

TOENAIL ARSENIC CONCENTRATIONS AMONG RESIDENTS OF A COAL MINING AREA OF THE APPALACHIAN MOUNTAINS OF THE UNITED STATES: A PILOT STUDY.

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Background and Aims: Arsenic is an established lung carcinogen. Lung cancer rates in the Appalachian region of Kentucky are about twice the national rates in the U.S.A. The high rates of smoking in the area do not explain all the elevation in lung cancer risk. This area is also characterized by extensive coal mining activity. This pilot study explored a comparison of toenail arsenic concentrations in Appalachian Kentucky and another distant region of the state.

Methods: Toenail samples were collected for a population-based case-control study in Kentucky. A sub-group of the samples were selected and analyzed for trace elements, based on location of the study participants, who were included if they lived in the East Kentucky Coal counties in Appalachian Kentucky, or in the largest urban center of Jefferson County. For the assessment of population-based exposure, only the controls of the original study were included. Total elemental analyses were performed using inductively-coupled plasma-mass spectrometry. There were a considerable number of samples with arsenic concentrations below the method detection limit, due in part to inadequate sample mass. Therefore, a reverse Kaplan-Meier method was used for the statistical analysis of the left-censored data.

Results: A total of 88 toenail samples from Appalachian Kentucky and 155 from Jefferson County were analyzed for arsenic concentrations. The reverse Kaplan-Meier estimation indicated that the arsenic concentrations in the Appalachian counties were significantly higher than in Jefferson (75th and 90th percentiles were 0.13 vs. 0.03 and 0.29 vs. 0.04 ug/g, respectively).

Conclusions: The results of this study suggest that residents of the selected Appalachian Kentucky counties with high coal mining activity have higher exposure to arsenic than those in an urban, non-coal mining region of the same state. However, further studies are needed to elucidate the source of the arsenic exposure.