

## **Oral toxicity of nanomaterials and the effect of human gastrointestinal digestion on key hazard-related properties**

*Francesco Cubadda*

*Istituto Superiore di Sanità-National Institute of Health, Rome*

Oral exposure to manufactured nanosized particles takes place through a number of micronized materials containing a nanofraction – used in food, supplements, toothpaste, and medicines – and is expected to increase rapidly as a result of the growth of nanotechnology applications. The interactions of nanoparticles with the human gut and the mechanisms of intestinal uptake will be discussed, with emphasis on the role of enterocytes and M-cells in Peyer's patches. Evidence from properly designed oral toxicity studies in rodents will be reviewed. Systemic exposure to ingested nanoparticles requires that they persist as such after gastrointestinal digestion and are absorbed in the gut. The transformations and potential dissolution of nanoparticles in the gastrointestinal tract will be addressed so as to highlight the consequences on nanoparticle properties and toxicity. The role of *in vitro* methods simulating human digestion in safety assessment of orally ingested nanomaterials will be discussed. Finally, potential effects on gut microbiome will be dealt with.