

1,4 times – at the age of 50-59. After 60 years old there became more women: in the age category up to 70 their quantity exceeded the number of men 1,2 times, and after 70 – 2,3 times.

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#### **SOME ASPECTS OF HEALTHY AND OBSTRUCTIVE PULMONARY DISEASE PATIENTS' RESPIRATORY SOUNDS COMPARATIVE ASSESSMENT**

<sup>1</sup>Guseinov A.A., <sup>2</sup>Naumenko Zh.k., <sup>3</sup>Kerimova A.M.,  
<sup>3</sup>Kichiyeva B.N., <sup>3</sup>Kerimov K.Sh.

<sup>1</sup>Dagestan State Medical Academy, Makhachkala,

<sup>2</sup>Scientific Research Institute of Pulmonology,

Moscow, <sup>3</sup>City Clinical Hospital, Makhachkala

##### **Subject actuality**

Modern computer technologies open up new possibilities in studying respiratory sounds acoustics, their treatment, archivation and standardization. Active research activity of scientists of a range of European countries is combined in the project CORSA (Computerized Respiratory Sound Analysis).

Russian scientists have developed an ingenious method of respiratory murmurs time and frequency characteristics analysis based on registration (scanning) of respiratory cycle – bronchophonography (BPG). The BPG is carried out with the help of computer diagnostic complex (CDC) “Pattern”. Such parameters as respiration period, instantaneous spectrum of respiration process within the limits from 200 to 12600 Hz, respiration acoustic mechanical equivalent (RAM) – the final integral characteristic representing the quantitative assessment of metabolic cost of the bronchopulmonary system for specific acoustical phenomenon activation and being expressed in millijoules (mJ), are investigated. The RAM measuring is performed in different frequency diapasons (RAM 0 – 200-1200 Hz - so called “basic” diapason, RAM 1 – 1200-12600 Hz - the whole spectrum, RAM 2 – 5000-12600 Hz – high frequency and RAM 3 – 1200-5000 Hz – low frequency ones), K – is the coefficient reflecting the same parameters in relative units in the corresponding frequency spectrums (K1 – the whole spectrum, K2 – high frequency and K3 – low frequency ones).

##### **Purpose of work**

Respiration patterns formation in healthy persons and obstructive pulmonary disease patients and their comparative assessment.

##### **Materials and methods**

We have examined 108 healthy persons (50 men and 58 women) and 166 (85 men and 81 women)

chronic obstructive pulmonary disease (COPD) patients: 91 bronchial allergy patients and 62 chronic obstructive bronchitis ones and 13 patients with these diseases' symptoms combination. All the patients had the functional disturbance of external respiration on the obstructive type in common. The BPG was carried out in the modes of quiet and forced respiration. More than 1000 of bronchophonograms have been analyzed as a whole. Nonparametric tests were used at the statistical treatment of the material. The statistical significance of difference between the factors in the examined groups was evaluated on the Mann-Whitney test.

##### **Results**

In the examined groups the authentic ( $p < 0,05$ ) difference of RAM1, RAM3, K1, K3 factors in the mode of quiet respiration and RAM 0, RAM1, RAM2, RAM3, K1, K2, K3 ones at forced expiration was got.

##### **Conclusions**

Thus, we can hope that bronchophonography gives the possibility to get unbiased parameters of respiratory sounds which differ in healthy persons and obstructive disease patients, that can be used as a supplementary evaluative parameter in functional diagnostics of pulmonary diseases.

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#### **INFLUENCE OF OXIDATIVE STRESS ON REDOX-STATE AND PERIPHERAL BLOOD HETEROPHILIC LEUKOCYTES APOPTOTIC PROGRAM REALIZATION**

Zhavoronok T.V., Stepovaya Ye.A.,

Ryazantseva N.V., Petina G.V.,

Starikov Yu.V., Ageyeva T.S.

*Siberian State Medical University of Federal Agency for Healthcare and Social Development, Tomsk, Russia*

**Purpose:** oxidative processes and neutrophils apoptosis evaluation in acute period of community-acquired pneumonia (CAP).

**Materials and methods:** 34 patients with the verified diagnosis of CAP were examined, the control made 32 healthy donors. Neutrophils were released on the bi-gradient; the number of apoptotic cells and the intracellular level of oxygen active forms (OAF) were evaluated in cell cultures by the method of ductal laser cytometry; the number of oxygenized carbonyl-proteins (CP) and cytokine production (IL-8, FNO $\alpha$ ) were defined by the IFA method; the OH group production, myeloperoxidase (MP), glutathione-peroxidase (GP), glutathione-reductase (GR), thioredoxine-reductase (TRR) activity, deoxidized (DG)

and oxidized (OG) forms of glutathione were investigated spectrophotometrically.

*Results and consideration.* During the acute CAP period the production of proinflammatory cytokines IL-8, FNO $\alpha$  and OH group by neutrophils into the incubation medium increased ( $p < 0,05$ ) together with the activity increase of MP, which produced CLO $^-$  ions, that correlated with the pulmonary parenchyma inflammation intensity increase (the verification on the evidence of computerized tomography data). And with it the intracellular OAF amount in heterophilic leukocytes grew with protein oxidative modification (POM) processes promotion attended by the CP content increase and thiol-disulphide (TD) system balance shift towards oxygenized disulphide components formation. Against the OAF production increase in CAP patients the fact of total imbalance in glutathione-dependent neutrophil system has been registered, that was manifested in the GP activity inhibition, the decrease of DG amount and DG/OG integral factor characterizing the total TD potential capacity. The intracellular OG amounts' increase in neutrophils along with insufficient activity of GR and TRR reactivating reduction potential of the cell was registered. The HS/SS change is a repair moment in the processes of proteins oxidation and there can be no reparation in other OPM variants. Thus, the ratio of deoxidized thiol groups to oxidized ones and their ability to oxidative modification (buffer capacity) are important criteria of nonspecific cell resistance and enable their effective functioning. Antioxidative protection resources exhaustion and level increase of damaging functional proteins OAF leads to the creation of an oxidative stress situation in acute inflammation effector cells themselves. The redox potential decrease could promote the acceleration ( $p < 0,05$ ) of lethal program of neutrophils' apoptosis, which is registered in the acute CAP period.

*Conclusions.* The intra- and extracellular prooxidants production increase, POM with CP accumulation, glutathione-dependent system activity decrease against the expressed DG/OG index fall and reduction potential regeneration system's inhibition in neutrophils are the signs of oxidative imbalance of effector cells of acute inflammation developing in CAP debut, that worsens the clinical course.

Intracellular redox- potential modulation can take part in the regulation of programmed cell death of neutrophils in OS conditions.

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#### EVALUATION OF NEUTROPHILIC AND ERYTHROCYTIC PROTEINS' OXIDATIVE MODIFICATION IN OXIDATIVE STRESS CONDITIONS

Zhavoronok T.V., Stepovaya Ye.A., Petina G.V.,  
Starikov Yu.V., Ryazantseva N.V. Ageyeva T.S.  
*Siberian State Medical University of Federal Agency  
for Healthcare and Social Development,  
Tomsk, Russia*

Protein molecules are not only objects, but also participants of regulation processes of cells' oxidative metabolism, the imbalance of which is registered in case of oxidative stress (OS) formation.

The *purpose* is to detect the features of neutrophilic and erythrocytic proteins oxidative modification (POM) processes on the model of OS, which is formed in acute period of community-acquired pneumonia (CAP).

*Materials and methods.* 47 patients with the verified CAP diagnosis have been examined; the control group was made up of 32 healthy donors matching on age and sex. Neutrophils were released on the Ficoll-Paque density bi-gradient; plasma was collected; erythrocytes were washed out and hemolysate was prepared (1:10). The oxidized carbonyl group proteins were detected in neutrophils by the enzyme immunodetection method. In erythrocytes the proteins' carbonylation level, superoxide dismutase (SOD), catalase, glutathione peroxidase (GP) activity, deoxidized glutathione (DG) content were determined by spectrophotometric methods. The bitirosin formation and tryptophane oxygenation was evaluated in blood plasma by the fluorimetric method; the SOD, catalase activity, lipid peroxidation (LPO) products composition – diene (DC) and triene (TC) conjugates, malondealdehyde (MDA).

*Results and considerations.* In CAP patients in vivo the OS formation signs were registered. The LPO activation was attended by the increase of peroxide cascade toxicants in blood plasma: the DC, TC, MDA indexes were higher than the control ones ( $p \leq 0,01$ ) against the background of catalase, SOD antioxidant enzymes' activity decrease ( $p \leq 0,01$ ). The LPO products' excess lead to the mobilization and following degradation of antioxidants, creating their deficit in cells. The DG level in erythrocytes decreased at the GP, SOD, catalase activity combined inhibition against those in the control ( $p \leq 0,05$ ), being indicative of these cells' reduction potential inhibition. In parallel, the restoration capabilities of disulfide cross-links, provoking the inhibition of a range of key SH-containing enzymes, turned out to be suppressed in red blood cells. The oxidative metabolism imbalance in the CAP debut promoted the activation of POM processes: the carbonylation increased ( $p \leq 0,05$ ) both in acute inflammation effector cells (neutrophils) and in target cells (erythrocytes). Simultaneously the carbonylated proteins amount in plasma increased; the