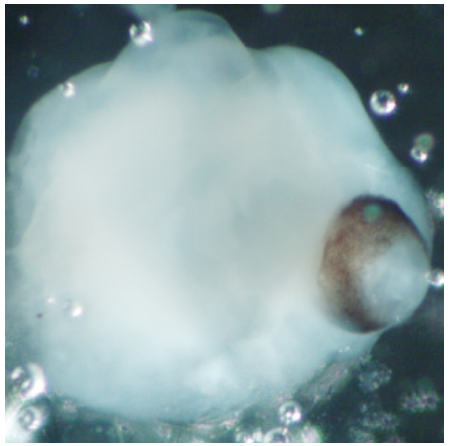
www.tebu-bio.com/blog/

Cell based-immunotherapy: Validation

IN VITRO

MiniBrains



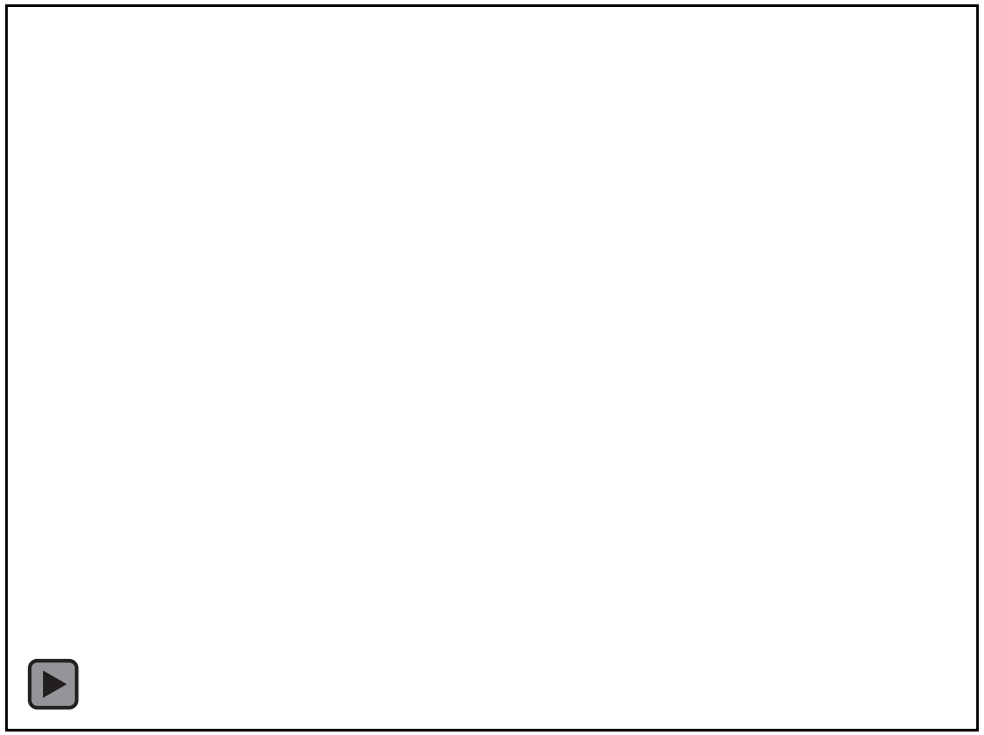


Lancaster, M. A. et al. 2013. Nature.

Cell based-immunotherapy: Validation

IN VITRO

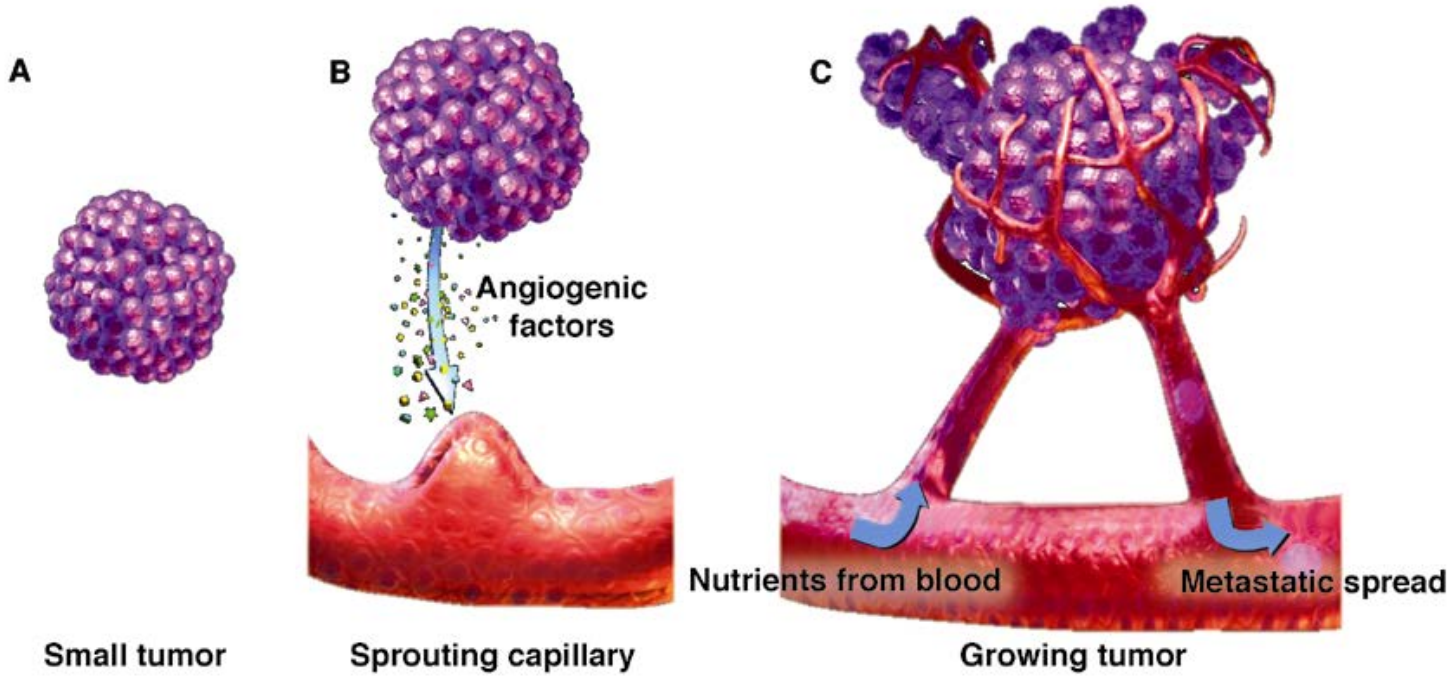
Mini Hearts



Cell Applications inc

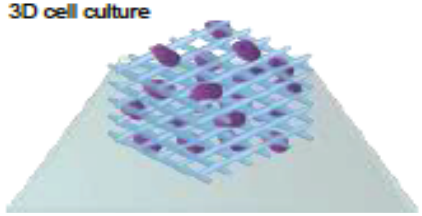
Cell based-immunotherapy: Validation

IN VITRO
Vascularization



Cell based-immunotherapy: Validation

IN VITRO

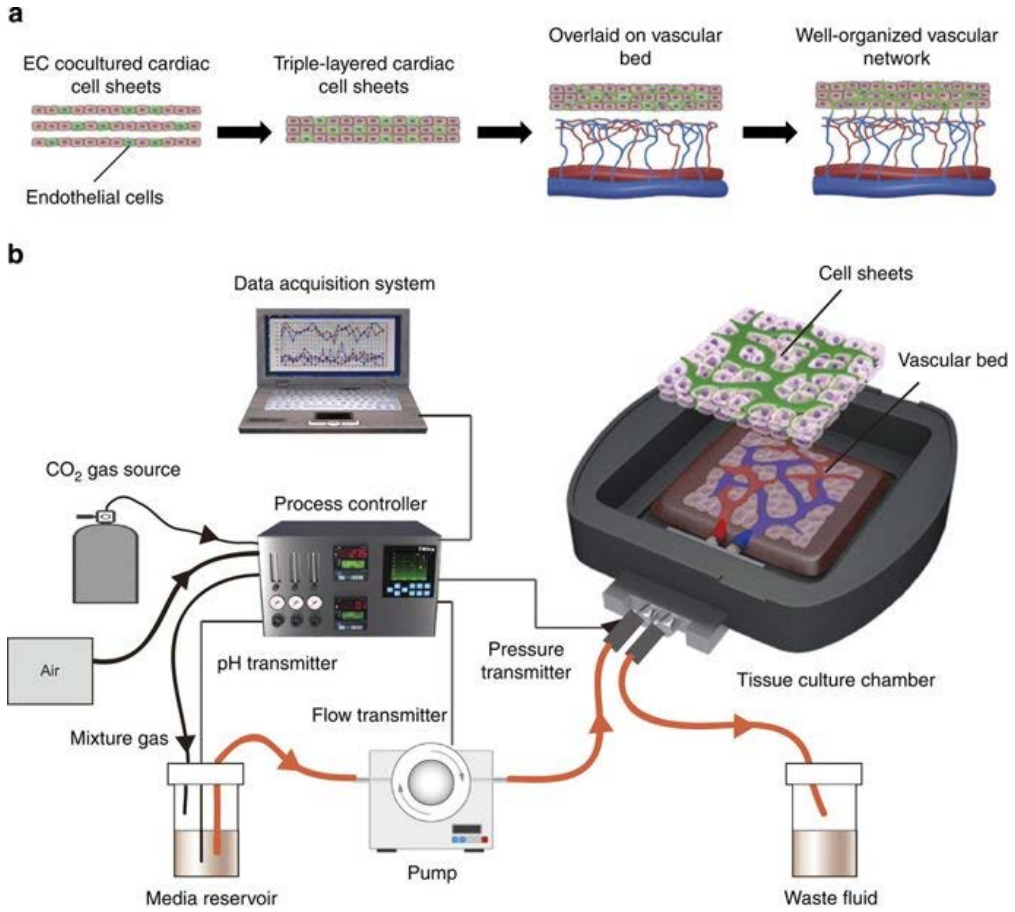
Culture model	Advantages	Disadvantages
2D cell culture 	Methodology well established Simplicity to work with cell monolayer	Static conditions Uniform concentration of nutrients and drugs Lack of 3D environment Large reagent volumes
3D cell culture 	Cell–cell and cell–ECM interactions Sensitivity to cytotoxic agents similar to *in vivo*	Failure to produce dynamic environment Lack of fluid flow perfusion

Valente et al. Microfluidic technologies for anticancer drug studies. 2017. Drug discovery today.

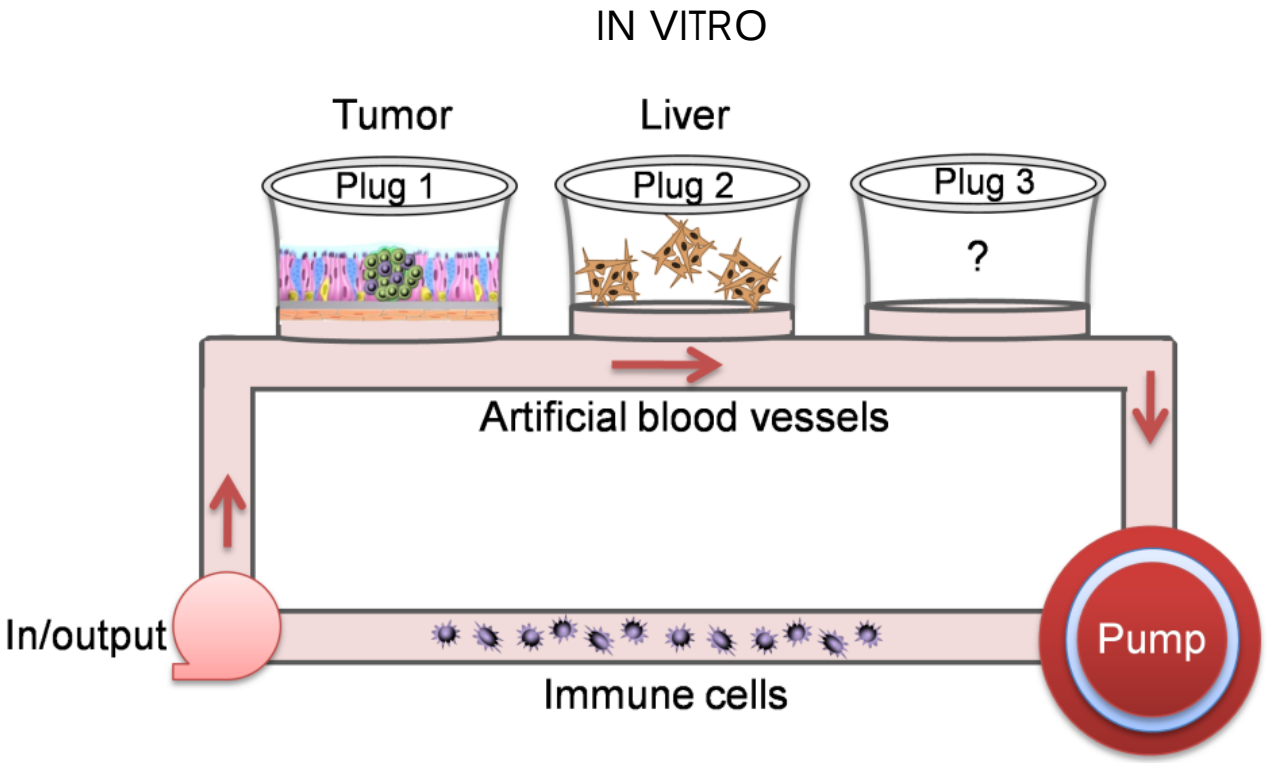
Cell based-immunotherapy: Validation

IN VITRO
Vascularization

Sekine et al. In vitro fabrication of functional three-dimensional tissues with perfusable blood vessels. 2013. Nat Commun.



Cell based-immunotherapy: Validation



Samuel Constant et al. Advanced Human In vitro Models for the Discovery and Development of Lung Cancer Therapies. 2015.

CELL THERAPY TEAM

THANK YOU SO MUCH