Don’t Be Led Ashtray: Toxicological Effects of Electronic Cigarettes on Inflammation and Lung Cell Viability with Comparison by Brand, Flavor, and Generation

Lawton, Ralph

One of the hottest public health issues today is the health impact of electronic cigarettes (e-cigs). Few toxicological studies have been done on e-cig vapor, and none have been done on lung cells. This study used two tests to assess toxicological effects of e-cig vapor on lung cell viability and inflammation, looking at variance of effects by e-cig technology, brand, and flavor. Four e-cig brands (Blu, Greensmoke, V2, Vaporfi) and three flavors (Tobacco, Menthol, Coffee) were tested. Vapor was captured using a condenser device invented by the researcher. In the first test, lung cells were exposed to various concentrations of vapor, an untreated control, and traditional cigarette vapor. A hemocytometer and Trypan blue dye were then used to calculate lung cell viability. The Chi-square test for Independence showed statistically significant lower rates of mortality for the untreated control versus all e-cig vapor samples. E-cigs lung cell death was about 81% of traditional cigarettes. The same test showed significant differences in cell death among flavors, brands, and generations. The second toxicological test simulated inflammation using a macrophage migration assay. In every flavor, brand, and concentration, vapor-treated cells migrated more than untreated cells, representing higher inflammation. Greater total migration was observed in third generation than second generation e-cigs, and in tobacco flavor compared to other flavors. Blu had the lowest impact on migration, followed by Vaporfi, Greensmoke, and V2. Overall, samples treated with e-cig vapor had higher incidences of both lung cell death and macrophage migration compared to untreated samples.

Awards Won: