



# **Quartz in Swedish iron foundries – exposure and cancer risk**

av

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## **Akademisk avhandling**

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## Abstract

Lena Andersson (2012): Quartz in Swedish iron foundries – exposure and cancer risk. Örebro Studies in Environmental Science 16, 78 pp.

The aims of the studies underlying this thesis were to assess the exposure to quartz in Swedish iron foundries and to determine the cancer morbidity for Swedish foundry workers. A cohort of 3,045 foundry workers and a final measurement database of 2,333 number of samples was established.

The exposure measurements showed high levels of respirable quartz, in particular for fettlers and furnace and ladle repair workers with individual 8 hr TWA (GM=0.041 and 0.052 mg/m<sup>3</sup>; range 0.004-2.1 and 0.0098-0.83 mg/m<sup>3</sup>). In our database, the quartz concentrations as 8hr TWAs of current and historical data varied between 0.0018 and 4.9 mg/m<sup>3</sup>, averaging 0.083 mg/m<sup>3</sup>, with the highest exposures for fettlers (0.087 mg/m<sup>3</sup>) and furnace and ladle repair workers (0.42 mg/m<sup>3</sup>). The exposure for workers using respirators assuming full effect when used were assessed quantitatively, revealing workers with actual exposure exceeding the occupational exposure limits.

Overall cancer morbidity was not increased, but the incidence of lung cancer was significantly elevated (SIR 1.61; 95 % CI 1.20-2.12). In the cohort study, significant associations between lung cancer and cumulative quartz exposure were detected for quartz doses of 1-2 mg/m<sup>3</sup>. year (SIR 2.88; 95 % CI 1.44-5.16) and >2 mg/m<sup>3</sup>. year (SIR 1.68; 95 % CI 1.07-2.52). These findings were not confirmed in the case-control analysis.

The agreement between the estimated exposure in our early historical model and the development model showed a regression coefficient of 2.42, implying an underestimation of the historical exposure when using the development model data. The corresponding comparison between the development and the validation model based on our survey data showed a B of 0.31, implying an overestimation of present exposures when using data from the validation model.

The main conclusions of the thesis are that certain foundry workers are still exposed to high levels of quartz, and the overall excess lung cancer could not be confirmed in the exposure-response analysis.

*Keywords:* Case-control study, crystalline silica, exposure assessment, iron foundry, lung cancer, morbidity, occupational hygiene, respirable quartz.