

OPPORTUNITÀ TECNOLOGICHE NEL SETTORE DEI DISPOSITIVI BIOMEDICALI

Davide Prosperi

Progetto:

Nanoparticelle per applicazioni diagnostiche e per l'incapsulazione di principi attivi



NANOBIOLAB



Paolo Tortora



Davide Prosperi



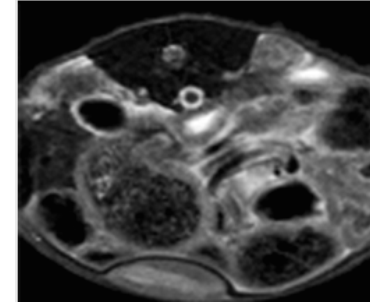
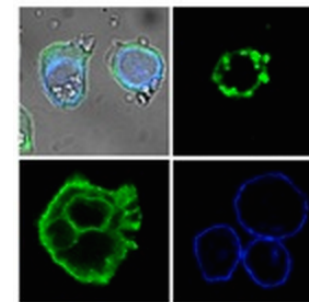
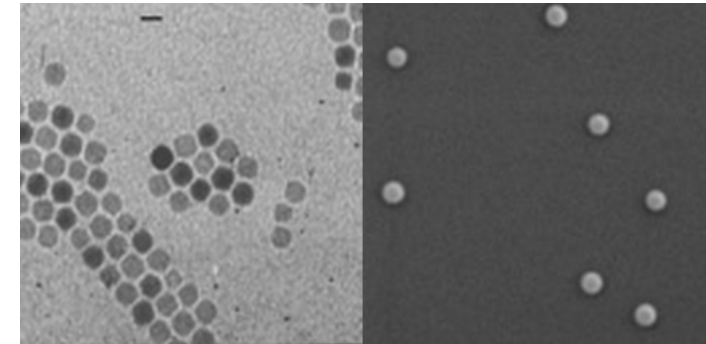
Miriam Colombo

Design and synthesis of colloidal, polymeric and biomimetic nanoparticles

- ✓ Chemical/Physical characterization
- ✓ Interactions with Biological systems
- ✓ Preclinical investigation

Applications:

- **Therapeutic**
- **Diagnostics and Imaging**
- **Formulations**
- **Cosmetics**
- **Nutraceuticals**



DIAGNOSIS AND THERAPY WITH NANOPARTICLES (THERAGNOSTICS)



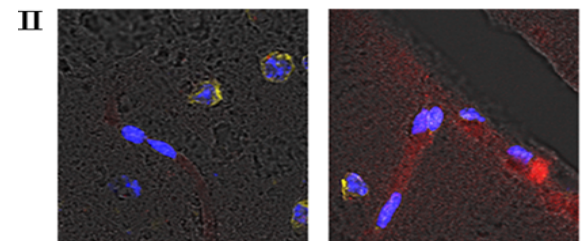
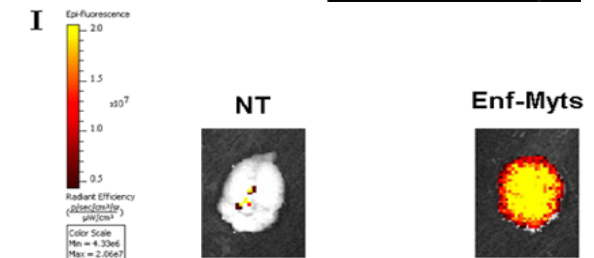
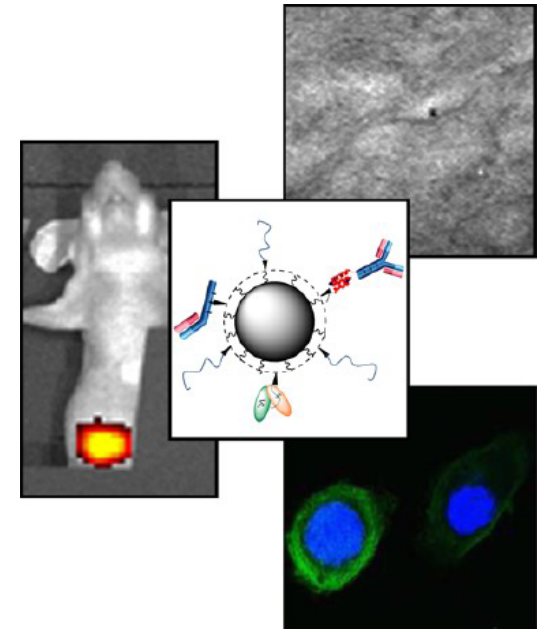
TUMOR DIAGNOSTICS

Development of novel colloidal nanoparticles consisting of a magnetic core, useful as **MRI contrast agent**, and an organic shell responsible for cell receptor targeting action:

- Nanoparticle synthesis, characterization and functionalization with biomolecules
- In vitro studies in cells (viability and internalization)
- In vivo studies on tumor bearing mice

TUMOR TARGETING

Drug-loaded nanoparticles can be used to target selective cancer cells resulting in the localization of the therapeutic activity, which should strongly reduce the typical side-effects usually encountered with conventional chemotherapeutics.



ANTIVIRAL THERAPEUTICS

Nanotechnology has potential in HIV treatment by two approaches:

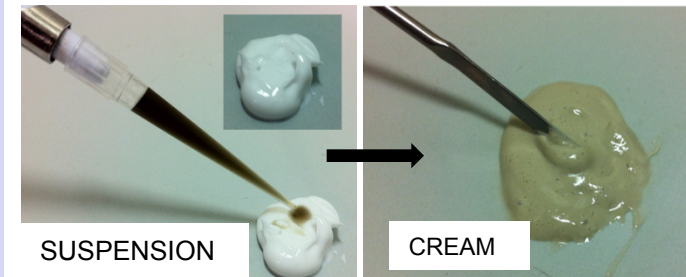
- 1) improving the pharmacokinetic properties of antiretroviral drugs
- 2) assisting drugs to cross the biological barriers (e.g., the blood brain barrier) to target the virus reservoirs.

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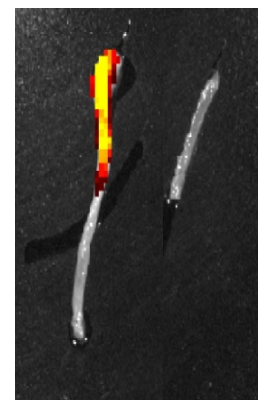
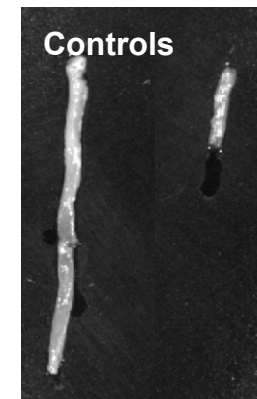
INNOVATIVE WAYS TO DELIVER NANOPARTICLES ALTERNATIVE TO THE TRADITIONAL INTRAVENOUS ROUTES OF ADMINISTRATION

In vivo investigation of topical, oral and intranasal administration as promising non-invasive delivery options especially for a regional and/or local effect, ameliorating the patient compliance, improving the pharmacokinetics of degradable peptides and proteins, and reducing the administration frequency.

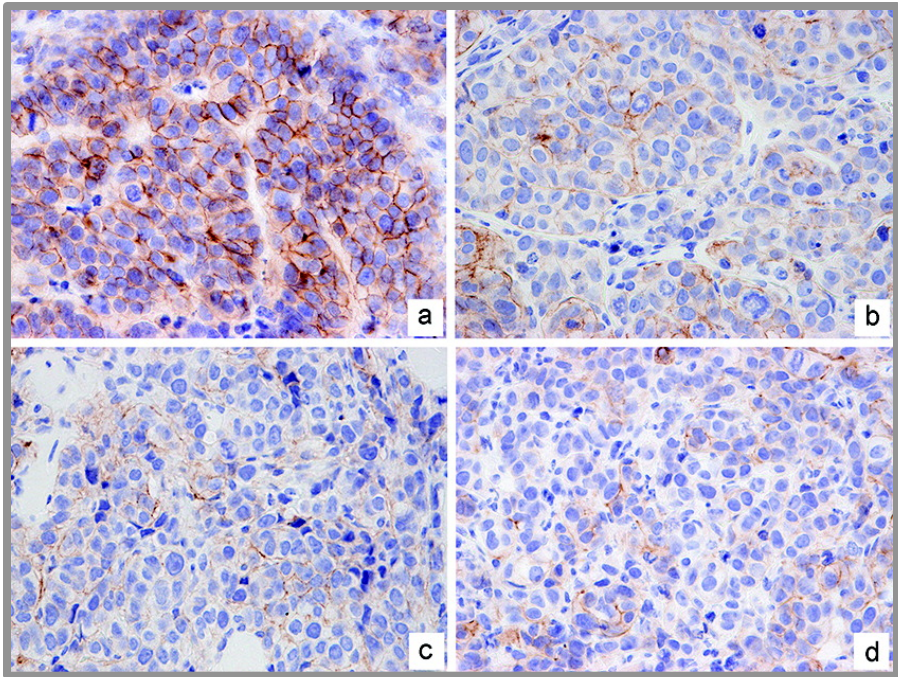
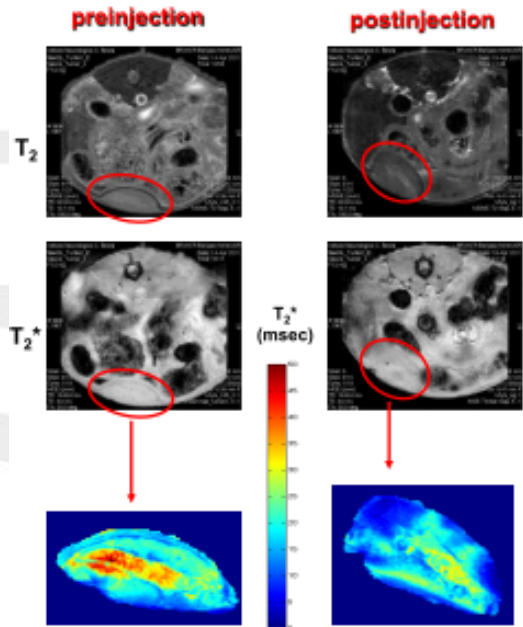
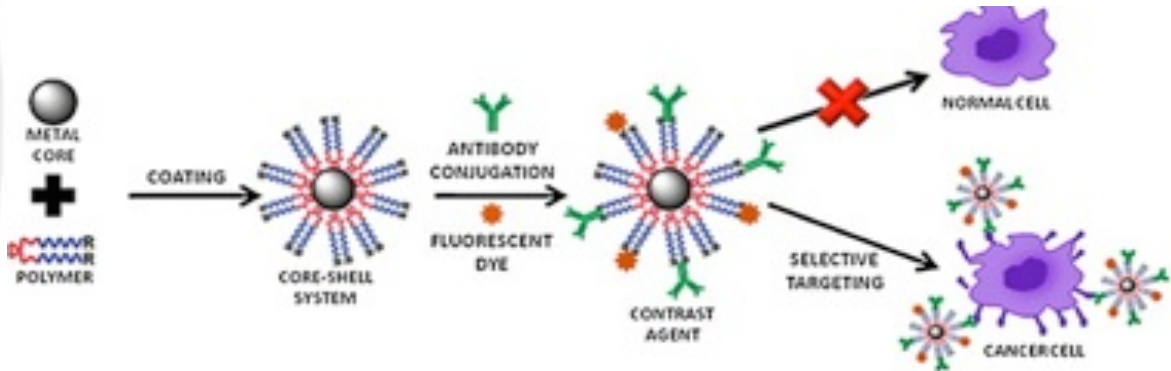


INFLAMMATORY DISEASES

Bioengineered nanoparticles can be developed to localize, monitor and quantify the early stages of inflammatory bowel diseases (IBDs), particularly Crohn disease and ulcerative colitis inflammatory diseases, and to treat aggressive inflammatory disorders including IBDs, rheumatoid arthritis, transplant rejection, edema, sepsis, and other inflammatory conditions.



NEOADJUVANT THERAPY and TUMOR IMAGING



Immunohistochemistry of tumor section extracts before (a) and after treatment with TMNC (b-d). a) Strong and diffuse membrane c-erb-2 immunostaining in all the neoplastic cells. b-d) c-erb-2 pattern of distribution in the tumor at 5 h, 24 h and 1 week, respectively.

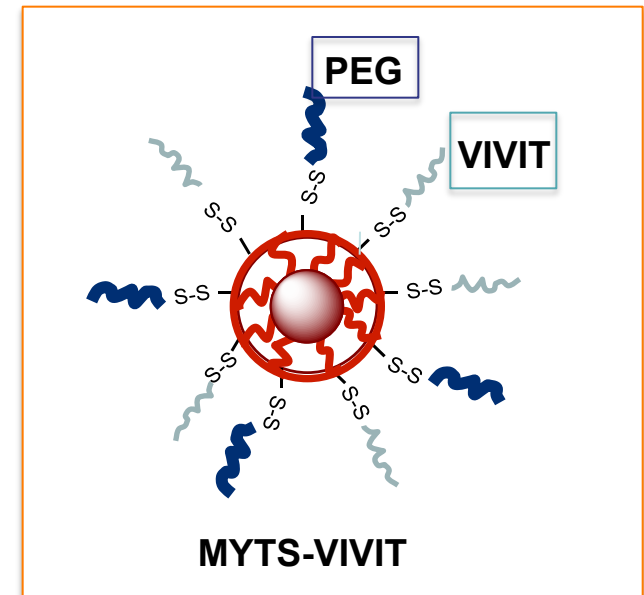
Nanoconstructs useful in the treatment of inflammatory diseases

Patent n°:

PCT/IB2013/055943

Spin-off: inTHEna s.r.l.

- Design and preparation of new nanotools able to transport directly on inflammation sites antiinflammatory biomolecules
- Treatment of autoimmune and chronic inflammatory states (i.e rheumatoid arthritis, allogenic or xenogenic transplant rejection, autoimmune diseases...)
- Selective targeting
- Improved bioactivity on in vivo inflammation models



Nanoconstructs useful in the treatment of inflammatory diseases

NANOPARTICLE TREATMENT REDUCES ALLOGRAFT REJECTION

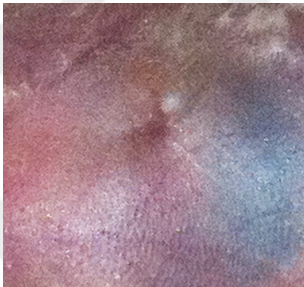
Male → Female

Male → Female
MYTS-VIVIT

10 days



27 days



RHEUMATOID ARTHRITIS

