

E-CIGARETTES INDUCE TOXICOLOGICAL EFFECTS THAT CAN RAISE THE CANCER RISK. A FRAME FROM DRUG-METABOLISM AND ANTIOXIDANT HOMEOSTASIS.

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Electronic cigarettes (e-cigs) are devices designed to deliver nicotine in a vaping solution without tobacco combustion. Perceived as a safer alternative to conventional cigarettes, e-cigs are aggressively marketed as lifestyle-choice consumables, thanks to few restrictions and a lack of regulatory guidelines. Despite the burgeoning worldwide consumption of e-cigs, their safety remains largely unproven and it is unknown whether these devices cause in vivo toxicological effects that could contribute to cancer occurrence.

In the present study, we investigated the co-mutagenic and cancer-initiating effects of e-cig vapour in a rat model. To explore whether e-cigs induce toxicological effects, such as those involving cytochrome P450 (CYP) changes, we analyzed the modulation of carcinogen-metabolizing enzymes in the lung of rats exposed to e-cig vapour. We observed a significant increase in CYP1A1/2 (activating, for example, polychlorinated biphenyls, aromatic amines, dioxins and PAHs), CYP2B1/2 (activating olefins and halogenated hydrocarbons), 2C11 (activating nitrosamines and mycotoxins) and CYP3A (activating hexamethyl phosphoramidate and nitrosamines) documented by the sharp rise in the corresponding probes.

Conversely, we observed that the antioxidant enzymes catalase, DT-diaphorase and glutathione peroxidase and the conjugating phase II glutathione S-transferases, mainly involved in xenobiotic detoxification, were noticeable decreased, whereas UDP-glucuronyl-transferase was substantially unchanged.

Extrapolated to humans, the corresponding boosted CYP-linked monooxygenases together with reduced activity of antioxidant and detoxifying machinery would predispose a subject to an enhanced cancer risk from the widely bioactivated e-cig vapour procarcinogens associated with an increased risk of lung cancer.