PolyTarget

Polymer-based Nanoparticle Libraries for Targeted Anti-inflammatory Strategies

www.polytarget.uni-jena.de
The CRC PolyTarget

The goal of the CRC PolyTarget is the development of new strategies for the treatment of infection-triggered inflammatory states, centered on a rational design of tailor-made nanoparticulate drug carriers. Pharmacologically active nanoparticles based on functional synthetic polymers and (modified) biopolymers are utilized and characterized to address the fundamental questions of targeted nanomedicine from the bottom up. Based on the establishment of polymer libraries and a detailed molecular and morphological characterization of the nanoparticles, structure-property relationships are studied to optimize the nanoparticles with respect to their biological and pharmaceutical function.

Systematic polymer and particle libraries

- Multiple, advanced characterization methods combined with detailed biological studies, GMP laboratory
- Elucidation of quantitative structure-property relationships
- Transition from trial & error experimentation towards knowledge-based design of multifunctional polymer-based nanoparticles

Cell and organ specific delivery systems for inflammation-related diseases

PROJECTS

**Subject Area A: CORE**

- **A01** Tailor-made multifunctional polymers and nanoparticles with optimized compatibility between biodegradable core and encapsulated drug
- **A02** Multifunctional nanoparticles based on polysaccharides for targeted drug delivery with two-step release behavior
- **A03** Photoacids and bases as responsive elements in block copolymer nanostructures for uptake and transport
- **A04** Spatial and temporal targeting of membrane-bound mPGES-1 and FLAP / 5-LO by dual inhibitors employing polymer-based nanocarriers
- **A05** Targetable nanoparticles for efficient translocation across gastrointestinal barriers
- **A06** Controlling stealth and barrier breaking behavior: Hybrid protein nanofibers and POxylation on polymeric nanoparticles with structurally tailored thermal properties

**Subject Area B: SHELL**

- **B01** Targeted nanoparticle mediated delivery of nucleic acids into muscle stem cells for prevention of critical illness myopathy
- **B02** Macromolecular prodrug nanoparticles for antimicrobial therapy
- **B03** Bioinspired guanidinium-containing nanoparticles for gene delivery
- **B04** Nanoscale monitoring of surface effects, structural changes, and encapsulation in block copolymer nanostructures using tip-enhanced Raman spectroscopy

**Subject Area C: MEDIUM**

- **C01** Biophotonic characterisation of the interaction of nanoparticles and drugs with hepatic stellate cells
- **C02** Tailored delivery of anti-inflammatory natural drugs using polymer-based nanocarriers to prevent cytokine and eicosanoid storms in infectious inflammation
- **C04** Investigation of cellular response to nanoparticle uptake by dual TEM and superresolution fluorescence imaging
- **C06** Prevention of late phase liver damage by targeted modulation of the liver’s immune response

**Subject Area D: VIRAL**

- **D01** Mimicking viral entry mechanisms with polymeric nanoparticles
- **D02** Delivery platforms for antiviral and anti-inflammatory agents targeting infections of respiratory viruses with pandemic potential

**Subject Area T: TRANSFER**

- **T01** Targeting renal phosphoinositide 3-kinase γ (PI3Kγ) by dye-tagged nanoparticles

**Subject area Ö: Educational institutions and the public**

- **Ö01** Science education on target: Didactic reconstruction of current research at the interface between nanotechnology and medicine

**Subject area Z: Central research platform and supporting projects**

- **Z01** Research platform for the synthesis, formulation, and advanced physicochemical characterization of polymers and nanoparticles
- **Z02** Integrated Research Training Group
- **Z03** Central tasks of the Collaborative Research Center