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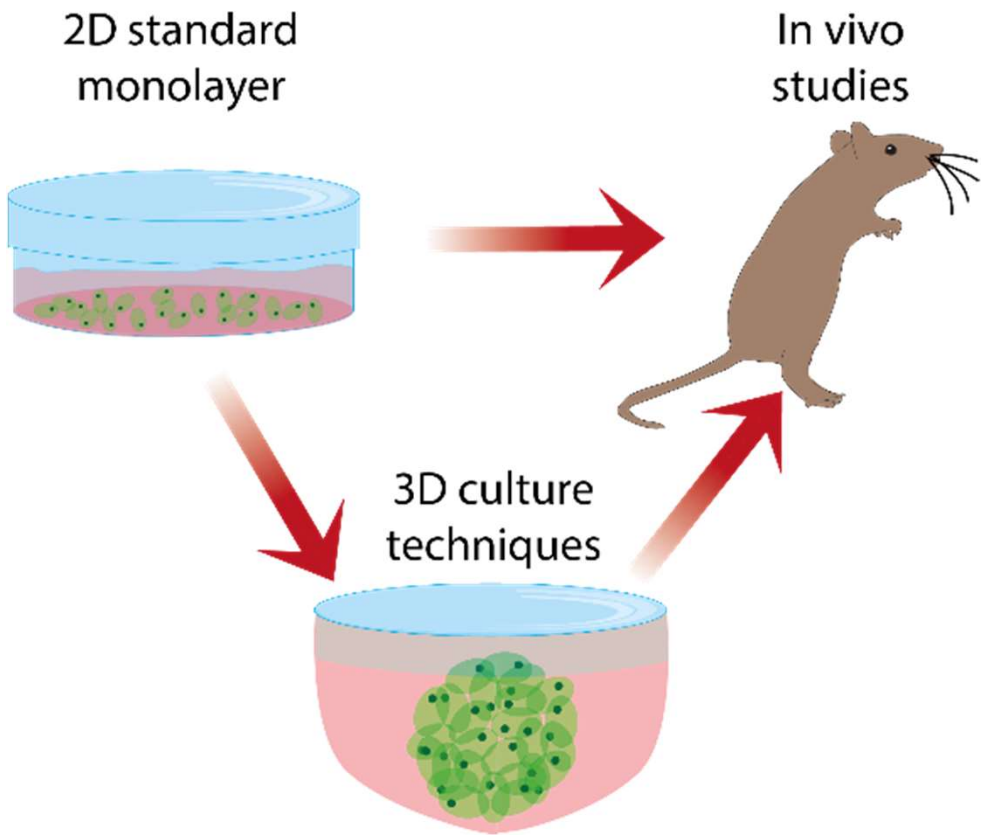
Chaired by Dr. Alfredo Berzal-Herranz and Prof. Dr. Maria Emília Sousa
pharmaceuticals
MDPI

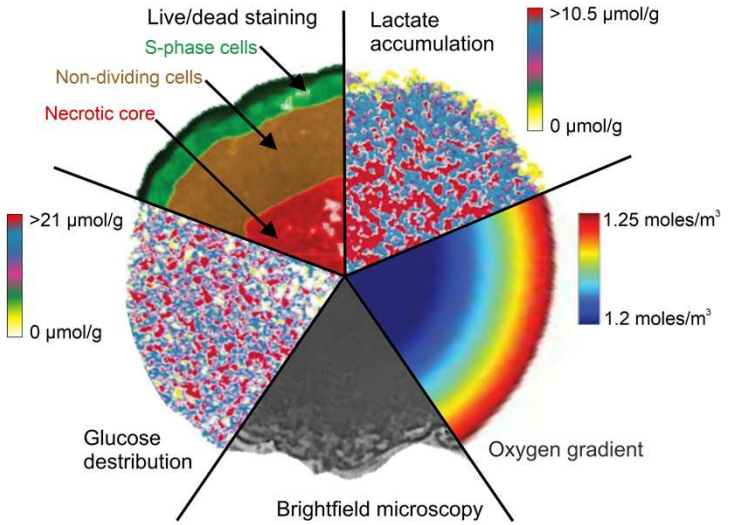
Investigation of Polymeric Carrier Uptake and Passage within Cellular Spheroids Using Advanced Analytical Techniques

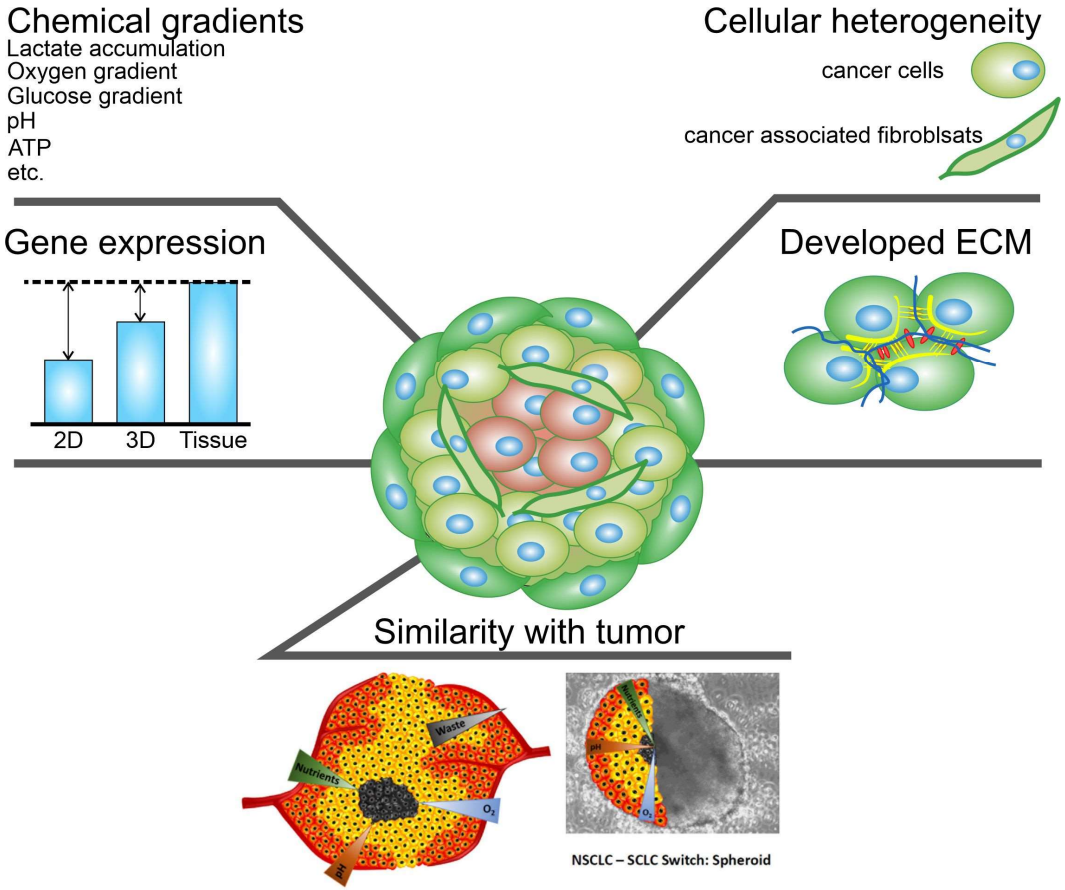
Skoltech
Blindman Maria, Marina Novoselova, **Anatolii Abalymov**

Advantages of using 3D cell cultures



Advantages of using 3D cell cultures





Anisimov, R. A.; Gorin, D. A.; Abalymov, A. A. 3D Cell Spheroids as a Tool for Evaluating the Effectiveness of Carbon Nanotubes as a Drug Delivery and Photothermal Therapy Agents. *C* **2022**

3D cell cultures can be used for different approaches

Cancer research

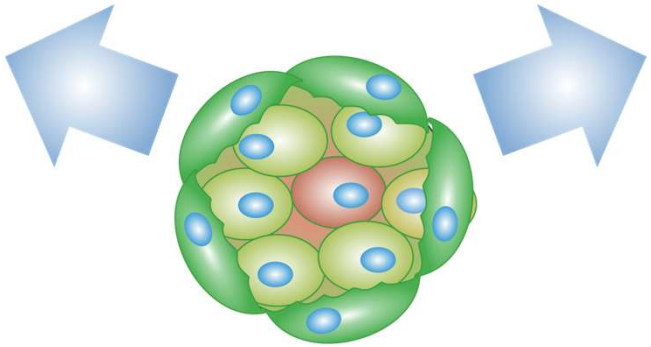
-cytostatics activity

-penetration of carriers and nanoparticles

-molecular gradient

-phototherapy

-tumor fibrosis
etc.



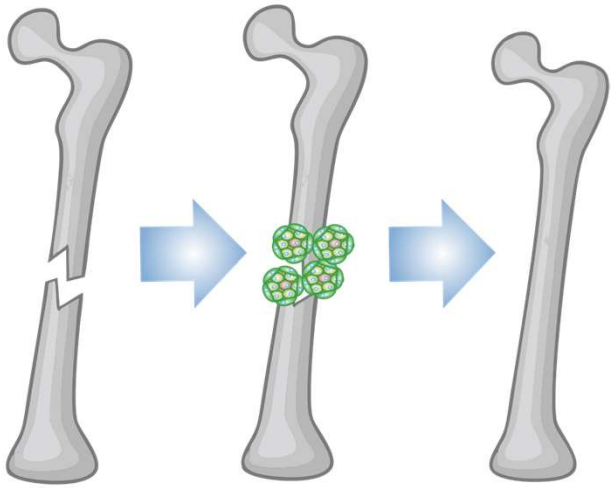
Tissue engineering research

-repair of damaged tissues

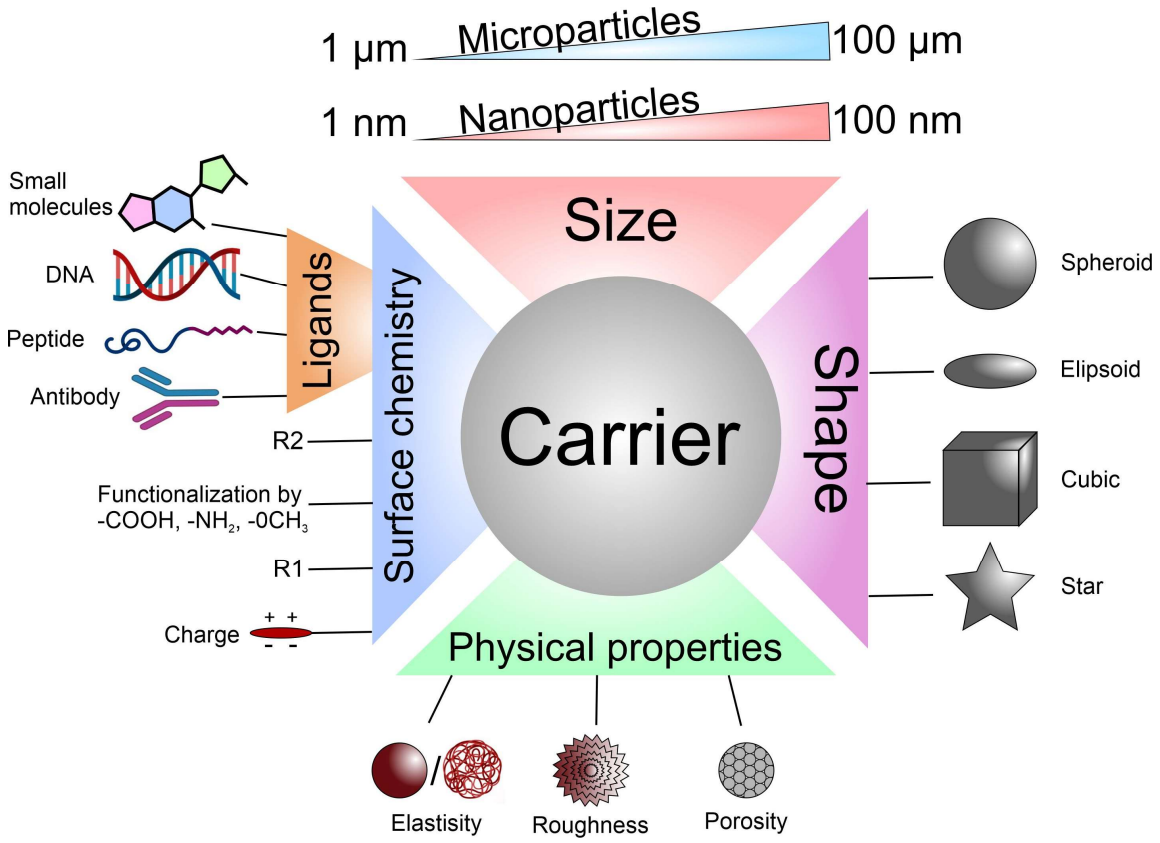
-angiogenesis

-bioink design

-organoid formation
etc.



High amount of the carrier properties… Which combination is better?



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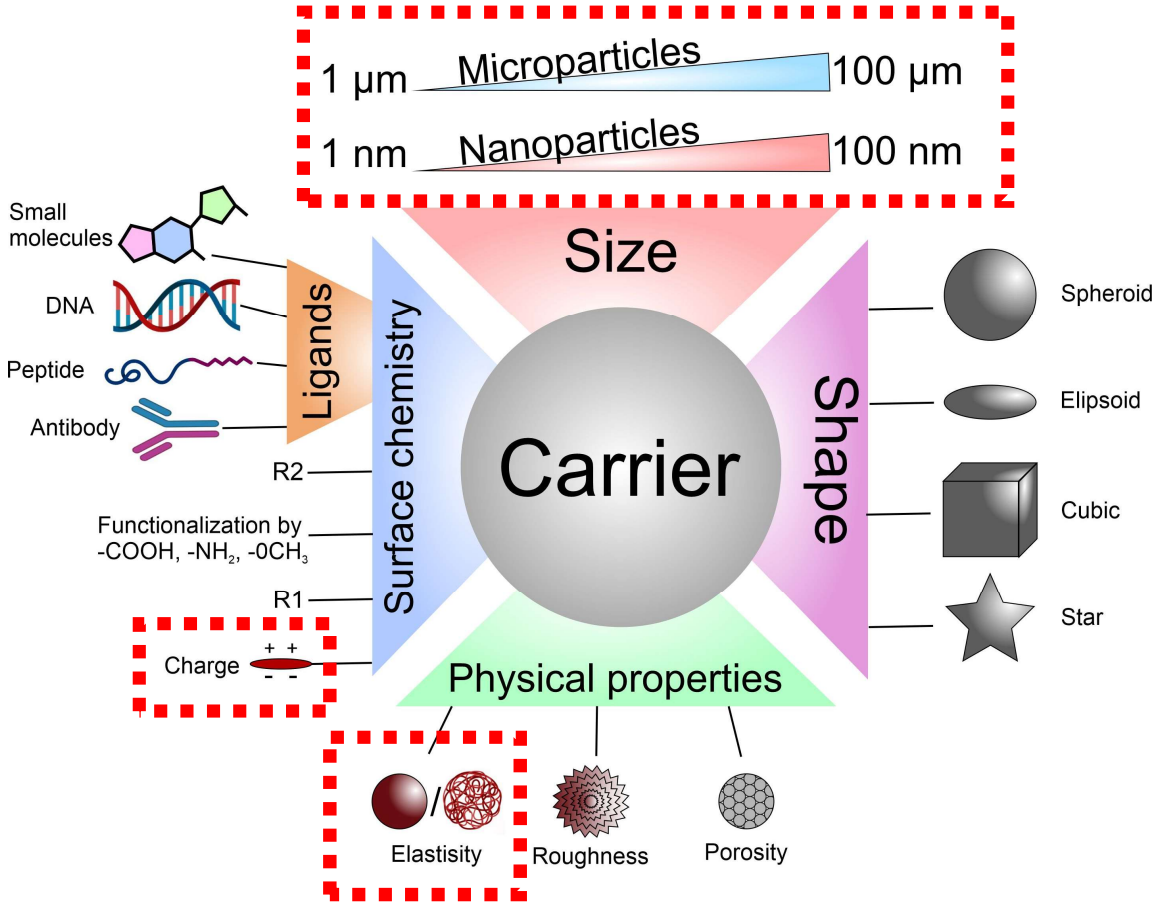
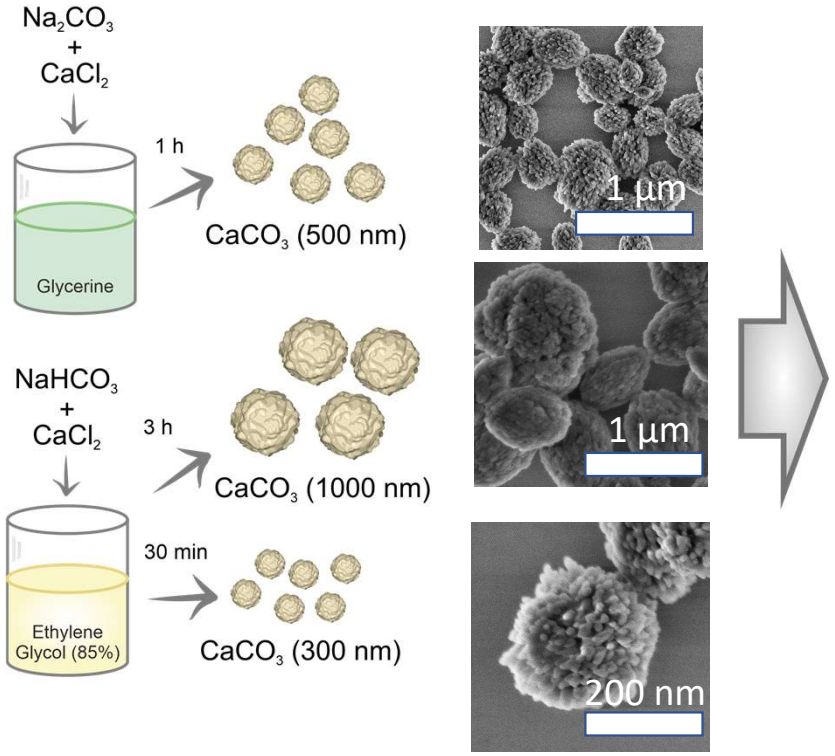
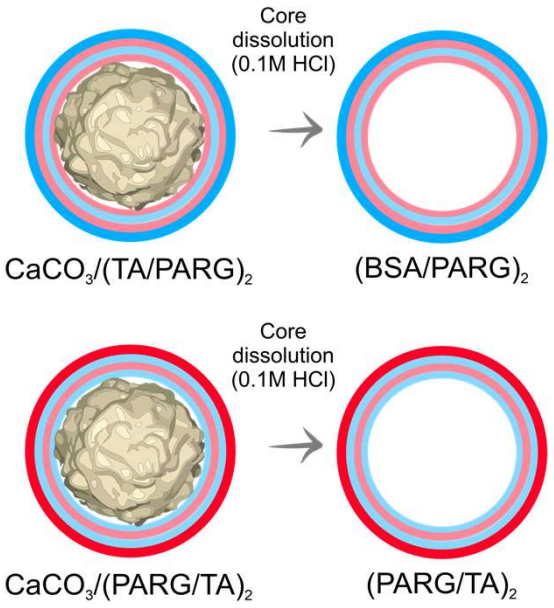
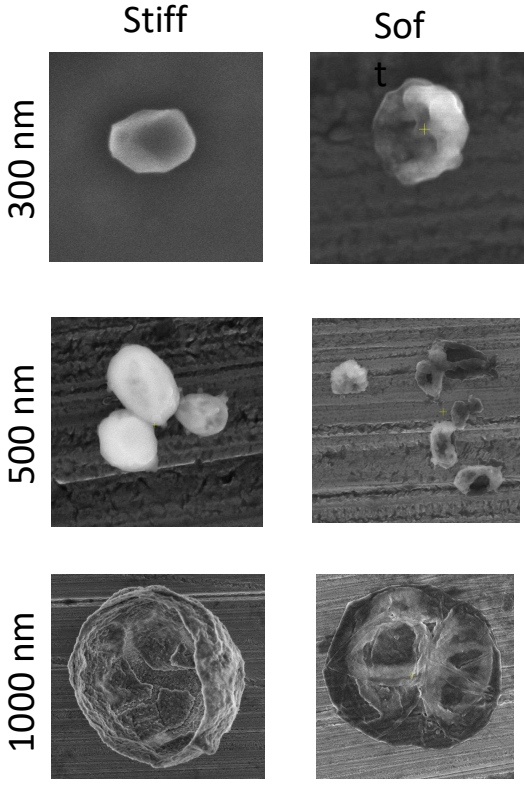


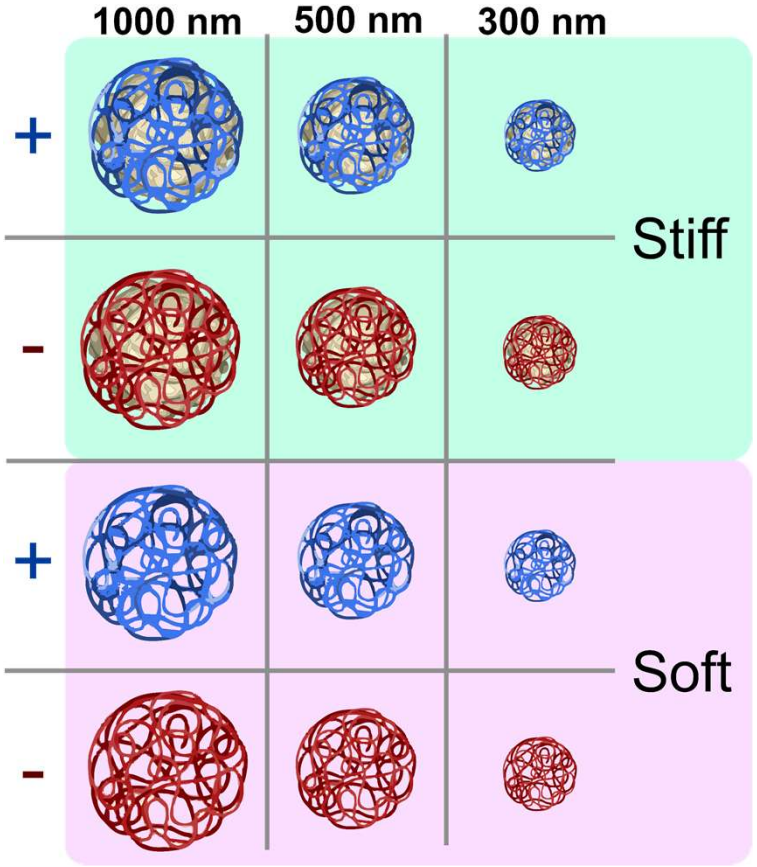
Synthesis of the carriers with different Size, charge and *stiff*ness

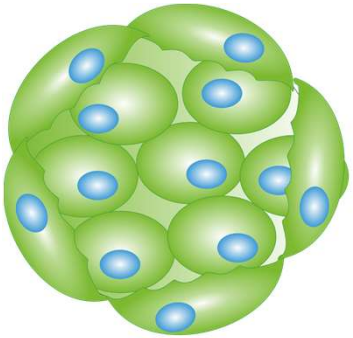




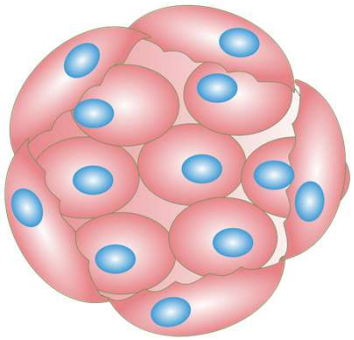


12 type of carriers + 2 type of spheroids



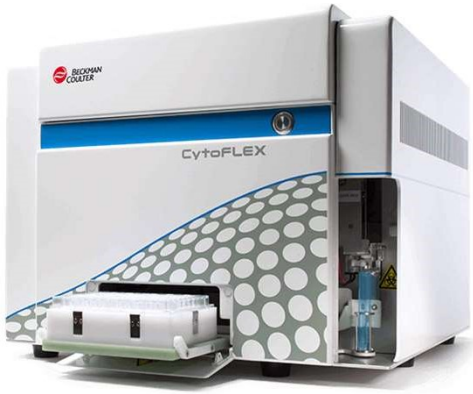


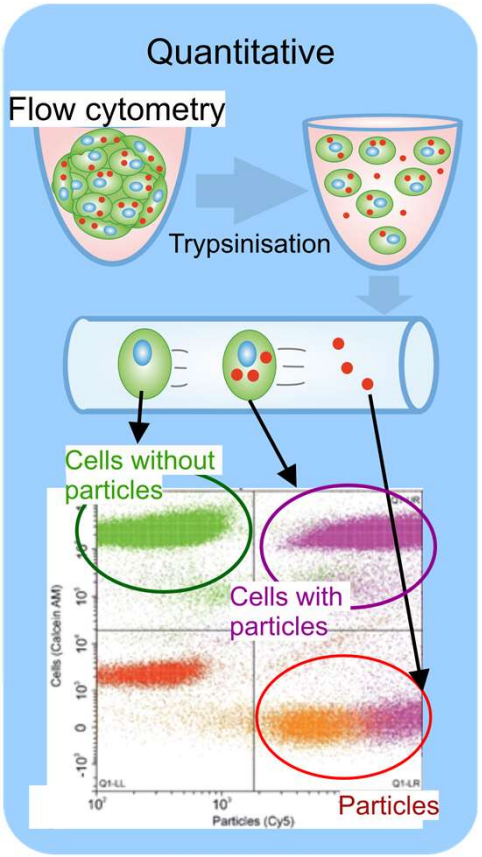
L929
(Fibroblast
cell line)

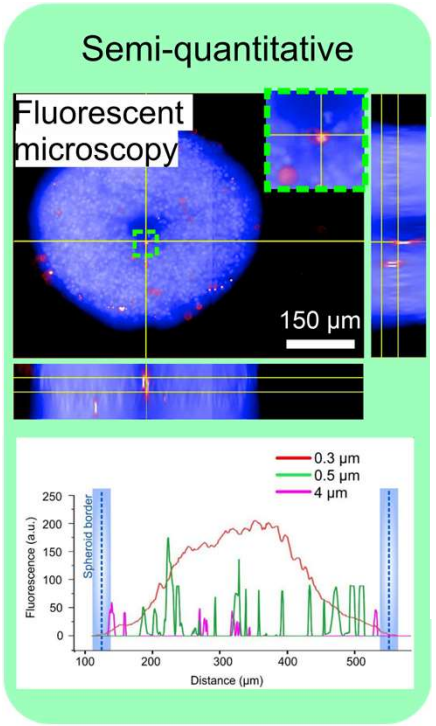


4T1
(Breast cancer
cell line)

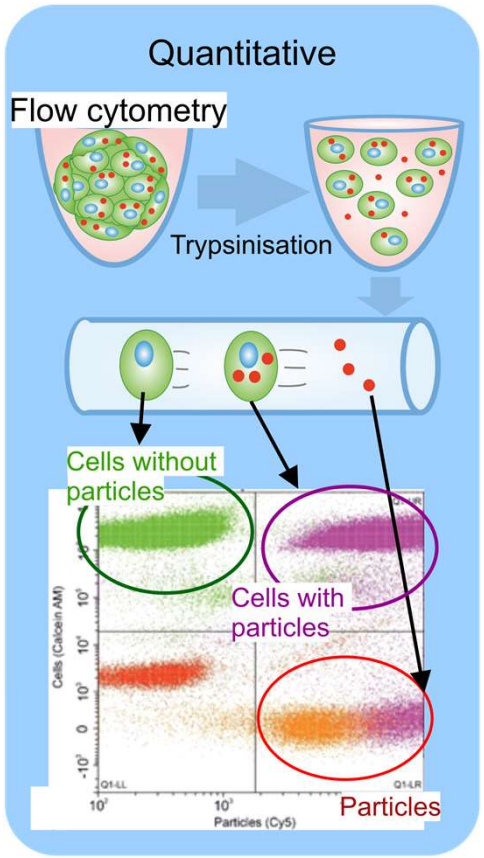
Methods of spheroids analysis

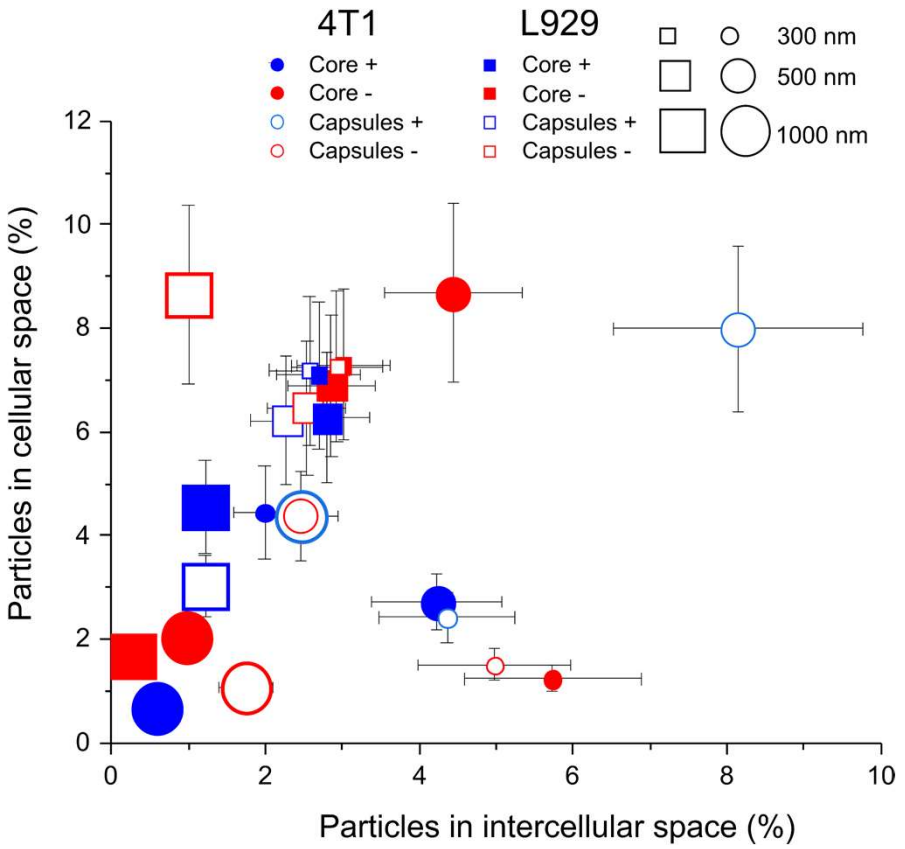




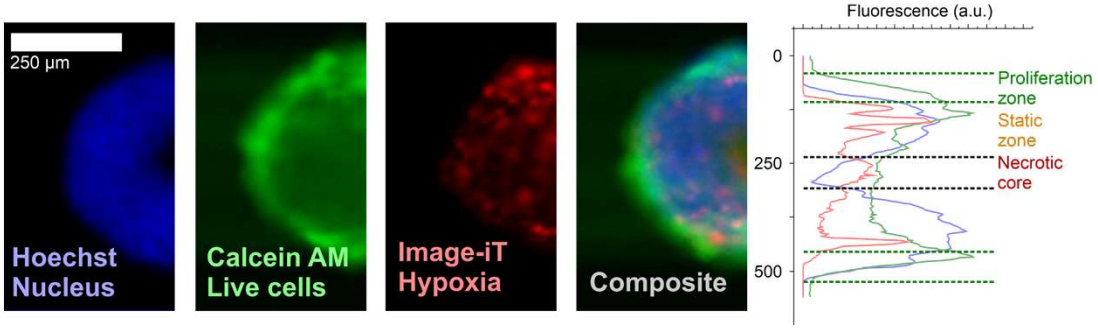


Flow cytometry results

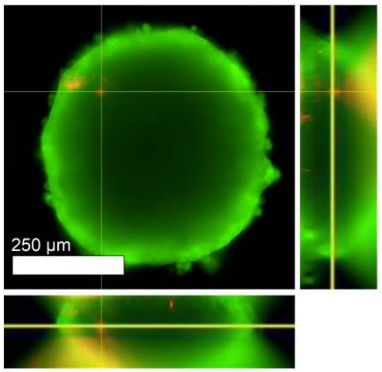


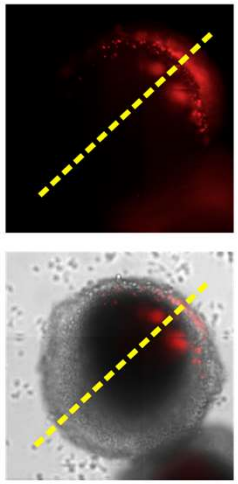


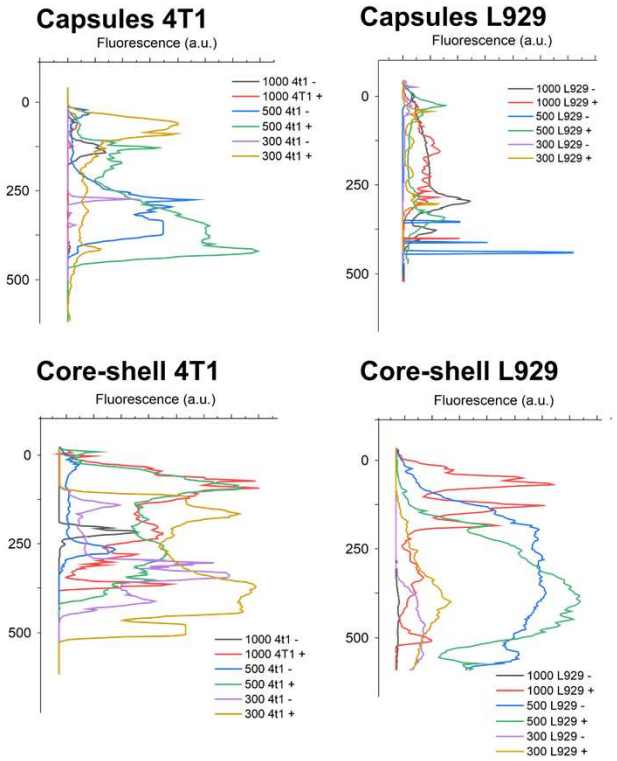
Determination of spheroids zones

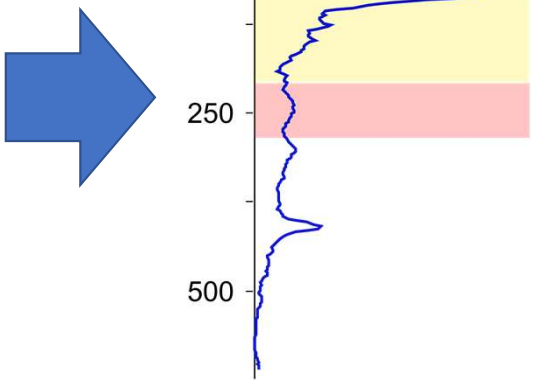


Orthogonal projection

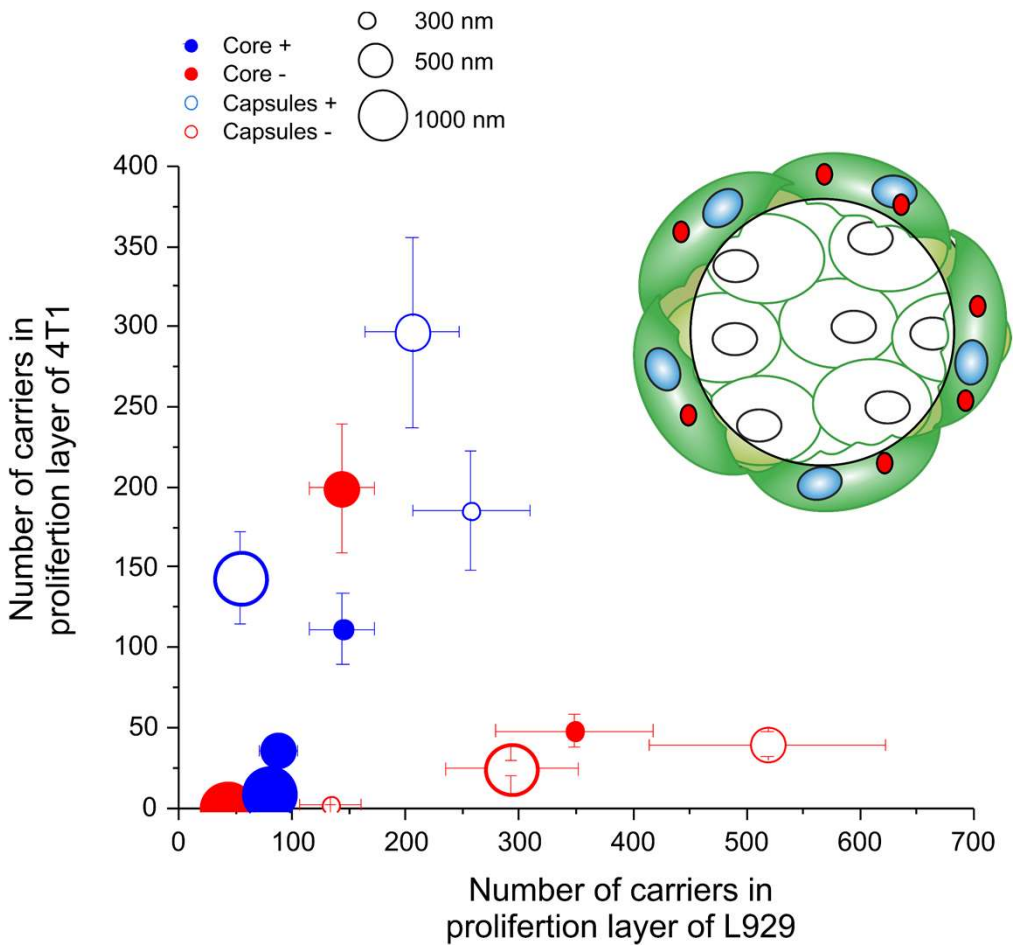








Carriers in proliferation zone

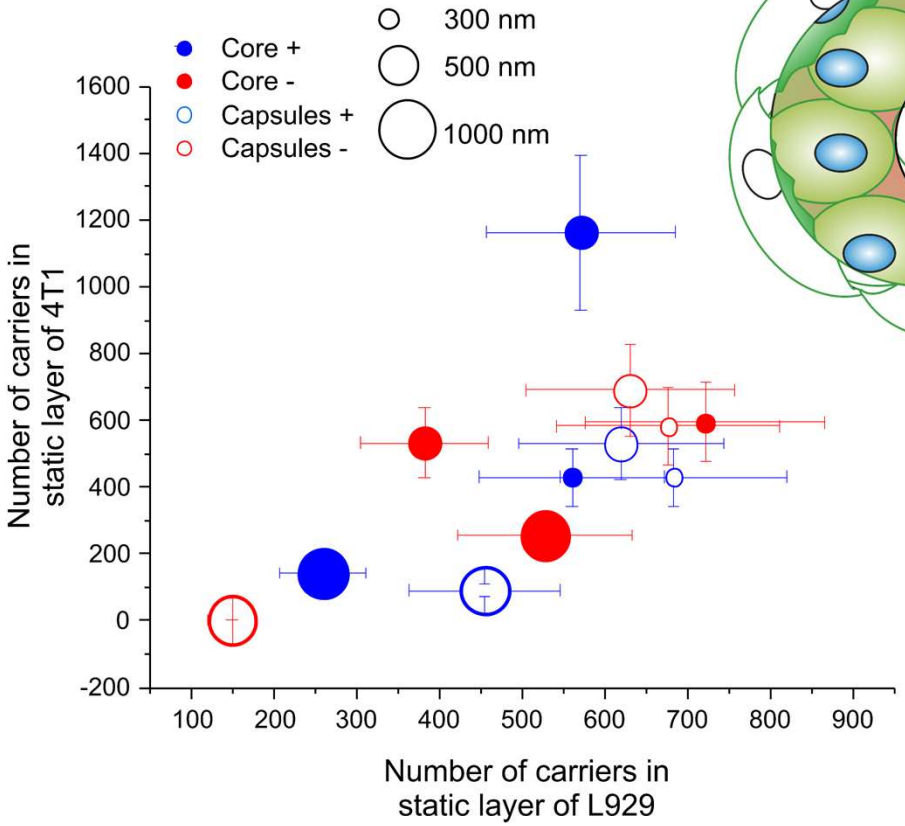


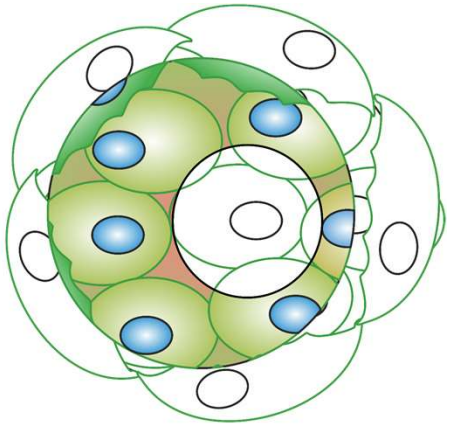
Best results:

For L929 – Negative, soft 500 nm particles

For 4T1 – Positive, soft 1000 nm particles

Carriers in static zone



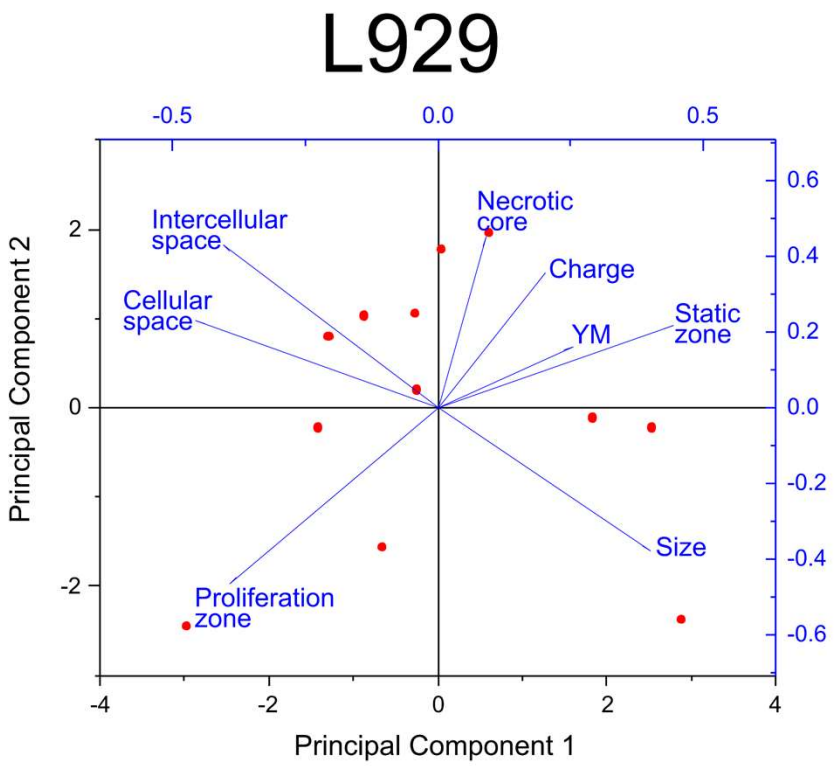


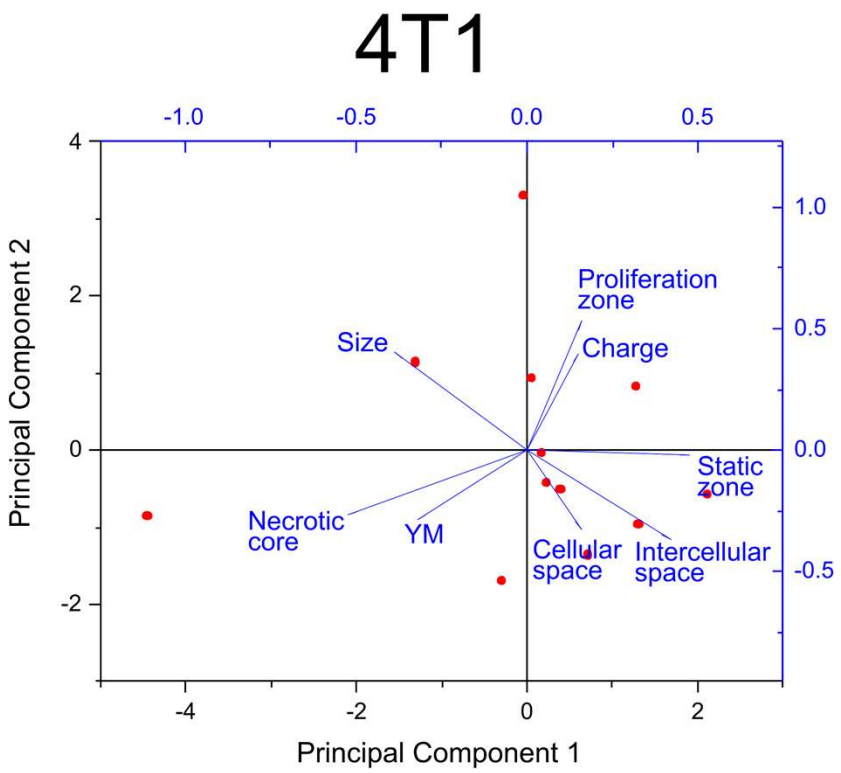
Best results:

For L929 – Positive, *soft* 1000 nm particles

For 4T1 – Negative, **stiff** 500 nm particles

Principal component analysis





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Thank you for your attention

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