

# Rat and hamster species differences in susceptibility to elastase-induced pulmonary emphysema relate to differences in elastase inhibitory capacity

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Syrian Golden hamsters develop severe emphysema after a single intratracheal dose of elastase, whereas Sprague-Dawley rats exhibit mild emphysema with the same dose per kilogram body weight. We hypothesized that the development of severe emphysema is prevented in rats by the high serum level of  $\alpha$ 1-antitrypsin reported in rats, compared with hamsters, which provides for a high lung elastase inhibitory capacity (EIC). To explore this possibility, we challenged the antiprotease system of the rats by treating them with three similar weekly doses of elastase. Four months after treatment, we evaluated changes in histology, volume, and elastic properties of rat lungs and compared them with those of hamsters receiving a single dose of elastase. We also measured serum  $\alpha$ 1-antitrypsin levels and serum and lung EIC in control rats and hamsters. Results showed that, in association with 40% less serum and lung EIC compared with rats ( $P < 0.001$ ), hamster lungs had upperlobe bullae formation, severe m