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New routes in treating brain disorders

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Evolution gave birth to an extremely useful structure: The blood-brain barrier that protects our delicate central nervous system homeostasis by shielding off toxic metabolites, extraneous substances and attacks of pathogens. But biologically valuable does not always mean pharmacologically welcome. The blood-brain barrier does not distinguish between friend and foe and causes many potentially effective brain therapeutics to fail *in vivo* - not because of a lack of potency, but because they cannot pass this physiological barrier. This dilemma especially comes into focus for the class of neurodegenerative disorders: Demographic changes drive the rapidly growing prevalence for age-related maladies such as Alzheimer's or Parkinson's disease resulting in horrendous socio-economic burden. Scientists feverishly search for new causal drugs, but even if they showed beneficial effects *in vitro*, the chance that they pass the blood-brain barrier unhindered is virtually non-existent. Today, we can use the elegant approach of molecular Trojan Horses: The fast-emerging field of nanotechnology offers the possibility to enlarge the pool of substances by packing promising drugs into nanoparticles. By this, we can mask the original physico-chemical properties of the substances and even surface-modify the particles with ligands targeting specific receptors at the blood-brain barrier. The advantages are tempting: Apart from reducing peripheral doses and consequently side effects, drugs can be targeted directly to the brain.

Biography

Sylvia Wagner studied chemistry at the University Karlsruhe. She did her PhD thesis at the Fraunhofer IBMT, where she is group manager of the Preclinical Nanobiotechnology group since 2008. Her main research topics are focused on nanobiotechnology and development of *in vitro/ex vivo* models for preclinical testing of new nanoparticulate formulations and nanosafty issues. For example formulations for the specific drug targeting (e.g., tumor targeting) as well as for crossing of biological barriers (e.g., blood-brain barrier or gastrointestinal barrier) are mainly on focus.

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