

of ores, it may be connected with certain differences in mining methods employed, or it may have its cause in the use of respirators by the miners. Arguing from the erroneous conception that the pulmonary cancers appeared among the miners after the introduction of pneumatic drills, Humphris contended that these neoplasms were the result of the inhalation of dust containing silica particles and solid radium and were not due to an exposure to radium emanation.

This theory has received support by Tschelnitz, who believed that the chief cause of the pulmonary malignancy is represented by the inhaled silica particles, which, in his opinion, are so small that soluble quartz particles are given off that cause a chronic inflammatory reaction. This process is activated by the radioactive portion of the dust, leading ultimately to the development of a malignant tumor.

In the opinion of Tschelnitz the inhalation of radium emanation plays only a contributory role, the pneumoconiosis being of chief importance. The arguments of Tschelnitz are based on his calculations in regard to the amount of radioactive matter passing through and being deposited in the lungs. Tschelnitz estimated that during a seven hours' shift 5,000 to 10,000 liters of air containing 14,000 to 28,000 Mache units pass through the lungs of a miner, making a yearly exposure to approximately 7 million to 8 million Mache units. Assuming that about thirty grams of dust are inhaled yearly, and about 50 per cent of the dust is retained in the lung of a miner, an additional exposure to radioactive material from this source corresponds to an amount of radium equivalent to 1.5×10^{-8} gm. This estimate is too high, according to Běhounek, and, in his opinion, is in the neighborhood of 1.5×10^{-12} gm. Ra. per gram of dried lung. Inasmuch as Flinn has stated that the lowest amount of radium representing a hazard is equivalent to 1.5×10^{-6} Ra., Tschelnitz concluded that the quantities of radioactive matter passing or deposited in the lung were too small to exert a carcinogenic effect.

In support of his contention, this investigator pointed out that the rest period of 17 hours elapsing between two shifts was sufficient for the complete removal of any radon inhaled from the body, so that a permanent exposure did not exist. Tschelnitz based this argument on the observation of Meyer, who reported that radon inhaled is completely eliminated after seven hours. Inasmuch as Fernan and Smereka had shown that no short lived depots remain in the body when emanation-containing water is ingested and that long-lived degradation products of the radon are retained in only negligible quantities, Tschelnitz felt that his conception of the innocuousness of the exposure to radioactive matter by the miners was further strengthened by these observations. Reference was finally made by him to the fact that a patient, who took a drinking cure of radioactive water, received within 8 weeks 56 million Mache units without showing untoward effects upon the lungs, while a miner was exposed within a year to only 8 million Mache