Nanostructured materials | Jožef Stefan Institute Ljubljana, Slovenia

SEMINAR I

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Active targeting in cancer therapy: on the road to develop peptide-decorated biomimetic nanocarriers

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Neuropeptide Y (NPY), a 36-amino acid peptide, interacts with G protein-coupled receptors (GPCRs) known as NPY receptors (NPYRs), including Y1, Y2, Y4, Y5, and Y6 subtypes. Y1 regulates food intake, heart rate, anxiety, and bone homeostasis, while Y2 influences neurotransmitter release, memory, circadian rhythm, and bone formation. Y4 is involved in feeding regulation, energy homeostasis, colonic transit, and hormone release, primarily in the gastrointestinal tract and brain. Y5, mainly expressed in the central nervous system, regulates food intake, circadian rhythm, and hormone release. The Y6 receptor is active in certain animals.

GPCRs, the largest class of cell surface receptors, play roles in cancer development. Over 30% of FDA-approved drugs target GPCRs or related pathways. The targeting of NPYRs with NPY analogs holds immense promise for advancing cancer therapy. By leveraging innovative carriers such as red blood cell ghosts (EMVs), which offer unique advantages with their nontoxicity, biocompatibility, and circulation time, the development of novel NPY analogs gains further momentum. These analogs have the potential to precisely target cancer cells while sparing healthy tissue, thus revolutionizing the efficacy and safety of cancer treatments. We hypothesize that drug-loaded EMVs will be preferentially internalized by cancer cells expressing these receptors, leading to a more selective and effective drug delivery.

Kindly invited.