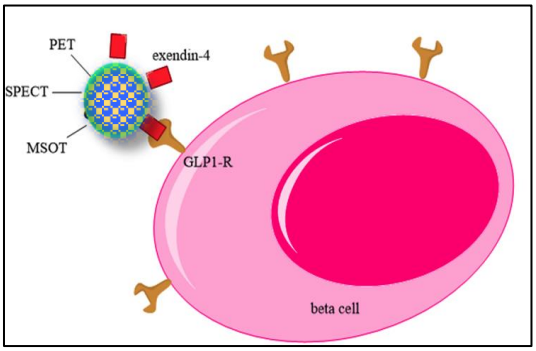
Design of polymeric nanoparticles formulation as *in vivo* multimodal imaging tool

Pignatelli C.* [1], Rossi L.[1], Rabbachin L.[1], Prépost E.[2], Kerekes K.[2], Körhegyi Z[2], Kocsi J.[2], Bodnar M.[2], Russo L. [1], Nicotra F. [1]
* cataldo.pignatelli@unimib.it
[1] University of Milano-Bicocca, Milano, Italy
[2] BBS Nanotechnology, Debrecen, Hungary

Keywords: Polymeric nanoparticles, multimodal diagnosis, multimodal imaging, click chemistry, specific targeting

In vivo imaging is a rapid, intuitive and non-invasive approach that can be useful for the early detection of severe pathologies, for the follow-up of patients, to display the recovery of damaged tissues as well as the therapy efficacy. Interestingly, *in vivo* imaging can become a more important tool in these fields because of the improvements in the molecular-imaging technologies. However, it needs probes in order to study physio-pathological structures and/or processes at biological and molecular level. Nanoparticles have been largely used for this aim, thanks to their very small dimensions and high surface area to volume ratio. Such large area is available to be labeled and it makes them appealing for improving the resolution of *in vivo* imaging.
Polymeric nanoparticles based on poly-glutamic acid and chitosan were prepared through ionic gelation. Thanks to the functionalization of the polymeric components with different functional groups suitable for chemo-selective ligations, the nanoparticles have been decorated with ligands for targeting and a couple of detecting agents. Through click chemistry reactions, nanoparticles were easily functionalized with a chelating agent for gallium or gadolinium, dodecane tetra-acetic acid (DOTA), allowing them to be detectable by SPECT (Single Photon Emission Computed Tomography), PET (Positron Emission Tomography) or MRI (Magnetic Resonance Imaging) imaging approaches. Furthermore the nanoparticles were functionalized with IRDye800 CW, a near infrared dye viewable with MSOT (Multi-spectral optoacoustic tomography) technique. For targeting, nanoparticle formulation was functionalized with the peptide exendin 4, a specific ligand of the pancreatic β-cells receptor glucagon-like peptide-1 receptor (GLP-1R).



Acknowledgments: this project is funded by H2020-NMBP-15-2017- GA-760986 — iNanoBIT (1.10.2017-30.9.2022) Integration of Nano- and Biotechnology for beta-cell and islet Transplantation. http://inanobit.eu/about-inanobit/