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

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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.