On Mucociliary Clearance Mechanism; Effect of Cigarette Smoke
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The purpose of the present study is to assess the effect of a cigarette smoke on the mucociliary clearance mechanism in the normal dog by measuring migration of a centrifuged $^{99m}$Tc-MAA solution as reported previously. The effect of a cigarette smoke filtered through glass fiber filter paper (Toyo Roshi, GA 200) was also studied which is claimed to trap over 99.5% of particulate phase of a cigarette smoke.

The dogs were divided into the following seven groups; 11 dogs which smoked no cigarette served as control, 6 dogs smoked 1 cigarette, 6 dogs 3 cigarettes, 8 dogs 5 cigarettes, 8 dogs 8 cigarettes, 10 dogs 5 cigarettes each filtered through glass fiber filter paper and 8 dogs 8 cigarettes filtered. Within 2 minutes following completion of cigarette smoking, the test agent was placed on the airway mucosa at about 5 mm distal to the carina through a Cook catheter under fiberoptic bronchoscopic guidance. Sequential imaging was made with a gamma camera and the migrating distance of radioactivity was measured every 1 to 2 minutes. A linear regression was calculated from time and the migrating distance, and its gradient was defined as mean migrating velocity (MMV).

The mean MMV was 12.5±1.5 mm/min (mean ±S.E.), 11.6±1.5, 8.3±2.2, 3.3±1.3, 4.2±2.3 in the control dogs and in dogs who smoked 1, 3, 5 and 8 cigarettes, respectively. There was a converse correlation ($r=-0.59$) between the MMV and the number of cigarettes smoked with a statistical significance ($p<0.0001$). The mean MMV in the 10 dogs who smoked 5 cigarettes each filtered through glass fiber filter paper was 7.0 ±0.5 mm/min. There was a statistically significant difference between the MMVs in the dogs who smoked 5 cigarettes with and without filter. The mean MMV in the 8 dogs who smoked 8 cigarettes with filter was 1.3±0.9 mm/min which was not statistically significant as compared with the counterpart not filtered.

In summary a cigarette smoke damages the mucociliary clearance mechanism of the airway in a dose-response fashion. When the particulate phase is removed from a cigarette smoke, the mucociliary damage is kept less in intensity to a certain number of cigarettes if filtered, but the damage seems inevitable and to the same degree as the number of cigarettes exceeds a certain number or 8 cigarettes in this study.

Evaluation of Aerodynamic Change in the Airway of Patients with Chronic Obstructive Pulmonary Disease using Radioaerosol Scintigraphy

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It is well known that in the chronic obstructive Pulmonary disease (COPD), radioaerosol inhalation scintigraphy revealed an excessive deposition of the aerosol in the central airway which is called “hot spot” formation on the scintigraphy. We investigated the aerosol scintigraphy of COPD in various stages, and established the grading criteria according to scintigraphic findings comprising extent of peripheral irregularity as well as hot spot formation. The grading criteria was well correlated with a conventional lung function test such as the forced expiratory volume at one sec-