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L-ARGININE SUPPLEMENTATION AND EXPERIMENTAL AIRWAY HYPERREACTIVITY

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The interest in L-arginine metabolism it was triggered primarily by the discovery of NO synthesis in mammals and its remarkable biological roles. It has not yet been established the real role of L-arginine in the airway hyperreactivity. The deficiency or the decrease of the bioavailability of basic substrate for NO synthesis - L-arginine can result in the damage of bronchomotoric tone control and can be one of factors contributing to the airway hyperreactivity. Therefore, we studied whether and how the supplementation of L-arginine can influence the experimental airway hyperreactivity or if it has beneficial effects on airway reactivity evoked by two different triggers - allergen or exogenous irritant. Pathogens-free male Trik guinea pigs (250-300g) were used in study. The senzibilization of guinea pigs by allergen (ovalbumin) was used to induce the airways hyperreactivity. Toluene vapours were used as exogenous irritant for the provocation of the airways hyperreactivity. The duration of exposure in the special machinery was two hours in each of three consecutive days. We used the pre-treatment with L-arginine in adose of 300 mg/kg intraperitoneally in two regimens – short- and long- term. Short-term regimen posed the administration of L-arginine 30 minutes before the provocation of the airway hyperreactivity by toluene in each of three consecutive days, in ovalbumin-induced hyperreactivity the administration of L- arginine 30 minutes before the ovalbumin inhalation at the 14th day. Long-term regimen posed the administration of L-arginine in each of 17 consecutive days before the provocation of the toluene-induced hyperreactivity. Animals received L-arginine as well as 30 minutes before toluene exposure during last 3 days. We used in ovalbumin-induced hyperreactivity the administration of L-arginine during senzibilization by ovalbumin (14 days). We used as well as in vitro administration of L-arginine 10-4mol/l. Animals were sacrificed 24 hours after the last trigger exposure. Strips from trachea and lung tissue were placed into organ bath and were contracted by cumulative doses of histamine or acetylcholine (10-8 – 10-3 mol/l). The administration of L-arginine during 3 days decreased the airway reactivity increased by irritant exposure. We recorded the decrease of the airway reactivity in animals with bronchial hyperreactivity after incubation of tissue strips with L-arginine, also. The pre-treatment of animals with L-arginine during 17 days did not affect the airway smooth muscle reactivity induced by toluene vapour in larger extent. Short-term administration of L-arginine caused the decrease of the ovalbumin-induced reactivity of the tracheal smooth muscle to both bronchoconstrictors. Trachea responded with more significant decrease of reactivity after the short-term L-arginine pre-treatment compared with the long-term pre-treatment. The most significant decrease of the tracheal smooth muscle reactivity we observed after the short-term L-arginine administration using acetylcholine as abronchoconstrictor. Lung tissue responded by the

increase of the amplitude contraction after short-term as well as long-term pretreatment with L-arginine in the lower concentrations of mediators (10-8 – 10-7 mol/l). The decrease of the reactivity but statistically non-significant reacted the lung tissue to acetylcholine in the higher concentrations (10-5-10-3 mol/l) after short-term as well as long-term pretreatment with L-arginine. The supplementation of L-arginine resulted to a modification of the response of the airways smooth muscle. The effect of supplementation was different depending on the airways hyperreactivity trigger, airways level and pre-treatment duration. The results show the protective effect of the short-term pretreatment with L-arginine mainly in irritant-induced experimental airway hyperreactivity. Results refer also to the importance of optimal L-arginine level for the control of bronchomotoric tone and the relationship between optimal offer of NO precursor - L-arginine and the airways hyperreactivity.

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