Stress response as mediator and modifier of air pollution health effects

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Air pollution is a leading contributor to global morbidity and mortality. While cardiovascular and respiratory effects of exposure to air pollutants have been known for some time, more recently a growing literature supports a link with many other adverse health effects, including metabolic (e.g. metabolic syndrome, obesity, type 2 diabetes) and central nervous system (e.g. cognitive decline, dementia, anxiety, depression, suicide) disorders. Given the growing prevalence of these diseases, and ubiquitous exposure of the population to pollutants, even small increases in relative risk attributable to air pollutants imply a significant public health burden.

Substantial progress has been made in establishing the plausibility of health effects associated with exposure to air pollution; however, a critical gap in our understanding is the nature of early initiating events triggered by pollutant inhalation that contribute to such diverse disease processes. In this talk, I will describe recent experimental evidence from my lab implicating glucocorticoid stress hormones as early mediators of effects of air pollutants across multiple tissues, with a focus on the lungs and brain. Evidence that innate differences in stress response may modify effects of pollutant exposure will also be presented. Finally, I will discuss recent work aimed at extending our laboratory findings to effects in the Canadian population. Collectively, these studies suggest that air pollutants act as chronic stressors, and that our stress response systems play a critical role in determining the nature and magnitude of resulting health impacts.

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