Biological safety assessment of 10 nm gold nanoparticles with BSA coating in a mouse model *in vitro* and *in vivo*

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Targeted drug delivery systems offering countless benefits to human health represent a hot topic in the field of nanomedicine. Such interest in this type of therapy is caused also by the close cooperation between medicine and nanotechnology, which, thanks to dynamic technological progress, is now able to generate a wide range of nanoparticles that differ in size, shape, and coating material. However, the ever-increasing available spectrum of nanoparticles potentially usable in medical practice lacks information about their biological safety. To expand the accessible data on the biosafety of nanomaterials, a closer look at the impact of 10 nm BSA-coated gold nanoparticles (since their basic biological, chemical, and physical properties meet the criteria for carriers in targeted drug delivery systems) was chosen and performed on a mouse model - both *in vitro* and *in vivo*.

Despite the fact that *in vitro* experiments did not reveal any serious adverse effects of the tested nanoparticles (after 24 hrs of exposure), results from *in vivo* experiments showed changes at the mRNA level in the expression patterns of genes related to the inflammatory process, oxidative damage, and tissue fibrosis both 1 and 30 days after treatment (a single intravenous injection of nanoparticles in 5% glucose solution at a dose of 1 mg (Au)/kg (mouse)). Moreover, a higher representation of fibronectin-positive cells in the spleen and kidney of mice from 30-day variant of the *in vivo* experiment was captured by immunohistochemical staining. The fact that overexpression of fibronectin at the protein level can be detected by immunohistochemistry *in situ*, but not quantitatively by western blotting, leads to the conclusion that pathological processes may appear in the organism later in time, and therefore it is important to supplement the obtained data with experiments focused on the impact of the tested nanoparticles in longer periods of time.

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