



Theranostic Exosomes in Personalized Cancer Nanomedicine

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Cancer is currently second cause of death behind cardiovascular diseases in the European Union. Among different cancers, lung cancer is the most common cause of global cancer-related mortality due to late diagnoses and limited treatment, leading to over a million deaths each year. Accumulating evidence suggests that lung cancer represents a group of histologically and molecularly heterogeneous diseases. Recent strategies, e.g., surgery, radiotherapy, chemotherapy and immunotherapy, to treat lung cancer are still far to be sufficient for suffering patients. Therefore, the application of nanotechnology to treat lung cancer seems to unleash a huge capacity to solve many unmet clinical needs including the potential for new drug development in the coming future. Our proposal consists of an ambitious and responsible transnational research and development program of cancer theranostics using nanotechnology for personalised nanomedicine. The proposal integrates nanoscience products and their technological applications resulting in completely new ideas, methods and outputs, based on the bioengineering of a highly sensitive and highly reliable multifunctional patient-personalized theranostic exosomes. These next generation theranostics can deliver a molecular-based sensing program by a trojan horse-like effect, employing also radiotherapy combined with magnetic fluid hyperthermia. This novel therapeutic approach will be tested in preclinical studies addressing common regulatory issues and using novel technologies such as 3D cultures, organ-on-a-chip, microfluidics and proteomics. To reach these challenges, the project will merge multinational teams representing Polish and Norwegian laboratories, academia, clinical hospital, and industrial partnerships to elucidate different areas of biosciences, nanotechnology, clinical oncology and business ventures.

Europeans need a highly competitive and sustainable social market economy in order to maintain social cohesion. The project address to European nanomedicine especially personalized cancer nanotechnology and it has a strong pro-industrial potential as Key Enabling Technologies that were launched by the European Commission DG Enterprise and Industry.