

Doctoral School of Information and Biomedical Technologies
Polish Academy of Sciences (TIB PAN)

SUBJECT:

Cytotoxicity of melanin nanoparticles as a tool for melanoma detection and therapy

SUPERVISOR:

Michał Giersig

mgiersig@ippt.pan.pl

Institute of Fundamental Technological Research, Polish Academy of Sciences,
Pawińskiego St. 5B; 02-106 Warsaw, Poland

In a discipline of biomedical engineering to the TIB Doctoral School

DESCRIPTION:

Since the beginning of the 21st century, an increasing number of nanomaterials (NM) has attracted attention due to their potential application in nanomedicine, especially for therapeutic and diagnostic purposes. NM have different properties compared to larger materials and these properties can be used in a wide spectrum of biomedical fields such as drug delivery, imaging, detection, and tissue engineering. In this context, the safety (or toxicity) profile of NM and their health effects must be assessed along with biocompatibility and activity desired for their development. Some in vitro and in vivo studies have clearly shown no particular risk from NM, while others indicated that NM may pose a health risk. It is known that melanin nanoparticles are biologically harmless to human cells in a wide range of concentrations. In the proposed topic of the doctoral dissertation, the synthesis of melanin nanoparticles (NPM) is to be carried out. Modification of the NPM surface will enable their application in different neoplastic cultures of the population. In order to study the cytotoxicity effect in detail, it is necessary to produce highly monodisperse melanin nanoparticles coated with glucose. For massive cellular uptake of these nanoparticles, we will select metastatic melanoma cells and compare them to HeLa cells. We will also carry out NPM activation experiments by use of the infrared light beam and demonstrate the influence of NPM on the viability of the tested cells. This work will provide novel scientific findings on the bioactivity of NPM and some perspectives on potential applications in various clinical fields.

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