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EC PULMONOLOGY AND RESPIRATORY MEDICINE

Opinion

Silicosis and Biomarkers

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Received: August 06, 2018; **Published:** August 22, 2018

In 1705, Bernadio Ramazzini, founder of occupational/industrial medicine first described silicosis disease with its full name of 45 English letter words "Pneumonoultramicroscopicsilicovolcanoconiosis". He called it "miners' phthisis". Silicosis, an occupational hazard that caused by inhalation of the free crystalline silica dust or silicon dioxide and poses greater risk especially for the work force engaged in mining, stone crushing, construction, stone cutting, glass manufacturing, agriculture, cement industries, etc.

Silicosis causes inflammation and scarring that damage the pulmonary sacs and prevent gas exchange. The disease is characterized by thickening of alveolar interstitium, accumulation of inflammatory cells that produce inflammatory and fibrogenic cytokines and growth factor, including fibroblast growth factor, interleukin (IL)-1, insulin-liked growth factor, macrophage inflammatory protein (MIP)-1 and MIP-2, platelet-derived growth factor, transforming growth factor (TGF)-β, and tumor necrosis factor (TNF)-α, and hyalinized and fibrotic pulmonary nodules.

Serum copper elevation in silicosis have been reported in several studies whereas the mechanism of increase in serum copper is still not understood. Copper has a fibrogenic property. In those having exposure to respirable silica dust without developing the disease, the serum copper levels as biomarker is uncertain. Increasing serum Angiotensin Converting Enzyme (ACE) activity in the majority of the patients with silicosis and other granulomatous diseases, such as sarcoidosis have been confirmed by several investigators. Several previous studies revealed that MIP-1 α, MIP-2 β, and monocyte chemotactic protein (MCP)-1 were increased in silicosis. A previous study demonstrated that IL-1 β, IL-2, IL-6, IL-8, and TNF-α levels in bronchoalveolar lavage fluid (BALFs) in silicosis were increased. Additionally, increasing Fas ligand (FasL) expression in patients with silicosis has been found.

In conclusion, further studies are urgently needed to determine the suitable biomarkers for early prediction and effective prevention of silicosis in exposed workers.

Volume 7 Issue 9 September 2018