

**Asthma, respiratory allergy and cough**

**The relationship of theophylline plasma levels to its bronchodilator and anti-inflammatory effects in a model of ovalbumin-induced allergic inflammation**

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Phosphodiesterases (PDEs) represent 11 families and hydrolyze cyclic nucleotides (cAMP and cGMP) into inactive 5' monophosphates. Inhibition of PDEs leads to a variety of cellular effects including airway smooth muscle relaxation and inhibition of cellular inflammation, and immune responses. In our experimental study, we focused on theophylline known as a non-selective inhibitor of PDEs. Theophylline has been used for several decades in the treatment of chronic inflammatory diseases. It has narrow therapeutic range and belongs among drugs that should be monitored. Therefore, one of our aims was to evaluate plasma levels of theophylline and determine their relevance to its pharmacological effect, especially to airway reactivity in *in vivo* and *in vitro* conditions after single and long-term (7 days) administration of theophylline in different doses (5, 10, 20, 50 mg/kg). The airway hyperresponsiveness in adult male guinea pigs was induced by repeated exposure to ovalbumin. Theophylline has reduced specific airway resistance after nebulization of histamine measured in double chamber whole body plethysmograph. These changes have been confirmed in *in vitro* conditions using organ bath method with significant decrease of tracheal and lungs smooth muscle contractility after cumulative doses of histamine. Higher efficiency after long-term administration indicates predominance of anti-inflammatory activity of theophylline, which may indirectly participate in bronchodilating effect of theophylline.

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