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## INTERPLAY OF THE PULMONARY PHAGOCYTOSIS RESPONSE TO, AND THE IN VIVO SOLUBILIZATION OF AMORPHOUS SILICA NANOPARTICLES DEPOSITED IN LUNGS OF RATS UNDER LONG-TERM INHALATION EXPOSURES AS DETERMINANTS OF THEIR MODEST FIBROGENICITY AND LOW SYSTEMIC TOXICITY

Svetlana N Solovyeva, Marina P Sutunkova, Boris A Katsnelson, Vladimir B Gurvich, Larisa I Privalova, Ilzira A Minigalieva, Tatyana V Slyshkina, Irene E Valamina, Oleg H Makeyev, Vladimir Ya Shur, Ilya V Zubarev, Dmitry K Kuznetsov

and Ekaterina V Shishkina

Ekaterinburg Medical Research Center, Department of Toxicology and Biological Prophylaxis, Russia

The silica (mostly amorphous) containing submicron spherical particles with a prevailing proportion of those in the upper nanoscale range (mean diameter  $90\pm 30$  nm) induces, when instilled intratracheally into rat's low airways, a typical phagocytic cells' response comparable with that to very cytotoxic and fibrogenic standard quartz powder DQ12. However, under a long-term (up to six months, five times a week, four h per day) inhalation nose-only exposure at realistic concentrations ( $2.6\pm 0.6$  or  $10.6\pm 2.1$  mg/m<sup>3</sup>) rats developed but a quite negligible pulmonary silicosis along with very low systemic toxicity. Such unusual discrepancy between acute and chronic adverse effects of particulates could be explained by the demonstrated low SiO<sub>2</sub> retention in lungs and other organs most probably due to a relatively high solubility of these nanoparticles in relevant biological and model milieus. The multi-compartmental mechanistic model (figure 1) which had been previously found adequate for imitating pulmonary retention of different particles could be satisfactorily adjusted to the present experimental results (figure 2) only when operating with constants describing both the dissolution and cell-mediated controlling mechanisms. The unexpectedly mild adverse effects notwithstanding, the harmfulness of the studied industrial aerosol deserves a cautious assessment as

a health risk factor because of its genotoxicity and trans-nasal penetration of nanoparticles into the olfactory brain found by us in the same inhalation experiment.

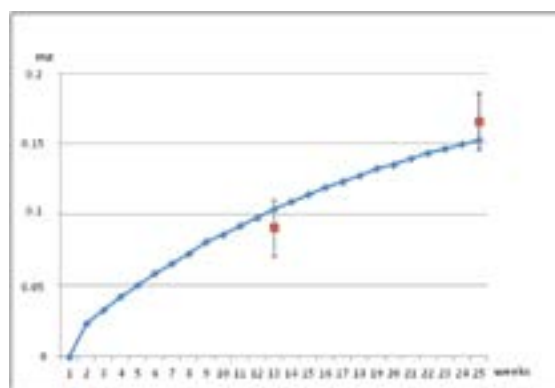


Figure 2. Silica content of rat lungs exposed compartmental model for the kinetics of to 2.5 mgm<sup>3</sup> aerosol concentration

### **Biography**

Solovyeva Svetlana Nikolaevna completed Graduation from Ulyanovsk State Agricultural Academy, Department of Veterinary Medicine, in 2005. Since 2014, she has been working as a Researcher in the Ekaterinburg Medical Research Center for prophylaxis and health protection in industrial workers, Department of Toxicology and Biological Prophylaxis. She authored or co-authored six scientific papers, included two in peer-reviewed international journals, and presented her work to several scientific meetings, both national and international.

[solovyevasn@ymrc.ru](mailto:solovyevasn@ymrc.ru)