

Review [Neuro Endocrinol Lett.](#) 2013;34(8):723-37.

Molecular mechanisms underpinning laser printer and photocopier induced symptoms, including chronic fatigue syndrome and respiratory tract hyperresponsiveness: pharmacological treatment with cinnamon and hydrogen

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PMID: 24522022

Abstract

Emissions of laser printers and photocopiers (LP&P) may be associated with health problems. The aim of this review is to describe the clinical picture that is triggered by exposure to LP&P and the molecular mechanisms underpinning the symptoms. Exposure to LP&P to vulnerable subjects may cause a symptom complex consisting of 1) irritation and hyperresponsiveness of the upper and lower respiratory tract; and 2) chronic fatigue (syndrome, CFS). Symptoms occur within hours after L&P exposure and may last for some days or become chronic with exacerbations following LP&P exposure. Substances that can be found in toners or are generated during the printing process are Silica nanoparticles, Titanium Dioxide nanoparticles, Carbon Black, metals, ozone, volatile organic compounds (VOC), etc. The latter may generate oxidative and nitrosative stress (O&NS), damage-associated molecular patterns molecules, pulmonary and systemic inflammation, and modulate Toll Like Receptor 4 (TRL4)-related mechanisms. It is concluded that LP&P emissions may cause activation of the TLR4 Radical Cycle and thus be associated with the onset of chronic inflammatory and O&NS illnesses, such as CFS, in some vulnerable individuals. Cinnamon, an antagonist of the TLR4 complex, and Hydrogen, a potent antiinflammatory and oxygen radical scavenger, may have efficacy treating LP&P-induced illness.

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