

# **Respirable crystalline silica (RCS) particles respired by equines in riding arenas: a mineralogical and cytopathological study aimed to identify a non-conventional exposure**

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Footings surfaces regularly used in equine riding arenas are composed by mixture of several natural rocks, frequently with the addition of specific additives (e.g., synthetic or natural organic fibres, wood, rubber, etc.). The most common and abundant minerals composing the used rocks are quartz and feldspars. The minerals composing the surfaces differ among different arenas and over time in the same arena depending respectively on the supply quarry and on the changes due to next additions or replacement.

Micrometric and sub-micrometric quartz grains (together with other silica polymorphs) are classified, from the health point of view, as respirable crystalline silica (RCS).

Exposure to RCS can cause the onset of silicosis, one of the first recognized occupational diseases in our country. The presence of RCS in the land on which horses work could be a risk factor for the development of pneumoconiosis in humans working closely with these animals. Since horses themselves can suffer from silicosis (the first recorded case in California), they can play the role of sentinel animals. It is also possible to hypothesize that horse riding represents an unconventional occupational exposure to SLC, resulting from the continuous crushing of the soil and consequent air dispersion of dust caused by the trampling of horses during work in the field.

The present investigation deals with SEM and TEM both equipped with EDS and cytopathological analysis of 10 equine bronchoalveolar lavage (BAL) samples.

The result highlights the abundant presence of respirable quartz particles, and also feldspars. The present study provides a way to characterize the exposure of horses to RCS and highlights the problem relating to a potential increased exposure risk to RCS for humans, both equestrian workers and people frequenting riding arenas.

In this dynamical context, the horses can be used as sentinel for the human health by a periodic control of the BALF inorganic particles burden.