

TITLE

DRUG DELIVERY IN PREGNANCY: TRANSPORT OF NANOPARTICLES ACROSS THE HUMAN PLACENTA AND THE FETAL EXPOSURE

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Humans have been exposed to fine and ultra fine particles throughout their history. Since the industrial revolution, sources, doses and types of nanoparticles have changed dramatically. In the last decade, the rapidly developing field of nanotechnology has led to an increase of engineered nanoparticles with novel physical and chemical properties. Research in these directions has provided an explosion in the number of nanoparticulate drugs or drug delivery systems being explored, developed and marketed for treatment and prevention of human diseases. Nanoparticulate delivery systems offer a potential avenue of delivering therapeutics in pregnancy. Limited studies on this topic show considerable variability in transplacental passage of nanosized particles, depending on size, physicochemical composition and interaction with biological molecules and systems. However, data are very limited and our understanding of the criteria that determine transferability of nanoparticles is poor. The human placenta is required to control and protect pregnancy with providing nutrients to the growing foetus. The placenta is both a drug target and drug barrier, as well as a potential target of any toxicity.

In the current report, the ability of the placenta to take up and transfer nanoparticles to the fetus, and the theoretical benefits and risks of administration of nanoparticle-based therapeutics in pregnancy will be discussed including potential toxicity of nanoparticles in pregnancy.