UNIVERSITÀ DEGLI STUDI DI PADOVA

PROJECT

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1) Project title

OCCUPATIONAL EXPOSURE ASSESSMENT TO CRYSTALLINE SILICA

2) Abstract (max 500 words)

Silica, the most abundant mineral on earth, is structurally classified as crystalline or amorphous. Crystalline silica (SiO2) has several polymorphs, including quartz (present in granite and sandstone), cristobalite and tridymite contained in volcanic rock. Respirable crystalline silica (RCS) is associated with lungs and other organ toxicity after inhalation. There are an estimated 3.2 million workers in the European Union and more than 36 million worldwide at risk from exposure to RCS. Despite risks from exposure to silica dust have been well known for centuries, in the last decade an increase of pneumoconiosis and silicosis have been highlighted: since 2000 there has been an increase in severe and rapidly progressive pneumoconiosis in coal miners; in 2006 an outbreak of acute or accelerated silicosis was described among workers using abrasive sandblasting to discolor denim fabric for jeans and, more recently, severe silicosis from exposure to high concentrations of RCS in the fabrication of artificial stone countertops has become an emerging worldwide problem. The first reported cases of artificial stone silicosis were published in 2010 in Italy, with later cases described in several other countries such as Israel, Spain, Australia, and United States. Artificial stone (also known as engineered stone or quartz conglomerate), commercially available from the mid-1980s, is made by mixing quartz with polymeric resins to make slabs. The RCS content is over than 90%, definitely higher than that in natural stone (marble 2%, granite about 35%). Workers are exposed to high concentrations of RCS deriving from cutting, grinding, and polishing slabs, or performing housekeeping duties such as dry-sweeping in workplaces.

Silicosis has a strict exposure–response relationship and it is characterized by a long latency (>20 years) but, as noted recently, artificial stone-associated silicosis is characterized by a shorter latency and more rapid loss of lung function than chronic silicosis even in younger workers. Because of this, primary

prevention through the characterization, evaluation and control of the occupational exposure to RCS dust levels in addition to the identification of possible biomarkers of early lung effect in exposed workers remains the most important component to address this disease. The study will include a first step where a field validation of the new devices to collect the silica dust in the personal exposure assessment (taking in account also the different dimension of particles), will take place and a second step with the identification and dosage of sensitive biomarkers (e.g. cytokines both in plasma and induced sputum) to evaluate oxidative and inflammatory effects of occupational exposure to RCS in workers with and without silicosis.