

Abstract Submitted
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Potential Nanoparticle Exposure during Consumer Use of a Nano-enabled Product¹ VINCENT CASTRANOVA, West Virginia University — Development of nano-enabled printer toner leads to possible aerosolization of nanoparticles and inhalation exposure during printer operation. The goals of the present study were to: 1) develop a generation system for printer-emitted particles (PEPs), which reflects emissions measured during actual use of laser printers; 2) characterize the generated aerosol (number concentration, size distribution and composition of the PEPs); and 3) determine the bioactivity of PEPs in an in vitro, co-culture system of small airway epithelial cells and microvascular endothelial cells, which mimics the air/blood barrier in the lung. Results indicate that laser printers using nano-enabled toner generate PEPs (as high as 1.3 million particles/cc with a mode diameter of 49-208 nm, containing nano-metals). In a transwell co-culture system, exposure of lung epithelial cells to PEPs results in particle uptake and secretion of pro-inflammatory mediators, which significantly alter endothelial cell function (increase production of oxidants, actin filament remodeling, gap formation, and mediator release). These responses could result in pulmonary edema and systemic inflammation in those operating laser printers in a poorly ventilated space for an extended period of time.

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