Tailor-made polymers and nanoparticles for applications in nanomedicine

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Pharmapolymers feature a great potential for the delivery of various active pharmaceutical ingredients (API). An optimum carrier material should be non-toxic, bind and protect its cargo from degradation, be invisible to the immune system and direct the API to its desired place of action, where it should release the cargo without reducing its effectiveness. Here, a modular approach is described to decouple the various requirements from each other: One section is to bind the API, a second part is to reduce toxicity and shield from recognition by the immune system, and an attached “director” is to navigate the carrier to a specific target. However, necessary approvals make it difficult to translate current polymer research into products relevant to the pharmaindustry, and optimum combinations cannot be realized sticking to one polymer type. The lecture provides an overview about how traditional pharmapolymers such as poly(lactic acid) (PLA), poly(ethylene glycol) (PEG) or linear poly(ethylene imine) (l-PEI) can be modified, coupled to relevant building blocks, or be replaced by more tailor-made alternatives such as, *e.g.* poly(2-oxazoline)s.

Selected recent references:
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