A SYSTEM FOR MEASURING SMOKE DEPOSITION IN A REALISTIC LUNG CAST TO COMPARE "SAFER" AND "CONVENTIONAL" CIGARETTES

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It is well known that smoking causes cancer of the mouth, throat, and lungs, as well as being a major risk factor for heart disease. It is estimated that it causes 434,000 deaths per year in the United States alone. In particular, the deposition of smoke particles in the lungs have been shown to have a direct correlation to the sites at which tumors eventually form. "Safer" cigarettes reportedly have fewer carcinogens, however, no independent study has been done to evaluate this claim. A senior design team created a smoking machine that is able to simulate a person smoking. The machine has the ability to smoke up to five cigarettes at a time, either in series or parallel, at a predetermined puff profile (flow rate as a function of time). The machine has three experimental options. The cigarette smoke can either (1) pass directly into a filter, which is then extracted to evaluate the presence of carcinogens; (2) pass into an impactor which separates the particles into different size ranges; or (3) pass into a replica oral cavity and lung cast which is used to estimate the smoke particle deposition in the human lung. The purpose of the work, which is sponsored by the American Cancer Society, is to compare "safer" and "conventional" cigarettes to see if their carcinogen concentrations, size distributions and deposition in the lung are different. From the experimental data, the company's claim to have produced a "safer" cigarette can be evaluated.