

## **Bronchitis and COPD**

**0093**

### **Acute and chronic effects of elevated carbon dioxide exposures in potash miners**

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Potash miners can be exposed to carbon dioxide (CO<sub>2</sub>) due to blasting of CO<sub>2</sub> basalt intrusions or loading and transportation of blasted salt containing CO<sub>2</sub> in the crystalline structure of potash. In a cross shift study we compared health outcomes and physiological effects in miners long-term exposed to elevated CO<sub>2</sub> concentrations to evaluate possible health risks resulting from this exposure. The study was approved by the ethics committee of the Ruhr-University of Bochum and performed according to the Helsinki declaration.

A total of 119 miners were scrutinized by clinical examination, lung function test, and determination of various blood parameters including blood gas analysis directly before and after the shift. During the working hours the cumulative CO<sub>2</sub> exposure was measured by a small personal monitor attached to the lapel of their jackets at least for 4 hours.

According to the results of the air monitoring the miners were categorized in low (<1,000 ppm, n=83) medium (< 5,000 ppm, n=26) and high > 5.000 ppm, n=10) exposed subjects. These groups were compared for differences of the investigated parameters. Some minor changes of blood electrolytes were observed in the miners during the 8 hours shift. However, no significant differences could be observed between the 3 groups, especially according to electrolytes, pCO<sub>2</sub> and pH in the capillary blood gas analysis. Lung function testing revealed also no conspicuous findings across the shift as well as between groups. Last but not least, no chronic health effects were observed in the miners being long-term exposed to elevated CO<sub>2</sub> concentrations.

In conclusion, no significant adverse effects were determined in potash miners exposed to CO<sub>2</sub> concentrations up to 15,000 ppm (1.5 Vol.-%). As a consequence, the responsible mining authorities allowed potash mining operations under CO<sub>2</sub> levels up 10.000 ppm for 4 hours and up to 15,000 ppm for 2 hours per shift.