

SOIL ARSENIC AND MELANOMA: IS THERE A LINK?

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Arsenic may act as a cocarcinogen in conjunction with ultraviolet radiation resulting in non-melanocytic skin cancers. Arsenic uptake from soil around historical gold mining activity during childhood is established and we sought to investigate possible links between soil arsenic level and melanoma risk in the larger population.

Preparatory to applying spatial epidemiological techniques to estimate these associations, spatial empirical Bayes (SEB) smoothed standardized incidence ratios (SIRs) for melanoma, and two soil arsenic exposure metrics, were derived for 61 statistical local areas (SLAs) in Victoria's goldfields.

We applied spatial autoregressive modelling to estimate associations, taking into account socioeconomic disadvantage (SED), modelled as a dichotomised score, such that SLAs with scores below the median Victorian value were classified as more disadvantaged. Interactions between SED and exposure metrics were investigated. The connectivity matrix for SLAs incorporated in conditional autoregressive (CAR) models was based on adjacency of SLA boundaries. To assess the robustness of findings, we also stratified SLAs by quintiles of exposure metric 1, estimated aggregate SIRs by gender and SED category, and calculated relative risk (RR) as the ratio of the SIR in the uppermost quintile relative to the lowest quintile.

SEB smoothed SIRs for male melanoma increased by 0.05 (95% CI, 0.01 - 0.08) per 2.7 fold increase in exposure metric 1, when adjusted for SED and an easterly trend, and for female melanoma, by 0.05 (95% CI, 0.02 - 0.09) in more disadvantaged areas, adjusted for a northerly trend. In more disadvantaged areas with high soil arsenic, excess risk of melanoma was observed for males (RR 1.52 [95% CI, 1.25-1.85]) and females (RR 1.29 [95% CI, 1.08-1.55]).

This ecological study found that elevated soil arsenic levels are associated with a small but significant increase in melanoma risk over a twenty year period in socioeconomically disadvantaged areas. Inferences from group-level analysis cannot be assumed to apply at individual-level, and the study was not able to account for other melanoma risk factors or other possible sources of arsenic but these findings suggest that elevated soil arsenic levels may be linked with melanoma. In a country such as Australia where elevated rates of melanoma development are recorded, this finding has significant public health implications.

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