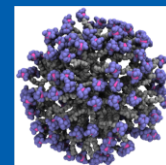




Trinity College Dublin

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COST ACTION CA 17140

NANO2CLINIC

CANCER NANOMEDICINE - FROM THE
BENCH TO THE BEDSIDE

In vivo tracking of clathrin nanoparticles radiolabelled with Technetium-99m and Gallium-68

Oliviero Gobbo

The School of Pharmacy & Pharmaceutical Sciences
Trinity St James's Cancer Institute
Trinity College Dublin, Ireland

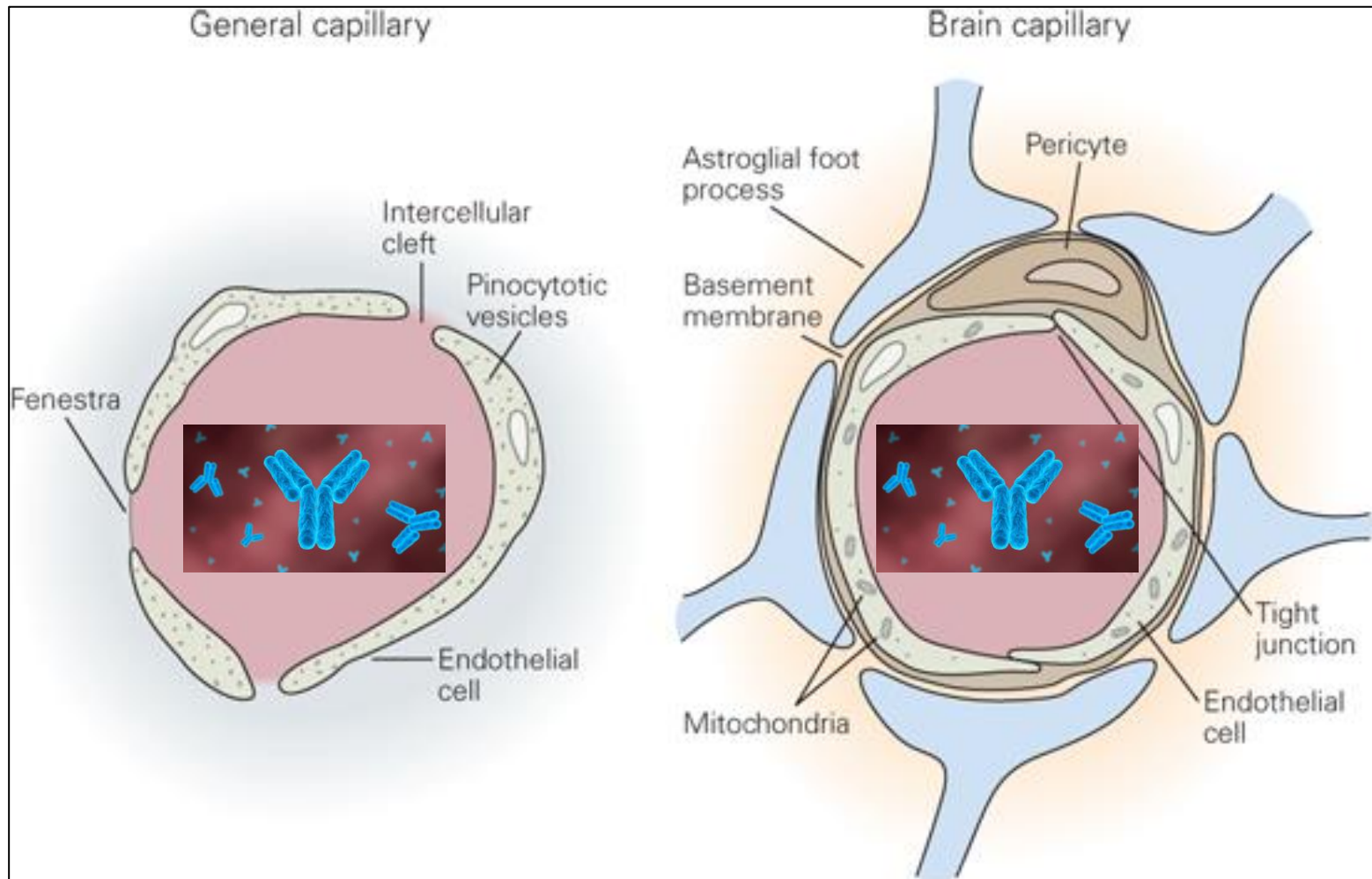
The host: Dr. Penelope Bouziotis

Institute of Nuclear and Radiological Sciences and
Technology, Energy and Safety,
National Center for Scientific Research
"Demokritos", Athens, Greece

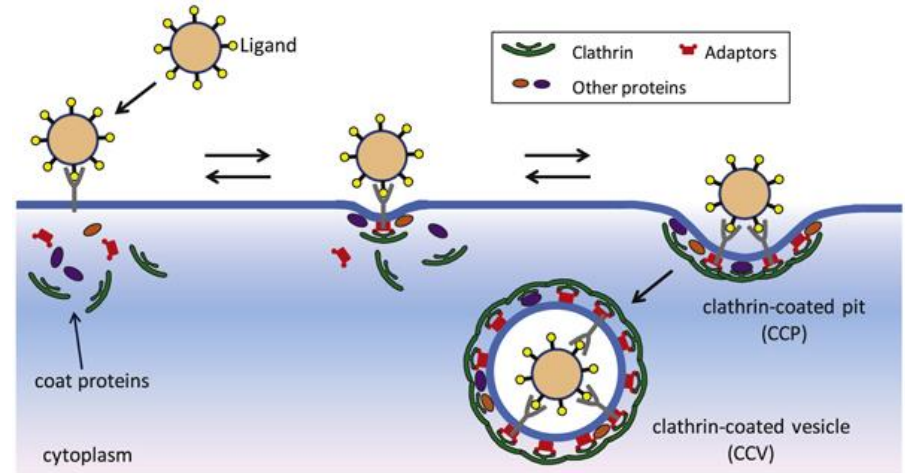
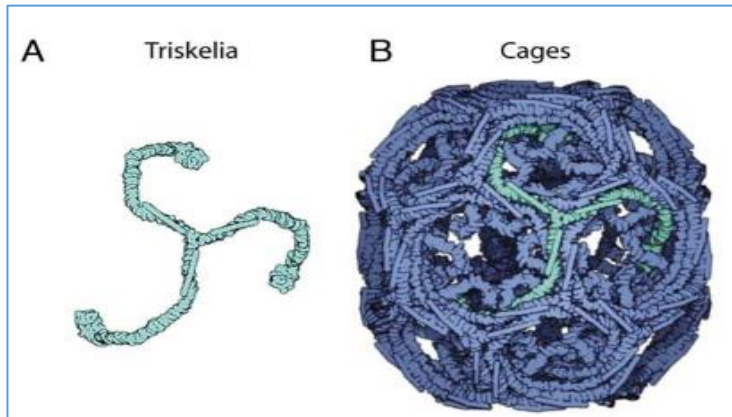
Breast Cancer Brain Metastases

- Breast cancer : Most diagnosed cancer in women
- HER2 overexpression in 50% of BCB Mets
- HER2+ BCB Mets, survival time <6 months
- Anti-HER2 therapy is available (trastuzumab)

Blood Brain Barrier

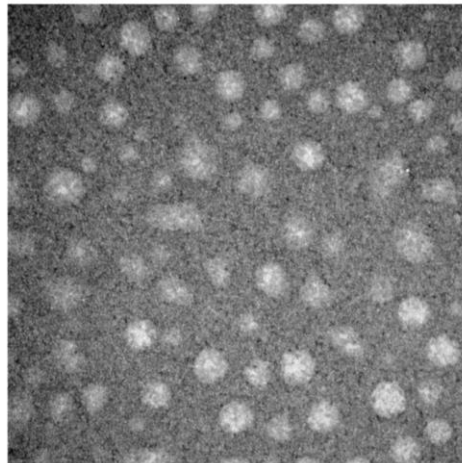


Clathrin-based nanoparticle



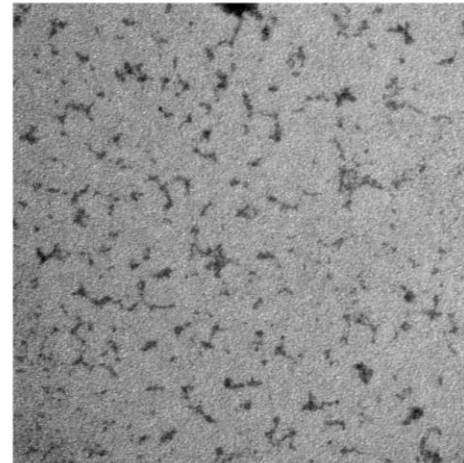
Transmission electron microscopy (TEM) images

a CCV



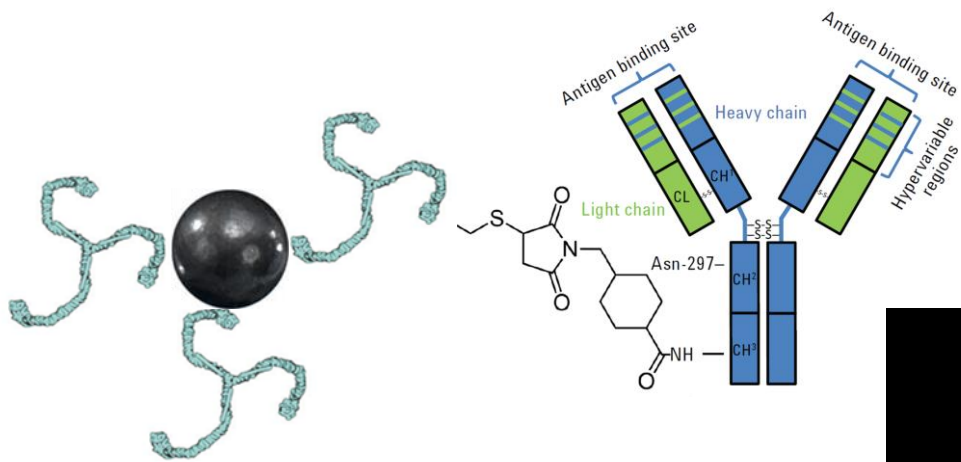
100 nm

b CT

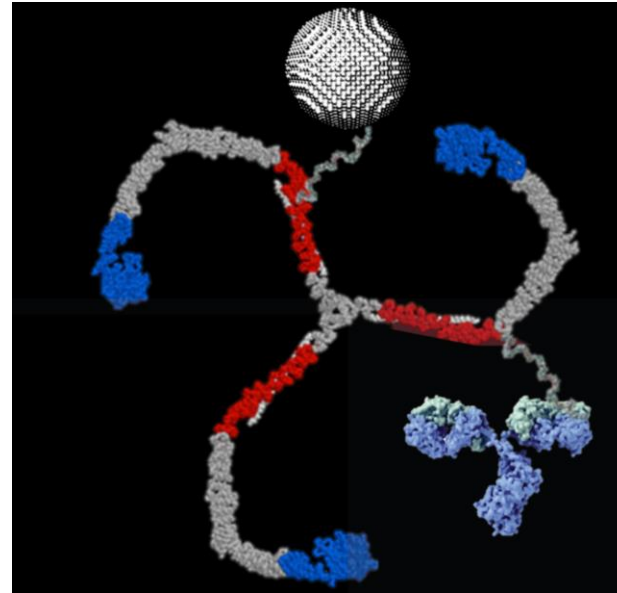


20 nm

Clathrin-based nanoparticle



Theranostic Nanoparticle



Trastuzumab

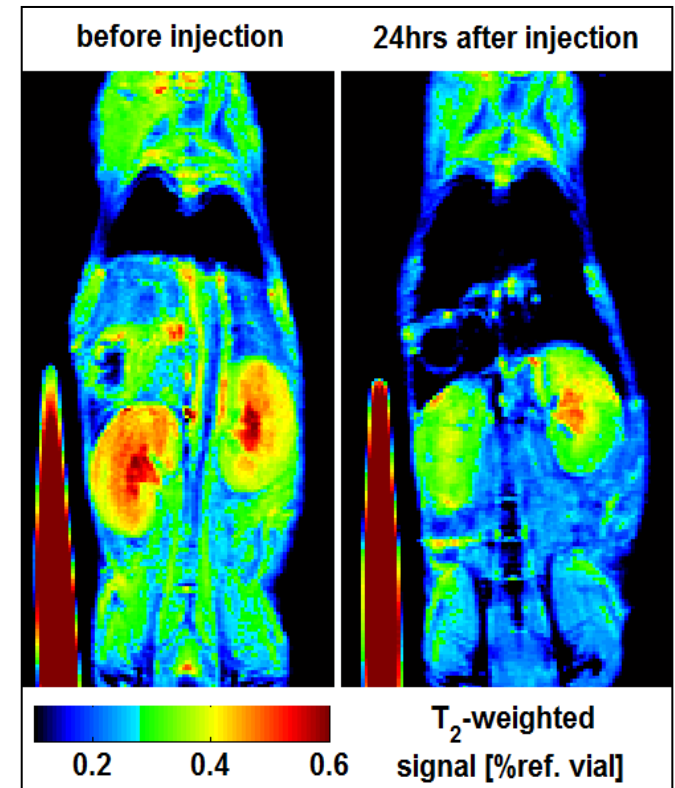
MRI T2 weighted images

Enhanced MRI contrast diagnosis of metastatic tumours
(increases in sensitivity and specificity)

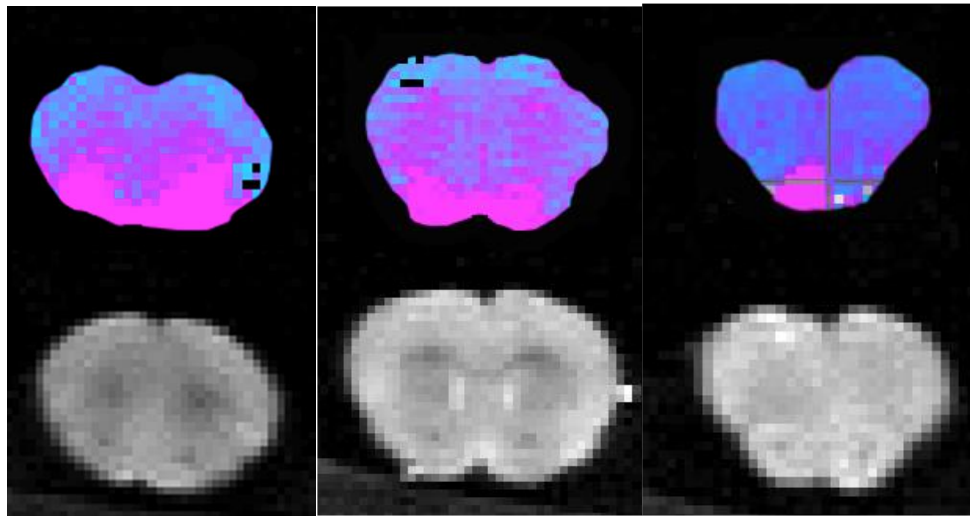


7T MRI scanner

Mouse

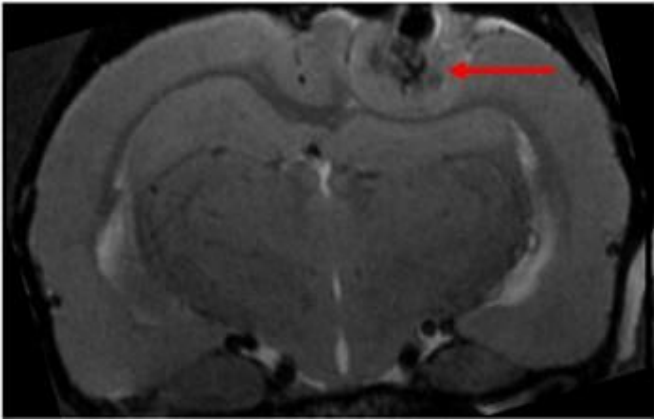


MRI T2 weighted images



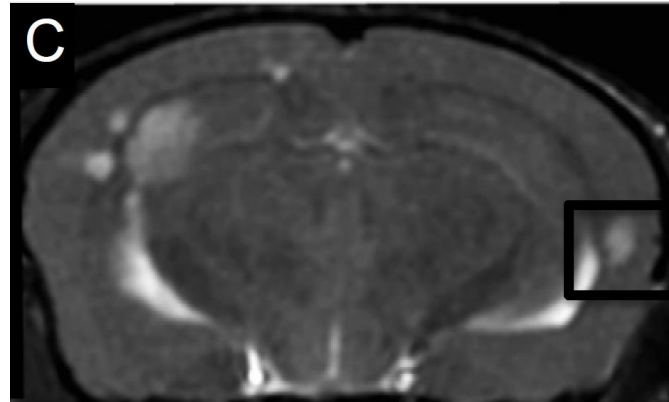
DAT-Ab-Clathrin-SPION

Breast Cancer Brain Metastases: Animal Model



MR image of brain tumour, 3 weeks after a direct injection of cancer cells. (7T-MRI scanner)

MDA-MB-231-BR-HER2



MR image of brain metastases, 4-8 weeks after an intracardiac injection of cancer cells. (3T-MRI scanner)

Biodistribution after Intranasal Adm. ^{68}Ga -clathrin

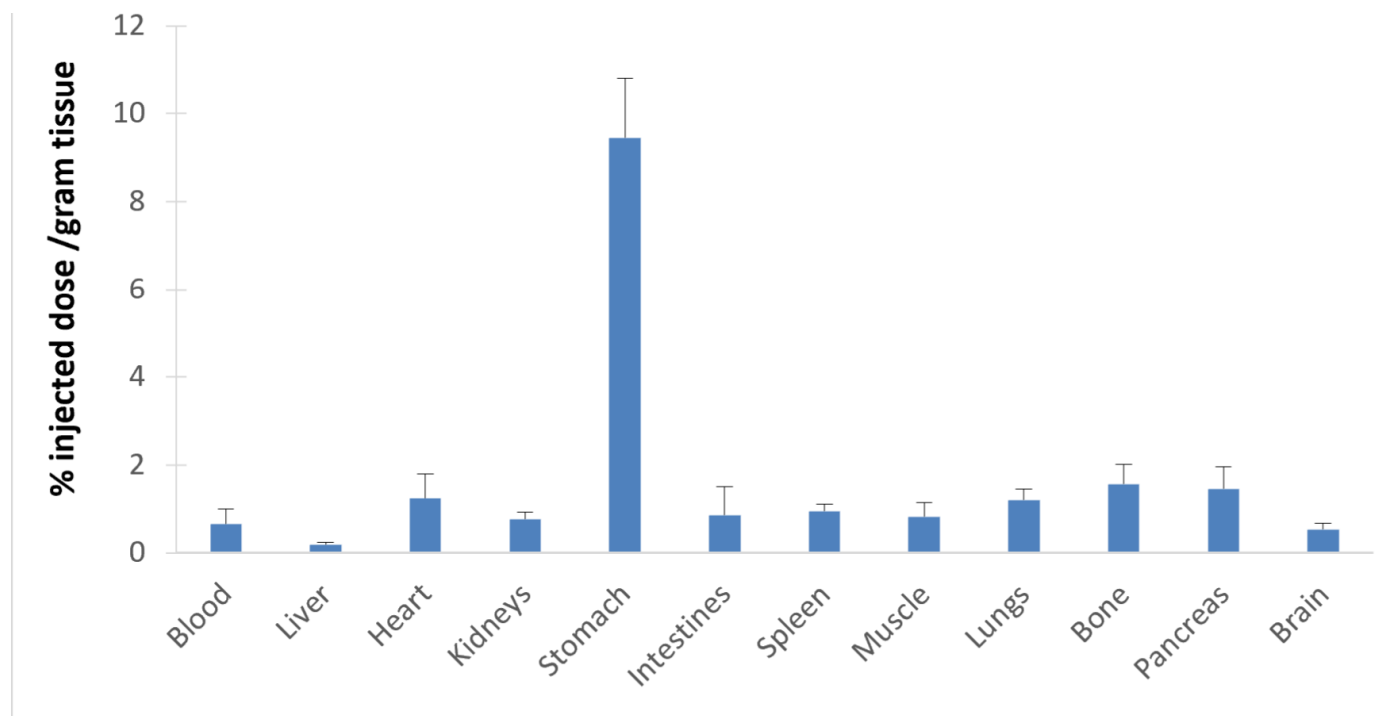


Figure 1: Biodistribution of ^{68}Ga -clathrin in mice after intranasal administration, $n=3$

Biodistribution after Intranasal Adm.

^{99m}Tc -clathrin

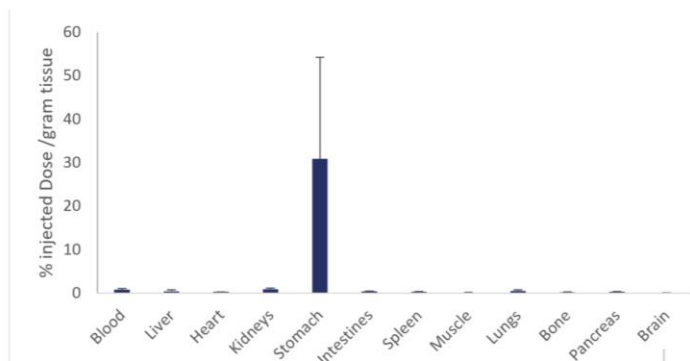


Figure 2a : Biodistribution of ^{99m}Tc -clathrin in mice after intranasal administration

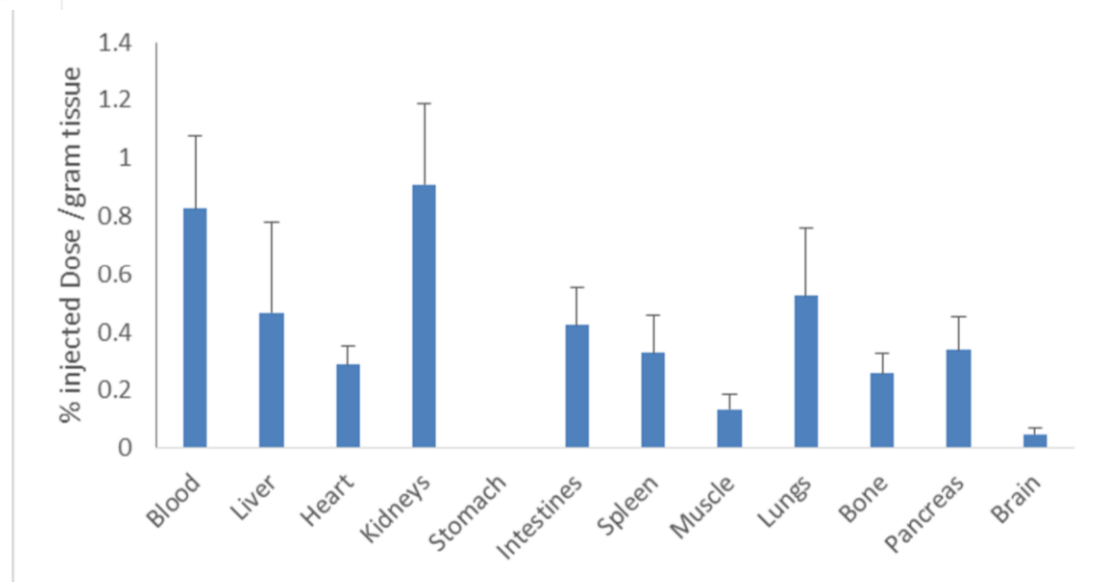


Figure 2b: Biodistribution of ^{99m}Tc -clathrin in mice after intranasal administration without stomach value, n=4

Conclusion

- Both Technetium-99m and Gallium-68 can be used for radiolabeling of clathrin
- Intranasal administration did not show an extraordinary concentration of clathrin in the brain
- IN administration of clathrin did not provide distinct advantage over i.v. delivery for clathrin

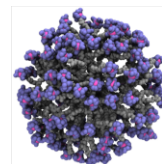
- **Dr. P. Bouziotis**
- **Mr. S. Xanthopoulos (Demokritos, Athens, Greece)**
- **Prof. G. Vitaliano (Harvard Medical School, Boston)**
- **Dr. F. Vitaliano (ExQor Technologies Inc, Boston)**

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*The Faculty of Health Sciences
Dean's Research Initiatives Fund*



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- New clathrin-based nanoplatforms for magnetic resonance imaging. Vitaliano GD, Vitaliano F, Rios JD, Renshaw PF, Teicher MH. *PLoS One.* 2012;7(5):e35821. doi: 10.1371/journal.pone.0035821.
- S262. Novel Targeted Clathrin-Based Superparamagnetic Iron Oxide Nanoparticles for CNS Magnetic Resonance Imaging of Dopamine Transporters. Gordana Vitaliano, Jae Kim, Dionyssios Mintzopoulos, Christopher Adam, Franco Vitaliano, Scott Lukas, Marc Kaufman. *Biological Psychiatry* Volume 83, Issue 9, Supplement, 1 May 2018, Page S450