OXIDATIVE STRESS AND INTERLEUKIN 6 IN ALVEOLAR EPITHELIAL CELLS EXPOSED TO E-CIGARETTE AEROSOLS

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E-cigarettes produce an inhalable aerosol containing nicotine, propylene glycol, glycerin, and flavorings, which lack tobacco smoke contaminants but are not risk-free. This study evaluated the effects of e-cigarette smoke on alveolar epithelial cells (A549 cell line). Smoke extract (ECSE) was prepared using four e-liquid flavors, and cells were exposed for 24 hours. Intracellular IL-6 levels and oxidative stress (DCF fluorescence) were analyzed using double fluorescence assays. Controls included nicotine, tert-butyl hydroperoxide, lipopolysaccharide (LPS), and traditional cigarette smoke. Additional experiments involved cells pretreated with buthionine sulfoximine, a glutathione-depleting agent. Results showed cell scatter patterns on fluorescence plots varied by flavor, reflecting immune and inflammatory responses. None of the e-cigarette aerosols reached the pro-inflammatory or oxidative stress levels caused by traditional cigarette smoke. Nicotine alone had a milder pro-inflammatory effect, while some flavors increased IL-6. In cells with reduced glutathione, oxidative stress and inflammation were significantly amplified. These findings suggest that while e-cigarette aerosols are less harmful than traditional cigarettes, their potential to induce sub-clinical redox imbalance and inflammation—exacerbated by certain conditions—may have clinical relevance.