Respirable crystalline silica and feldspar particles in respiratory apparatus of equines in riding arenas: a diffuse and non-conventional exposure for animals and humans

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Soils used in equine riding arenas, commonly described as riding surfaces, are a mixture of several natural sandy rocks frequently enriched with organic additives.

According to commercial information, the most common and abundant minerals composing these soils are quartz, feldspars, and some types of phyllosilicates.

Respirable crystalline silica (RCS), i.e. < 4 μm quartz grains and other silica polymorphs, are classified as carcinogens of IARC group 1. The literature presents few studies on the potential toxicity of respirable feldspar particles (RFP). It may be similar or greater than quartz and different feldspars correlate with different toxicities and pro-inflammatory effects (Grytting et al., 2022).

Therefore, the presence of quartz and feldspars in equine riding surfaces could be a risk factor for health problems in humans working closely with these animals because mineral particles result from the continuous crushing of the soil and consequent air dispersion of dust caused by the trampling of horses during work in the field. Since horses themselves can suffer from pneumoconiosis, they are considered sentinel animals. Moreover, the hypothesis that horse riding represents an unconventional occupational exposure to RCS and RFP is likely.

The present study investigates the presence of minerals and inorganic particles present in soils and air in equine riding arenas and equine bronchoalveolar lavage samples. The investigations were carried out by SEM-EDXS, TEM-EDXS, XRPD, and cytopathological analyses (accordingly to the type of sample).

The result highlights the abundant presence of RCS and RFP in soils, air, and equines respiratory system in different riding arenas.

The present study provides a way to characterize the exposure of horses to RCS and RFP and highlights the problem relating to a potential increased exposure risk for equestrian workers and people attending riding arenas.

Grytting V.S., Refsnes M., Låg M., Erichsen E., Røhr T.S., Snilsberg B., White R.A. & Øvrevik J. - The importance of mineralogical composition for the cytotoxic and pro-inflammatory effects of mineral dust. Particle and Fibre Toxicology, 19(1), 1-22. https://doi.org/10.1186/s12989-022-00486-7.