Subacute oral toxicity investigation of selenium nanoparticles and selenite in rats

Selenium (Se) nanoparticles have been proposed as food supplements. However, the particle formulation may exert unexpected toxicity. The aim was therefore to compare toxicity of low doses of Se nanoparticles and the dissolved, ionized Se species selenite. Female rats were dosed orally for 28 d with either: 0.05, 0.5, or 4 mg Se/kg body weight (bw)/day as 20 nm Se nanoparticles or 0.05 or 0.5 mg Se/kg bw/day as sodium selenite. Male rats were dosed 4 mg Se/kg bw/day as Se nanoparticles. Body weight and clinical appearance were recorded throughout the experiment. At necropsy, blood samples were taken for hematological and clinical chemistry analyses; organ weights were recorded. At the high-dose of Se nanoparticles, overt toxicity occurred and the female animals had to be euthanized prematurely, whereas the male animals were reduced in dose. At all doses of Se nanoparticles and at 0.5 mg Se/kg bw/day as selenite, a lower body weight gain as compared to vehicle occurred. Relative liver weight was increased for both Se formulations at 0.5 mg Se/kg bw/day. Creatinine clearance and urinary pH were affected in some Se dosed groups. There were no effects among dosed groups on brain neurotransmitters or on hematological parameters compared with controls. There were no histological changes in the livers of animals exposed to Se nanoparticles or to selenite. Based on effects on body weight and liver weight, selenium nanoparticles and ionic Se exerted similar toxicity. This suggests that a nanoparticle-specific toxicity of Se did not occur.

General information
Publication status: Published
Organisations: National Food Institute, Research group for Nano-Bio Science, Research group for Risk Benefit, Research group for Analytical Food Chemistry, Danish Hydraulic Institute
Corresponding author: Mortensen, A.
Number of pages: 8
Pages: 76-83
Publication date: 2019
Peer-reviewed: Yes

Publication information
Journal: Drug and Chemical Toxicology
Volume: 42
Issue number: 1
ISSN (Print): 0148-0545
Ratings:
BFI (2019): BFI-level 1
Web of Science (2019): Indexed yes
Original language: English
Keywords: Selenium, Nanoparticle, Sodium selenite, Toxicity, Subacute
Electronic versions:
Accepted_version.pdf. Embargo ended: 17/06/2019
DOIs: 10.1080/01480545.2018.1491589
Source: FindIt
Source ID: 2437958345
Research output: Contribution to journal › Journal article – Annual report year: 2019 › Research › peer-review