Bronchial hyperresponsiveness (BHR) is a cardinal feature of bronchial asthma (BA) and is defined as the excessive spastic reaction of airways in response to exposure to various inhaled irritants. Accumulated during the latest decades data give the reason to believe that airway inflammation is a major factor of formation of bronchial hyperresponsiveness in bronchial asthma patients. Inflammatory theory of the asthma pathogenesis substantiated asthma management approach, such as basic anti-inflammatory therapy aimed to reduction of disease relapses and, as well, to control asthma symptoms. At the same time, heterogeneity of the airways inflammation (eosinophilic, noneosinophilic, paucigranulicytic) is one of the aspects of inadequate asthma control. Published data regarding the association of the bronchial hyperresponsiveness severity with a variant of the chronic airway inflammatory response remains controversial and, at the same time, not studied enough in children population.

**The aim.** To study the particularities of the airway hyperresponsiveness to histamine in school-age children with different inflammatory asthma phenotypes.

**Materials and methods.** On the base of the pulmonology department of the Chernovtsy Regional Children Clinical Hospital the diagnostic value of the indices of airway hyperresponsiveness to histamine for a verification of asthma inflammatory phenotypes has been studied in 83 school age children with persistent bronchial asthma. The first (I) clinical group has been formed from 47 (56,6%) children with eosinophilic asthma phenotype. The second (II) clinical group included the remaining 36 (43,4%) patients with noneosinophilic/neutrophilic moderate bronchial asthma. The comparison groups did not differ significantly on the main (sex, age, place of residence) clinical characteristics. The nonspecific bronchial hyperresponsiveness (BHR) to direct stimuli using spirometric provocative test with inhalation of the serial dilutions of histamine has been performed by the method of Juniper E.F. (1994). There have been calculated indices: provocative concentration of histamine ($PC_{20}H$), provocative dose of histamine ($PD_{20}H$) and dose-response slope (DRS). These survey results were analyzed by parametric (Pt, Students’ criteria) and
nonparametric (Pφ, Fisher's angular transformation) methods of calculation. To evaluate the diagnostic value of the tests their sensitivity (Se), specificity (Sp), the positive (PPV) and negative predictive (NPV) values have been measured.

**Results.** It should be noted that among the patients in both clinical groups the borderline level of BHR (PC20H from 8.0 to 16.0 mg/mL) has been observed. In this connection, PC20H <8.0 mg/ml can be used for separation patients with different inflammatory phenotypes of asthma from healthy children with high sensitivity of this test (Se=95%) and low rate of the false negative results (only in 5% of cases).

It has been observed that the considerable airway hypersensitivity to low doses of histamine has been more common for patients with eosinophilic asthma phenotype. Thus, PD20H < 0.15 mg was determined in 61.7±7.1% 10.5% of cases in the I-st group, but only in 38.9±8.1% patients with neutrophilic asthma phenotype (P<0.05). It has been determined that bronchial hyperreactivity was likely higher in patients with eosinophilic airway inflammation. Thus, DRS ≥1.8 arbitrary units was determined in 66.0% of patients with eosinophilic asthma, but only in 44.4% cases of the II-nd comparison group (Pφ<0.03).

The diagnostic value of PC20H <0.4 mg/ml for a verification of eosinophilic asthma phenotype characterized by high specificity of this test (Sp=72%), but a low sensitivity (Se=47%). Such index of airway hypersensitivity as PD20H< 0.15 mg characterized by an insufficient diagnostic value for eosinophilic asthma diagnosis: Se=62%, Sp=61%, PPV=67%, NPV=55%. The index of bronchial hyperrereactivity to histamine (DRS≥3.0 arbitrary units) is the most informative test for confirmation of eosinophilic asthma phenotype: Se=21%, Sp=94%, PPV=83%, NPV=48%.

**Conclusions.** Bronchial provocation test with inhalation of serial dilutions of histamine should be used for bronchial asthma verification in school-age children. Namely, PC20H <8.0 mg/ml appears highly sensitive screening test (Se=95%) in the diagnosis of different inflammatory asthma phenotypes. None of the indices of nonspecific BHR to histamine can be used independently as a screening method
for verification of eosinophilic asthma phenotype because of the high incidence of false negative results. The index of bronchial hyperreactivity to histamine (DRS ≥ 3.0 arbitrary units) is the most informative test to confirm eosinophilic asthma phenotype due to the high specificity of the test (Sp=94%) and a small number (17%) of a false diagnosis of eosinophil-associated airway inflammation in his absence.