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Title: Synchrotron imaging of regional ventilation/perfusion- ratio after methacholine provocation in rabbit

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Body: Rationale: K-edge subtraction (KES) CT imaging with synchrotron radiation allows quantitative measurements of regional ventilation (V) during xenon inhalation and regional blood volume (VB) distributions during iodine infusion. In this study, we assessed the feasibility of quasi-simultaneous KES imaging of V and VB. Methods: Experiments were performed in anaesthetized and ventilated New Zealand rabbits (n=5). Images of V and VB were obtained at baseline and after inhaled MCh (125 mg/ml). Heterogeneity of both parameters was estimated as the coefficient of variation (CV) between pixels. Results: Images of V, VB and their ratio (V/VB) are shown in one rabbit at baseline and after MCh challenge (Figure). Mch inhalation produced clustered areas of poor ventilation; mean V decreased to 75.7±24.2%* and VB to 69.4±12.7%* of baseline. The CV of V increased to 334±186%*, CV of VB to 140±21%*, and CV of V/VB ratio to 180±50%* of baseline. Values are m±SD, *: significant change vs. baseline ($P<0.05$, Students paired t-test).

Conclusions: KES imaging allowed quasi-simultaneous measurement of regional ventilation and blood volume. Mch challenge caused significant changes in V and VB and increased the mismatch between the parameters. This method allows quantitative assessment of changes in regional V/VB ratio induced by drugs in models of asthma.