Association of expiratory airway dysfunction with marked obesity in healthy adult dogs

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Objective—To evaluate the effects of obesity on pulmonary function in healthy adult dogs.

Animals—36 Retrievers without cardiopulmonary disease.

Procedures—Dogs were assigned to 1 of 3 groups on the basis of body condition score (1 through 9): nonobese (score, 4.5 to 5.5), moderately obese (score, 6.0 to 6.5), and markedly obese (score, 7.0 to 9.0). Pulmonary function tests performed in conscious dogs included spirometry and measurement of inspiratory and expiratory airway resistance (R\text{aw}) and specific R\text{aw} (sR\text{aw}) during normal breathing and during hyperpnea via head-out whole-body plethysmography. Functional residual capacity (FRC; measured by use of helium dilution), diffusion capacity of lungs for carbon monoxide (DLCO), and arterial blood gas variables (PaO\text{2}, PaCO\text{2}, and alveolar-arterial gradient) were assessed.

Results—During normal breathing, body condition score did not influence airway function, DLCO, or arterial blood gas variables. During hyperpnea, expiratory sR\text{aw} was significantly greater in markedly obese dogs than nonobese dogs and R\text{aw} was significantly greater in markedly obese dogs, compared with nonobese and moderately obese dogs. Although not significantly different, markedly obese dogs had a somewhat lower FRC, compared with other dogs.

Conclusions and Clinical Relevance—In dogs, obesity appeared to cause airflow limitation during the expiratory phase of breathing, but this was only evident during hyperpnea. This suggests that flow limitation is dynamic and likely occurs in the distal (rather than proximal) portions of the airways.

Further studies are warranted to localize the flow-limited segment and understand whether obesity is linked to exercise intolerance via airway dysfunction in dogs.