416. Update on monitoring airway diseases

P4011
P4014
Challenge already identified: Identification of risk factors for early need for ventilatory support in Duchenne muscular dystrophy
Leonardo Augusto Tavares1, Maria Teresa Fonseca2, Maria Laura Lasmar3, Alessandra Lúcia Machado1, Vera Lúcia Anastácio1, 2 Neuromuscular Disease Program/Complex Disease Unit, John Paul II Child Hospital/Hospital Foundation of Minas Gerais State, Belo Horizonte, Minas Gerais, Brazil, 2Neuromuscular Disease Program, Complex Disease Unit, John Paul II Child Hospital/Hospital Foundation of Minas Gerais State, Belo Horizonte, Minas Gerais, Brazil

Introduction: Duchenne muscular dystrophy (DMD) is a genetic, progressive and disabling disease. Functionally, it puts a restrictive respiratory disorder. Faced with signs and symptoms of chronic respiratory failure should be started as ventilatory support (VS), usually in the second half of adolescence, which was initially due to nocturnal hyperventilation. Ventilator Program (VP) assist DMD patients VS-users and VS-non users in John Paul II Child Hospital/Hospital Foundation of Minas Gerais State (JPICHHFHEMIG).

Objective: To identify among patients with DMD assisted by the VP/JPICHHFHEMIG, possible risk factors for the need early VS.

Patients and methods: Cohort study between 2002-2010. Clinical score 20 points to score (1 point for each sign of hyperventilation). Risk factors associated with VS were evaluated in multivariate analysis by proportional hazards model of Cox. Multivariate model of Cox: all variables p<0.20 in univariate analysis. Final model of significance p<0.05. Group A: 16 (25.8%) VS-users; group B: 46 (74.2%) VS-non-users. Group C: loss of ambulation before 10 years and group B after 10 years.

Results: Statistically significant difference in univariate analysis for risk factors: body mass index: p=0.15, difficulty swallowing (p=0.05), moderate to severe scoliosis (p=0.01), age at loss of ambulation (p<0.001) and clinical score 0-17 and >17 points (p<0.001). Cox final model: clinical score: relative risk 1.89 (p=0.001) and loss of ambulation before 10 years: relative risk 2.04 (p=0.01).

Conclusion: Age at loss of ambulation and clinical score were independent risk factors for the installation of VS before 20 years of age of DMD patients.

P4015
ISAAC Malta: Changes in geographical distribution of wheezing children in Malta between 1994 and 2002
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Introduction: Malta is one of the centres which participated in the Phase 1 and 3 of The International Study of Asthma and Allergies in Childhood (ISAAC). Aim: To investigate changes in the geographical distribution of wheezing in the Maltese Islands.

Methods: ISAAC Malta Phase 1 was carried out in 1994 with 3506 participants from 24 schools for the 5 to 8 year old age group and 4184 participants from 25 schools for the 13 to 15 year old age group. ISAAC Malta Phase 3 in 2001 studied 3800 from 44 schools and 4139 children from 18 schools in the 5 to 8 and 13 to 15 year old age groups respectively.

Results: In the youngest age group there was an increase from 8.8% to 14.8% (p<0.0001) in the total prevalence of current wheezing between 1994 and 2001. Most geographical regions of the Maltese islands reported an increase in wheezing with the Central East (10.2% vs 23% p<0.0001), Grand Harbour (8.5% vs 21.2% p<0.0001), East (8.6% vs 22.5% p<0.0001) and Central North (6.5% vs 16.3% p<0.0004) regions having the largest increases. The prevalence of current wheezing in the older age group remained stable (16% to 14.6% p=0.08). A decline in current wheezing (p=0.5) was observed in Central West (16.3% vs 11.2%) and South (14.8% vs 11.2%) while three regions reported an increase in wheezing.

Conclusions: A strong genetic component together with environmental factors must influence the geographical distribution of wheezing in the Maltese Islands.

P4016
The relationship between sleep respiratory disorder and daytime PaO2 in OSAS and in overlap syndrome
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Introduction: Disorders of daytime hyperoxemia, in recent years, has been strongly associated with OSAS. However, it is known that the sleep apnoea syndrome is a chronic disease characterised by the absence of the normal respiratory control, and the patient has a constant or intermittent negative pressure (CPAP) therapy.

OSAS and COPD are often associated with daytime hyperoxemia. Overlay Syndrome (OS) increases the risk of daytime hyperoxemia. The aim of this study was to investigate the mechanisms which could justify the low oxygen level in these patients and the effect of CPAP therapy.
P4017
Oxygen prescription and oxygen therapy on the wards according to British Thoracic Society guidelines: Experience of an acute trust in the UK
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Background: Oxygen is one of the most commonly used drugs in a hospital setting. therapy are associated guidelines in 6 of 2008 to guide oxygen use in hospital setting S aimed at standardising practice in the setting. The British Thoracic Society (BTS) published guidelines in Oct 2008 to assess current practice of prescription and monitoring of oxygen therapy and compliance with standards set out in the BTS Guideline

Methodology: All adult patients admitted to a medical or surgical ward and using oxygen were evaluated. All patients were reviewed at the time of the audit to assess their oxygen prescription and monitoring. A chart review was carried out using the BTS audit tool on 6th Feb 2010. The patient's drug chart, monitoring chart and medical notes were used to gather information about oxygen prescription and use. In total 740 patients were audited.

Results: 11% of patients in EKHUT were using oxygen at the time of the audit. This is comparable with national figures of 17.5%. Only 30% had formal prescription and the mode (continuous or PRN) of oxygen delivery was clearly documented and 12% did not have any documentation about the mode. Rest of the 3 patients did not have any instruction about oxygen therapy in the medical notes but not on the chart. Majority of patients were within the target saturation range at their most recent observation round indicating that adherence to prescription target range was overall good.

Conclusion: This audit has highlighted the need to raise awareness in all medical and nursing staff of BTS recommendations and educate health professionals to deliver oxygen in a more standardised and safe manner.

P4018
Computed tomography of the chest as a way to diagnose and monitor treatment of patients with sarcoidosis in Omsk, Russian Federation
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Purpose: To evaluate lung injuries with computed tomography (CT) for diagnosis and therapeutic follow-up of patients with sarcoidosis (S). Methods: 247 consecutive patients with biopsy-proven S were retrospectively included respectively. All patients underwent corticosteroid (CS) treatment. All patients were re-examined by CT to assess response to CS treatment at 3 and 6 months.

Results: Medialinal lymphadenopathy (ML) was detected in 93.75%. The small focal dissemination (SFD) detected in 67.5% and frosted glass areas (FGA) - 30%. A single large-scale patchy shadows (SLPS) - 8.75%, the consolidation of lung tissue (CLT) - 6.25%, bronchiectasis - 3.75%, pleural effusion - 1.25%.

Conclusion: CT of the chest shows the disappearance or reduction of CT manifestations in respiratory organs.

P4019
Ventilation heterogeneity is associated with asthma control in adults
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Background: The clinical relevance of increased ventilation heterogeneity, a marker of small airways disease in asthma is unclear. Ventilation heterogeneity is an independent determinant of airway hyperresponsiveness, improves with bronchodilators and inhalated corticosteroids (ICS), and worsens during exacerbations but its relationship to asthma control is unknown.

Objective: To determine the association between ventilation heterogeneity and current asthma control before and after ICS treatment.

Methods: Asthmatic subjects had the 5-item symptom-only asthma control ques- tionaire (ACQ5) and lung function measured at baseline and after 3 months of high dose ICS treatment. Ventilation heterogeneity was measured as Svmax and Smin by multiple breath nitrogen washout. Svmax and Smin represent ventilation heterogeneities in small airways in which gas transport occurs mainly by convection or diffusion, respectively. Spearman correlations and paired t-tests were performed.

Results: At baseline (n=110, 64 female). ACQ5 correlated with Smin (r = 0.30, p=0.002) and Smax (r = 0.21, p=0.03). After treatment (n=55), the mean (SD) ACQ5 improved (1.31 (0.71) to 0.70 (0.77), p<0.0001). Smax improved (0.068 (0.035) to 0.053 (0.033) L1, p<0.0001) but Smin did not significantly change (0.147 (0.07) to 0.142 (0.06) L1, p=0.28). The change in ACQ5 correlated with changes in Smax (r = 0.34, p<0.002) and Smin (r = 0.33, p<0.01).

Conclusions: Current asthma control is associated with markers of small airways disease. Improvements in ventilation heterogeneity with anti-inflammatory ther-

P4020
The burden of airway hyperresponsiveness on the control of asthma
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Background: Airway HyperResponsiveness (AHR) in asthma is correlated with decreased functional parameters and exacerbations. Different phenotypic expres-
sion in asthma requires valid biomarkers to monitor the disease. Aim: To assess the effect of the level of AHR on the preservation of asthmatic control.

Methods: 98 asthmatic pts with ACT (Asthma Control Test) >20, non-smokers were enrolled in a 3 yrs controlled randomized trial. Group A (49) (ICS) receiving a continuous treatment with inhaled beclomethasone, Group B (50) (control) treated with inhaled salbutamol as needed. Step up therapy was performed as recommended by guidelines. Measures of PDE20 (methacoline), ACT, exacerbations, use of drug, and visits are scheduled every 3 months. Primary endpoints were AHR, ACTscore, exacerbations, therapy as needed.

Results: Significant difference of mean PDE20 (mcg) was reported between the 2 groups.

Although group A showed values higher than group B no significant difference were reported for ACT (A20.1, B19.7), exacerbations/3mths (A3.9, B4.2, days of low dose ICS/3mths (A47.4, B48.8), days oral CS/3mths (A050, B0.39).

Conclusion: In controlled asthma long term treatment with low dosage ICS deter-

P4021
Audit of the impact of introducing exhaled nitric oxide (FENO) monitoring to an adult asthma clinic in a district general hospital
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Background: FENO can assist in diagnosis of asthma and enhanced optimization of inhaled corticosteroid (ICS) therapy.

Although group A showed values higher than group B no significant difference were reported for ACT (A20.1, B19.7), exacerbations/3mths (A3.9, B4.2, days of low dose ICS/3mths (A47.4, B48.8), days oral CS/3mths (A050, B0.39).

Conclusion: In controlled asthma long term treatment with low dosage ICS deter-

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563 consecutive OSAS patients were enrolled. According to pulmonary func-
tion test they were divided in 2 groups. Group 1: 473 OSAS/CPAP +, Group 2: 90 patients OSAS/CPAP +. All patients underwent blood gases, noctur-
nal polysomnography, postbronchodilator spirometry. A multivariate analysis was performed to evaluate which were the factors that determining the diurnal PaO2. The groups were matched for BMI, for age and AHI. OS group showed lower level of daytime PaO2 compared with OSAS patients (71±9.6 vs 79.3±11 mmHg, p<0.001), the alveolar-to-arterial oxygen partial pressure difference (AaDO2) was higher in OS than in OSAS (28.3±9.9 vs 22.1±8.9 mmHg, p=0.001). While the TST90 was higher in OS (34.8±35.5 vs 24%±26%). In OS group diurnal PaO2 correlated with age (coefficient=0.41) with AHI (0.18) and with FEV1 (0.21), while in OS group the correlation was found with age (coefficient=0.27), FEV1 (<0.07) and mostly with BMI (0.46), but not with AHI. In both groups, patients with good compliance (<484mg/mg) of CPAP improve daytime PaO2 (<0.001) whereas, in patients with poor compliance PaO2 was reduced (p<0.001).

Our data suggest that daytime hypoxemia in OSAS patients is largely determined by the increased of body weight. In the overlap patients daytime hypoxemia has a more complex origin. However CPAP therapy has been shown to improve daytime PaO2 values both in OSAS than in OS patients with good compliance.
Methods: Data for the first 67 patients to undergo FENO testing with NOx MINO in a secondary care adult asthma clinic were collected. ICS doses are expressed as mean ± standard deviation (SD) equivalent.

Results: FENO was performed in 17 patients undergoing diagnostic workup for asthma. The need for histamine challenge testing was prevented in 10 patients with normal spirometry and FENO≥500. Six patients were subsequently discharged who would otherwise have required follow-up. Of the 50 patients with asthma receiving ICS, FENO was high (>45ppb) in 15, intermediate (25-45ppb) in 8 and normal (<25ppb) in 27. FENO altered decision-making in 22 (44%) patients by permitting a reduction (n=3) or maintenance (n=12) in ICS in patients who would otherwise have had their dose increased, and a reduction in 7 patients who would have had their ICS dose maintained. There was more appropriate matching of ICS changes to FENO, with a reduction in ICS dose in patients with normal FENO (160±97μg to 138±42μg; p=0.017), no change in the intermediate FENO group (1738±639μg to 1800±513μg; p=0.35), and an increased dose in the high FENO group (2140±676μg to 2733±683μg; p=0.007).

Conclusions: In almost half of patients tested, FENO prevented the need for a bronchial challenge testing in patients undergoing diagnostic workup for asthma and permitted reduction in overall steroid burden in patients receiving ICS containing a corticosteroid supplement will be followed to see what impact FENO has on overall asthma control and steroid dose burden.

P4022
Functional, clinical evolution and cellular inflammatory pattern in induced sputum in patients with difficult-to-control asthma

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Background: Patients with difficult-to-control asthma (DCA), show several peculiarities. Our aim is to identify possible mechanisms over time in this population.

Methods and materials: Prospective study in subjects with DCA. Clinical status was evaluated by Asthma Control Test (ACT), exacerbations/month (E/M), and relief therapy use (RTU). Daily corticosteroids dose (inhaled -ICS- or oral -OCs-), lung function (FEVI), inflammatory and infectious bronchial status (FNO), differential cell count and culture in induced sputum for 6 months. Results: 26 patients with DCA were enrolled. Outcomes at initial time (T0): ACT 15±0.95, E/M 4.3±1, RTU 6±2.6 G. At T6, ACT 14±0.6, E/M 4.6±1.6, RTU 6±2.4 G. A significant negative relationship was observed between Th2 cell prevalence and ACT (r=-0.43; p=0.02) and between ICS use and ACT (r=-0.46; p=0.01). Patients with similar or poor ACT had an eosinophilic pattern in sputum. At T0 three or more points. The patients improve ACT had a paucigranulocytic pattern. E6M 4.3 and FENO 48 ppb. Six months after (T6) 12 patients improved ACT in more than 2 points. The patients improve ACT at T6 had a paucigranulocytic pattern. At T0 12 patients had a mixed pattern at T6 and three patients had an eosinophilic pattern. At T6 12 patients had a paucigranulocytic pattern in sputum. Patients who didn’t improve showed aggressive patterns (eosinophilic, neutrophilic and mixed). There are individualized changes to beniging or aggressive patterns in sputum without improvement or worsening expected in ACT. Some patients had microbial colonization associated with aggressive patterns in sputum.

P4023
Relationship between circulating Th2 prevalence and asthma control in pregnant asthmatics

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Introduction: Asthma is one of the most common diseases complicating pregnancy and a risk factor for several maternal and fetal complications. It was previously shown that altered systemic inflammation present in pregnant asthmatics may contribute to the outcome of the pregnancy, however less has been known about the relationship between circulating T cell profiles and clinical characteristics of asthma in pregnant patients.

Aim: The aim of this study was to assess the relationship between various T cell profiles and clinical variables in asthma during gestation, including lung function, exhaled nitric oxide, and asthma control.

Methods: The prevalence of Th1, Th2, and Treg lymphocyte subsets was identified by cell surface markers and intracellular FSp3 staining in 22 pregnant women in the second or third trimester suffering from persistent allergic asthma. FENO, Asthma Control Test (ACT) total score and lung function were also evaluated.

Results: A positive relationship was observed between Th2 cell prevalence and FENO or lung function parameters. However, none of the other T cell subsets were correlated to any of the clinical characteristics (FENO, lung function, or ACT, p>0.05).

Conclusions: The levels of asthma control related to blood Th2 cell prevalence suggests a direct relationship between symptoms and cellular mechanisms of asthma in pregnant patients. The study was supported by OTKA 68808.

P4024
Chronicus: A new wearable monitoring system for COPD patients

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CHIRONIOUS is a FP7 European Community project which also includes a new wearable platform for home monitoring of people suffering from chronic diseases. The wearable system is composed of a shirt made of washable stretch-material into which are sewn 4 ECG electrodes, two bands for respiratory inductive plethysmography (RIP) and a reflectance pleuximeter. The data coming from the sensors are collected and transmitted via wireless connection by the Data Handler, a microcontroller-based acquisition system. To evaluate accuracy and usability of this device, we studied 9 COPD patients (70±6.6 years, FEV1 45±1.9%pred) during 1 hour in the seated and 1 hour in the supine positions. We were breathing spontaneously and data were collected continuously. At the beginning and at the end of each hour flow at the mouth was also measured by a spirometer (Sibemib, Barcelona, Spain), heart rate (HR) and oxygen saturation (SpO2) by a finger clip pulseoximeter (NONIN, Plymouth, Minnesota, USA) for 10 minutes, to get reference values for comparison. The first measurement for each subject with the spirometer was used to calibrate the RIP using Sackner algorithm, J.Appl.Physiol.1989; 66(1): 410-420.

The evaluation of accuracy was focused on the following parameters: HR, SpO2 and tidal volume (VT). Linear regression analysis on the data acquired resulted as follows: HR r=0.99, m=1.00, q=0.31, SpO2 t=0.92, m=1.29, q=0.27, VT r=0.89, m=1.15, q=0.07.2. From the signals of the ECG electrodes it was possible to identify PQRST waves within the 3 derivatives. The new wearable monitoring system provided reliable measurements of HR, SpO2, VT and ECG in both supine and seated posture. RIP calibration was still consistent after 1 hour of use.

P4025
Using routine spirometry to obtain sputum samples in the respiratory clinic

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Background: Analysis of sputum is helpful in diagnosis and management. Not all patients produce sputum on request. However most undergo spirometry during their clinic visit. We had noticed that many patients apimum to sputum sampling during spirometry which was often swallowed and wondered if this might be an opportunity to obtain a sample.

Methods: 303 consecutive patients performing nurse led spirometry in our chest clinic at the North Bristol Lung Centre from 1st November 2010 to 31st January 2011 were studied. Initial 139 patients were not informed prior to spirometry that a sputum specimen was required; subsequent 164 patients were asked to provide a specimen if possible. Nature of the sputum (mucoid/purulent) was recorded by the nurse.

Results: Of the initial 139 patients, 14 (10%) produced sputum spontaneously 19 (12%) of the subsequent 164 were able to produce sputum on request during spirometry. Many patients in both groups swallowed sputum during spirometry. Among the 303 patients, 66 (22%) had bronchiectasis, 65 (21%) had asthma and 51 (17%) had chronic obstructive pulmonary disease (COPD). Among those who produced sputum at spirometry, 22 (17 perent) had bronchiectasis, 5 had COPD and 4 asthama.

22/33 sputum samples collected were sent to the laboratory. Sputum assessment by the clinic nursing staff matched that of the lab in 18 (82%) of the 22 cases.

Conclusion: Performing spirometry provides an opportunity to gain sputum. Forewarning the patient appears to have no effect on giving a sputum specimen. Nurses’ categorisation of sputum nature correlates well with microbiology laboratory asessment. Categorisation as mucoid may enable fewer samples to be submitted for microbiology assessment.

P4026
Concordance between the new questionnaires to evaluate asthma control

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Objectives: Regarding asthma, the main objectives is to control the disease symptoms. Both Asthma Control Test (ACT) and Asthma Control Questionnaire (ACQ) are discriminate asthma control in medical practice. Two studies have been recently published where new cut-off points for ACT (> 21, 19-20 and <19) and ACQ (>0.5, from 0.6 to 0.99 and <1) are established. This led us to evaluate the concordance between both test in our patients.

Methods: We have included 179 asthmatic patients chosen from our medical prac- tice, who performed both questionnaires and were classified in different categories of asthma control, and we analyzed the concordance of the results.

Results: The average age of our patients was 45±11 years and the FEV1 measured was 2.65±0.95 litres (82±22%).
The classification of our patients, according to the questionnaires is shown in Table 1.

<table>
<thead>
<tr>
<th>ACT &gt;20</th>
<th>ACT &lt;20</th>
<th>FEVI &gt;0.8</th>
<th>FEVI &lt;0.8</th>
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<td>26</td>
<td>96</td>
<td>57</td>
<td>65</td>
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<td>Mean age</td>
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<td>48</td>
<td>48</td>
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<tr>
<td>Mean % FEVI</td>
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<tr>
<td>93.7</td>
<td>73.7</td>
<td>103.4</td>
<td>58.1</td>
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<td>Physician Judged Controlled (%)</td>
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<tr>
<td>88.4</td>
<td>24.2</td>
<td>53.6</td>
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<tr>
<td>Physician Judged Uncontrolled (%)</td>
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<tr>
<td>11.6</td>
<td>75.8</td>
<td>46.4</td>
<td>75.4</td>
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<tr>
<td>Treatment Increased (%)</td>
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<tr>
<td>3</td>
<td>38.5</td>
<td>21.4</td>
<td>42.4</td>
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<tr>
<td>Treatment Unchanged (%)</td>
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<tr>
<td>81.6</td>
<td>75.3</td>
<td>73.5</td>
<td>54.5</td>
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<tr>
<td>Treatment Decreased (%)</td>
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<td>13.4</td>
<td>4.2</td>
<td>7.1</td>
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</tbody>
</table>

In the group defined as having controlled asthma (as defined by ACT >20), 88.4% of patients were also classified as controlled by clinicians. However, in the group with predicted FEVI < 0.8, only 53.7% of patients were classified as controlled by clinicians.

Conclusion: The results of our study show that an ACT score of <20 had a strong association with the physicians assessment of asthma control and correlated better with treatment decisions than did the severity of asthma as defined by FEVI. The ACT could serve as a useful in the assessment and management of asthma by guiding physicians with regards to asthma control.

P4028

Circulating nucleosomal DNA of blood as an indicator of the pathological process during chronic bronchitis

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The expression of the protein Ras is the basis of the activation of cell cycle by the connection of the signal path of the EGRF with the cascade of MAP. This method of regulation is used in the cells of respiratory epithelium as a response to the impact of air pollutants and caused in the inhibition of apoptosis in pathogenesis of COPD. Low-molecular-weight, nucleosomal DNA fraction (lmwDNA) of the blood plasma is an universal quantitative indicator of apoptosis, which allows to distinguish fundamentally different condition of the organism. The states accompanied by strengthening of apoptosis are marked by increase in lmwDNAs content. The level of lmwDNA can be lower than background level during states, connected with the apoptosis inhibition. The COPD is noticed for the first time by the decline of the level of lmwDNA in the blood plasma unlike in the case of the CnonOB patients compound 22.9 ng/ml (n=19) and it is 1.24 time lower than in group of relatives of COPD patients compound 22.9 ng/ml (n=19) and it is 1.24 time lower than in group of relatives of CnonOB patients - 22.5 ng/ml (n=19). Our results suggest with the dates of the detection of K-ras mutation in plasma DNA. It is used as a method of determination of malignant disease and risk factor for them. The results indicate that it is possible to use the proposed indicator for integrated differential diagnosis in practical medicine. Further research in this field is promising.