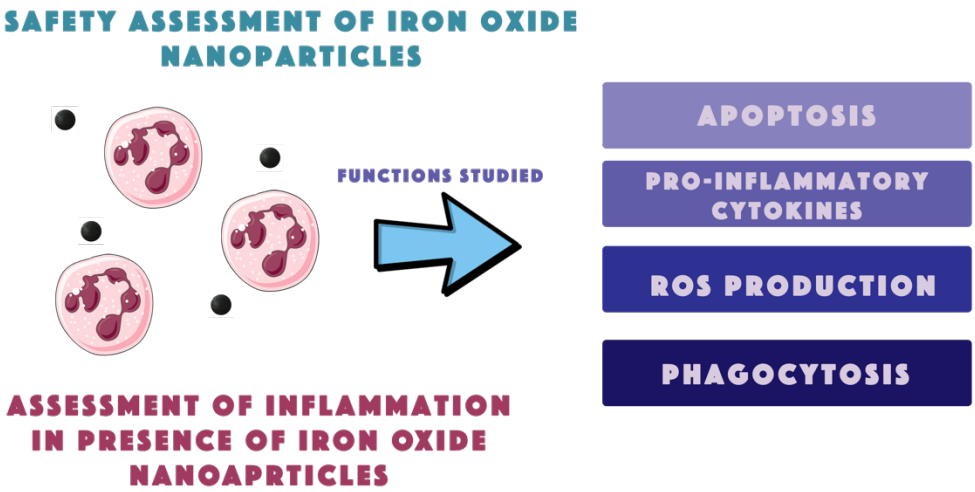

Iron oxide nanoparticles: Question of nanosafety for nanomedicine applications

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Iron oxide nanoparticles (Fe_3O_4 NPs) are probably the NPs that have received the most increasing attention in nanomedicine. These NPs have been found to possess some properties related with their superparamagnetic behaviour. In fact, this characteristic offers them a great potential to develop a variety of applications in medicine, including the treatment of iron deficiency, thermotherapy, drug delivery and so on. However, many safety concerns are rising, mostly regarding their interactions with innate immune cells. For example, their capacity to induce inflammation, which is one of the most undesired side effects associated with NP exposures, needs to be studied more in depth.

The aim of this project is to understand the effects of Fe_3O_4 NPs on the biology of human neutrophils, key player cells in inflammation and the most important leukocyte population present in the circulation.

The iron oxide nanoparticles (Fe_3O_4 NPs) were purchased from Sigma. According to the manufacturer, the particle size is 9-11 nm as assessed by transmission electronic microscopy (TEM). The solution is at 5 mg/ml in de-ionized water and a fraction was further diluted to obtain a stock solution at 1000 X to work with and was used as is. The endotoxin level of the NPs suspension was determined by the classical Limulus amebocyte lysate (LAL) assay using the ToxinSensor™ Chromogenic LAL Endotoxin Assay Kit and were under the detection limit of 0.01 EU/mL.

Before performing any experiments, we previously determined that Fe_3O_4 NPs do not induce cell necrosis in our experimental conditions used as assessed by the trypan blue exclusion assay.

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