

## **Title: *Caenorhabditis elegans* as a model of air pollution toxicity during development and lifespan**

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### **Abstract**

Air pollution (AirPoll) is among the leading human mortality risk factors and yet little is known about the molecular mechanisms of this global environmental toxin. Our recent studies using mouse models even showed genetic variation and sex can alter biological responses to air pollution. To expand genetic studies of AirPoll toxicity throughout the lifespan, we introduced *Caenorhabditis elegans* as a new AirPoll exposure model which has a short lifespan, high throughput capabilities and shared longevity pathways with mammals. Acute exposure of *C. elegans* to airborne nanosized AirPoll matter (nPM) caused similar gene expression changes to our prior findings in cell culture and mouse models. Initial *C. elegans* responses to nPM included antioxidant, inflammatory and Alzheimer homolog genes. The magnitude of changes was dependent on the developmental stage of the worms. Even short term exposure of *C. elegans* to nPM altered developmental and lifespan hormetic effects, with pathways that included *skn-1*/Nrf family antioxidant responses. We propose *C. elegans* as a new and complementary model for mouse and cultured cells to study AirPoll across the lifespan. Future chronic nPM exposure and high throughput genetic screening of *C. elegans* can identify other major regulators of the developmental and lifespan effects of air pollution.

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