

# Advanced *in vitro* models for (nano)toxicity determination

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MARCH 16, 2022



# SHORT TERM SCIENTIFIC MISSION (STSM)

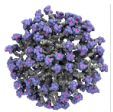
## 1<sup>st</sup> call

Title of the STSM Project: **Evaluation of antitumor activity of selenium-based nanoparticles**

Duration of the STSM: 23/04/2019 – 29/04/2019

Home Institution: Biomedical Research Center, SAS, Bratislava, Slovakia

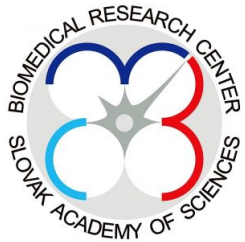
Host Institution: Institute for Medical Research and Occupational Health, Zagreb, Croatia



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**NANO2CLINIC**  
CANCER NANOMEDICINE - FROM THE  
BENCH TO THE BEDSIDE

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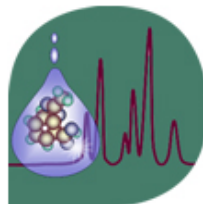
## Biomedical Research Center of the Slovak Academy of Sciences



<http://www.biomedcentrum.sav.sk/research-departments/department-of-nanobiology/?lang=en>



## Institute for Medical Research and Occupational Health



### Analytical Toxicology and Mineral Metabolism Unit

Dr. Ivana Vinkovic Vrcek (WG2 leader)



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Horizon 2020

Call: H2020-SC1-BHC-2018-2020

(Better Health and care, economic growth and sustainable health systems )

Topic: SC1-BHC-11-2020

Type of action: RIA

Proposal number: 964160

Proposal acronym: AFFECTS

**Animal Free Framework for Chemical Testing and Safety**

VEGA 2/0121/21

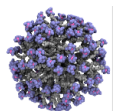
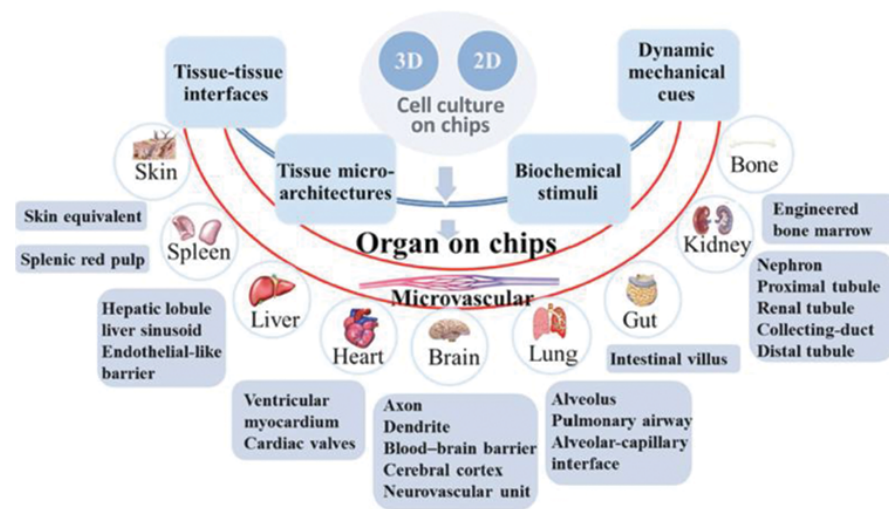
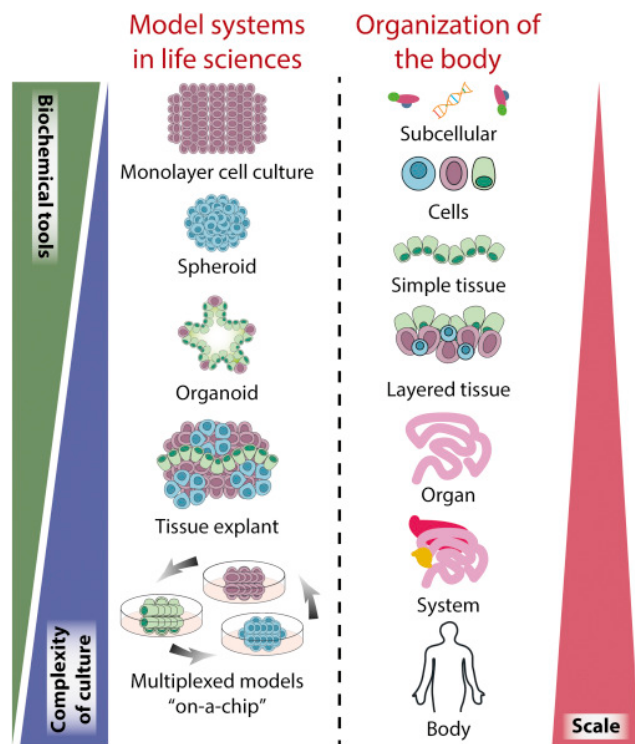
**Use of microfluidic systems for risk assessment of xenobiotics**



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# Mammalian *in vitro* testing models



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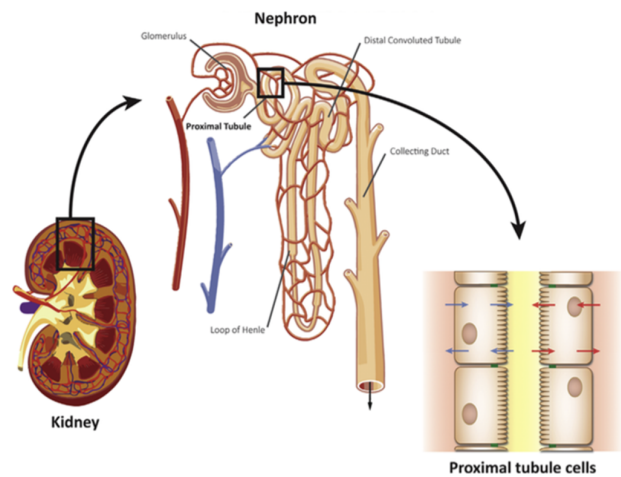
## Why we need better *in vitro* models?

**Toxic Concentrations ( $\mu\text{M}$ ) *in vivo* and *in vitro***

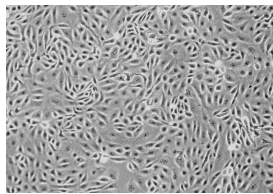
| Drug         | Plasma Concentration (Rat In Vivo) | 2D Hepatocytes | 3D Hepatocytes | Reference         |
|--------------|------------------------------------|----------------|----------------|-------------------|
| Azathioprine | 1                                  | 1              | 1              | Wu et al., 2006   |
| Chloroquine  | 2.5                                | 5              | 2.5            | Shen et al., 2008 |
| Clozapine    | 4                                  | 30             | 5              | Lu et al., 2008   |
| Amiodarone   | 5.4                                | 10             | 5              | Shen et al., 2008 |
| Rifampicin   | 12                                 | 600            | 12             | Shen et al., 2008 |
| Tetracycline | 26                                 | 100            | 25             | Shen et al., 2008 |
| Isoniazid    | 30                                 | 1100           | 33             | Shen et al., 2006 |

(Q. Meng, Zhejiang University CHD)

Kidney



TH1 cells



Mimicking *in vivo* conditions

Transwell inserts (polycarbonate membrane, porosity 3  $\mu\text{m}$ )

Static

vs.

Dynamic

N. Sánchez-Romero et al., 2016



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