

Anti-inflammatory effects of β -blockers in a rat asthma model

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Introduction

The β -blockers effects on the lungs during the bronchial asthma can have the independent meaning for the control of the inflammatory process in experimental asthma [1]. In order to investigate this effect, we've made a comparative analysis of the effect of β AB in monotherapy and in combined therapy with the use of β AM.

Materials and methods

➤Species of animal: adult Wistar male rats weighing 180-200 g (n = 50).
➤Model: ovalbumin (4mg / kg) model of asthma with the replaced adjuvant (lyophilized bacterial lysates, 2,5 mg/kg).
➤The duration of the experiment: 60 days.
➤On the 14th day the animals were divided into 4 groups (group №1-asthma, group №2-basic therapy (2 mg/kg), group №3-metoprolol (5mg/kg), group №4-metoprolol and basic therapy) and the control group (n = 10).
➤The method of drug delivery: "dry" insufflation Dry Powder Insufflator-Model DP-4 (Penn-Century, USA). Figure 1 (A, B).

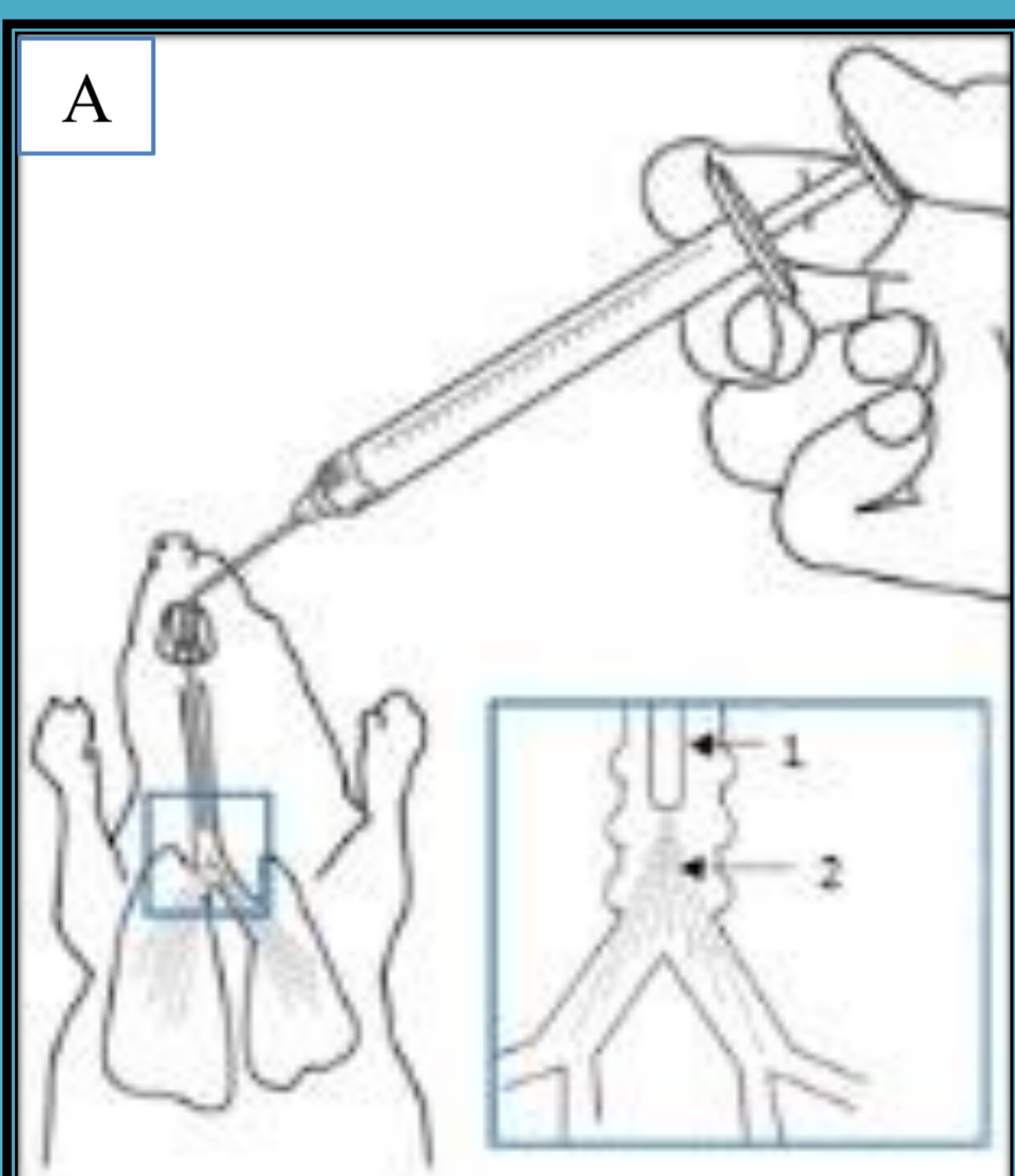


Fig. 1. A : The process of insufflation (1-insufflator, 2-spray powder); B: x-ray light reflects the distribution of the drug during insufflation. The arrows designated trachea with contrast medium (finely dispersed barium sulfate).

Results

During the metoprolol monotherapy (group 3) were observed: a reduction in the number of MC in the large bronchi of 3.5 times (Figure 2, C), in small bronchi of 1.3 times, in the BALT of 2.7 times, in PV of 5.8 times in the lung tissues, compared with the control number ($p < 0,05$). The number of eosinophils (Figure 3, C) in the PB decreased in 4.1 times, in the BALT in 68 times, PV in 4.9 times. The volume of secreted mucin (Figure 3, C) decreased in 6.5 times ($p < 0,05$).

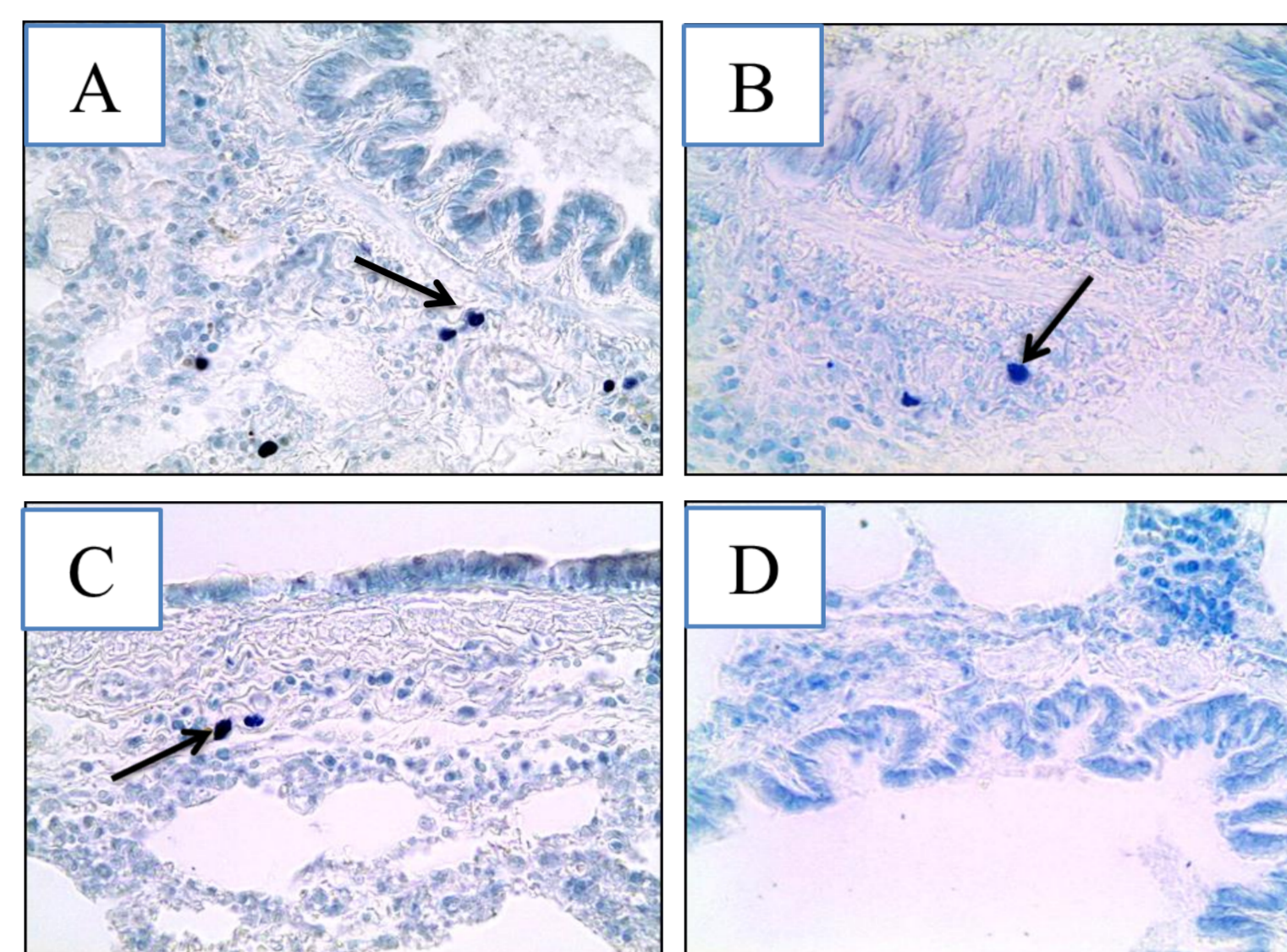
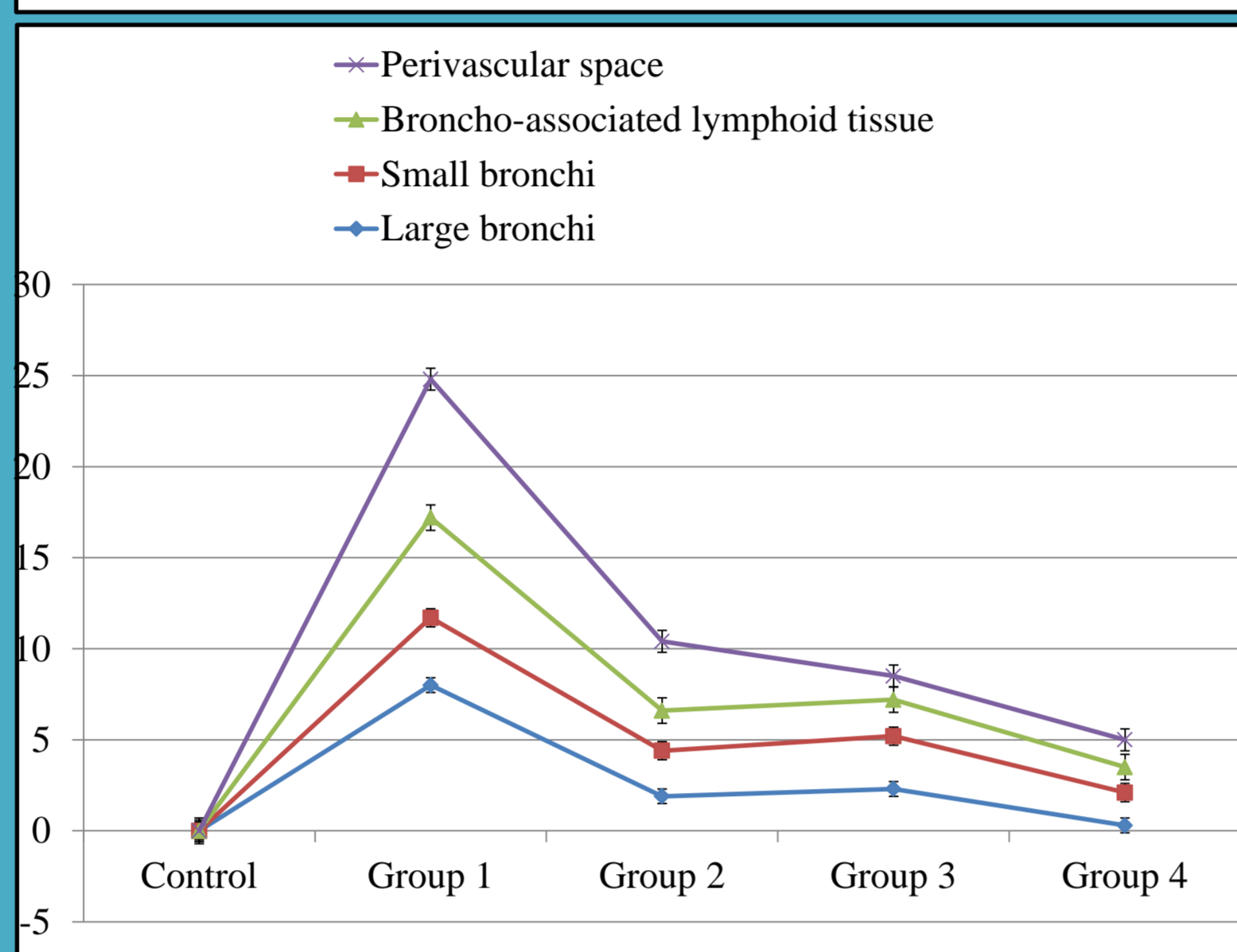


Fig. 2. Semi-quantitative analysis of mast cells (MC) in the tissues of the lung. A- group №1, B-group №2, C-group №3, D-group №4.

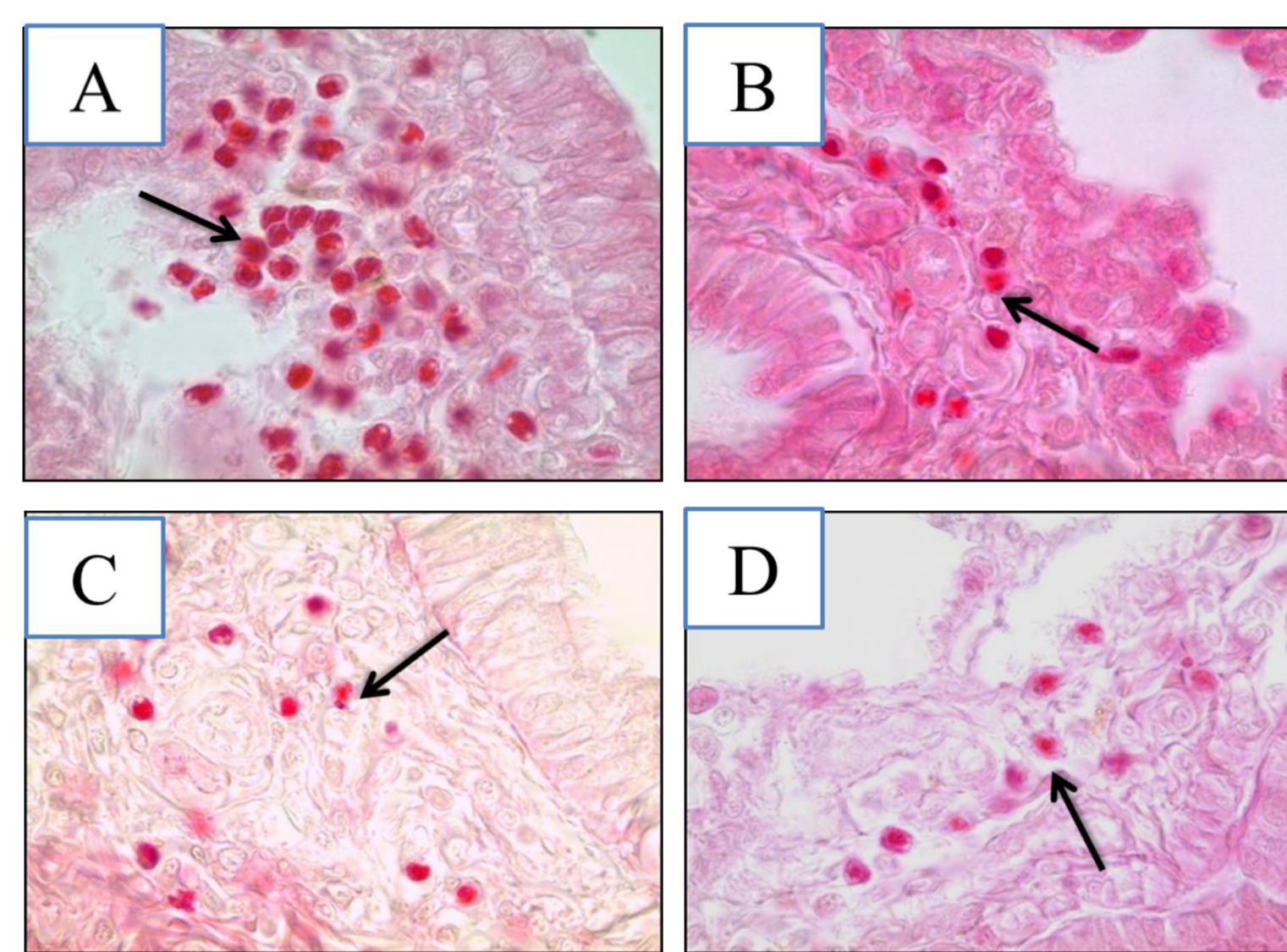
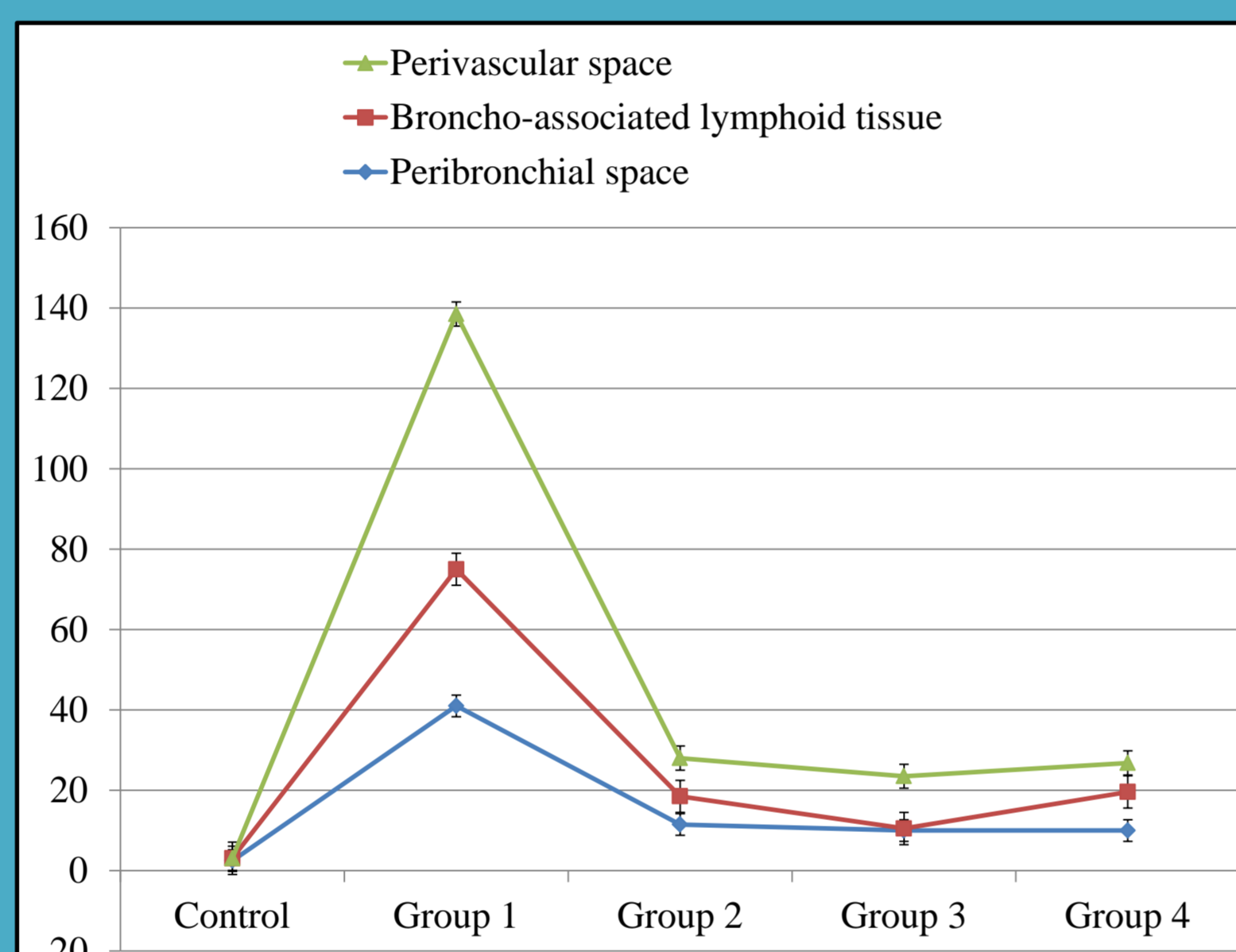


Fig. 3. Semi-quantitative analysis of the number of eosinophils in the lung tissues

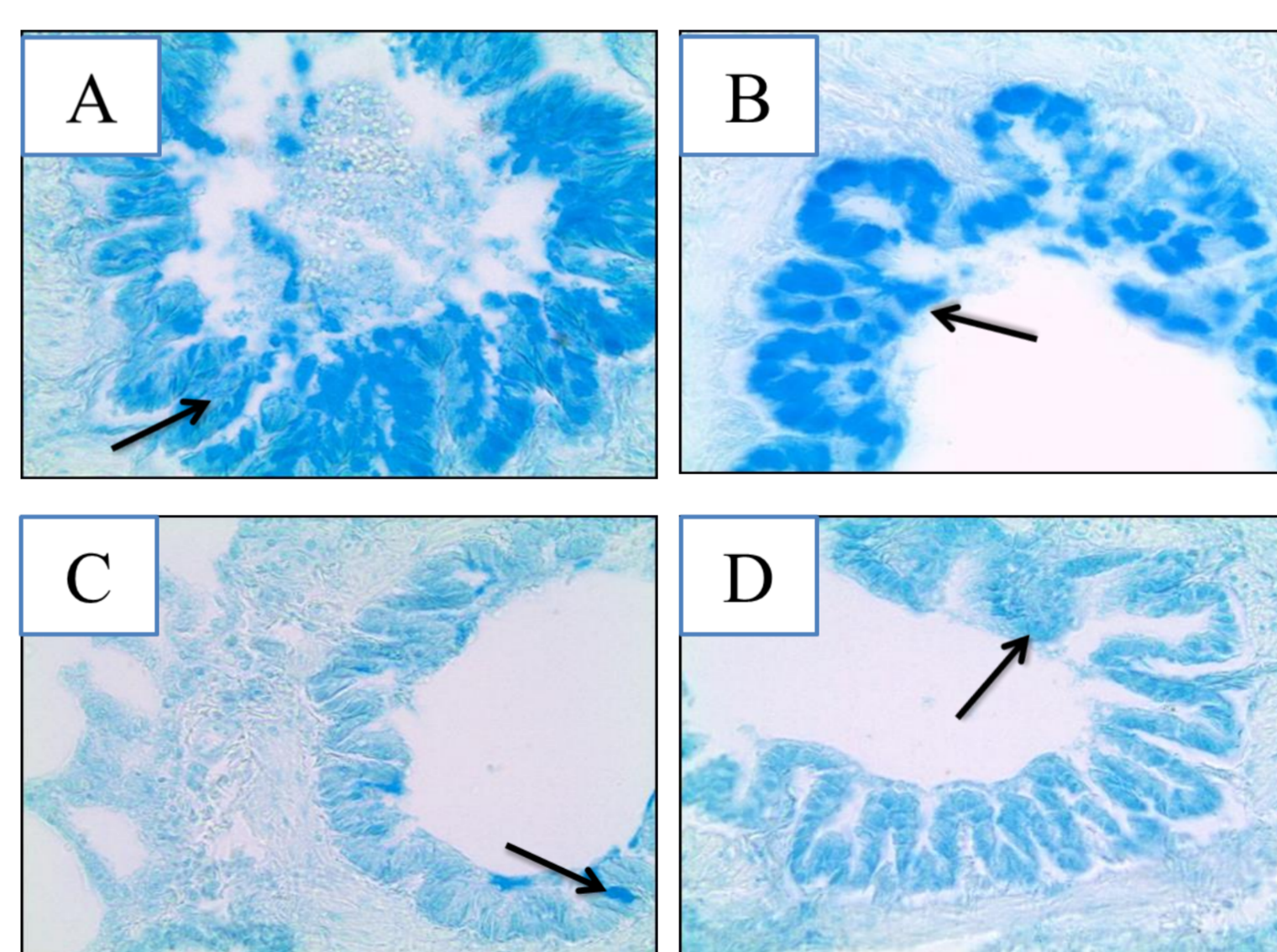
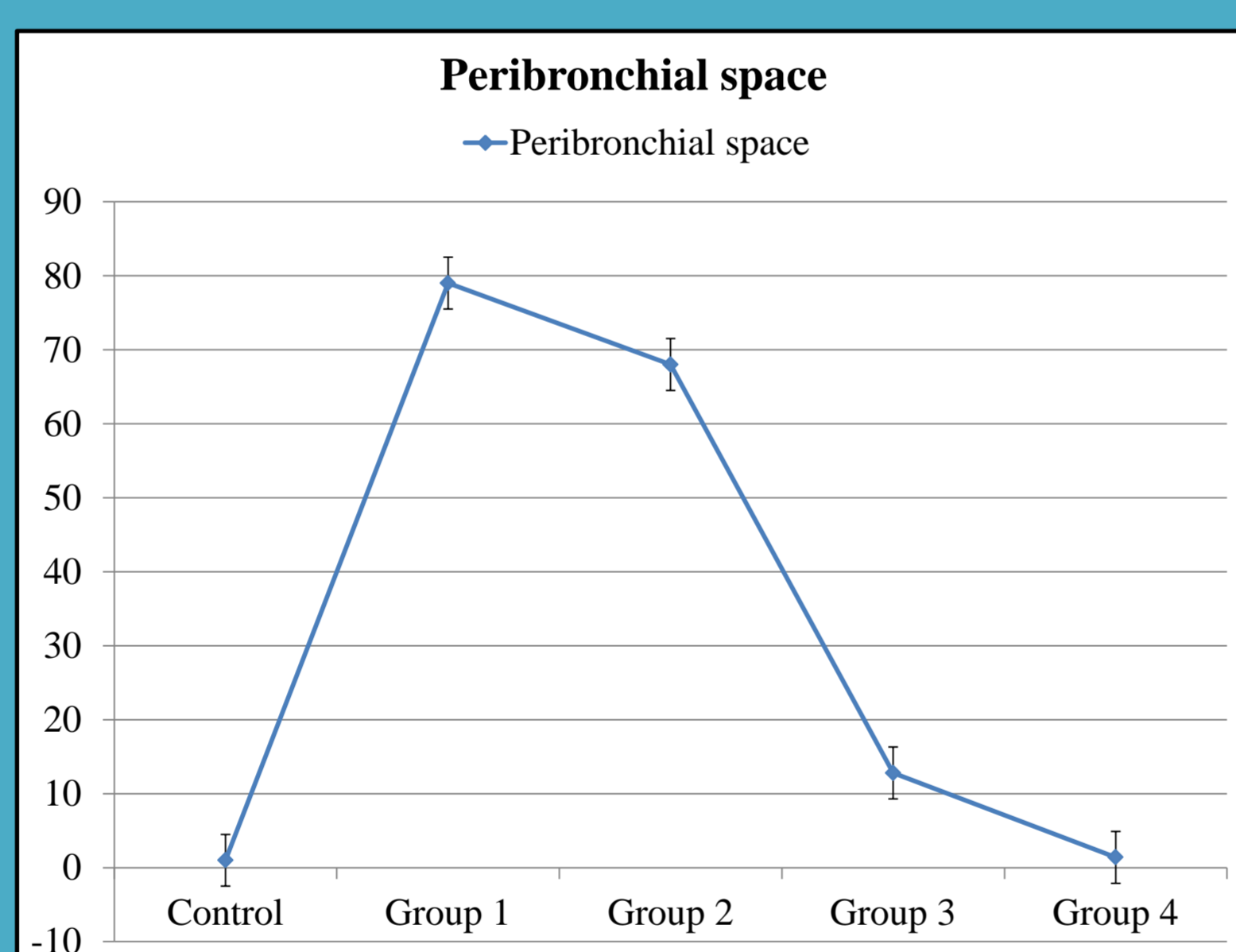


Fig. 4. The change the area occupied by mucin in the bronchi

In the group №4 (metoprolol and standard therapy) was observed: the number of MC in the major bronchi (Figure 2,D) decreased in 4.3 times in PV space in 1.3 times ($p < 0,05$). The number of eosinophils (Figure 3, D) decreased in 10-times ($p < 0,05$). The volume of the detected mucus (Figure 4, D) in the lumen of the bronchi was not significantly different from the number of the control group ($p > 0,05$).

Conclusions

The findings are the evidence of the presence of anti-inflammatory characteristics of beta-blockers injected by the method of "dry" insufflation in experimental asthma, which will consider the possibility of inhalation application β AB, as additional preparation in the basic treatment of asthma.

Literature cited

1.Nguyen L. P., Singh B., Okulate A.A. et al. Complementary anti-inflammatory effects of a β -blocker and a corticosteroid in an asthma model // Naunyn-Schmiedeberg's Arch. Pharmacol. - 2012. - Vol. 2, № 385. - P. 203-210.

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