

Particles and Health 2021

Nanotoxicology and Health Session

Moderator: Kevin E. Driscoll, PhD

Presentation Summary

Title: “Occupational exposure to carbon black and risk of cardiovascular disease.”

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Environmental particulate exposure and the potential risk to people with cardiac disease has aroused scientific and regulatory interest worldwide. Epidemiological studies have shown associations between exposure to airborne environmental particles and mortality from cardiac disease. Few studies, however, have examined such effects from poorly soluble particles of low toxicity such as manufactured carbon black (CB).

To address risk of cardiac disease from exposure to one specific type of manufactured particle, carbon black, we combined standardized mortality ratio (SMR) and Cox proportional hazards results from cohort studies of US, UK and German CB production workers. Under a common protocol, we analyzed mortality from all causes, heart disease (HD), ischemic heart disease (IHD) and acute myocardial infarction (AMI). Fixed and random effects (RE) meta-regression models were fit for employment duration and for cumulative and lagged quantitative CB exposure estimates. Full cohort meta-SMRs (RE) were 1.01 (95% confidence interval (CI) 0.79–1.29) for HD; 1.02 (95% CI 0.80–1.30) for IHD, and 1.08 (95% CI 0.74–1.59) for AMI mortality. For all three outcomes, meta-SMRs were heterogeneous, increased with time since first and time since last exposure, and peaked after 25–29 or 10–14 years, respectively. Meta-Cox coefficients showed no association with lagged duration of exposure. A small but imprecise increased AMI mortality risk was suggested for cumulative exposure (RE-hazards ratio (HR) = 1.10 per 100 mg/m³-years; 95% CI 0.92–1.31), but not for lagged exposures. In contrast to environmental studies, our results do not demonstrate that airborne CB exposure increases all-cause or cardiac disease mortality. Possible explanations for this disparity between the results of environmental and occupational studies will be discussed.