Title: Nitric oxide and $\beta_2$-adrenoceptor activation attenuate pulmonary vasoconstriction during anaphylactic hypotension in anesthetized BALB/c mice

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Body: Systemic anaphylaxis accompanies pulmonary vasoconstriction and bronchoconstriction, which may contribute to increased right heart afterload, and finally anaphylactic hypotension. However, the pulmonary response to anaphylaxis is not known in mice. We determined the pulmonary vascular and bronchial response to systemic anaphylaxis in anesthetized BALB/c mice. We also clarified the roles of $\beta$-adrenoceptors, nitric oxide and cyclooxygenase metabolites in these responses. Anaphylaxis was induced by an intravenous injection of the ovalbumin antigen into open-chest artificially ventilated sensitized mice. Mean arterial pressure, pulmonary arterial pressure, central venous pressure, airway pressure and aortic blood flow were continuously measured. In sensitized control mice, mean arterial pressure and aortic blood flow substantially decreased soon after the antigen injection, while pulmonary arterial pressure and airway pressure did not increase. In contrast, in mice pretreated with either the $\beta_2$-adrenoceptor antagonist ICI 118,551, or L-NAME, but not with the $\beta_1$-adrenoceptor antagonist atenolol or indomethacin, pulmonary arterial pressure increased after antigen. Airway pressure did not significantly change after antigen in any mice studied. In conclusion, pulmonary response to systemic anaphylaxis does not increase the right heart afterload and therefore may not contribute to the initial decrease in venous return and anaphylactic hypotension in anesthetized mice. $\beta_2$-adrenoceptor activation and nitric oxide, but not $\beta_1$-adrenoceptor activation or cyclooxygenase metabolites, attenuate the antigen-induced pulmonary vasoconstriction.