



NanoGhost: A stem cell- based off the shelf nano-delivery platform for targeted drug and gene therapy

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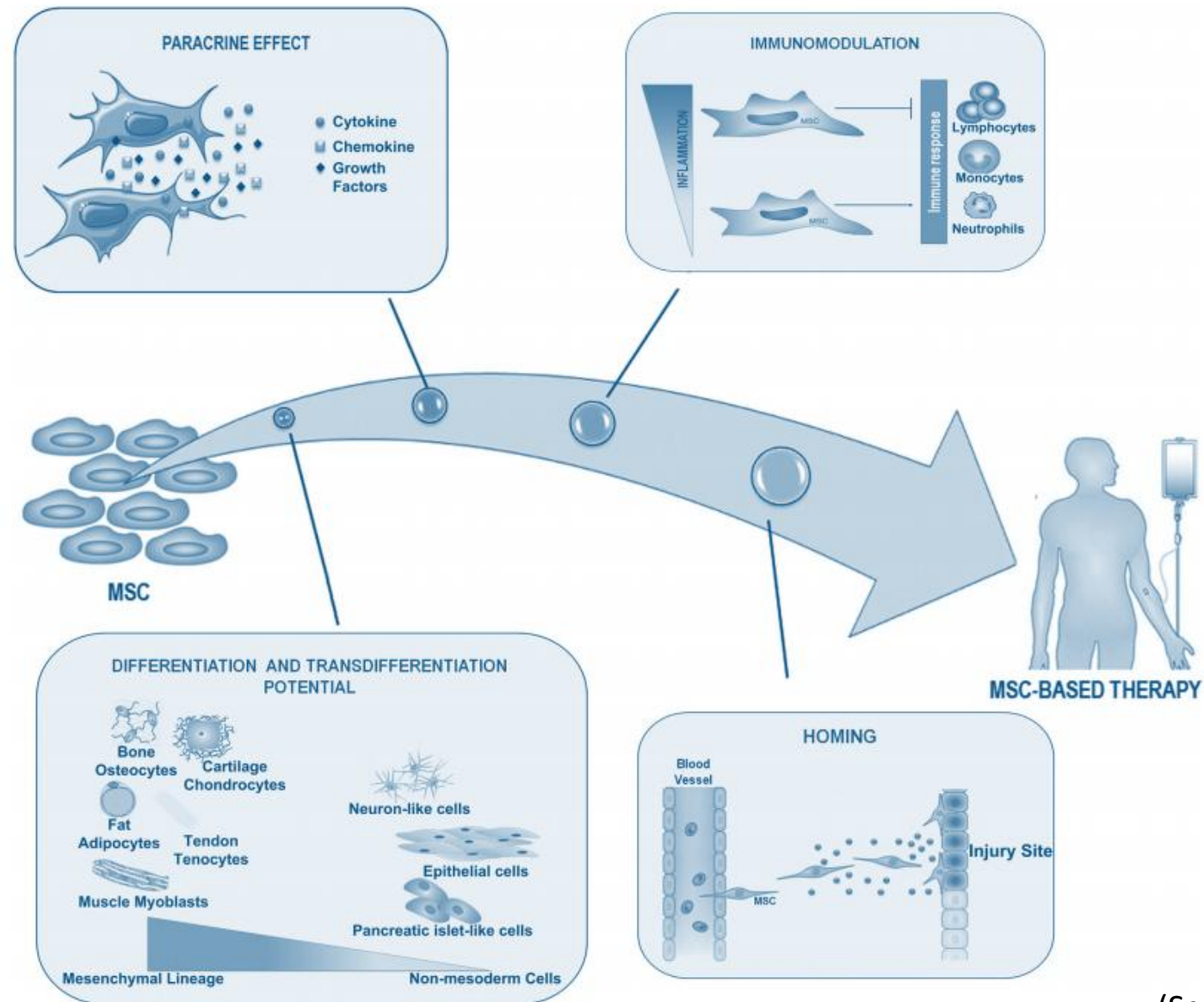
Mesenchymal Stem Cells (MSCs)

MHC-1 ↓

~~MHC-2~~

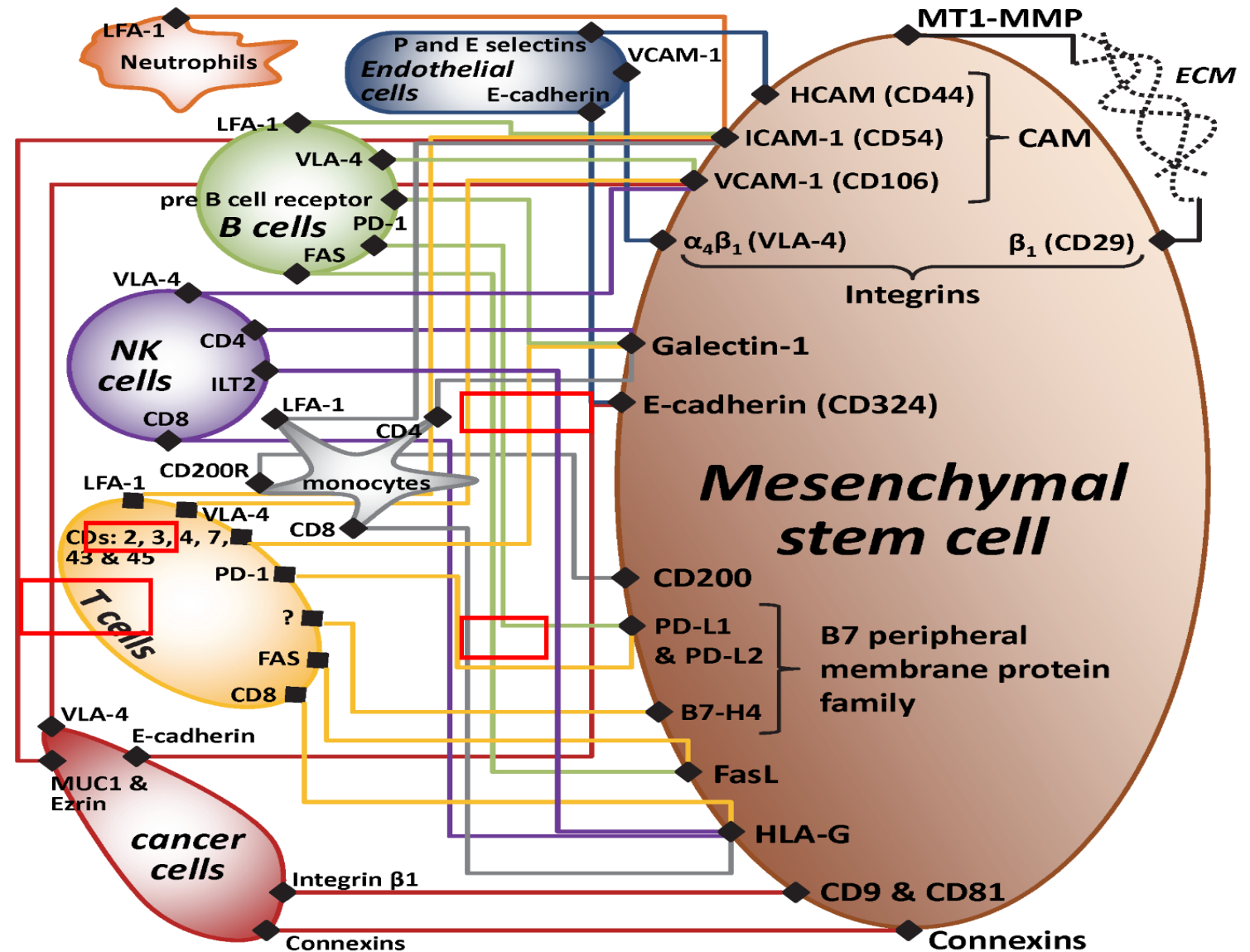
~~CD80~~

~~CD86~~

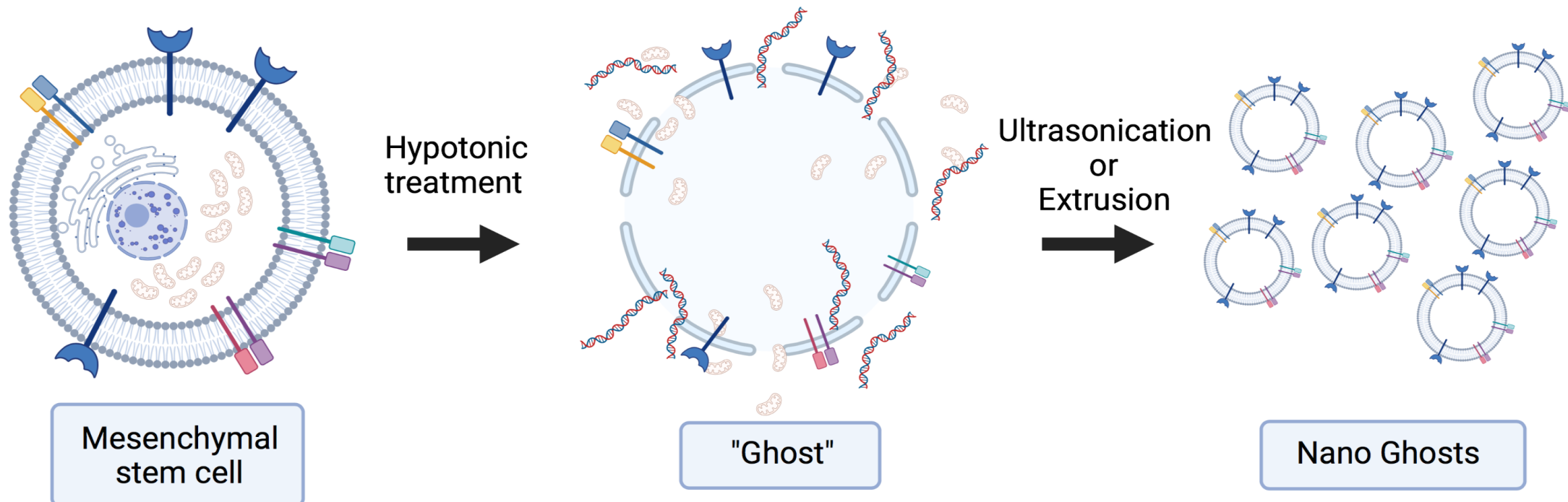


(Squillaro *et al.*, 2016)

MSCs Surface Interactions



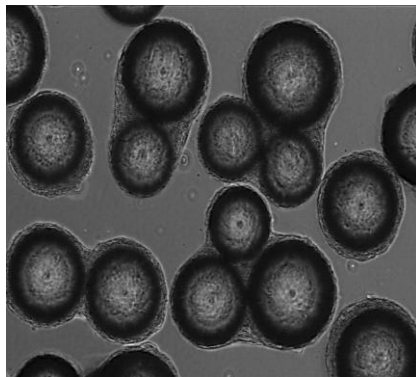
NanoGhosts



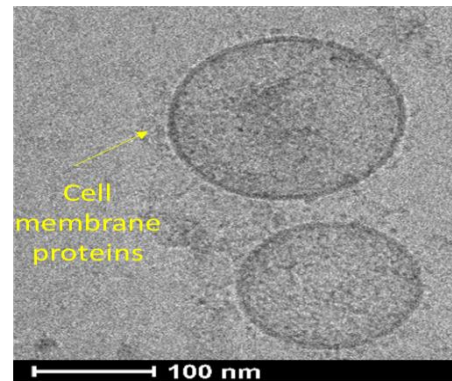


NanoGhosts Therapeutic Targeting Platform

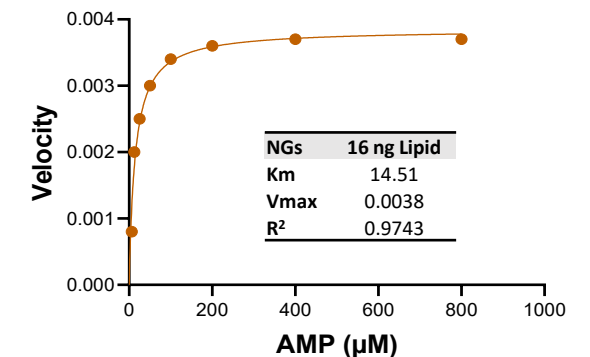
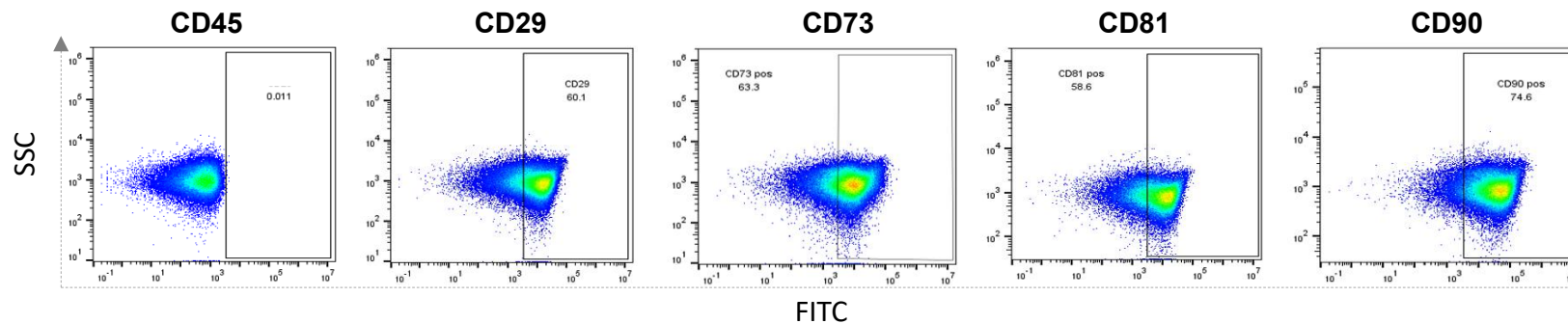
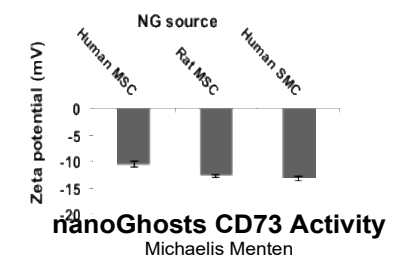
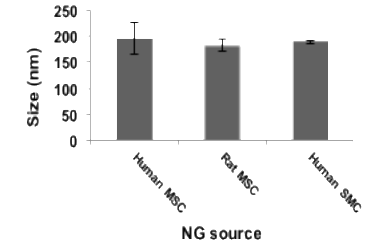
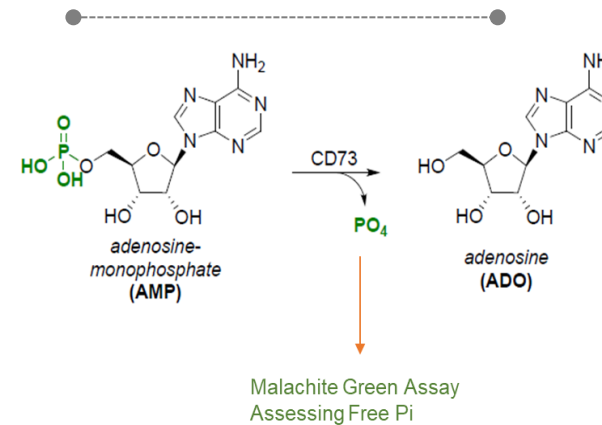
Bioreactor Expanded MSCs



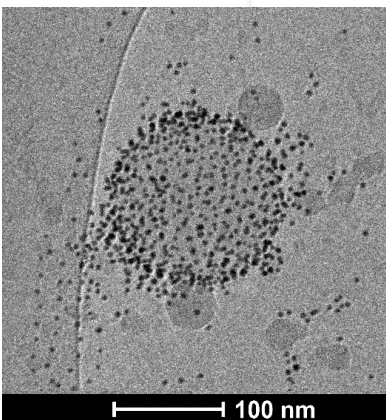
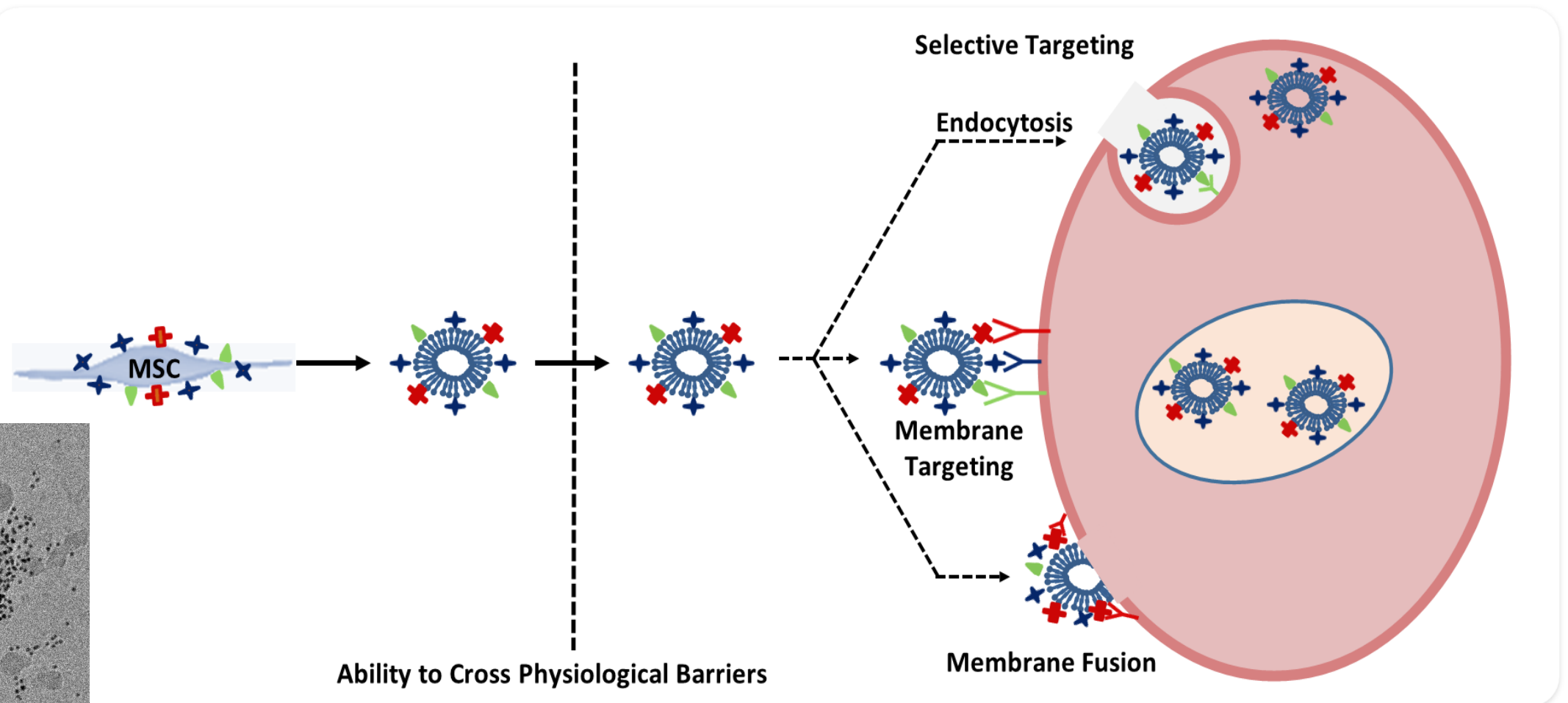
CryoTEM



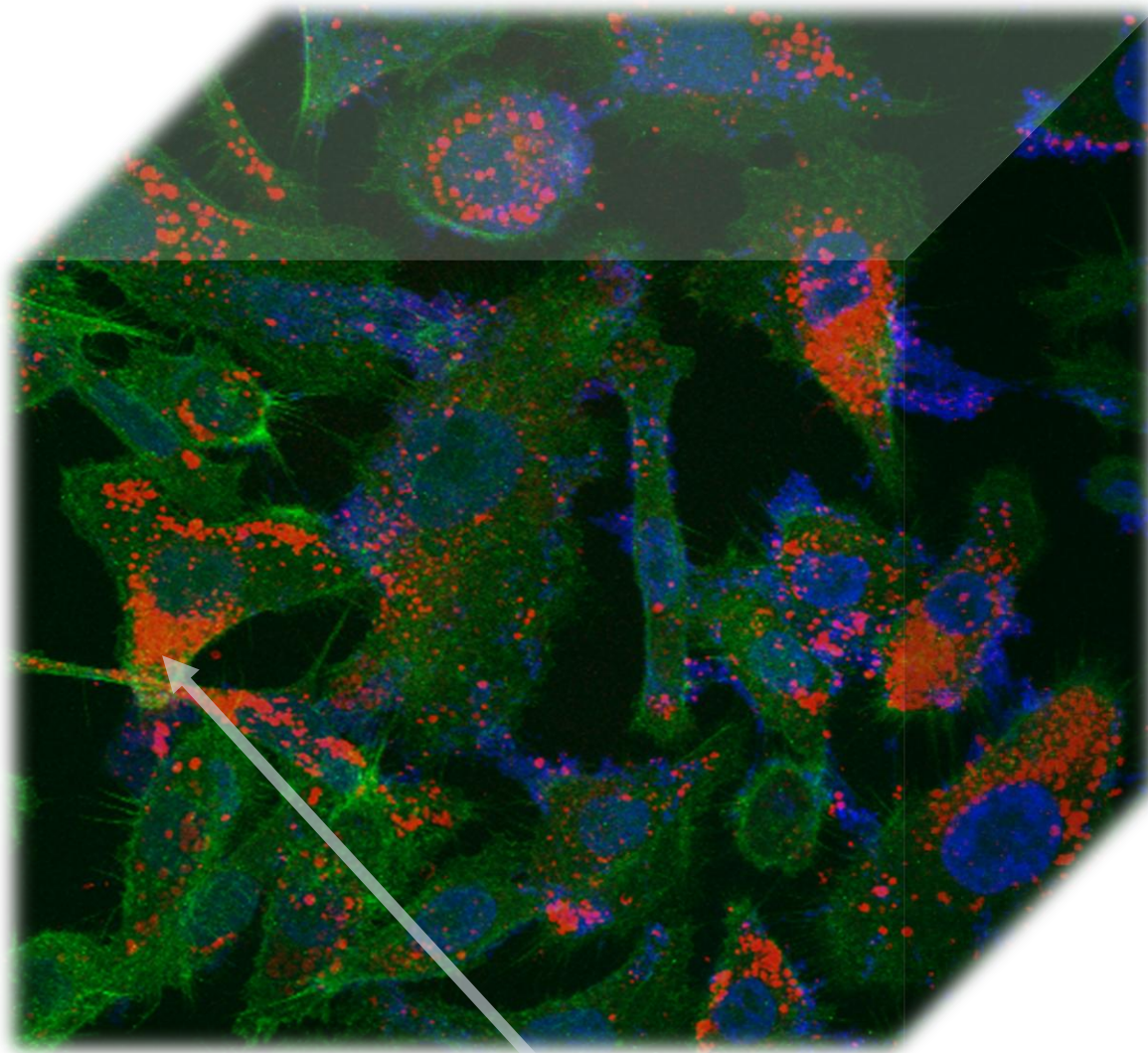
CD73 Activity



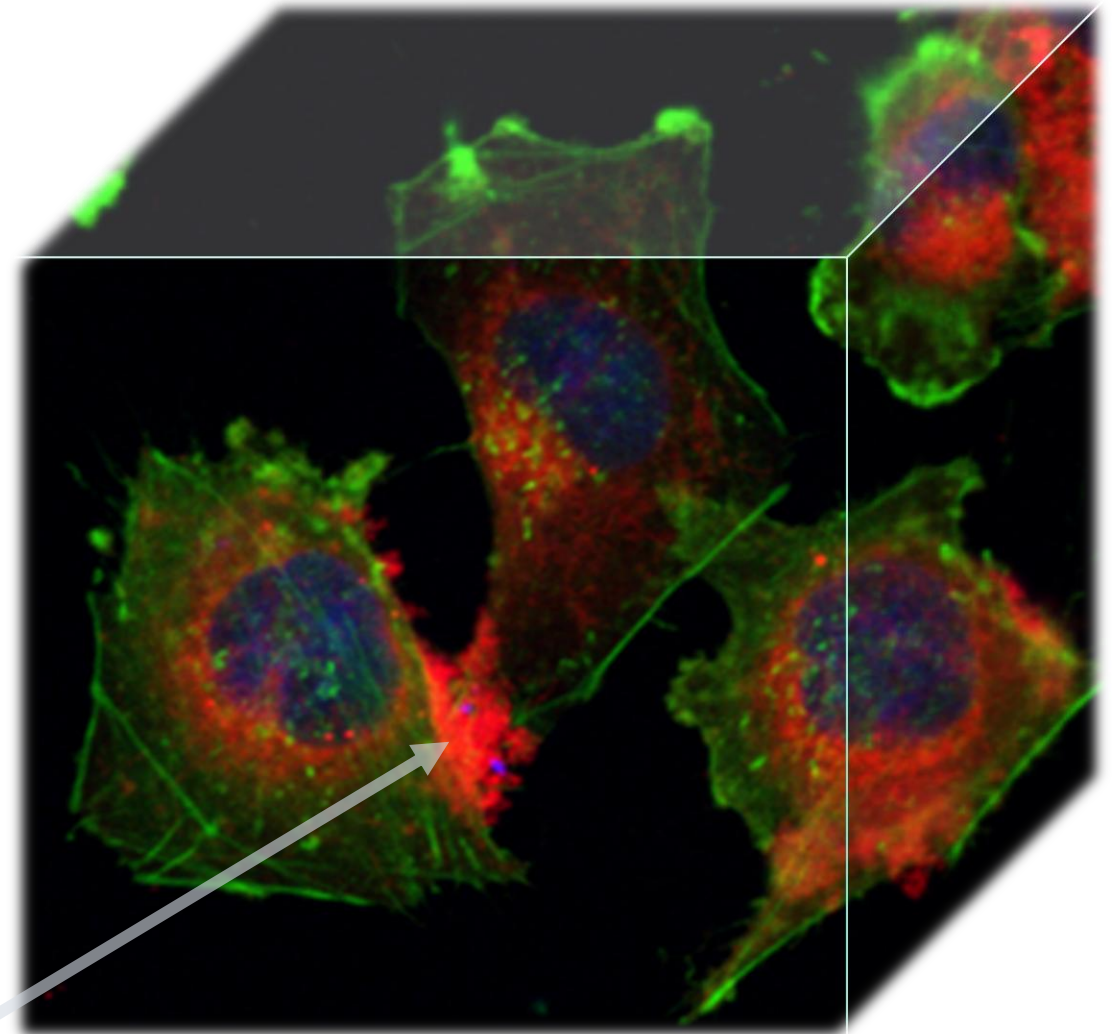
NanoGhost Interactions with Cell



Prostate tumor cells

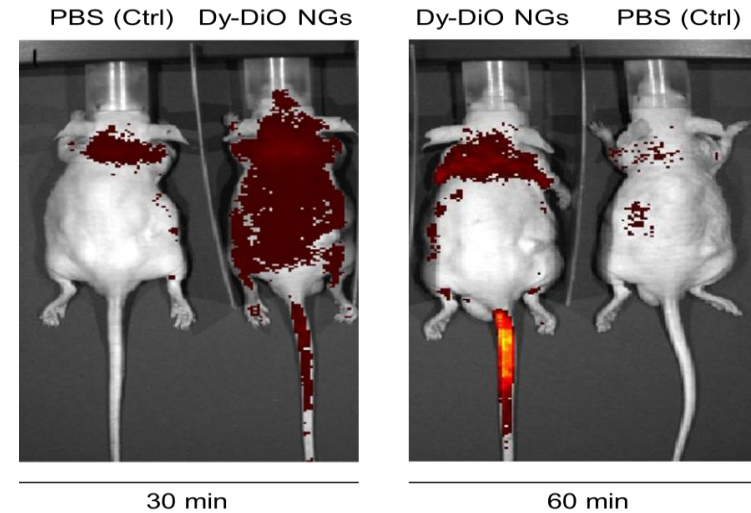
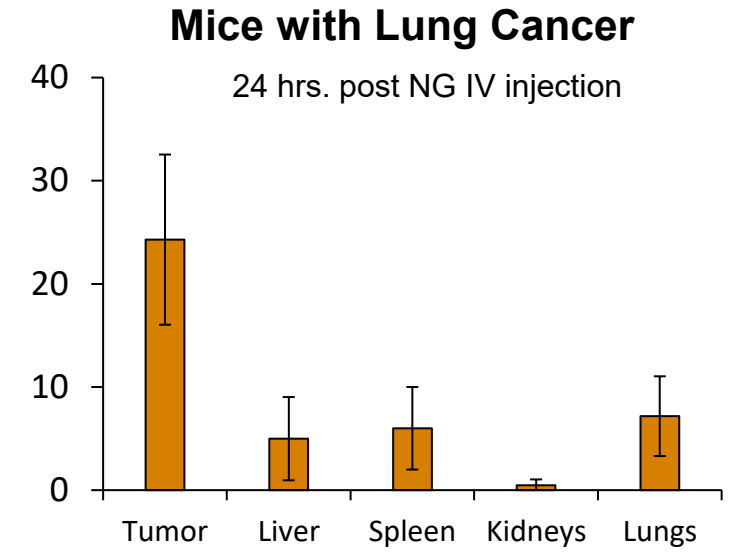
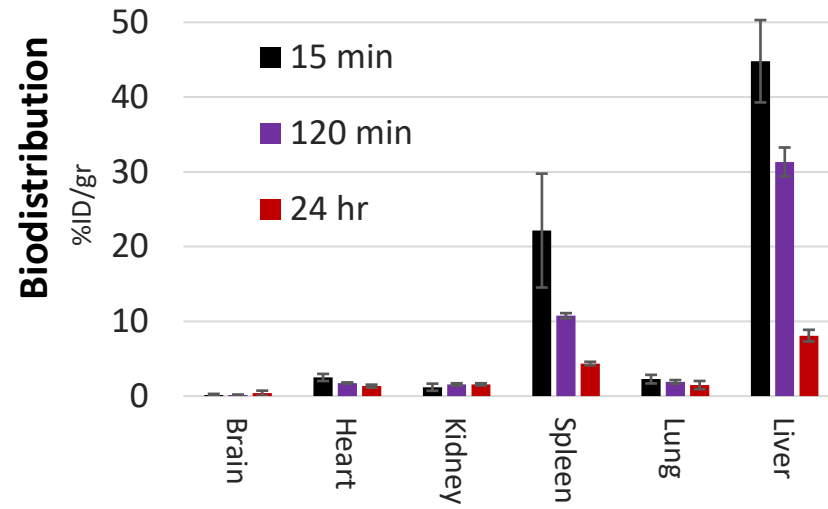


Brain tumor cells

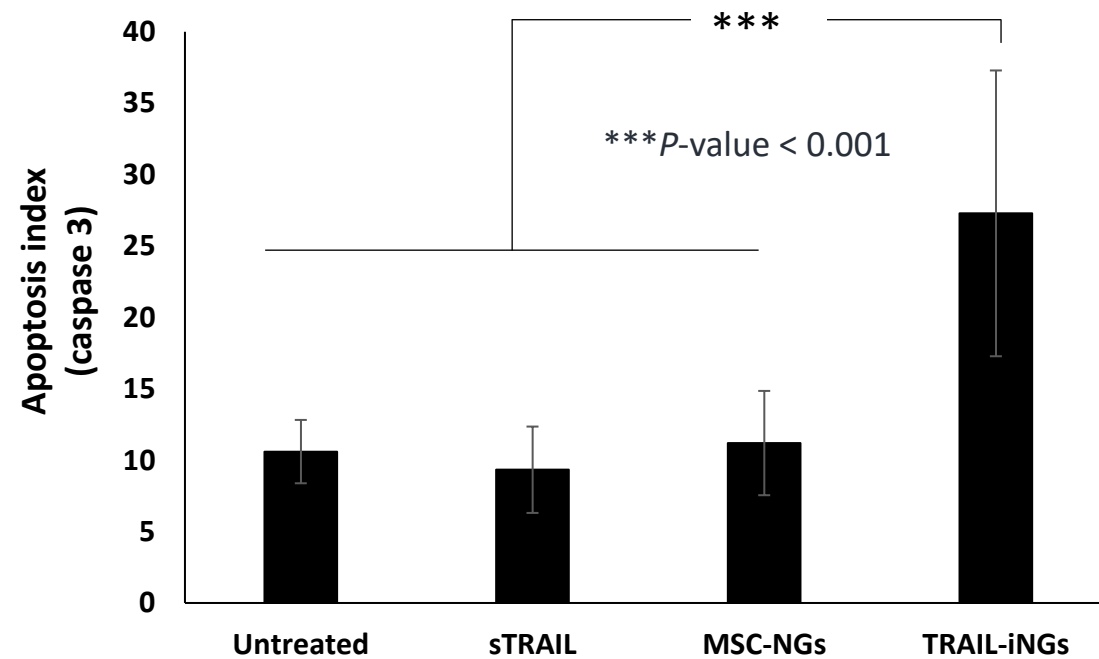
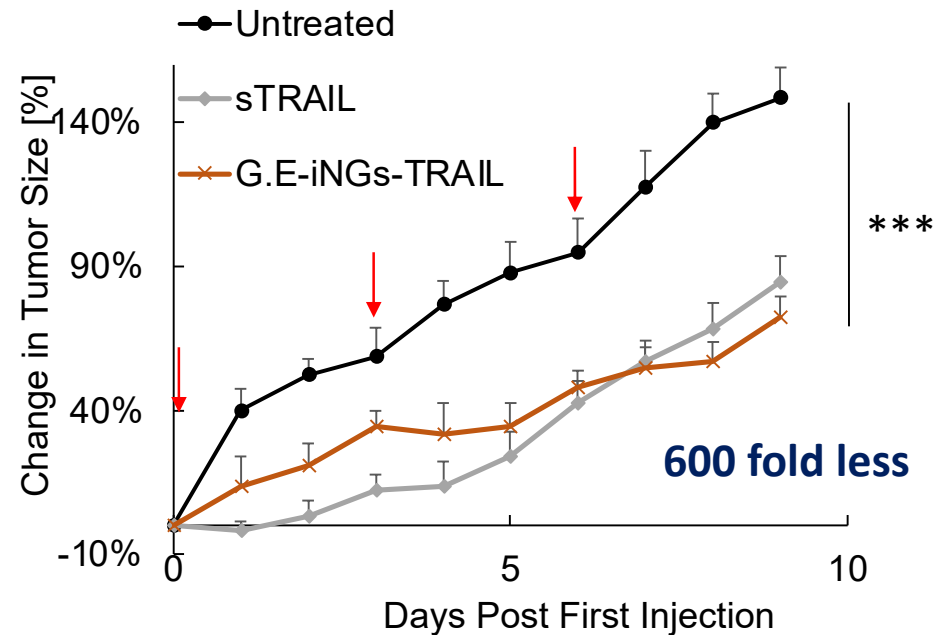
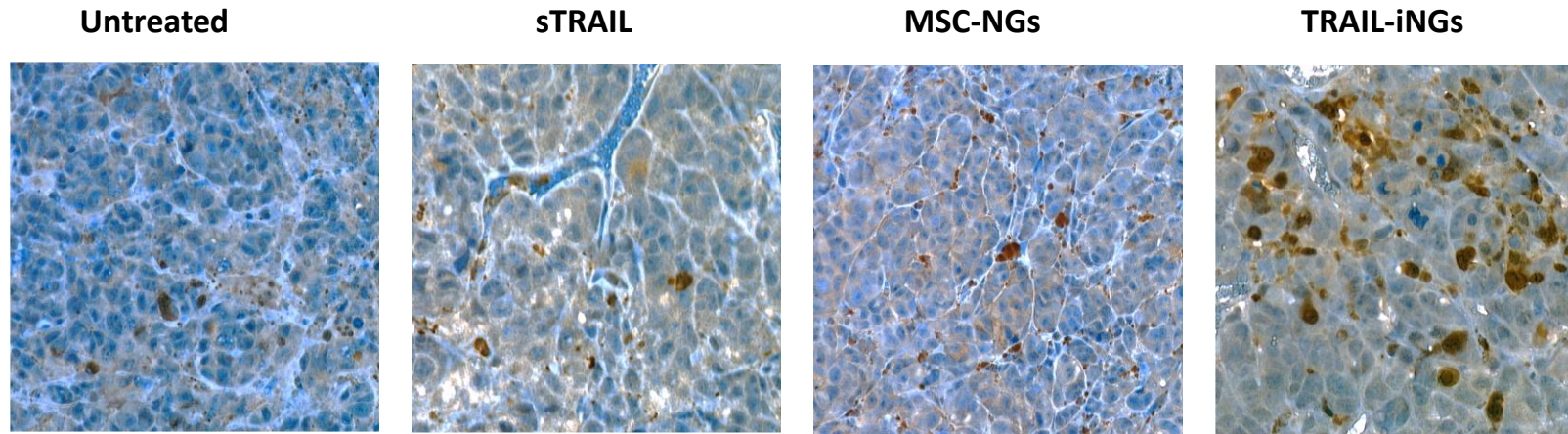


NanoGhosts (red)

NGs Targeting to Metastatic NSCLC

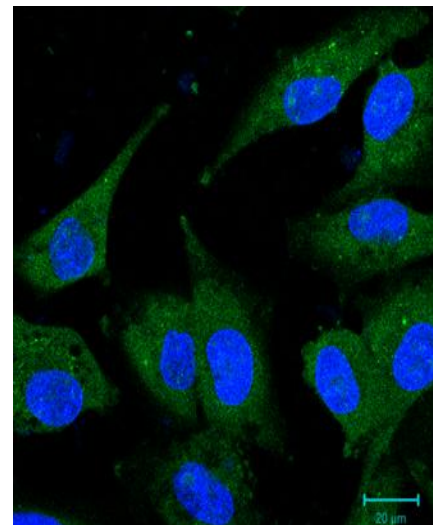
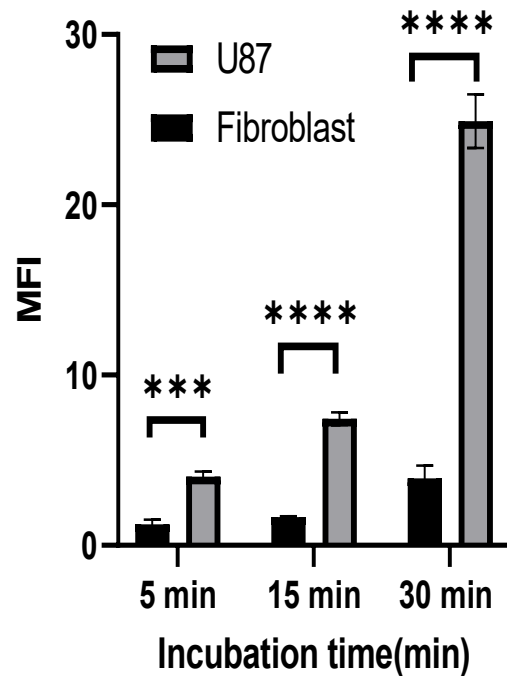


G.E-iNGs Efficacy Study In Melanoma Model



NGs Selectively Target Glioma Cells

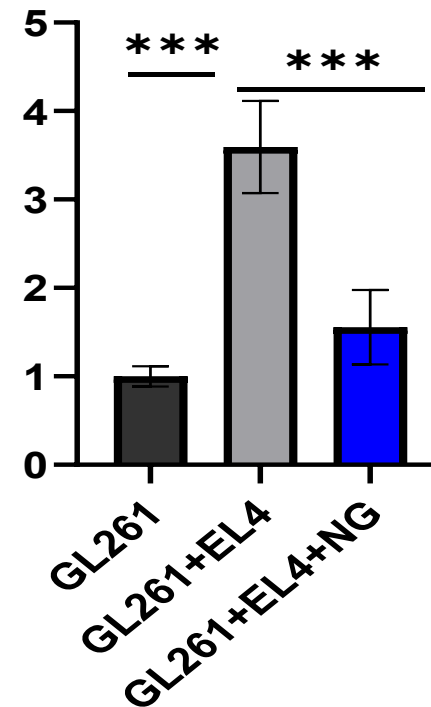
U87 and GL261 cells



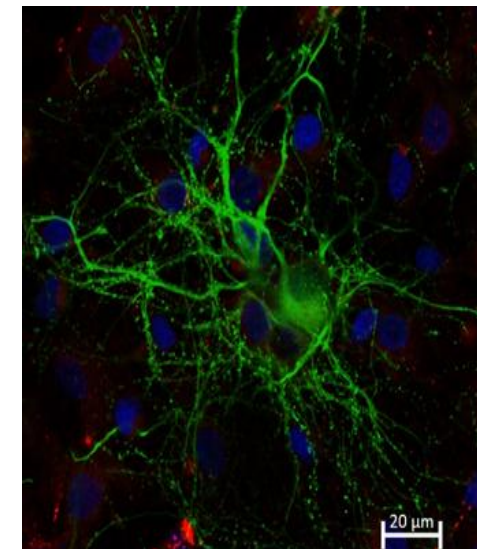
Green-NGs
blue-DAPI

Unpublished –DO NOT POST

Caspase 3/7
(treated/cells only)

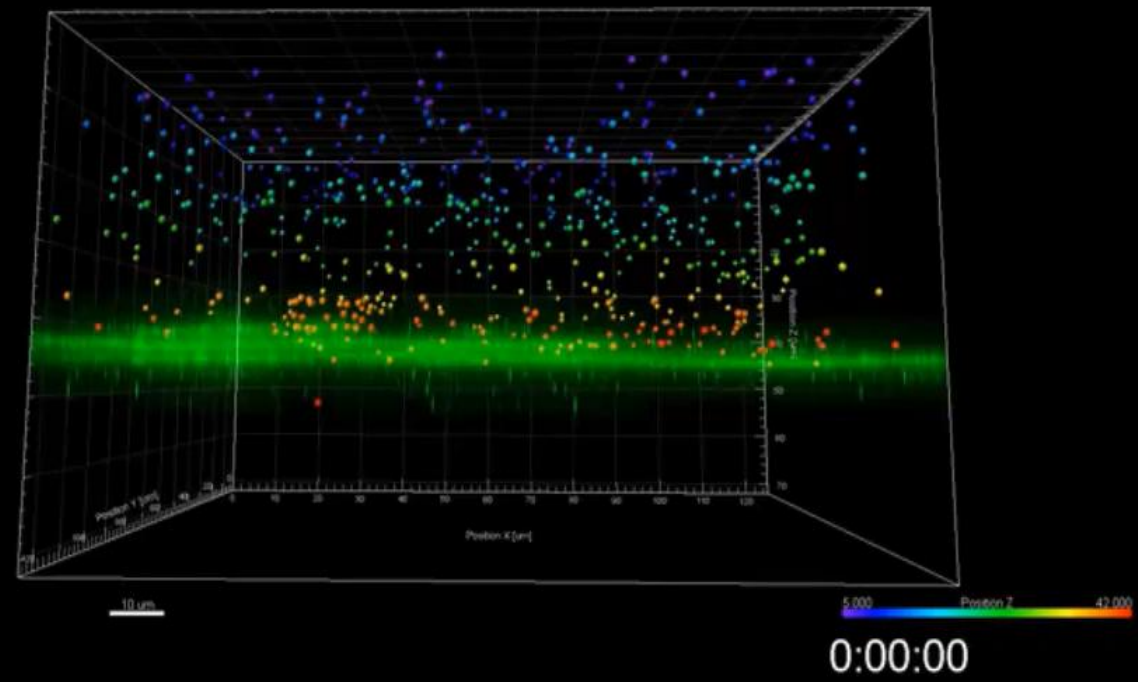


Rat cortical cells

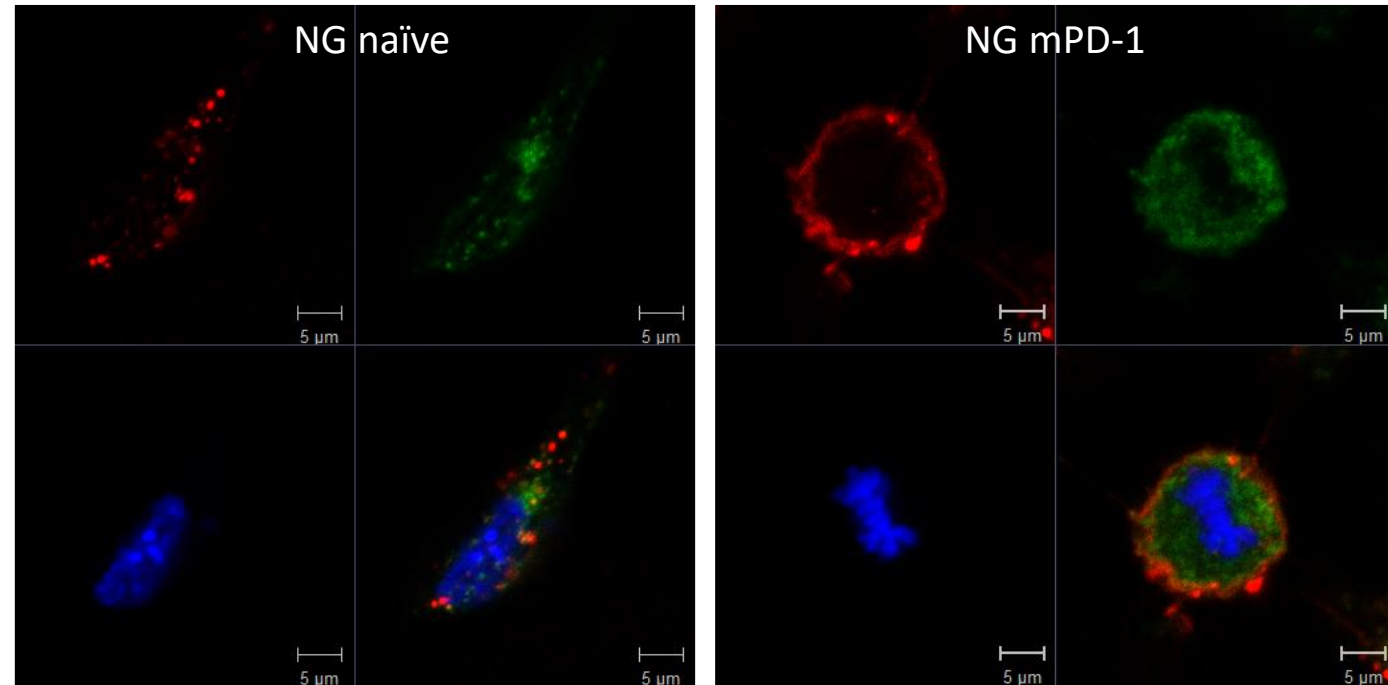
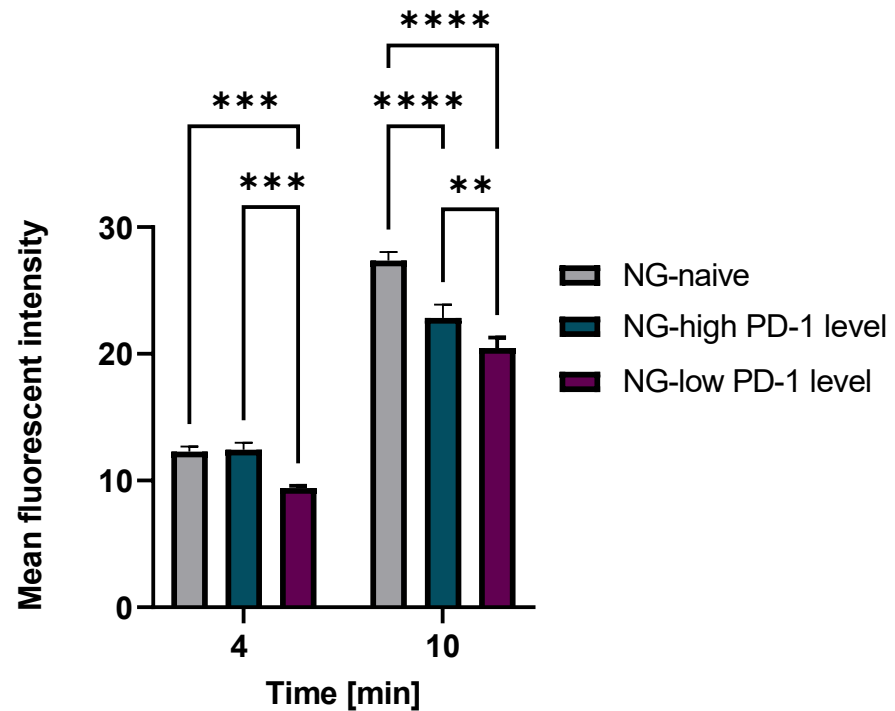


Red – NGs
Green-β III-Tubulin
blue-DAPI

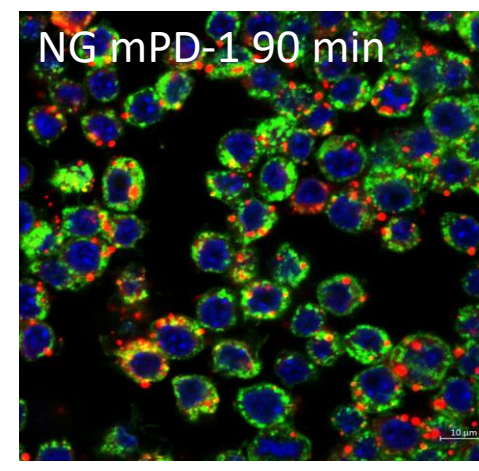
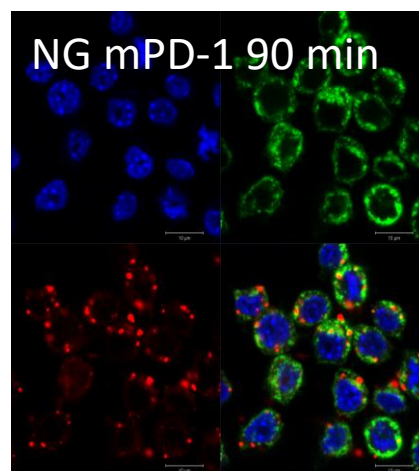
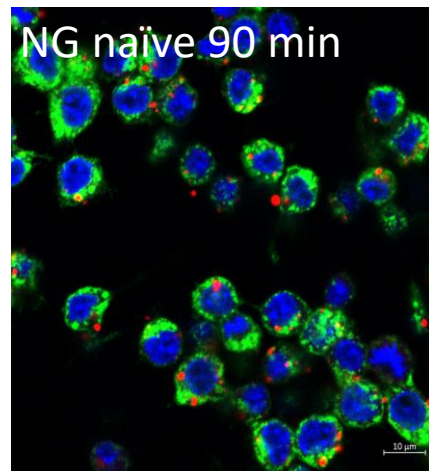
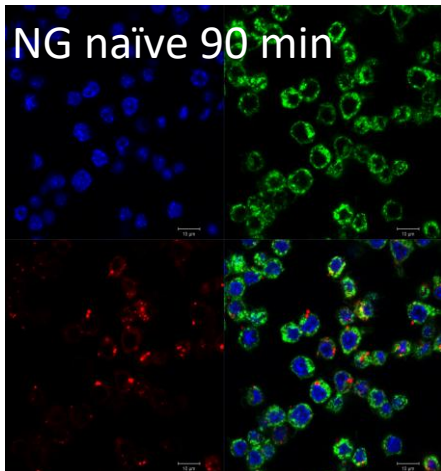
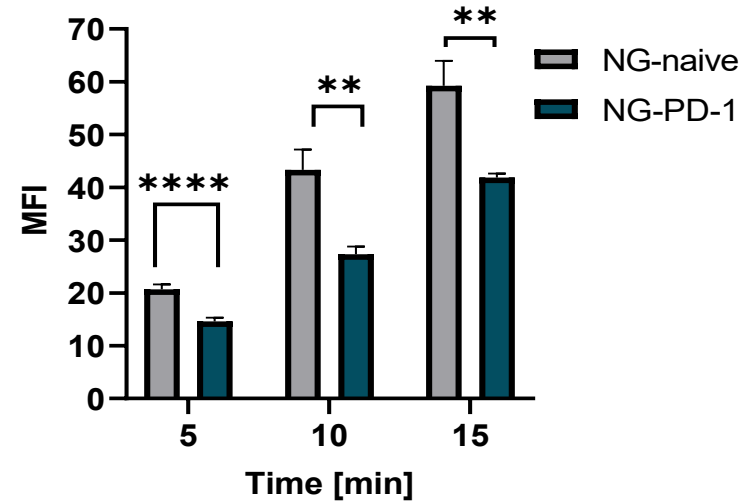
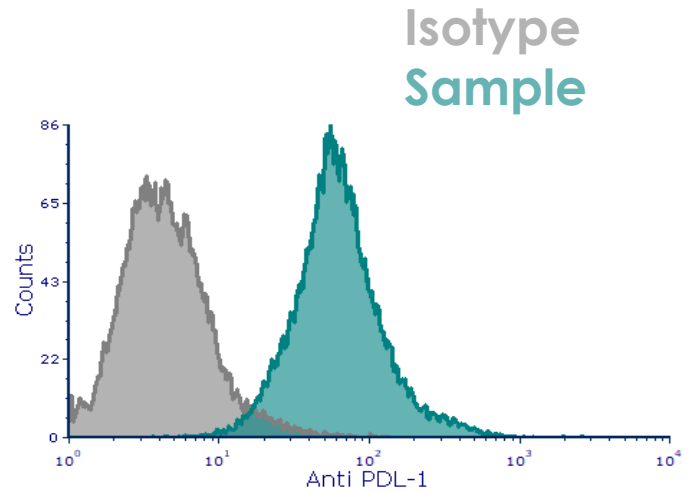
NGs Transport Through the BBB



NG-mPD-1 Targeting Mouse Glioma Cells (GL261)

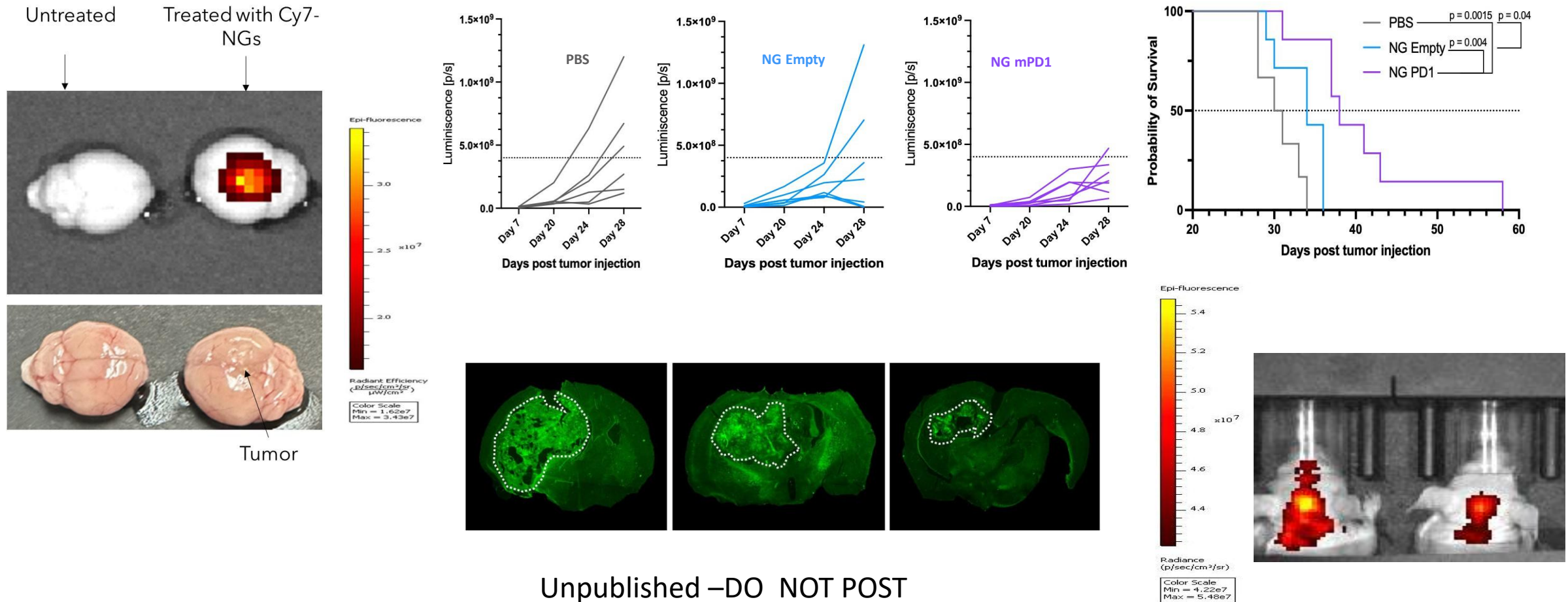


NG-mPD-1 Target RAW Cells

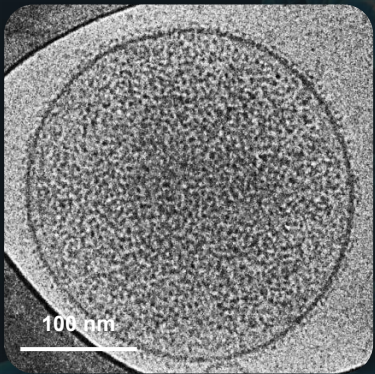


DAPI
WGA
DiD
labeled
NGs

PD-1 Expressing nanoGhosts Cross the BBB and Effectively Treat Glioblastoma

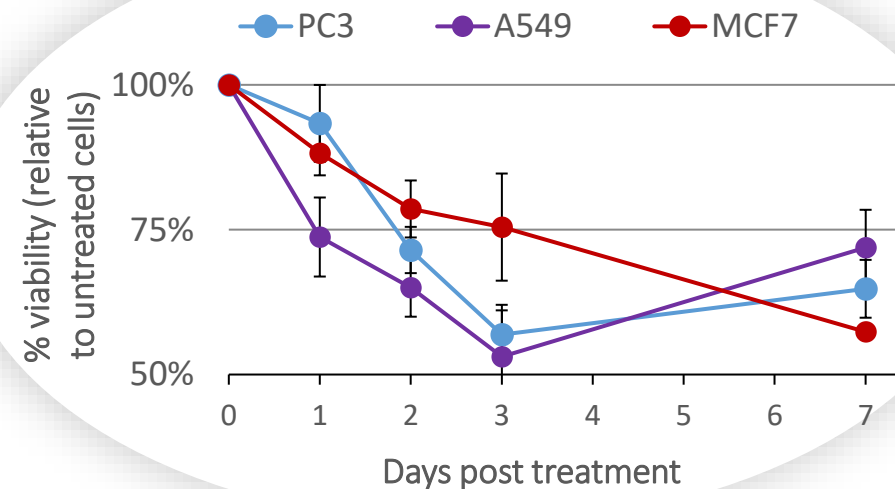
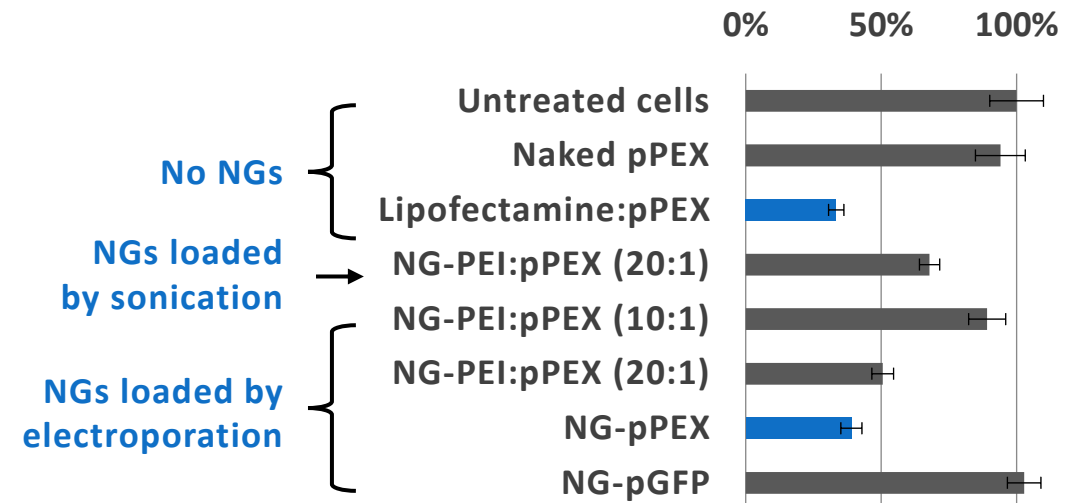


NGs loaded with a cancer-toxic gene (pPEX) effectively transduce cancer cell lines

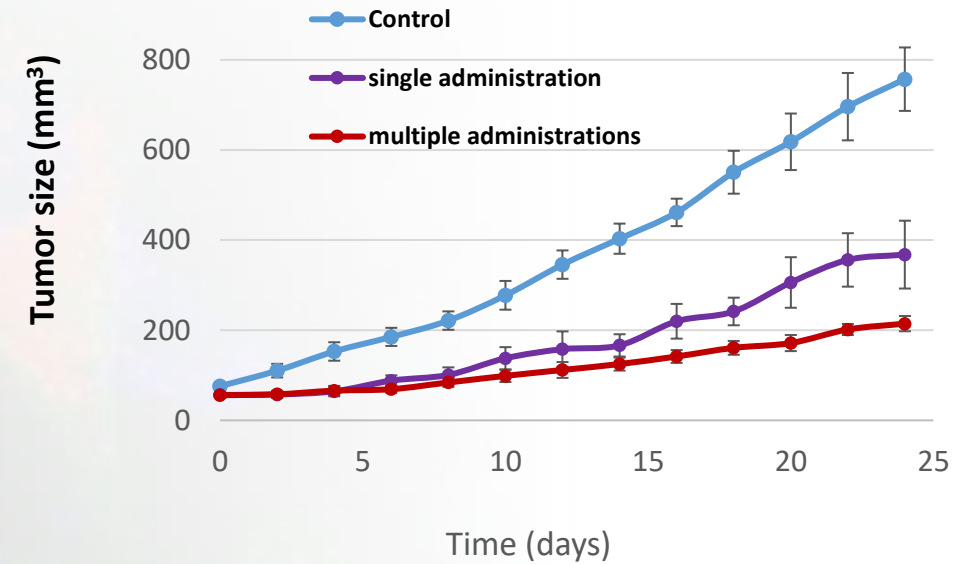
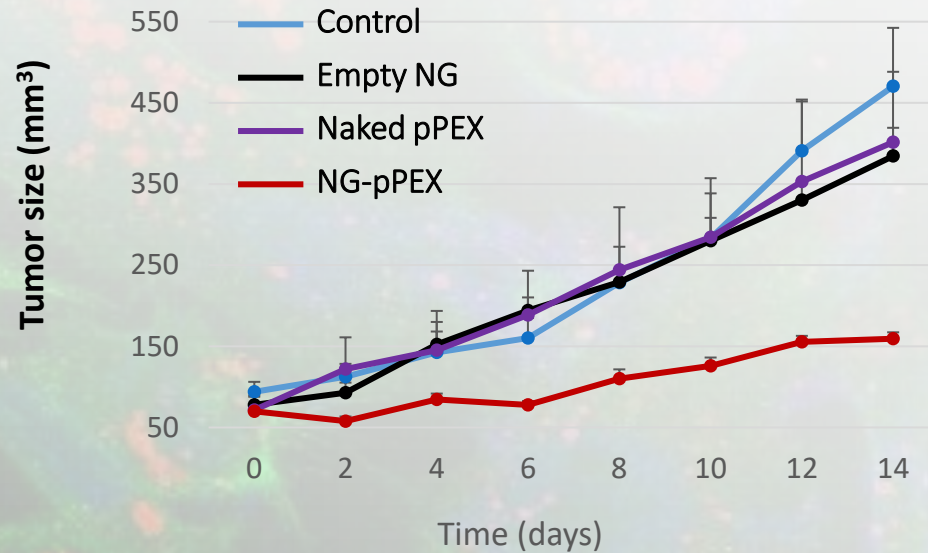


NGs loaded with gold-labelled pDNA

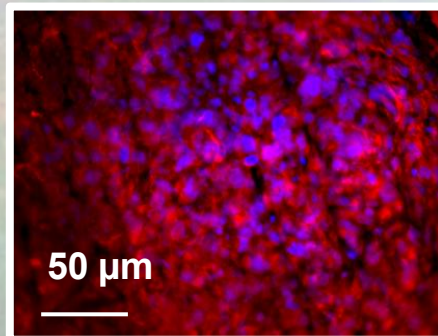
Cancer cells viability (%)



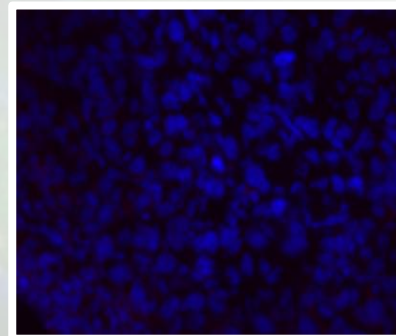
Cancer Gene Therapy



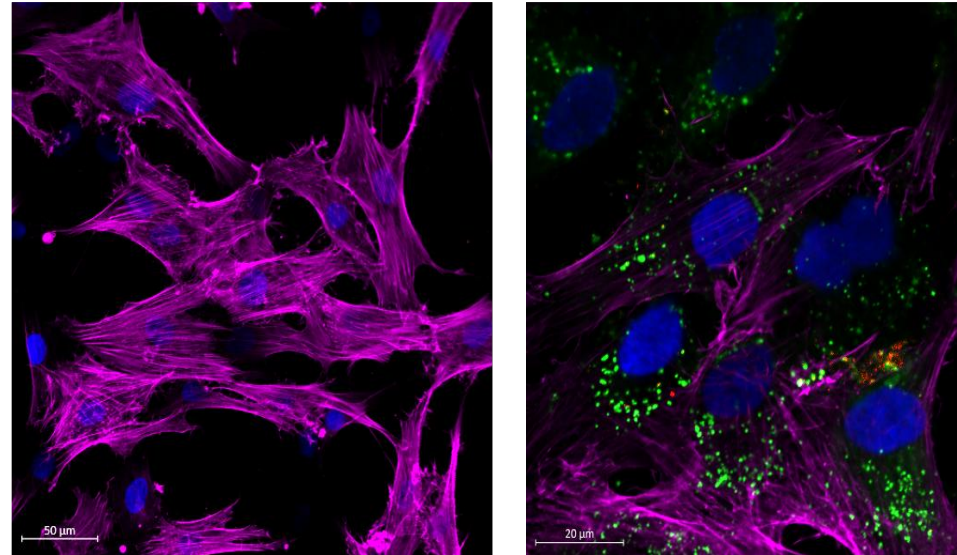
Human MSC-NG



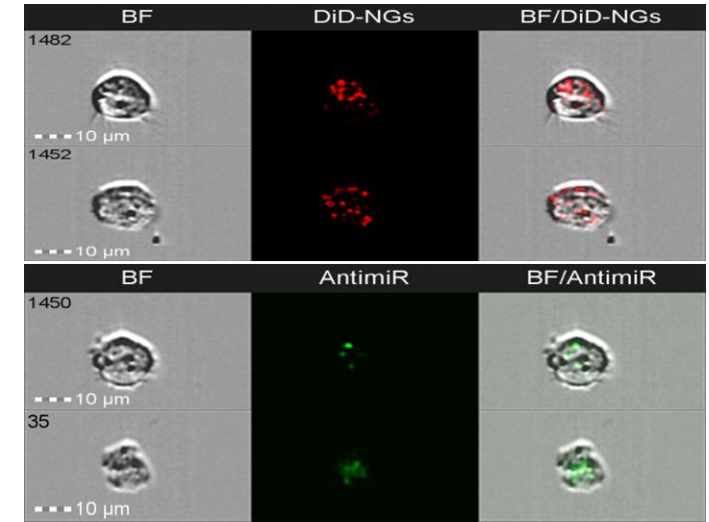
Muscle-NG



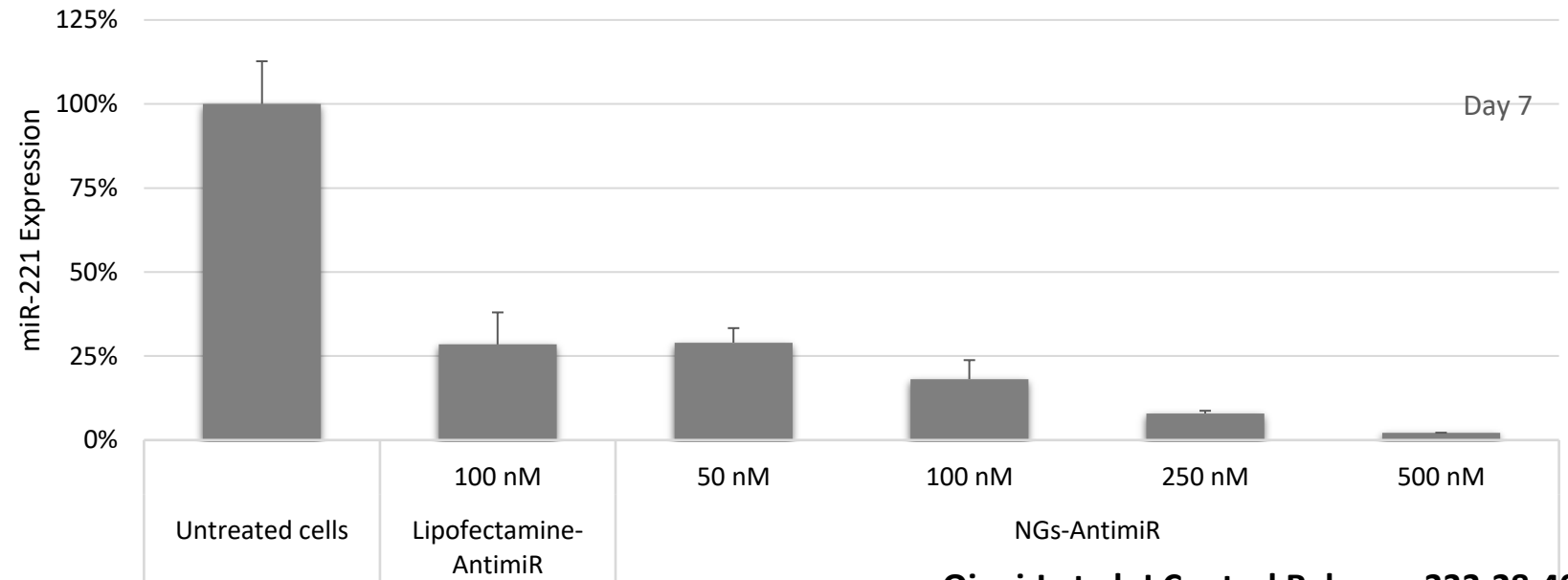
Delivery of Anti-miR



Nucleus – Hoechst; NGs – DiD; Actin – Phalloidin; anti-miR – FAM



ImageStream:
NGs uptake 91% Anti-miR uptake 80%



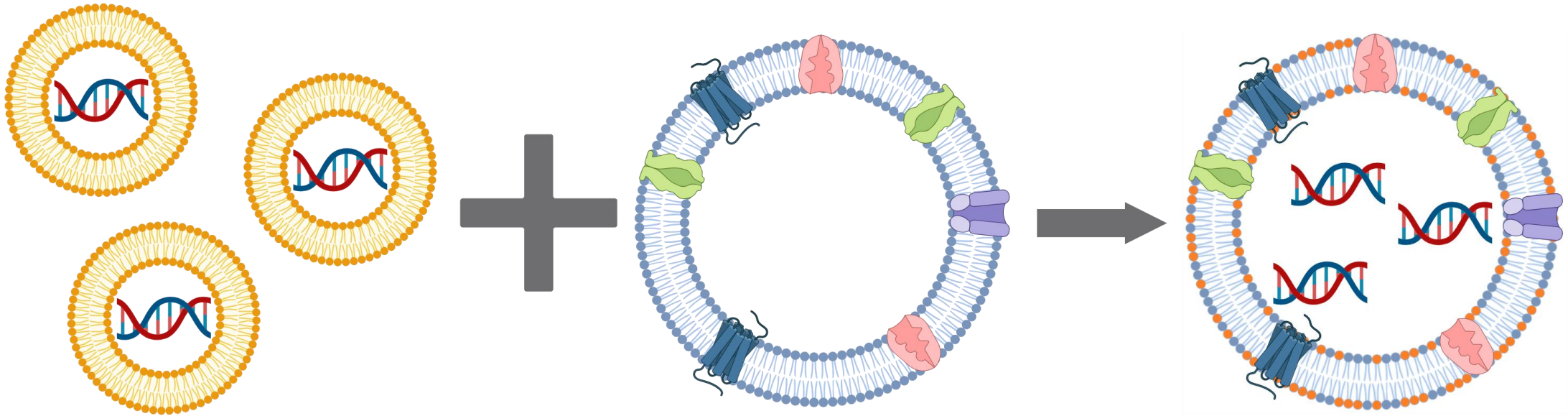


Anton Zernov, PhD



Prof Assaf Zinger
Technion

LNP-NG Chimera Nanoparticles Delivering mRNA

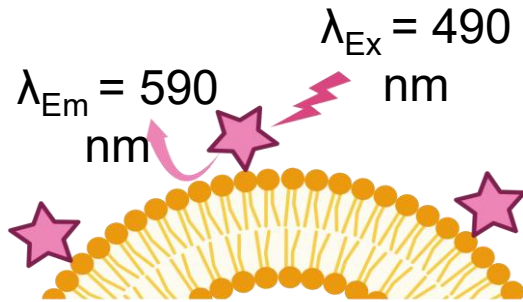


LNP with encapsulated mRNA

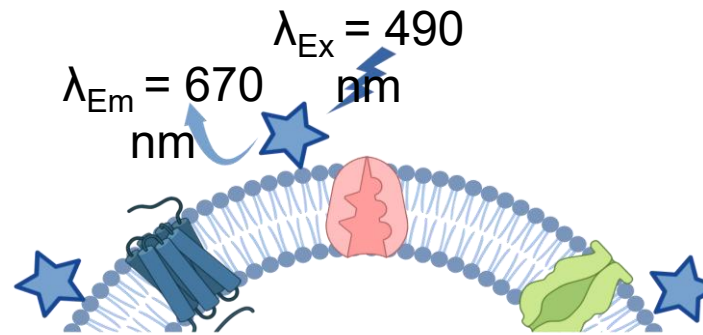
NGs bearing cancer targeting
moieties from MSC cell membrane
DSPC/ DMG-PEG/ MC3

LNP-NGs chimera nanoparticles
with encapsulated mRNA and
bearing cancer targeting moieties

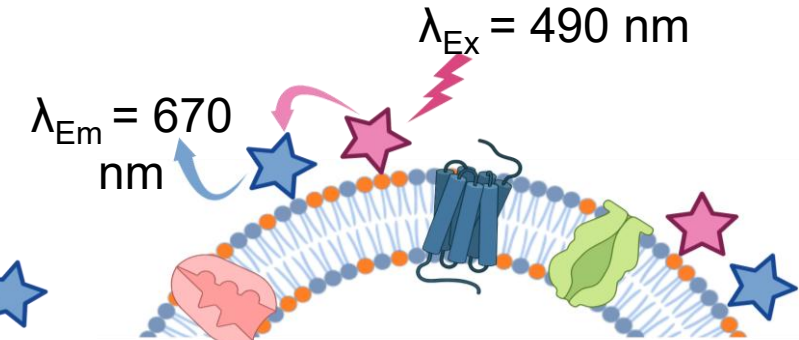
FRET for the Detection LNP and NG Biohybrid



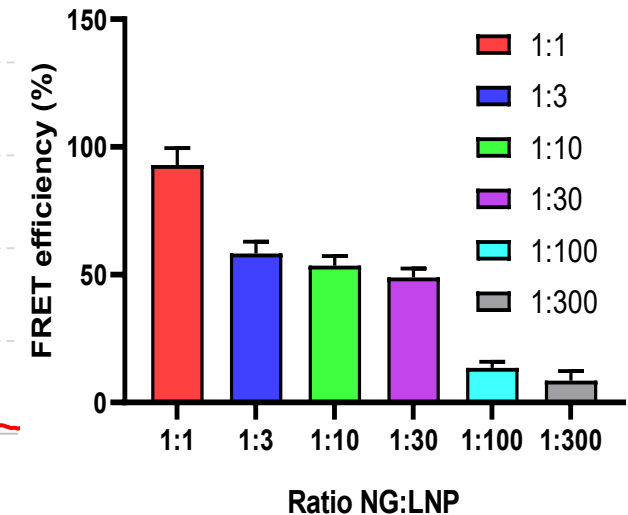
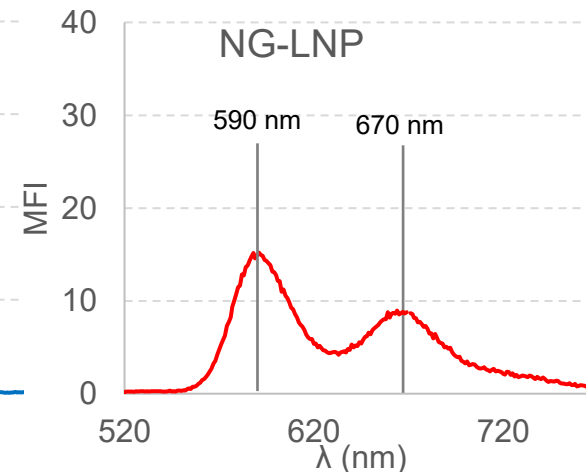
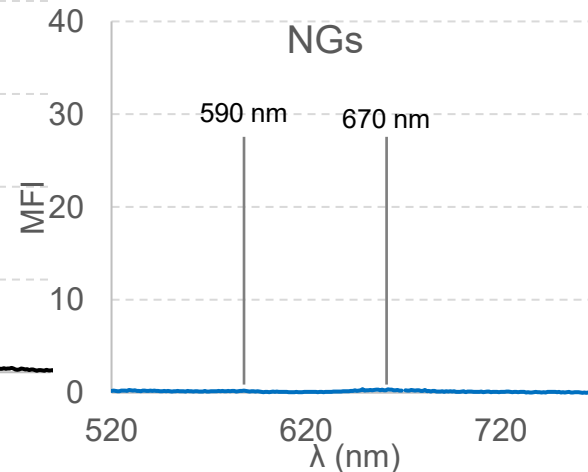
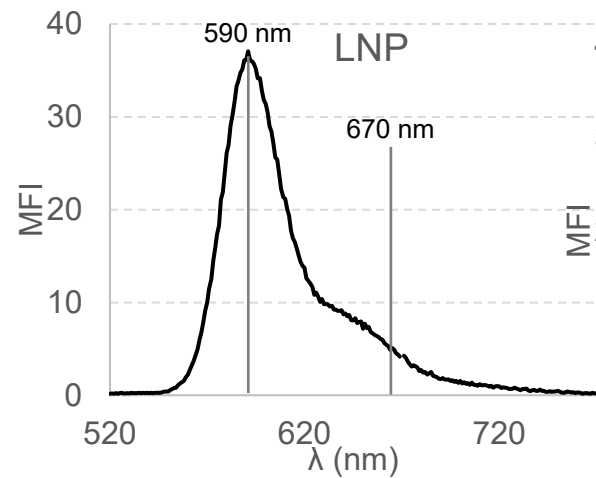
LNP stained with Rhodamine



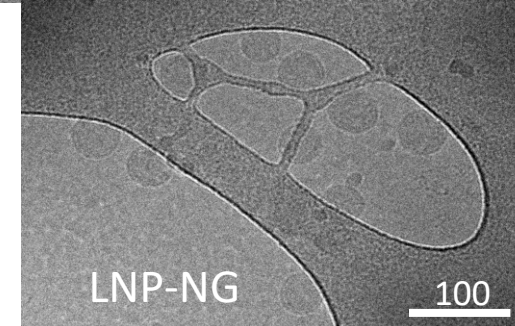
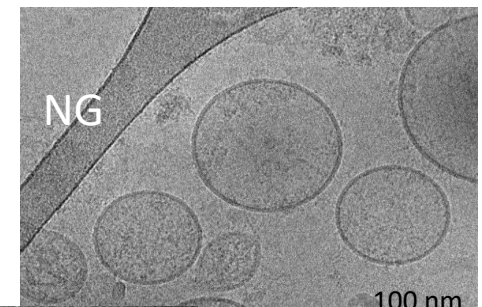
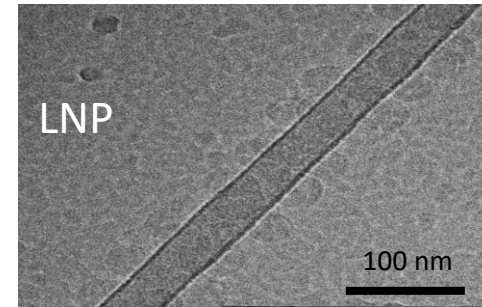
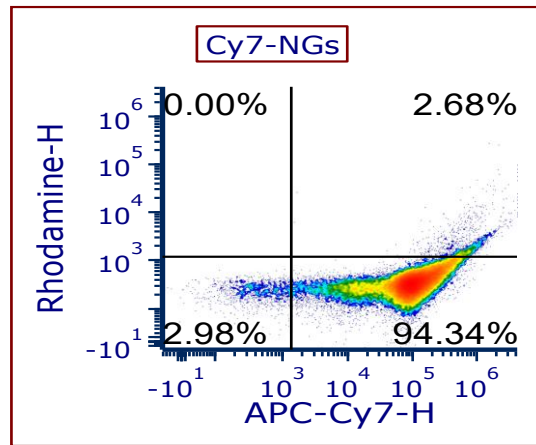
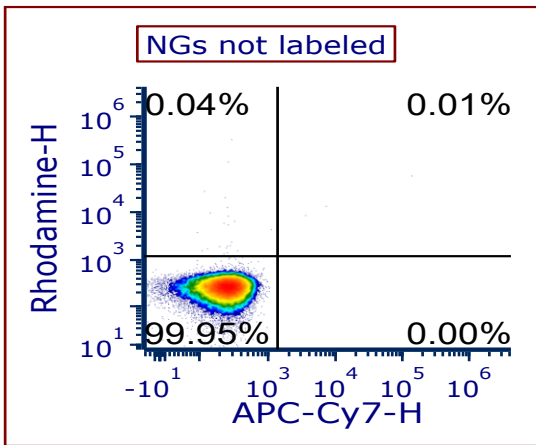
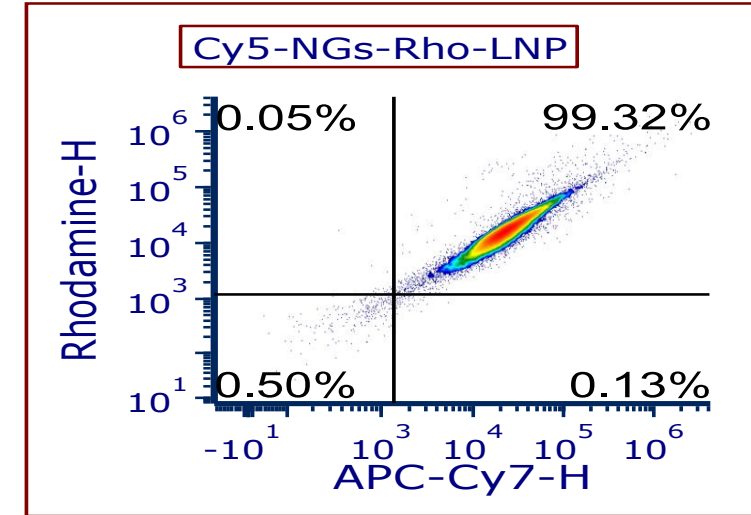
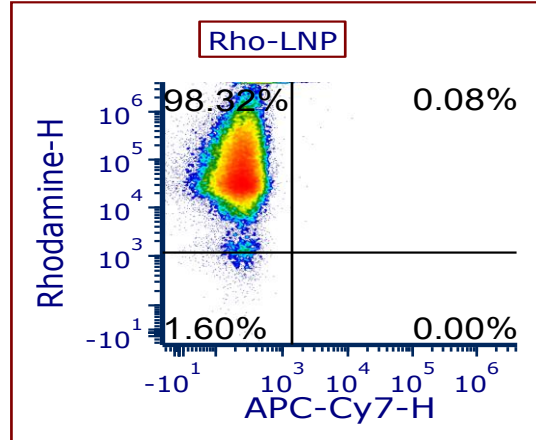
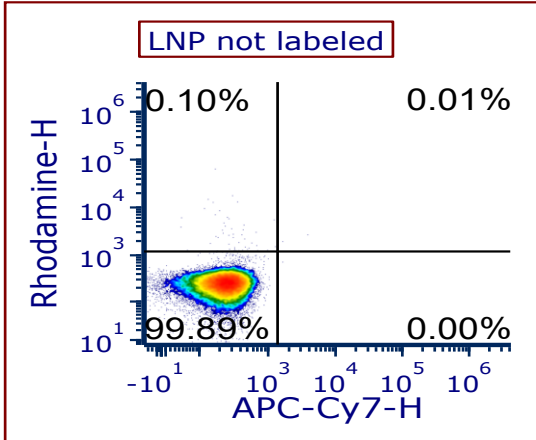
NG stained with Cy5



LNP-NGs bearing Cy3 and Cy5

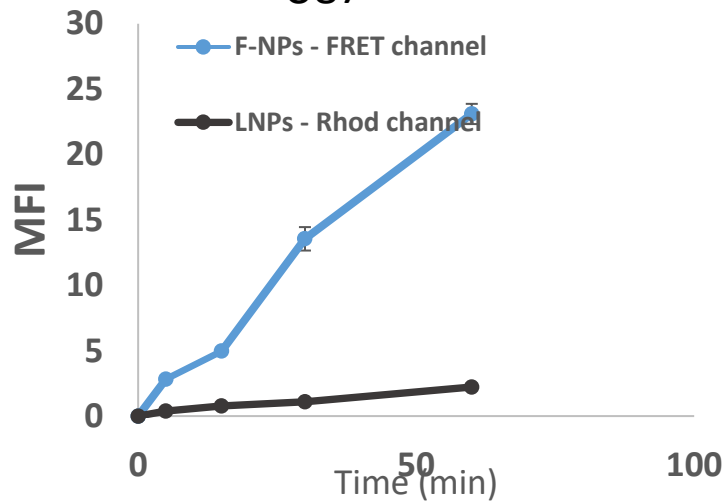


FRET for the Detection LNP and NG Biohybrid

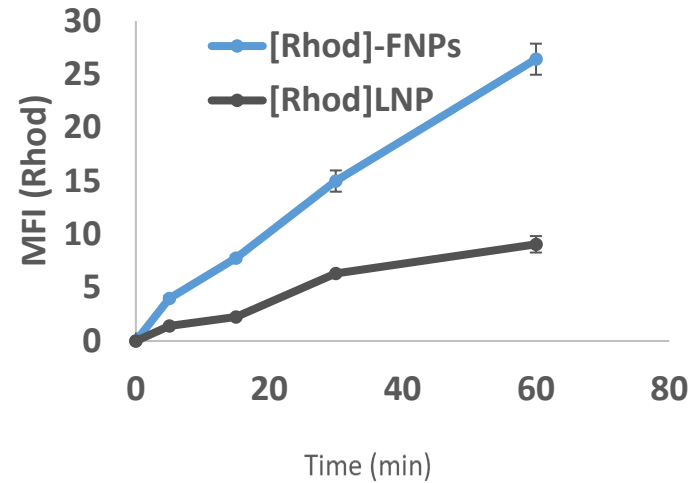


NGs-LNP Uptake by Tumor Cells

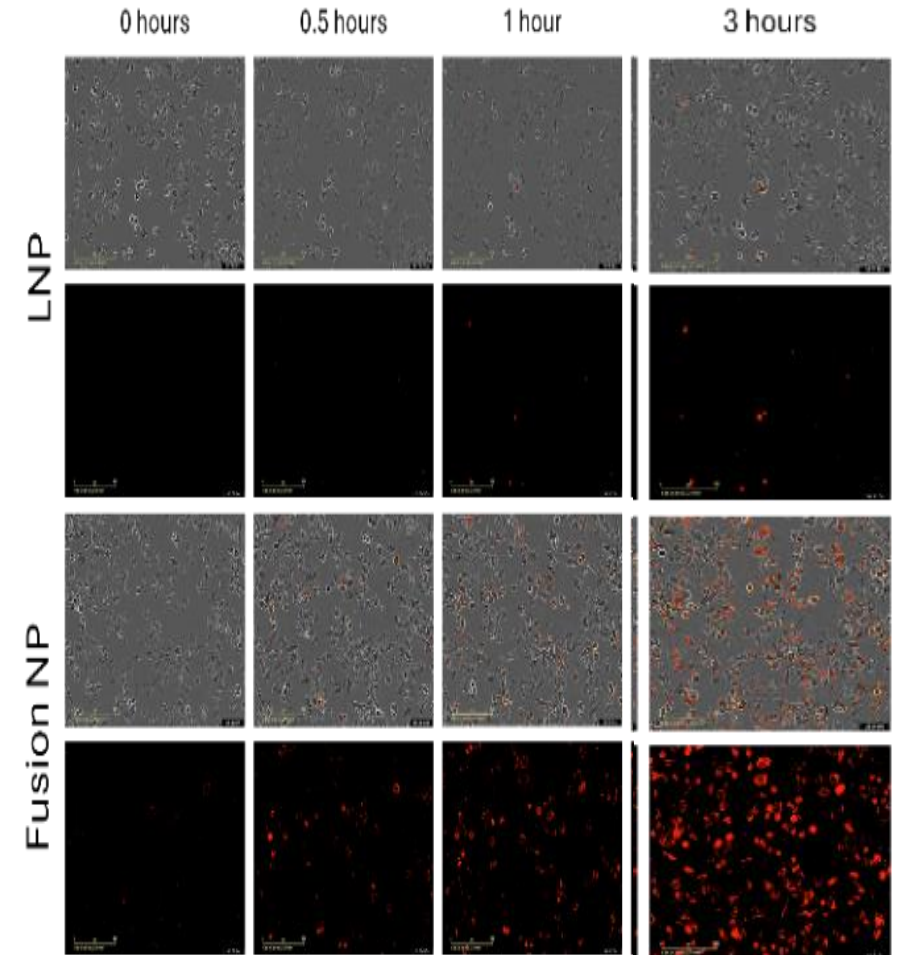
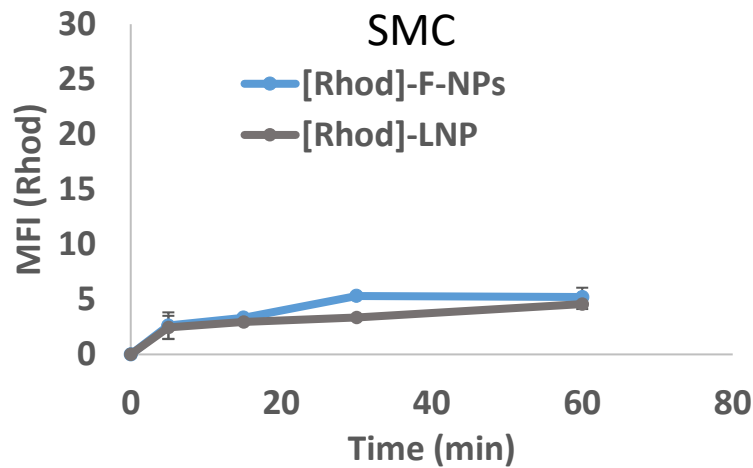
U87



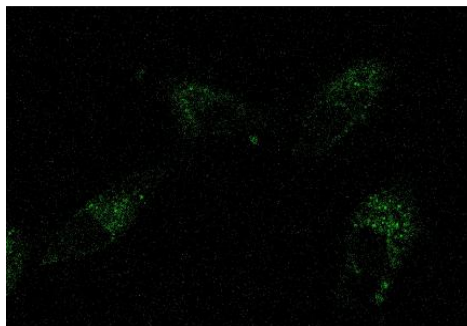
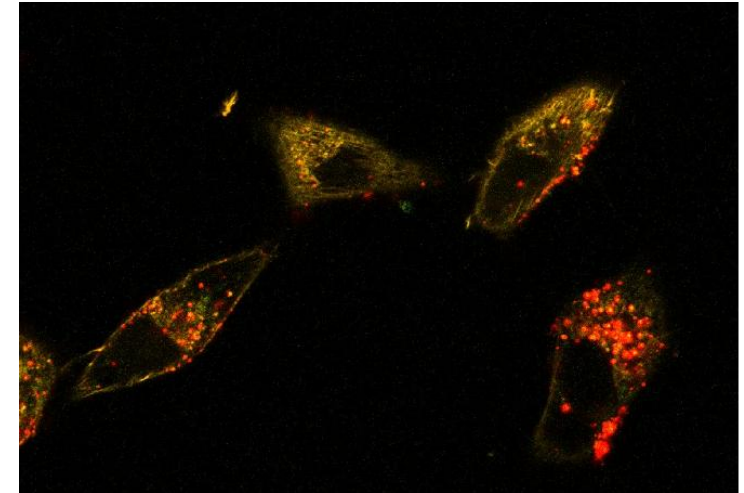
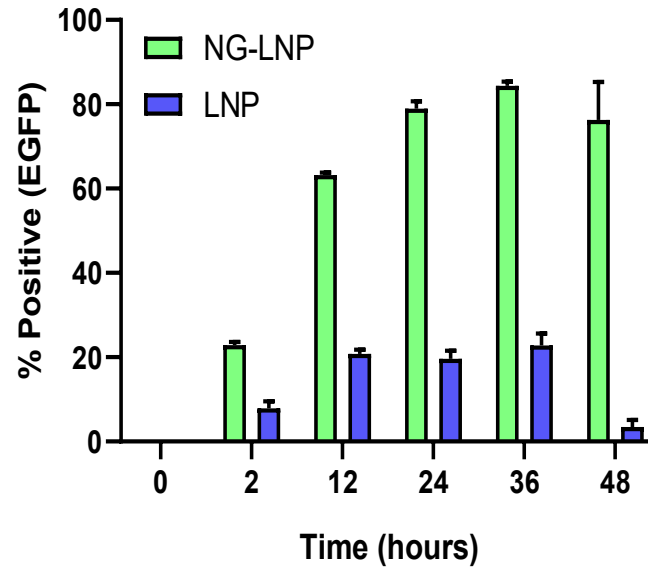
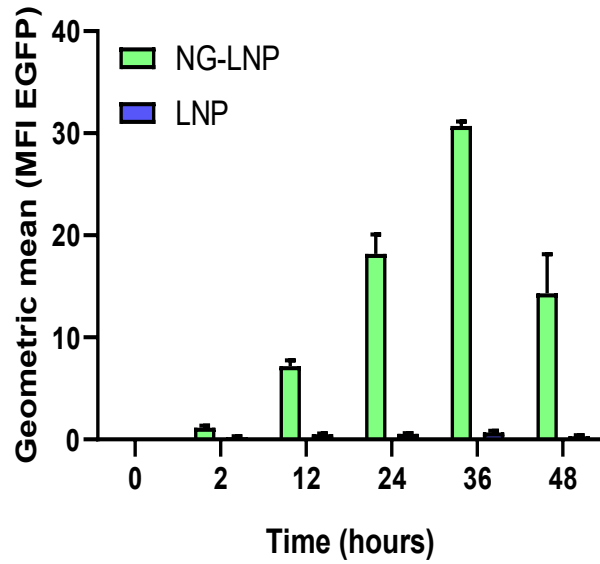
PANC-1



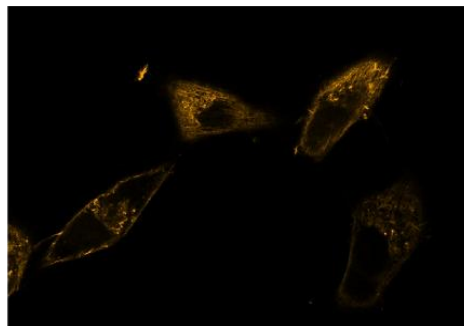
SMC



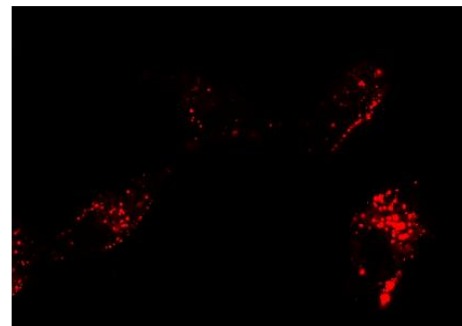
NGs-LNP-EGFP-mRNA Expression in PANC-1



EGFP expression

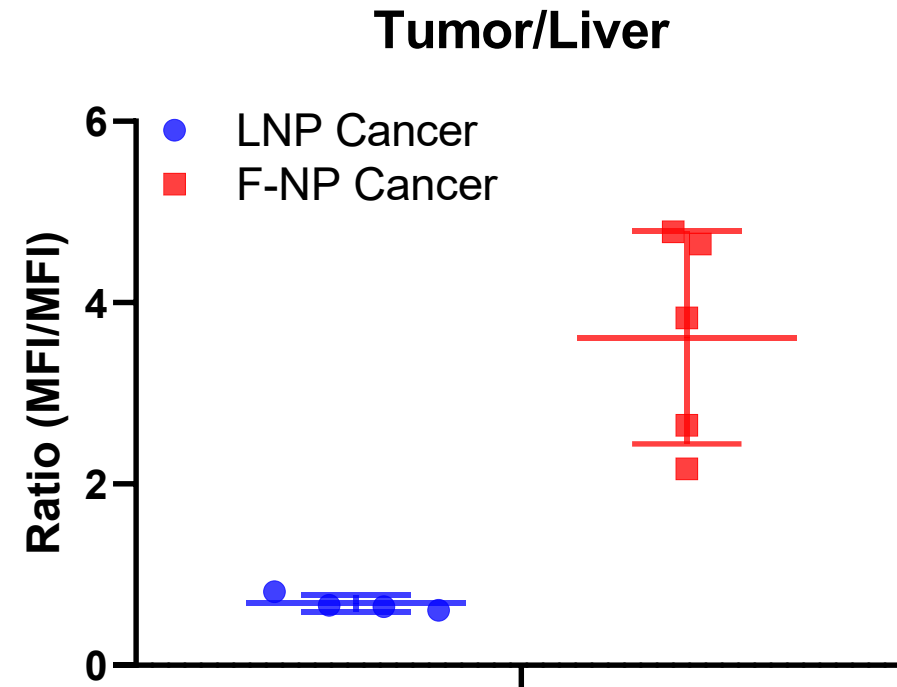
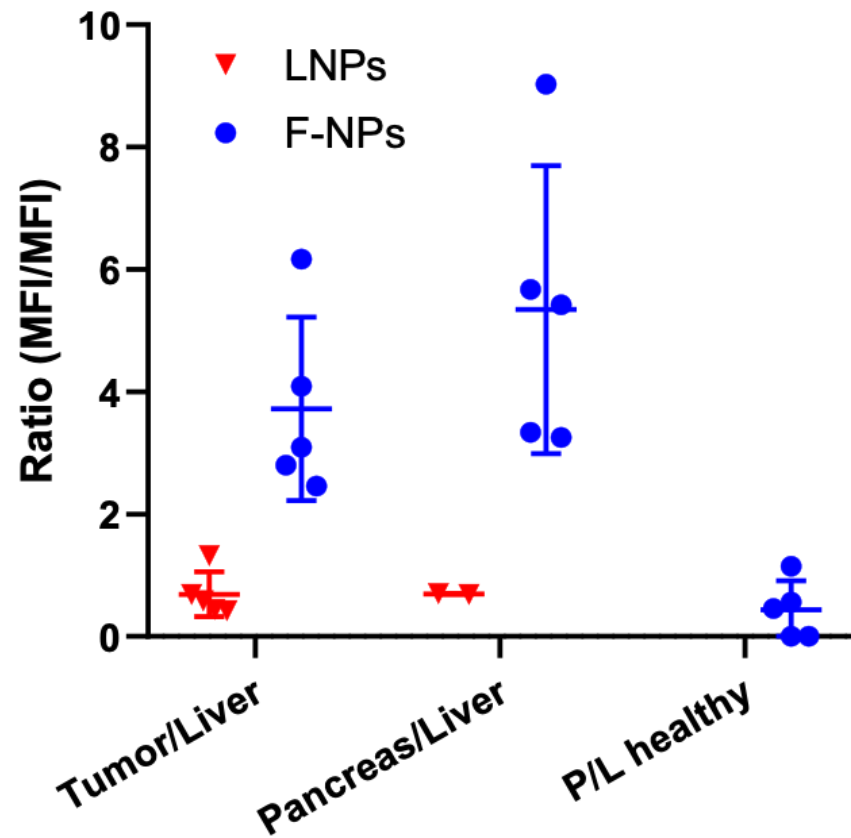


Actin filaments (TRITC)



Cy5 labeled NGs

NGs-LNP-EGFP-mRNA Expression in PANC-1 Tumor





Mr. Yonatan Malca
MA. CEO



Osnat Bohana-Kashtan
PhD, MBA. VP R&D

nanoGhost

**Revolutionizing drug and gene targeting
solid tumors and metastases across
multiple drug classes**

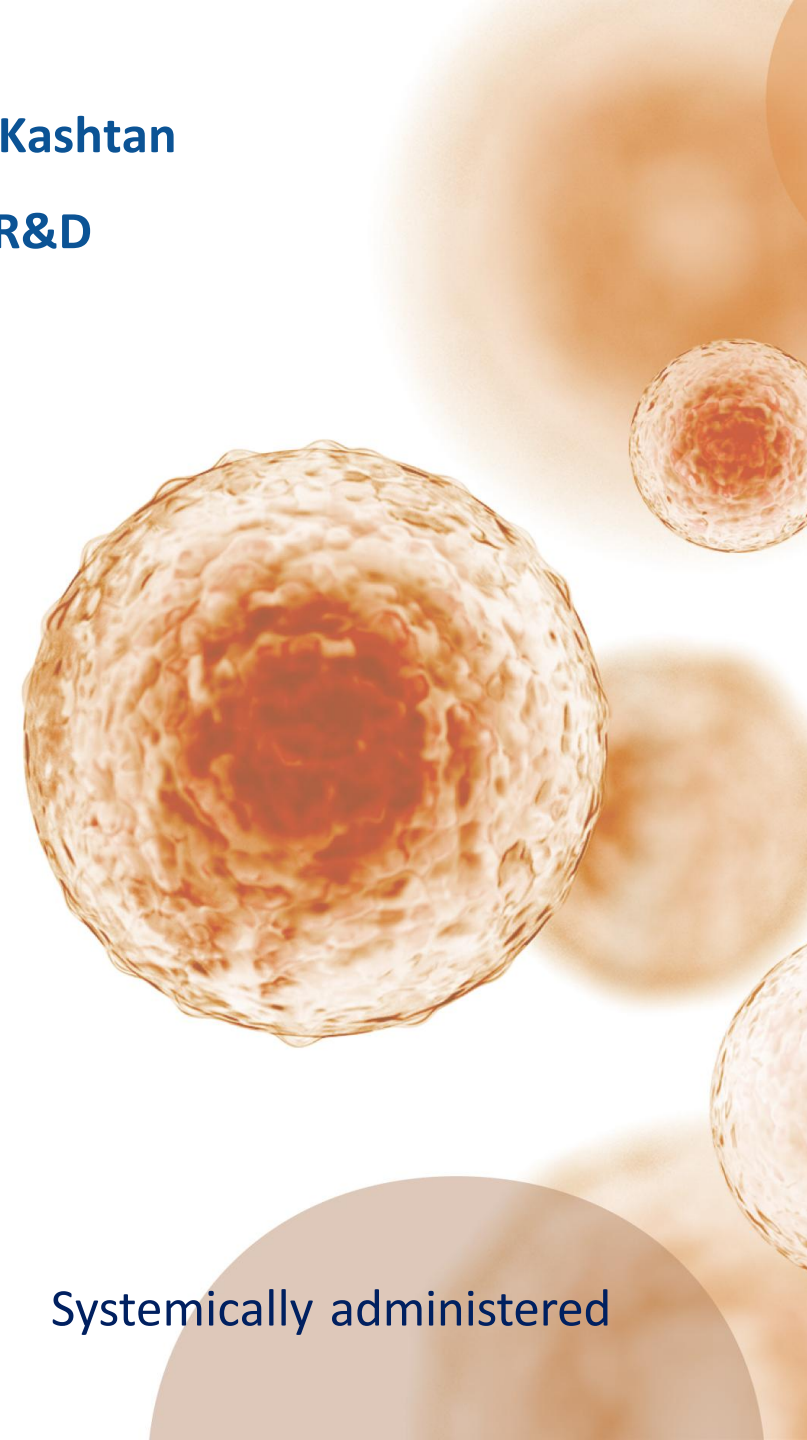
Modality agnostic

Non-viral

Targeted

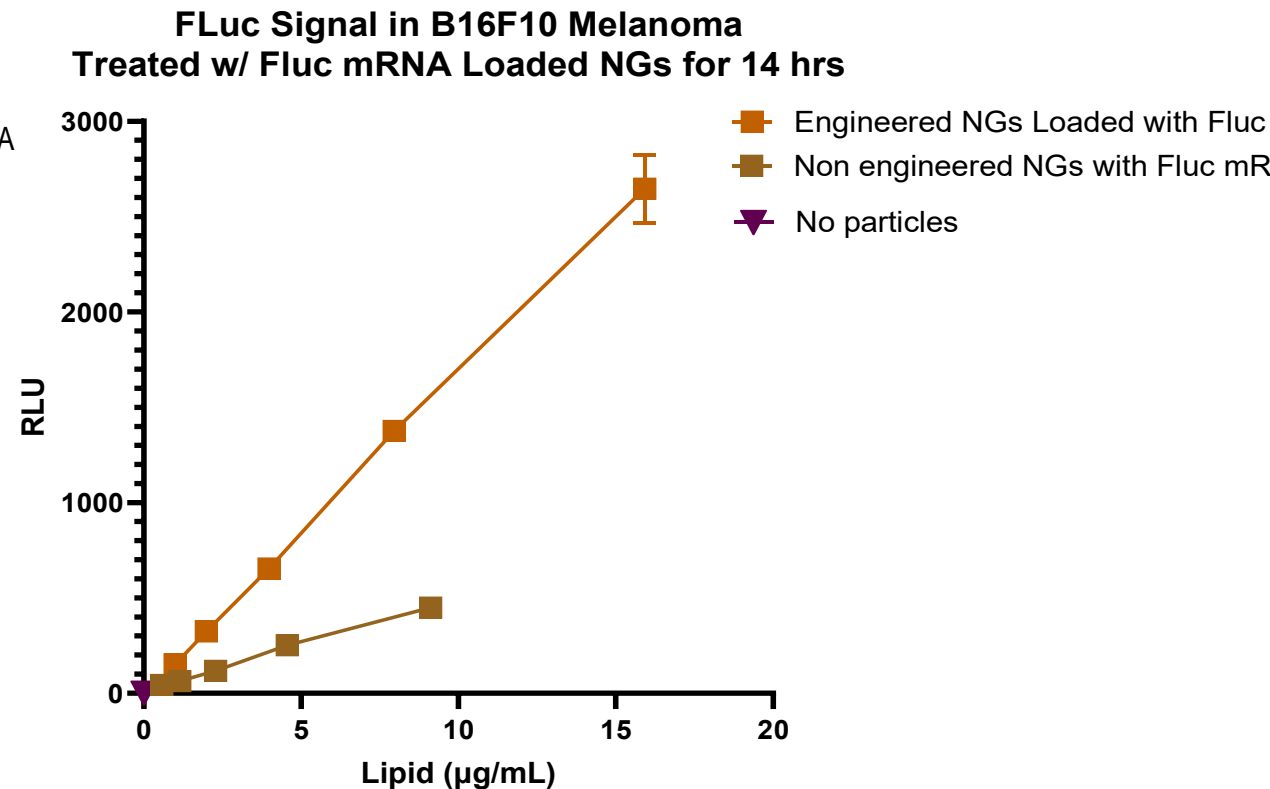
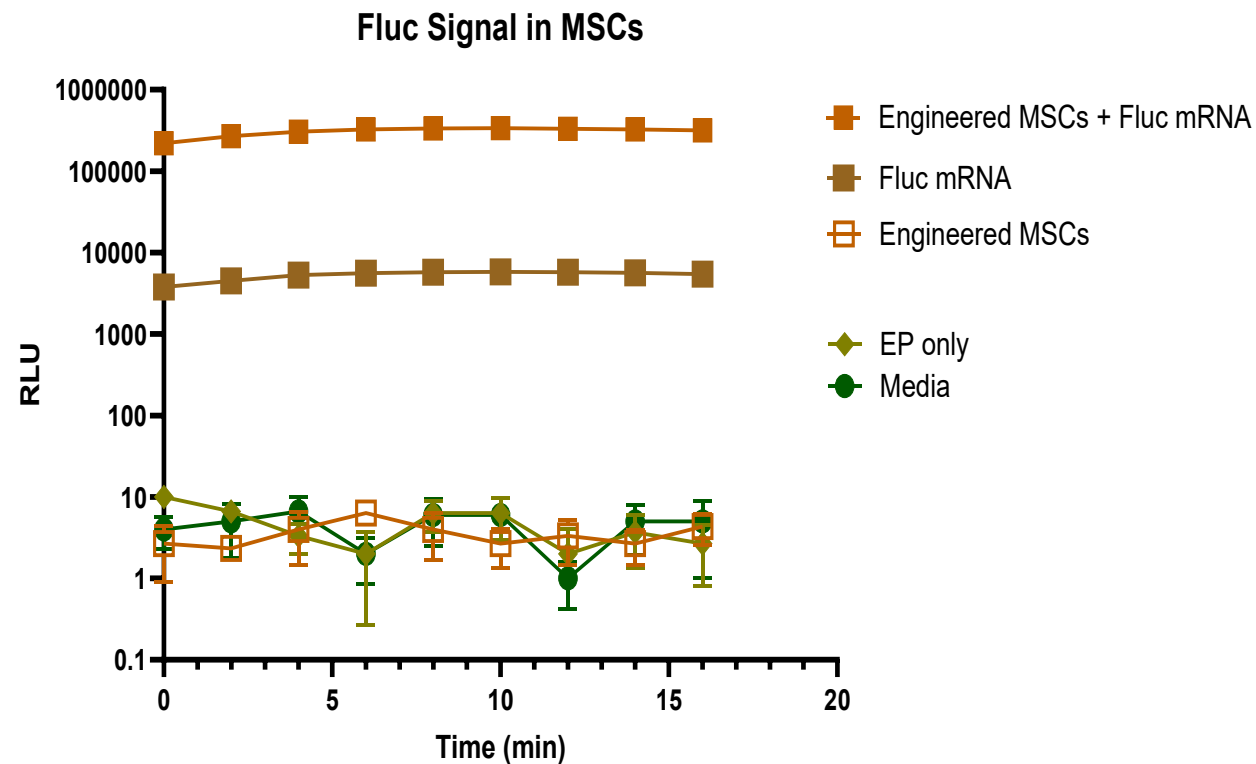
Safe

Systemically administered



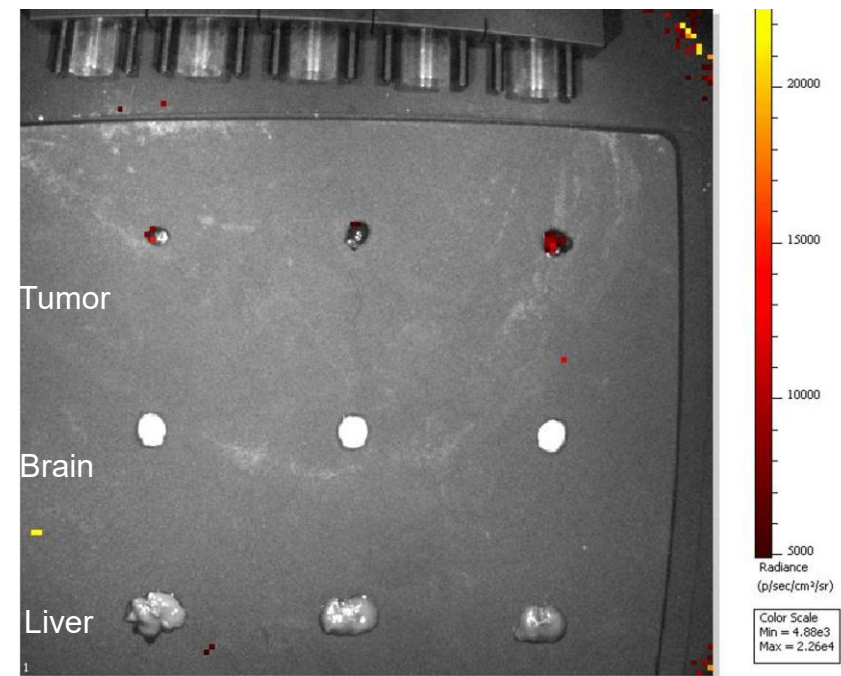
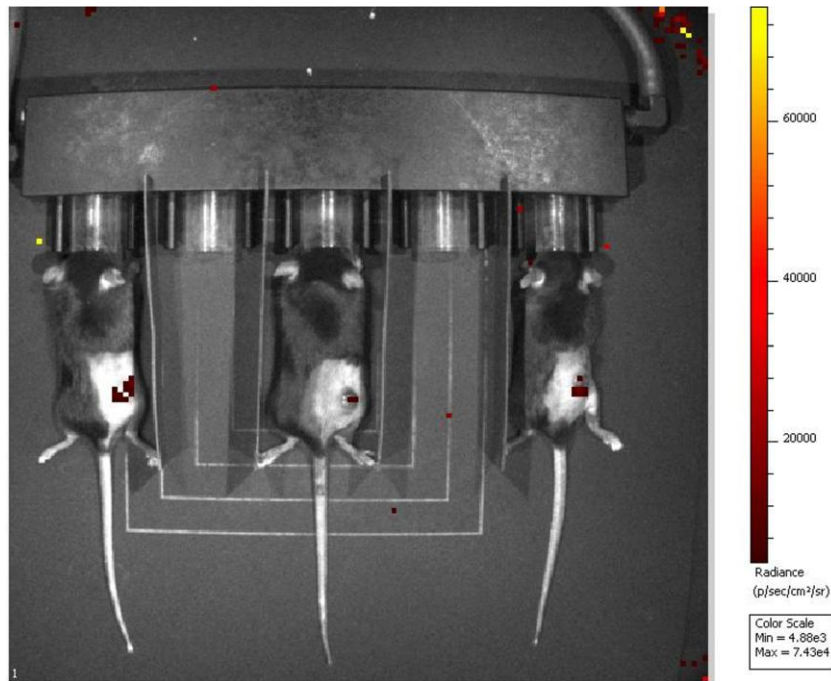
Luciferase mRNA Loaded NGs

Luciferase Activity in Engineered MSCs Loaded w/ Fluc mRNA and
in B16F10 Melanoma Treated w/ Fluc mRNA Loaded NGs



Luciferase mRNA Loaded NGs

Luciferase Activity in B16F10 Melanoma



Summery

→ Natural highly selective tropism to any tumor type

→ Does not elicit an immune response

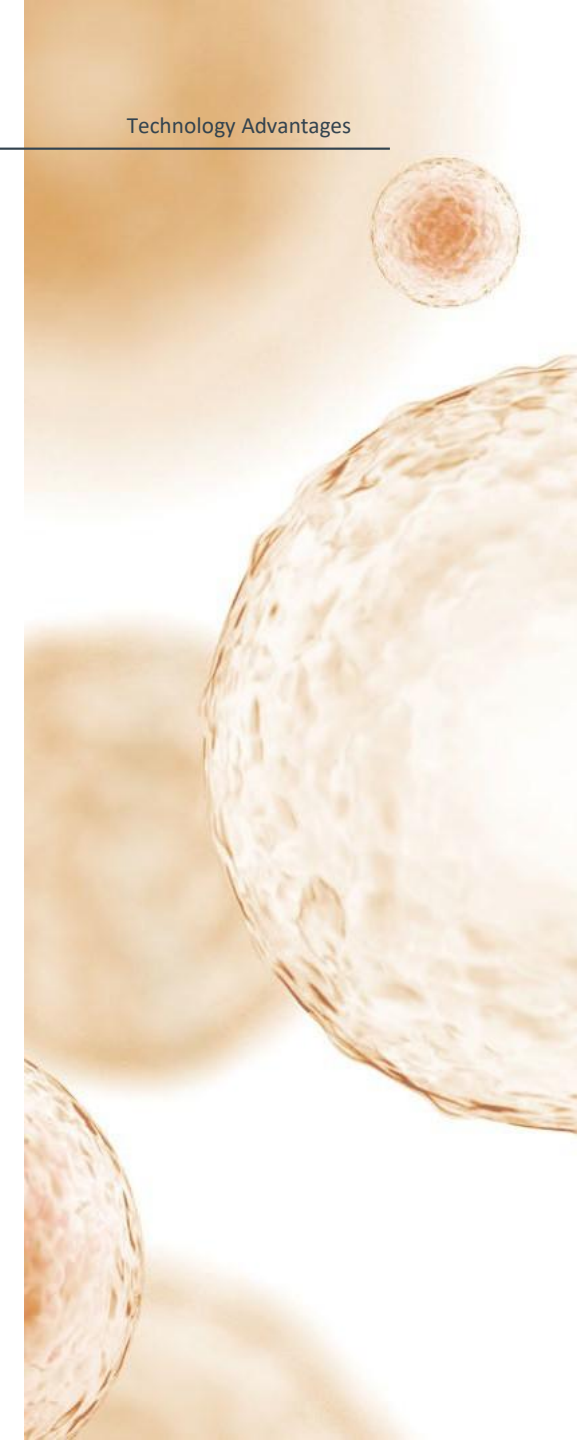
→ Scalable manufacturing process

→ Delivers different payloads: small molecules, proteins, nucleic acids (incl. mRNA), and viruses

→ Non-toxic (no accumulation in tissues, cleared fast)

→ Crosses physiological barriers (e.g., BBB, tumor barriers)

→ Allows chronic and systemic administration





Ph.D Students

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Ms Hadar Iecker-Zivan

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Dr. Lior Levi
Dr. Natali Malca
Dr. Yacopo Oieni

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Dr. Anton Zvernov
Dr. Yael Efraim
Dr. Tomer Bronshtein

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Prof Sarah Ferber, Sheba TA
Prof Lior Gepshtein, Technion
Prof Thomas Scheper Institute of Technical
Chemistry, Hannover
Prof Subbu Venkatraman Singapore
Prof Sunil Sharma TGEN, University of Arizona US



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Research Fund