429. Biological correlates and comorbidities of childhood asthma/allergy

P4268

Lung clearance index differentiates children with poorly controlled asthma better than FEF_{2575}: Data from the paediatric asthma genes and environment study

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Introduction: Lung Clearance Index (LCI) has been shown to differ between children with and without asthma. We have further examined relationships between LCI, spirometry and outcomes within a group of asthmatic children.
Methods: Children with asthma were recruited to a national study. Assessment included respiratory and children's asthma control questionnaires, spirometry, and for individuals recruited in Edinburgh, Multiple Breath Washout (MBW). Results are compared to previously obtained data from healthy controls.
Results: 63 asthmatic patients aged 5.1-16.5 years performed MBW. Controls included 66 children aged 5.0-16.1 years. Mean (SD) LCI in our asthmatic group was 6.7 (0.9) and was higher than in our healthy group, in which LCI was 6.3 (0.5) ($p=0.007$). The asthmatic group also had significantly worse FEF_{2575} z score ($p<0.001$), which correlated with LCI ($r=-0.33$; $p=0.02$). There was no difference in FEV_1; FEV_1 did not correlate with LCI.
Patients with completely or well controlled asthma had significantly lower LCI (6.4) than those whose asthma was described as somewhat controlled or worse (6.9; $p=0.02$). There was no difference in FEV_1 or FEF_{2575} between these groups. LCI also correlated with reported time that asthma affected school work ($r=0.36$; $p=0.015$) and use of salbutamol ($r=0.33$; $p=0.03$).
Conclusions: Our cohort of children with asthma had significantly higher LCI compared to healthy children. LCI was also higher in patients whose parents reported poorer asthma control, something not evident for FEV_1 or FEF_{2575}. LCI may be considered a better surrogate of symptom control than spirometry.

P4269

Subclinical small airway involvement in children with seasonal allergic rhinitis

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Background: Allergic rhinitis (AR) has been incriminated as a relevant risk factor for asthma onset in children and young adults. The aim of this study was to examine the presence of subclinical reversible airflow obstruction in non-asthmatic children suffering from seasonal AR.
Methods: Twenty five children with seasonal AR and pollen allergens sensitiza-

tion were compared during the pollen season with 25 matched for age healthy controls. All participants had no prior history of asthma, asthma-related symptoms or use of asthma medication. Forced spirometry indices (FEV_1, FVC, FEV_1/FVC, FEF_{25-75}), as well as respiratory resistance (Rrs) and reactance (Xrs) at frequencies of 4, 6, 8, and 10 Hz (forced oscillation technique), were determined before and 15 minutes after bronchodilator (BD) administration (salbutamol 500μg). Baseline values and relative changes were calculated and compared between children with and without AR.
Results: There were no significant differences in baseline values of the studied indices between the two groups. Children with AR presented a significantly greater BD response compared to controls for FEF_{25-75} (29±12% vs 18±10%; P<0.001), $Rrs_{(4Hz)}$ (18±8% vs 12±5%; P<0.01), $Rrs_{(6Hz)}$ (14±8% vs 9±5%; P <0.01, $Xrs_{(4Hz)}$ (26±12% vs 17±8%; P<0.01), and $Xrs_{(6Hz)}$ (28±15% vs 20±12%; P<0.05).
Conclusion: Small airway bronchodilator responsiveness was increased in children with AR. These data suggest that a subclinical small airway involvement is present in non-asthmatic children with seasonal AR.

P4270
Spirometry and measurement of airway resistance by the interrupter technique (rint) in preschool children: Influence of atopy
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Background: Pulmonary function tests play an important role in the diagnosis, and management of respiratory diseases in children. The aim of our study was to evaluate the lung function by performing spirometry and airway resistance by the interrupter technique (Rint) in pre-school children in relation to their atopic status.
Materials and methods: We studied 83 asymptomatic children (Males: 51 and Females: 32, mean age 5.15 years ± 0.72 SD). For each child has been collected the family history concerning: atopy, respiratory diseases, history of gestational and neonatal period. In all children, Skin Prick Test (SPT) to inhalant and food allergens were performed. Rint, by requiring minimal cooperation to be carried out, were performed in all subjects. Spirometry was also well tolerated by 56 subjects and was used to determine FEV_1 and $FEV_{0.5}$.
Results: Twenty-two subjects (26.5%) had positive SPT. The following table shows the values of the main spirometric and Rint parameters of atopic (A) and not atopic subjects (NA).

	No. subjects	Atopic	Non atopic	P<
FVC (lt)	56	1.35±0.31	1.41±0.35	n.s.
FVC % pred	56	99.7±8.6	101.7±7.9	n.s.
FEV1 (lt)	56	1.28±0.21	1.32±0.19	n.s.
FEV1 % pred	56	97.3±9.5	102.3±9.7	n.s.
FEV0.5 (lt)	56	0.95±0.11	0.99±0.13	n.s.
FEF25-75 (l/sec)	56	1.31±0.22	1.33±0.26	n.s.
Rint I kPa (l/sec)	83	1.12±0.31	1.10±0.26	n.s.
Rint E kPa (l/sec)	83	1.19±0.32	1.08±0.25	0.01

Conclusions: Despite our study assess the feasibility and repeatibility of both tests in preschool children, spirometric parameters were not statistically different between atopic and not atopic children, while mean values of $Rint_E$ were significant lower in non atopic compared to atopic children.

P4271
Clinical correlation & evaluation of spirometry in children with asthma
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Introduction: Spirometry is gold standard tool in management of asthma.
Aims & objectives: To determine correlation between improvement in symptom score & lung function in pediatric asthma.
Methods: 32 Patients were followed up over 6 months each at Pediatric Chest Clinic. Childhood Asthma Control test was used to determine the symptom score (symptoms, daytime- & night-time cough, wheezing) & spirometry was performed at baseline, 6 weeks, 3 months & 6 months. Parents were educated about medications, techniques & compliance.
Results: The mean age was 8.72 years (8.72±1.95, range 6-12 years) [M: F=1.67:1]. There was *20%, *26.8% & *36.3% improvement above baseline symptom score at 6 weeks, 3 months, and 6 months (*p<0.05, Mann Whitney U test). Over same time, there was 7.3%, *15.6% & *34.4% improvement in FEV1 and 7.2%, *12%, & *33% improvement in PEFR above the baseline (*p<0.05, student t test). At 6 weeks of treatment, there was significant improvement in symptom score with marginal improvement in lung function. At the end of 3 months, there was a significant improvement in lung function, though the improvement in symptom score tended to be more. However, at end of 6 months, all parameters showed almost same degree of improvement. The percentage improvement in score as reported by the child was comparable to that reported by parents. The improvement in PEFR was comparable to improvement in FEV_1 values.
Conclusions: A well conducted therapeutic program with good compliance, patient education, regular medication & follow up leads to improvement in symptom score & lung function measures. The symptom score, the FEV_1, and PEFR are good indicators of response to treatment in childhood asthma.

P4272
Validation of tidal breathing analysis in the diagnosis of asthma among Filipino children aged 1 month-6 years
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The purpose of the study was to assess the accuracy of Tidal Breathing Analysis in diagnosing asthma in Filipino Children aged 1 month to 6 years as compared with the Philippine Consensus for Asthma as a reference standard.
This is a cross-sectional validation study. Lung function was measured and analyzed using the tidal flow-volume loops (masterscreen Paed Jaeger Pediatric) in 119 sedated young children (55 males, 64 females; mean age 2.6 years) who are suspected of having asthma, before and 15 minutes after inhalation of nebulized salbutamol. The result of the Tidal Volume per kilogram (VT/kg) and the ratios of the time and volume until peak expiratory flow to the total expiratory time and volume, respectively (TPTEF/TE and VPEF/VE) were recorded. Provocation test was also done and reversibility after salbutamol inhalation was recorded.
Results showed that the sensitivity of TBA was 36.2% and the specificity was 80.3%. The positive predictive value was 63.6% and the negative predictive value was 57.0%.
We conclude that Tidal Breathing Analysis is a good validating device to diagnose children with asthma who can not perform the pulmonary function test. However, the test is not a reliable screening method to children still suspected to have asthma. With these findings, all clinicians dealing with pediatric patients suspected with asthma should be vigilant in diagnosing and treating children with asthma.

P4273
Do infants with bronchiolitis get any benefit with nebulized salbutamol?
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Background: The results of nebulized salbutamol in hospitalized infants with bronchiolitis are controversial. Rint is a standardized method of evaluation of airways broncho-constricion in infants.
Aim: 1). To compare expiratory interrupter resistance (Rint) among 19 infants with bronchiolitis and 21 healthy controls. 2). To assess the effect of nebulized salbutamol on Rint among infants with bronchiolitis.
Methods: Nineteen infants with bronchiolitis and positive history of atopy, family history of asthma and high total serum IgE levels were studied. Twenty one age-matched healthy infants were used as controls. Expiratory interrupter resistance (Rint) was measured before and 20 minutes after nebulized salbutamol.
Results: 19 infants with bronchiolitis (mean age 9.25±6.34 months, 57% boys) and 21 age-matched healthy control infants were studied. 90.1% of them had eczema and 18.2% of them had milk allergy. Mean total serum IgE was 180.4±33.5 IU/ml. 82% of them had siblings with asthma, while 55% of them had a history of maternal asthma. As compared to controls, infants with bronchiolitis had significantly higher Rint, (2.64±0.0.78 vs 1.26±0.12 kPa L^{-1} second, p<0.001). Moreover, Rint was reduced significantly after administration of salbutamol; mean difference (95% confidence interval): -0.49 (-0.92, -0.06) (p = 0.028).
Conclusions: Infants with bronchiolitis, positive family history of asthma and positive personal history of atopy might benefit from nebulized salbutamol, as shown by the improvement of Rint values.

P4274
Exhaled breath temperature and nitric oxide in assessing children with and without respiratory disease
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Background: The exhaled breath temperature (EBT) is a potential marker of airway inflammation. Recent data suggests a relationship between EBT and the fractional concentration of exhaled nitric oxide (FE_{NO}). Factors influencing EBT and its utility to distinguish subjects with respiratory disease are scarcely known.
Aims: To compare EBT and FE_{NO} in patients with asthma, rhinitis and healthy children.
Methods: In 50 subjects aged 10.3±2.8 yr (30 males), 26 with asthma, 11 with rhinitis and 13 healthy we measured the EBT plateau (EBTp, °C), FE_{NO}, spirometry at baseline and after inhaled salbutamol, skin prick test for common allergens, questionnaires and scores for respiratory symptoms. Post-salbutamol changes (D prefix) were calculated.
Results: EBTp and FE_{NO} correlated with age (r= 0.61 and r=0.34, p<0.02); FE_{NO} correlated also with lung function (e.g. with $FEF_{25-75\%}$: r=-0.60, p<0.001; $DFEV_1$: r=0.58, p<0.001). EBTp correlated with FE_{NO} only in asthmatic subjects (r=0.40, p<0.05). All children with asthma and 9/11 with rhinitis had positive skin prick tests. Both EBTp and FE_{NO} were higher in asthmatic patients with reported moderate-to-severe dyspnea in the past 4 weeks than in asthmatic patients

without or mild dyspnea and healthy children (EBTp: 32.4±1.6 *vs* 30.2±2.8 *vs* 30.0±3.0, p<0.05). FE_{NO} levels were also higher in symptomatic patients with asthma than in patients with rhinitis (48.4 ppb, 95% CI: 34.7–67.5 vs 11.0 ppb, 95% CI: 9.0–13.4, p<0.001). EBTp values were not influenced by current inhaled corticosteroid therapy.
Conclusion: EBTp and FE_{NO} are influenced by subjects' age. Both markers are useful to distinguish patients with poor asthma control from healthy patients.

P4275
Bronchial provocation testing (BPT) of pre-school children by acoustic respiratory monitoring (ARM) of wheeze (Wz) and cough (C)
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Background: Unequivocal diagnosis of asthma in pre-school children is limited by their inability to perform spirometry. We evaluated the feasibility of BPT using an automatic ARM system.
Methods: We performed doubling-dose methacholine BPT in 41 children age 2 to 7 to confirm asthma. Provoking Concentration by wheeze-endpoint (PCWz) was declared when Wz was heard by physician auscultation, SpO2 fell by 5% or respiratory rate (RR) increased by >50%. ARM of Wz and C (PulmoTrack®, KarmelSonix, Israel) was recorded in parallel and reviewed off-line.
Results: Endpoint by ARM was the same as clinical PCWz in 25/41 (60.9%) and preceded PCWz in 8/41 (19.5%) patients by 1-4 doubling doses. In 4 patients (9.8%) PCWz preceded ARM endpoint and in 4 patients (9.8%) the test was inconclusive due to poor patient cooperation. Of the 4 tests where ARM lagged behind PCWz, 2 were due to ARM not detecting Wz and 2 were possibly stopped prematurely by the physician. In 6 of the patients there were false positive ARM Wz detections due to ambient noise. In 9/41 patients (22%) there was excessive cough towards the endpoint.
Discussion and conclusions: ARM-based BPT was as good as or better than PCWz in 80% of tests. Improved sensitivity and specificity of wheeze detection and automatic detection of increased RR are needed to facilitate physician-unattended use of the ARM for a BPT.
Acknowledgement: S Godfrey, N Gavriely and the KarmelSonix Technical Team assisted in data recording and analysis. M Meriach, RT, performed the BPTs.

P4276
Relationship between H1N1 induced asthmatic symptoms and airway hyperresponsiveness in children
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Purpose: H1N1 infection is known as an important aggravating factor of asthma. However, there is no report about airway hyperresponsiveness (AHR) in patients who developed H1N1 induced acute asthmatic symptoms without previous asthma. The aim of this study was to investigate whether moderate to severe asthmatic symptoms induced by H1N1 were related with AHR in patients without previous asthma.
Methods: We studied children less than 15 years old visited for H1N1 infection in Severance Children's Hospital from August in 2009 to February in 2010. H1N1 infection was confirmed by real-time RT-PCR analyzing the products of nasopharyngeal swab when the patients had fever and acute respiratory symptoms like cough, rhinorrhea, and sore throat. Among the infected children, patients hospitalized due to acute asthmatic symptoms like dyspnea or wheezing sound were enrolled. We performed methacholine challenge test one month after discharge. AHR was defined as PC_{20} below 16 mg/mL.
Results: Total number of H1N1-infected children was 4,362 (age of 6.95±3.75). Male to female ratio was 56.88%. Two hundred eighty seven patients (6.58%, age of 5.83±3.75) were hospitalized due to respiratory complications. Among them, 76 patients without previous asthma showed acute asthmatic symptoms (26.48%). Forty six patients were performed methacholine challenge test. Only 17 (36.96%) patients presented AHR.
Conclusion: H1N1 infection induced acute asthmatic symptoms not only in patients with asthma, but also in patients without previous asthma. H1N1 induced moderate to severe asthmatic symptoms might tend to be temporary and would not contribute to AHR.

P4277
Malacia, inflammation and bacterial colonisation of the conducting airways in infants with persistent respiratory symptoms
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In infants with persistent respiratory symptoms, wet cough and wheezing despite regular anti-asthma inhalation treatment diagnostic investigations to exclude underlying disease are warranted.
Prospectively 124 infants with treatment resistant respiratory symptoms were enrolled. Sweat test, 24 hours oesophageal pH measurement and fiberoptic bronchoscopy (FOB) with bronchoalveolar lavage (BAL) were performed. BAL fluid was processed for neutrophil counting and bacterial culture. Inflammation of the respiratory mucosa was registered.
A 24 hours oesophageal pH measurement was positive in 29%. A structural abnormality of the central airways was found in 47% (40% females). In 19% of infants no anatomical anomalies nor chronic inflammation of the respiratory mucosa were observed, whereas in 64% definite macroscopic mucosal inflammation was registered. Pronounced inflammation of the respiratory mucosa was associated with a significantly higher percentage of neutrophils in the BAL fluid, 48% (IQR 14 – 82) compared to 7% (IQR 0 – 16) (p< 0,025) in the normal group. A positive BAL culture was found in 62% of the infants with pronounced mucosal inflammation compared to 25% in the group without inflammation (p< 0.016). Fifty six percent of the BAL fluid samples was positive for bacterial culture.
In infants with treatment resistant respiratory symptoms, nearly half have anatomical anomalies of the central airways. In 62% of the children with pronounced mucosal inflammation a positive BAL culture and a significantly higher percentage of BAL fluid neutrophils were detected, suggesting chronic bronchial infection as a possible reason for ongoing respiratory symptoms.

P4278
Upper and lower airway inflammation and bronchial hyperresponsiveness in allergic rhinitis children with or without asthma
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Background: Although allergic rhinitis and asthma frequently coexist, the nature of this association is still not clearly identified.
Objective: To estimate the upper and lower airway inflammation in allergic rhinitis (AR) children with or without asthma in relation with bronchial responsiveness.
Methods: 145 children aged 7-12 years with AR alone or AR with asthma and 35 age-matched healthy controls were observed.
Lung functions, bronchial hyperreactivity tests (methacholine and exercise) nasal and induced sputum samples were performed in all patients. Total and antigen specific IgE, IL-5, IL-10, γ-IFN levels were assessed by ELISA.
Results: Children with AR alone (39%) but no clinical evidence of asthma showed increased nasal and induced sputum eosinophil counts and bronchial hyperreactivity to methacholine and exercise challenge compared with healthy control. In children with AR and asthma (61%) nasal and induced sputum eosinophilia and bronchial hyperresponsiveness were more significant compared with AR alone (p<0.05).
Remarkable, that blood eosinophil count, nasal and sputum eosinophilia were inversely correlated with bronchial hyperreactivity in all allergic patients. These parameters correlated with increasing production of IL-5, IL-10 and decreased gamma-IFN production and were more significant in AR with asthma children (p<0.05).
Conclusion: In children with AR without asthma subclinical changes in the lower airways and inflammatory mediators were detected. These data support the concept of significant links between upper and lower respiratory tract involvement in AR children with or without asthma and its association with bronchial hyperresponsiveness.

P4279
Eosinophil cationic protein in children with respiratory allergies – When is it useful?
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Backgrounds: Eosinophil cationic protein (ECP) is a secretory protein that is released from eosinophils in patients with allergic diseases. The aim of the present study was to investigate the usefulness of determination of serum ECP levels in children with respiratory allergies. Specific objectives were: (1) to asses if there are any differences in serum ECP concentrations between treated and untreated children with asthma, children with rhinitis, and children with both astma and rhinitis and (2) if the natural seasonal exposure to sensitizing allergens is responsible for increasing serum ECP.
Methods: The study included treated (N=156) and untreated (N=55) children with asthma, children with rhinitis, and children with both, astma and rhinitis. Serum ECP was measured in serum collected between 8:00 and 12:00 a.m. under standardized preanalytical conditions (regarding the type of blood collection tube, time and incubation temperature during blood clotting).
Results: Untreated children, had significantly higher (p<0.0001) concentration of ECP [M (IQR)=35.1 (29.5-50.9) μg/L] than treated children [M (IQR)=11.3 (7.1-16.1) μg/L]. ECP was singificantly higher during the allergen exposure season [M (IQR)=23.9 (17.6-40) μg/L], than out of season [M (IQR)=8.3 (5.4-17.2)] μg/L, p=0.0001.

Conclusions: If all limiting factors for reliable determination of serum ECP should be taken into account, determination of ECP could be helpful in objective evaluation of eosinophil degranulation in allergic inflammation and for monitoring the effectiveness of anti-inflammatory treatment.

P4280

Chemotaxis and adhesion from peripheral eosinophils in atopic asthmatic children with and without obesity

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Background: The prevalence of obesity and asthma has increased over the past several decades. Recent investigations suggest relationship between asthma and obesity in many studies, but the mechanisms are unclear. The aim of this study was evaluate chemotaxis and adhesion of eosinophils in atopic asthmatic children and adolescents with and without obesity.
Method: 32 obese asthmatic and non obese asthmatic and 5 healthy volunteers were included. Peripheral blood was collected and eosinophils were purified using a Percoll gradient followed by immunomagnetic cell separator. Chemotaxis was performed with microchemotaxis chamber in triplicate with spontaneous chemeotaxis (MEM), eotaxin, platelet activating factor (PAF) and regulated on activation, normal T cell expressed and secreted (RANTES). The measurement was done by optical microscope count. The adhesion was performed by fibronectin plates in triplicate with MEM and eotaxin. Eosinophilic adhesion was calculated by comparison between absorbance of unknown samples with the standard curve.
Results: In spontaneous chemotaxis, with eotaxin and PAF, there was significant difference in the number of eosinophils between obese asthmatic, non obese and healthy volunteers ($p<0.05$). RANTES increased between asthmatic obese and healthy volunteers groups ($p<0.05$). Spontaneous adhesion and with eotaxin increased the adhesion of eosinophils between obese asthmatic and healthy volunteers ($p<0.05$).
Conclusion: This is the first study that demonstrated higher eosinophilic activity (chemotaxis and adhesion) in obese atopic asthmatic children than non obese asthmatic and healthy volunteers.

P4281

Specific IgE sensitisation in a six-year old infant cohort in New Zealand

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Aim: To determine sensitisation to inhalant and food allergens in 6-year old children in New Zealand.
Methods: Specific IgE (sIgE) levels were determined to 12 inhalant and food allergens in 659 6-year old children from Wellington (n=316) and Christchurch (n=343) from a birth cohort. Allergens tested were D. pteronyssinus, cat pelt, dog hair, horse hair, cockroach, A. fumigatus, Alternaria, olive pollen, rye grass, egg white, cow's milk and peanut by a 3rd generation liquid chemiluminescent enzyme immunoassay (Siemens IMMULITE 2000). Atopic sensitisation was defined as at least one sIgE $\geq$ 0.35 kU/L.
Results: Sensitisation was present in 299 children (45.4%). Sensitisation to D. pteronyssinus was most prevalent with 176 children sensitised (26.7%) and with the highest sIgE levels (geometric mean: 9.1 kU/L; 95% CI: 6.2-13.2). The next highest sensitisation rate was to rye grass (141 children, 21.4%) followed by egg white (124 children, 18.8%). Mono-sensitisation was observed in 122 children (18.5%): 44 to egg white, 35 to D. pteronyssinus, 18 to rye grass, 6 to cat pelt, 5 to cow's milk, 4 to peanut, 3 to horse hair, 3 to dog hair, and 1 each to cockroach, A. fumigatus, Alternaria and olive pollen. The other 177 children were poly-sensitised: 60 to two allergens, 40 to three, 26 to four, 22 to five, 17 to six, 3 to seven, 5 to eight, 3 to nine and 1 to all twelve. Of those poly-sensitised the highest sIgE level in three-quarter of these children was to D. pteronyssinus followed by rye grass.
Conclusion: Sensitisation to inhalant and food allergens is high in New Zealand 6-year old children with sensitisation to D. pteronyssinus the most prevalent and with very high sIgE levels.

P4282

Use of a very short protocol with no adjuvant in acute ovalbumin-sensitized allergic pulmonary response in mice for pre-clinical studies

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Many limitations have been raised over the murine models with ovalbumin (OVA) sensitization in asthma research. However, this model is still widely used as a pre-clinical study for some new specific targets for treatment. The use of adjuvant and long sensitization periods are some of the limitations raised. We have tested whether a shorter period of subcutaneous sensitization with OVA, with no adjuvant, induces a similar eosinophilic pulmonary response in mice, when compared with previous well-established control protocols. Adult BALB/c mice were used and divided into groups, according to the number of OVA sensitizations (once or twice, OVA: 20 μg) and number (twice and 3x) and dosage (40 μg and 100 μg) of intranasal OVA challenge. The shorter protocol (10 days- length) consisted of one subcutaneous OVA sensitization and three OVA challenges (100 μg). Total and differential cell counts from bronchoalveolar lavage (BAL), eosinophil peroxidase (EPO) from lung tissue and histopathology (HE) of the lungs were performed 24 hours after the last OVA challenge. Cell counts from BAL, EPO from lung tissue and histological lung abnormalities were not different between the groups studied. The shorter protocol induced a significant eosinophilic lung response to OVA. We conclude that the use of one subcutaneous OVA sensitization elicit a strong allergic pulmonary response, free of adjuvant, and in a 10-day protocol. Our findings suggest that very short protocols with no adjuvant can be used as one of the pre-clinical tests for new drug investigations, reducing cost and time of experiments, and avoiding the use of artificial adjuvants during sensitization.

P4284

Different prevalence of allergic diseases between children allergic to cow's milk, egg and fish

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Background: Food allergy is frequently associated with other allergic diseases. Allergy to certain foods might be associated to higher risk of other allergic diseases.
Objective: The aim of the study was to verify the differences in the prevalence of other allergic diseases between three groups of children allergic to cow's milk, egg and fish.
Methods: Three groups of children aged 3 to 12, with food allergy were analyzed: Group A: cow's milk allergy (n=55); Group B: egg allergy (n=35); Group C: fish allergy (n=20), mean age 7.3, 8.2 and 7.9. The type of manifestations of food allergy (mucocutaneous, gastrointestinal and respiratory) and the prevalence of associated allergic diseases -bronchial asthma (BA), rhinitis (R) and atopic dermatitis (AD) in each group were analysed.
Results: The mucocutaneous symptoms are the most prevalent in all groups (84%, 73% and 90% respectively). The gastrointestinal symptoms are less prevalent in group B than in the others (43%, 25%, 42%). The respiratory symptoms are much more frequent in group C (8%, 26%, 60%). The coexistent allergic diseases were: in group A lower prevalence - BA: 32%; R: 42%; DA: 20%; in Group B the most prevalent allergic disease is AD (68%) with the prevalence of BA 58% and R 50%; and in contrast in Group C, BA has the highest prevalence (80%), followed by DA (60%) and R (40%). In all groups The prevalence of allergic diseases was higher than in the general pediatric population.
Conclusion: Cow's milk allergy has lower frequency of association with other allergic diseases. Egg allergy shows a higher association with AD. Fish allergy has high frequency of respiratory manifestations and a stronger association with BA.

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Investigation of asthma prevalence in the adolescents of Russian Federation

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Aim: To definite the true prevalence of bronchial asthma (BA) in population of adolescents of Russian Federation.
Methods: At the first stage, according to GA^{2}LEN protocol, in 2 research centers (Moscow and Tomsk) a continuous sample of adolescents 15- 18 y.o. from own databases has been created. 12803 teenagers (5000 – Moscow, 7803 - Tomsk) have received the invitation to participate in research by post. Data of 2490 teenagers were included in statistical processing (19,5%: 1480 respondents from Moscow and 1010 from Tomsk). The average age of patients was 15,48±0,02 years.
Results: Cumulative morbidity of BA was marked at 19,9% of all respondents included in research. The analysis of prevalence of clinically diagnosed BA has shown that only 7,2% of teenagers had medical-verified diagnosis (in 2,7 times less in comparison with the cumulative morbidity of asthma). During the complex examination of the select number of adolescents at the second stage of the study the diagnosis of asthma was verified at 5,7% of children from the group with astma-like symptoms and at 4,9% of children without asthma symptoms according to answers in questionnaires (average index was 5,1% of adolescents in group). According to the official data asthma morbidity makes 2836,25 o/oooo. Thus, true prevalence of asthma has appeared to be 4 times less then the prevalence of symptoms registered by patients, in 1,4 times less than "diagnosed illness" according to answers of patients and in 2 times above the data of official statistics.
Conclusions: Use of the standardized indices, with the further clinical screening and complex examination allows to establish true prevalence of allergic diseases.

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Prevalence of allergic rhinitis in Russian adolescents

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The results were obtained by two centres in Russia (Moscow and Tomsk) as part of the international epidemiological study under the GA^{2}LEN programme. The total number of polled adolescents aged 15 to 18 was 12,803 with 2014 subjects, included in the statistical analysis (1004 subjects in Moscow, and 1010 in Tomsk). The male subjects accounted for 44.6% and female subjects for 55.4%. The age was 15.48±0.02 years. The cumulative disease incidence was determined as a totality of all the disease cases registered during the past year and in the previous follow-up period. Prevalence is the registered disease cases in which primary visits took place during the calendar year.

The cumulative allergic rhinitis (AR) incidence totaled 34.2%, which significantly exceeds official statistics. The female subjects indicated much more often the presence of AR compared to the male subjects (37.35% and 30.42% respectively at p=0,044). The symptoms of the ongoing AR were found in 86.45% of the total respondents who had indicated the cumulative rhinitis incidence. The follow-up results indicate significant variance from the official statistics (in 2008, the official AR incidence in Moscow was 599.2 per 100,000).

The percentage of the female subjects with AR symptoms, however, was reliably higher than that in Moscow (p=0.042), with the cumulative rhinitis incidence registered more often compared with the ongoing AR both for the entire population and for Moscow (at p=0.0125 and p=0.026 respectively). Prevalence of symptoms for allergic rhinitis was significantly higher than the diagnosed disease forms. The data obtained using standardised tools will help optimise the existing programmes for preventing and diagnosing allergic rhinitis.