1. Record Nr. UNINA9910346744203321

Autore	Paulo Bonan
Titolo	Interaction of Nanomaterials with the Immune System: Role in Nanosafety and Nanomedicinenanomedicine
Pubbl/distr/stampa	Frontiers Media SA, 2018
Descrizione fisica	1 electronic resource (177 p.)
Collana	Frontiers Research Topics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia

Sommario/riassunto

The immune system has the double role of maintaining tissue integrity and homeostasis and of protecting the organism from possible dangers, from invading pathogens to environmentally-borne dangerous chemicals. New chemicals recognisable by the immune system are engineered nanomaterials/ nanoparticles, new agents in our environment that are becoming common due to their presence in many products, from constructions and building material (e.g., solar cells, pigments and paints, tiles and masonry materials) to daily products (e. g., food packaging, cosmetics, and cigarettes). Human beings can be accidentally exposed to engineered nanomaterials when these are released from products containing them or during production in workplaces. Furthermore, intentional exposure occurs in medicine, as engineered nanoparticles are used as tools for improving delivery of drugs and vaccines, vaccine adjuvants and contrast agents in therapeutic, preventive and diagnostic strategies. Nanoparticles that come in contact with the immune system after unintentional exposure need to be eliminated from the organism as they represent a potential threat. In this case, however, due to their peculiar characteristics of size, shape, surface charge and persistence, nanoparticles may elicit undesirable reactions and have detrimental effects on the immune system, such as cytotoxicity, inflammation, anaphylaxis, immunosuppression. Conversely, nanomedicines need to escape immune recognition/elimination and must persist in the organism long

enough for reaching their target and exerting their beneficial effects. Immune cells and molecules at the body surface (airway and digestive mucosae, skin) are the first that come in contact with nanomaterials upon accidental exposure, while immune effectors in blood are those that more easily come in contact with nanomedical products. Thus, evaluating the interaction of the immune system with nanoparticles/nanomaterials is a topic of key importance both in nanotoxicology and in nanomedicine. Immuno-nanosafety studies consider both accidental exposure to nanoparticles, which may occur by skin contact, ingestion or inhalation (at doses and with a frequency that are not known), and medical exposure, which takes place with a defined administration schedule (route, dose, frequency). Many studies focus on the interaction between the immune system and nanoparticles that, for medical purposes, have been specifically modified to stimulate immunity or to avoid immune recognition, as in the case of vaccine carriers/adjuvants or drug delivery systems, respectively. The aims of this Research Topic is to provide an overview of recent strategies: 1.for assessing the immunosafety of engineered nanomaterials/nanoparticles, in particular in terms of activation of inflammatory responses, such as complement activation and allergic reactions, based on the nanomaterial intrinsic characteristics and on the possible carry-over of bioactive contaminants such as LPS. Production of new nanoparticles taking into account their effects on immune responses, in order to avoid undesirable effects on one hand, and to design particles with desirable effects for medical applications on the other hand; 2.for designing more effective nanomedicines by either avoiding or exploiting their interaction with the immune systems, with particular focus on cancer diagnosis and therapy, and vaccination. This collection of articles gives a comprehensive view of the state-of-the-art of the interaction of nanoparticles with the immune system from the two perspectives of safety and medical use, and aims at providing immunologists with the relevant knowledge for designing improved strategies for immunologically safe nanomaterial applications.