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PROCEEDİNGS OF THE FIRST INTERNATIONAL SCIENTIFIC PRACTICAL CONFERENCE GENETIC DISEASES CONSEQUENCES AND TREATMENT: PROBLEMS AND DEVELOPMENT PERSPECTIVES

AZERBAIJAN, BAKU MARCH 13-14, 2020

GENETIK XƏSTƏLIKLƏRİN NƏTİCƏLƏRİ VƏ MÜALİCƏSİ: PROBLEMLƏR VƏ İNKIŞAF PERSPEKTIVLƏRI BIRINCI BEYNƏLXALQ ELMI PRAKTIK KONFRANSININ XƏBƏRLƏRİ

AZƏRBAYCAN, BAKI MART 13-14, 2020

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ABSTRACTS AND THESES

THE FREQUENCY AND DISTRIBUTION OF SISTER CHROMATID EXCHANGES (SCES) IN THE INDIVIDUAL CHROMOSOMES OF HUMAN KARYOTYPE

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The aim of this study was to determine the frequency and distribution of sister chromatid exchanges (SCEs) in the individual chromosomes of human karyotype, Chromosomes were studied in (i) healthy subjects, (ii) subjects with rearrangements of X chromosome, (iii) in lymphoblastoid cell lines isolated from the peripheral blood of patients with acute leukaemias. 5-bromo- 2-deoxyuridine (BUdR) was added for 48, 72 and 96 hours, respectively, in a concentration of 30 µg per ml. The slides were stained according to the technique of Perry and Wolff (4).
The average number of SCEs was 9,2 with no statistically significant differences between the individual groups. Out of the total number of SCEs 20% was found in the centromeric region with no difference between the cells in the 2nd and 3rd divisions. The observed distribution of breakpoints was approximately proportional to the relative length of individual chromosomes with a higher number in long chromosomes and a lower number in the small ones. Non-random distribution of SCEs was only found in the B group of chromosomes of lymphoblastoid cell lines, which showed an excess compared with the SCEs of both the controls and the expected frequency based on the relative length of chromosomes. Neither in the late replicating i(Xq) nor in the early replicating Xq— did the number of SCEs significantly exceed the expected value.

MATERIAL AND METHODS

The evaluation of the number and distribution of SCEs was performed in
Seventy-five mitoses with karyotype 46,X,i(Xq) derived from 4 patients. In one of these subjects a double centromere in the i(Xq) was identified by means of C banding.
Twenty mitoses of one patient with reciprocal translocation 46, XX, t (X,4) (Xqter→Xq22: :4pl6→4qter). Autoradiography proved that both the deleted X and the B4 chromosome with translocation were early replicating.
Fifty-six mitoses obtained from three lymphoblastoid cell lines, derived from the peripheral blood of patients suffering from acute leukaemias. These were classified as dedifferentiated (Epstein-Barr virus positive), lymphatic and myeloid (both EBV-negative).
One hundred and seventy mitoses from the control group consisting of 3 males with karyotype 46,XY and 4 females with 46,XX karyotype. The mean age of controls was 29.5 years.
The peripheral blood leukocytes were cultivated for 48, 72 and 96 hours in EPL or Parker medium (Usol, Prague), enriched by 20% calf serum, with PHA (Welcome) and protected by streptomycin and penicillin. Bromodeoxyuridine (Sigma) was added in a concentration of 30 µg/ml since the beginning of cultivation. The tubes were protected from light to avoid photolysis. Colcemid (Ciba) in a concentration of 10 µg/ml was added two hours before harvesting. The cells were hypotonized by 0.075 M KC1 and methanol: acetic acid (3:1) were used for fixation(1).
The lymphoblastoid cell lines were grown as permanent suspension cultures from peripheral blood. They were established and subcultured in RPMI 1,640 medium enriched by 20% fetal calf serum, protected by streptomycin and penicillin, without PHA. BUdR was added in a concentration of 30 µg/ml for 48 or 72 hours following 48 hours of subcultivation. The examination of SCEs was carried out in the 15th, 3rd, and 38th, and in the 16th passages in three individual lines. The harvesting of chromosomes was the same as with the above-mentioned short-term peripheral blood cultures(2).
Chromosomal preparations were stained according to the FPG staining technique of Perry and Wolff (4). Intact mitoses with harlequin chromosomes were photographed and SCEs evaluated first directly under the microscope, then from enlarged negatives or karyotypes. Exchanges occurring in short arms, long arms and in centromeric regions were counted separately. The number of SCEs was examined independently by two experienced observers and expressed as the number of breakpoints. Statistical evaluation was performed by means of t test and χ^2 test.

RESULTS

The difference in the number of SCEs found per cell in 50 mitoses of control subjects when evaluated from photomicrographs or karyotypes is small but significant ($p< 0.01$). Therefore the data described have been obtained from karyotypes only.
The mean value of 9.5 SCEs per mitosis found in the control group was in no way significantly different from mean values of the other groups, i.e. those consisting of pathological karyotypes and lymphoblastoid cell lines ($p >0.05$).
High frequency of SCEs (20%) was found in the centromeric region of chromosomes after the 2nd and 3rd divisions in BUdR medium(6).

The distribution of SCEs both observed and expected on the basis of the relative length of chromosomal groups in the karyotype with results of $\chi 2$ test is shown in Table II. The changes were similar in all observed groups. The only exception were B group chromosomes of the lymphoblastoid ceil lines, where the number of breakpoints increased significantly ($p<0.01$). In this particular chromosomal group the breakpoints leading to exchanges were distributed proportionally along the whole length of all chromosomes. Significant difference was found not only as against the expected number of SCEs but also as against the control group. The increased number of breakpoints on the long chromosomes was naturally matched by their decrease in small chromosomes(5).
We preferred to evaluate the non-banded chromosomes (G-banding considerably interferes with the accuracy of SCE calculation), the regions of breakpoints are only roughly delineated. Even so it is clear that some regions are more often involved in SCEs than others. This is the case especially with regions 1q1, 3q2, 4q2, 8c and 16c. SCEs seem to be preferentially located on G-negative bands, as mentioned also by **Morad**, Jonasson and Lindsten (3).

CELL CLASSES AND TYPES WHICH ARE ESSENTIAL DURING SKIN REGENERATION

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ABSTRACT

The Skin has the natural ability to heal and replace damaged and dead cells regulated by a network of complex immune processes. This ability is conferred by the population of resident immune cells that act in coordination with other players to provide a homeostatic environment under constant challenge. In this article we conclude that near future discoveries using such innovative strategies will not only help us achieve better therapeutic products for skin-related immune disorders but will also foster ideas toward novel cosmetic formulations and topical applications for improving skin's regenerative potential.
Keywords: damaged and dead cells, resident immune cells, therapeutic products.

FEW IMPORTANT ASPECTS OF USAGE OF BIOLOGIC AGENTS IN THE DERMATOLOGY

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ABSTRACT

The Biologic therapy has dramatically changed the way medicine, and specifically dermatology, is practiced today. The use of biologic agents in dermatology is evolving, with psoriasis being the most common indication for which biologics are used currently. However, several other dermatologic diseases seem to be responsive to biologic therapy, and continuing research and development efforts are elucidating the benefit-risk profiles of various biologic medications in these dermatologic conditions. Understanding their mechanisms of action, labeled and off-label uses in dermatology, and common adverse effects helps to inform clinical decision making and improve patient outcomes.
Keywords: biologic agents in dermatology, dermatologic diseases, various biologic medications.

IMPORTANT SPECIFICATIONS ON THE THERAUPETIC SPECTRUM OF SKIN STEM CELL POPULATIONS

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ABSTRACT

Stem cell therapy has become a very promising and advanced scientific research topic. The development of treatment methods has evoked great expectations. This review focused on the discovery of different stem cells and the potential therapies based on these cells. The genesis of stem cells is followed by laboratory steps of controlled stem cell culturing and derivation. Quality control and teratoma formation assays are important procedures in assessing the properties of the stem cells tested. Among many types of stem tissue applications, the use of graphene scaffolds and the potential of extracellular vesicle-based therapies require attention due to their versatility. The review is summarized by challenges that stem cell therapy must overcome to be accepted worldwide. A wide variety of possibilities makes this cutting edge therapy a turning point in modern medicine, providing hope for untreatable diseases.
Keywords: different stem cells, extracellular vesicle-based therapies.

CELLULAR THERAPY AND STEM CELL USAGE DURING HAIR LOSS: FUTURE PERSPECTIVES

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ABSTRACT
Stem cells may have potential as a treatment for regenerating hair. Initially, methods to obtain stem cells have concentrated on isolating the primary cells from the tissue of interest through biopsy and growing these cells outside the body to be transplanted into the patient. Stem cell treatment of nonautoimmune hair loss like androgenetic alopecia is promising. Although an autologous transplant is viewed as the standard, its use is limited because of a lack of data and the diminished viability of cells that are made available using this method. Adipose-derived stem cells are a promising alternative because of their limited immunogenicity. They are easy to obtain, are multipotent, and can differentiate into different cell lines. They also have significant potential for angiogenesis. More studies are needed to establish the efficacy of the various types of stem cell-based treatments for people with hair loss.
Keywords: treatment for regenerating hair, autologous transplant, adipose-derived stem cells.

CELL THERAPY AND DERMATOLOGY

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ABSTRACT

The stem cells are undifferentiated cells capable of generating, sustaining, and replacing terminally differentiated cells and tissues. They can be isolated from embryonic as well as almost all adult tissues including skin, but are also generated through genetic reprogramming of differentiated cells. Preclinical and clinical research has recently tremendously improved stem cell therapy, being a promising treatment option for various diseases in which current medical therapies fail to cure, prevent progression or relieve symptoms. This review summarizes general aspects as well as current and future perspectives of stem cell therapy in dermatology.
Keywords: cells capable, replacing terminally, differentiated cells.

PHARMACEUTICAL AGENTS-MEDIATED LIVER TOXIC DAMAGE AND OBESITY

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ABSTRACT

Studies have shown that drug-induced liver injury, which involves the parent drug or a reactive metabolite generated through cytochromes P450, Microvesicular steatosis, a potentially severe liver lesion usually associated with liver failure and profound hypoglycemia, is due to a major inhibition of mitochondrial fatty acid oxidation (FAO). Moreover, recent investigations suggest that some drugs could favor lipid deposition in the liver through primary alterations of white adipose tissue (WAT) homeostasis. Numerous factors could favor drug-induced mitochondrial and metabolic toxicity, such as the structure of the parent molecule, genetic predispositions (in particular those involving mitochondrial enzymes), alcohol intoxication, hepatitis virus C infection, and obesity. In obese and diabetic patients, some drugs may induce acute liver injury more frequently.
World many countries are facing an epidemic of obesity that can be explained, at least in part, by a sedentary life style and calorie overconsumption. This poses a major issue for public health since obesity primarily enhances the risk of various illnesses such as type 2 diabetes, coronary heart disease, some cancers and non-alcoholic fatty liver disease (NAFLD). Consequently, obese patients are consuming on average more drugs than non-obese individuals, some medications in obese individuals can cause severe liver damage [1].
Keywords: microvesicular steatosis, profound hypoglycaemia, alcohol intoxication.

SKIN PROTECTANT CELLULAR AND INTRACELLULAR EFFECTS OF MELATONIN

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ABSTRACT

The environmental factors as radiation, physical injuries, chemicals, pollution, and microorganisms, the skin requires protective chemical molecules and pathways. Melatonin, a highly conserved ancient molecule, plays a crucial role in the maintenance of skin. As human skin has functional melatonin receptors and also acts as a complete system that is capable of producing and regulating melatonin synthesis, melatonin is a promising candidate for its maintenance and protection. Below, we review the studies of new metabolic pathways involved in the protective functions of melatonin in dermal cells. We also discuss the advantages of the topical use of melatonin for therapeutic purposes and skin protection. In our view, endogenous intracutaneous melatonin production, together with topically-applied exogenous melatonin and its metabolites, represent two of the most potent defense systems against external damage to the skin.
Keywords: protective chemical molecules and pathways, functional melatonin receptors.

CHARACTERIZATION OF HUMAN CHROMOSOMAL CONSTITUTIVE HETEROCHROMATIN

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Heterochromatin of centromeric chromosome regions contains late replicating, largely repetitive DNA. It is suggested that heterochromatin participates in chromosome pairing, crossing-over and in chromosome disjunction control (1,3).
Centromeric heterochromatin, a variety of heterochromatin, is a tightly packed form of DNA. Centromeric heterochromatin is a constituent in the formation ofactive centromeres in most higher-order organisms; the domain exists on both mitotic and interphase chromosomes. (4,5,6,8)
Centromeric heterochromatin is usually formed on alpha satellite DNA in humans; however, there have been cases where centric heterochromatin and centromeres have formed on originally euchromatin domains lacking alpha satellite DNA; this usually happens as a result of a chromosome breakage event and the formed centromere is called a neocentromere. Centromeric heterochromatin domains are flanked by pericentric heterochromatin.
Human chromosomes 1, 9 and 16 possess relatively higher amounts of centric heterochromatin varying in size. Individuals with extremely polymorphous heterochromatic regions may show a decreased relative reproductive fitness and there may be an increased risk of chromosome abnormalities for the progeny (2,7,9,10).
Our study of varying centromeric heterochromatin of the chromosome pairs 1, 9 and 16 was based on data provided by the Cytogenetic Counselling Centre of the AFGEN Genetik Laboratoryin Baku. Preliminary results of this study will be presented below.

MATERIAL AND METHODS
The short-term cultivation of human peripheral lymphocytes (60 hours) and trypsin-banding technique were used to prepare thecells for cytogeneticanalysis. The bands on chromosomes were marked according to the *International System for Human* Cytogenomic *Nomenclature*(ISCN2016). The size of 1q12, 9q12 and 16q11 bands under study (Fig. 2)were classified from the photographs,using the classic Smarttype Karyotyper method. Two cytogeneticists classified the size of each band independently, and in case of disagreement a third one decided the final classification.
The bands were classified as: normal (+), larger (+ +), very large (+ + +), narrow (±) and pericentric inversions (p.c.i.) The karyotypes were divided into four groups: (*I*) from persons with abnormal phenotype and abnormal karyotype, (*II*) from persons with abnormal phenotype (multiple congenital malformations) and normal karyotype, (*III)* from healthy nearest relatives (parents and sibs) of persons with abnormal phenotype and karyotype, *(IV)* from normal healthy persons with normal phenotype and karyotype without congenital malformations in family history. Abnormal karyotypes here mean inborn chromosomal aberrations (trisomy, deletion, unbalanced translocation), multiple congenital malformations mean abnormalities of at least two organs combined with mental deficiency.

RESULTS AND DISCUSSION
Our results are presented in Table I. A different variability of centromeric heterochromatin of chromosomes 1, 9 and 16 was observed. Quite a low variability was found in chromosome 16, while chromosomes 9 and 1 showed a high degree of variability, which was more accentuated in chromosome 9 than in chromosome 1.
In all four groups of persons there was a similar pattern of variability with the only exception mentioned below.
On the whole, band 1q12 was either enlarged or diminished, while band 9q12 was most frequently enlarged. Pericentric inversions were observed very rarely and only on chromosome 9.
The only exception was found in the nearest relatives of children with abnormal phenotype and karyotype: an unusually narrow band 1q12 was frequently detected, often onboth members of the chromosomal pair.
The study is to be continued.
Keywords: centromeric heterochromatin, chromosome pairs 1, 9 and 16,congenital malformations

GNOTOBIONTS – EXPERIMENTAL MODEL

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ABSTRACT

This paper presents the results of the studies of biological behavior and morphology of the lymphoid system in gnotobionts–animals with controlled microflora, namely: 1) age-related changes are determined in the thymus – the central organ of the lymphoid system in gnotobionts, in which maturation of the T-dependent lymphocytes is delayed, causing inhibition of the cellular immunity reactions; 2) comparative cytological profile and morphology of the peripheral lymphoid organs (spleen, visceral and somatic lymph nodes) are analyzed with regard to age; 3) the leading morphofunctional mechanisms responsible for development of non-coronary damages of the myocardium and the microcirculatory bed are indicated; 4) test morphological studies of the mucous membrane of the ileum are performed with a detailed cytological profile of the lymphoid tissue followed by determination of presence or absence of the structures of both “acceptor” and “protective” immunity.
Key words: gnotobiotic animal’s, microflora, acceptive and protective immunity

SENSITIVITY OF SERUM PROTEINS OF GI CANCER PATIENTS TO CHEMOTHERAPY COURSES

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ABSTRACT

Gastrointestinal cancers (GI) are one of the most abundant types of cancers among the world population, though statistical data indicate that in eastern Asia these types of cancer occur 4 times more often than in Western Europe. Absence of treatment of bacterial infections, obesity, and lack of vegetable food in a diet can be the case of GI cancer. All pathologies are inevitably connected to the changes in cell cycle, abnormal protein amount and their dysfunction. Serum proteins are widely used as an additional source of information about body condition, also changes in protein composition can point out the mechanism of disease development and effectiveness of treatment. In the presented work we studied protein composition of GI cancer patients in different stages of cancer development, after and before chemotherapy and compared these data to protein composition of healthy control group of voluntaries. Treatment of patients was performed according the guidelines appropriate for the GI cancer. Association of the effectiveness of treatment at the different stages of chemotherapeutic courses and changes of protein composition of blood serum has been assessed. Proteins composition was studies by SDS-PAGE electrophoresis and densitometry analysis. Experimentally gained molecular and statistical information exposed the most vulnerable groups of proteins affected by chemotherapeutic agents indicating targets for searching new biomarkers for treatment effectiveness.
Research involving human patients performed in accordance with the requirements of the Council of Europe Convention on Human Rights and Biomedicine, Biomedical Research, as well as the UNESCO Declaration of Bioethics and Human Rights.
Key wards: Gastrointestinal cancer, chemotherapy, proteins, biomarkers

CHANGES IN OPEN FIELD BEHAVIOR AND DECLARATIVE MEMORY IN “DEPRESSIVE” RATS WITH HIGH IMMOBILITY AND DECREASED LEVEL OF BRAIN MONOAMINES

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Introduction: Changes in some forms of motivational-emotional behavior, learning and memory are thought to be characteristic for major depressive disease. However, results existing until today about the character of changes in motivational-emotional and exploratory behavior as well as character of disorders in declarative memory, accompanying major depressive disease, are not unambiguous. Therefore, studying them in animal models of depression is very topical and important.
Methods: Experiments were conducted on adult white wild rats (with 250-300 g weight). “Depressive” and “non-depressive” rats were selected according to the level of immobility in forced swim test. Rats with low level of

immobility, “non-depressive” rats, constituted control group and rats with high level of immobility, “depressive” rats, constituted the experimental group (10 rats in each).
Changes of motivational-emotional and exploratory behavior were studied in open field test.
The changes of learning and memory were studied in the fear motivated one trial passive avoidance test considered as the declarative memory test. Experiments were carried out on “non-depressive”, control and “depressive”, experimental groups (10 rats in each).
Obtained results were processed statistically by Student’s t-test.
Results: Sharp decrease in locomotion was found in rats with high level of immobility. It was manifested in a significant decrease of the number of crossed squares. The quantitative indices of vertical activity, vertical standings, head risings, were also sharply decreased. Fear reaction was considerably increased in “depressive” rats, manifested in the significant decrease of the number of entering in the center of open field and grooming and sharp increase in defecation rate.
Investigation of the changes of learning and memory in the passive avoidance test has shown that the latency of entering from the light into dark section of passive avoidance camera, in the learning session, was sharply increased in “depressive” rats. They revealed an impaired ability to evaluate the level of danger coming from the brightly illuminated open area and therefore they do not hurry to escape from the dangerous section. The difference between “depressive” and “non-depressive” rats was maintained even after 24 hours from receiving a painful stimulation. In particular, the animals of control group remember that they have received a painful stimulation in dark section during learning session and do not enter there during testing session, whereas the experimental animals with considerable delay but still enter in the dark section during testing session, therefore, they show significant impairment of declarative memory in passive avoidance task.
Conclusions: Locomotor and exploratory behavior are impaired and fear motivation is increased in the open field in “depressive” rats with high immobility and low level of monoamines content in the brain. Learning and memory in one of the tests of declarative memory, so called passive avoidance task, is disturbed.
Keywords: “Depressive” rats, Open field Behavior, Declarative Memory and Monoamines Deficiency.

PRELIMINARY RESULTS ON THE USING TANDEM MASS SPECTROMETRY IN DIAGNOSIS OF INHERITED METABOLIC DISEASES

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Background: According to the results of the researches common indexes of the prevalence of inherited metabolic diseases (IMD) varies from 1 to 800 on 1 to 2500 alive newborns. IMD are taking one of the first places among children pathology, early children death (40%) and disability[1]. According to systematic review of the 43 forms of the inborn errors of metabolism are related to unexpected death of newborns. For IMD it is common to have a wide spectrum of the unusual clinical manifestation, often they are not diagnosed, while well timed diagnoses and proper treatment are able to prevent severe systematic lesions, which lead to death and disability[2]. For that reason one of the most significant problems of the modern pediatrics is to early diagnosis of IMD. The only way to diagnosis of orphan metabolic diseases is the tandem mass spectrometry (TMS) [3].
Aim: Scientifically substantiate the need for implementation of selective screening IMD of children using TMS method in Republic of Kazakhstan (RK) for early diagnosis, therapy of the inherited metabolic diseases, to reduce disability and death rate.
Materials and methods: Material of the research – dry blood spots, taken using standard methodology on filtered DBS papers, which are used in RK in the program of neonatal screening (for retrospective research – archived samples of the dry blood spots of the children dead during first year of life). Method of the research is tandem mass spectometry (QSight Perkin Elmer).
Results: Analysis of the archived dry blood spot samples showed metabolic deviations in 20.4% of the cases. The detected changes are related to amino acids metabolic disorders, defects of β-oxidation of the fat acids, decrease

activity of the glucocerebrosidase (Gaucher's disease) and sphingomyelinase (Nimman – Pick disease). Results of the selective screening have shown metabolic disorders in 5% of the cases (defects of β-oxidation of the fat acids, aminoacidopathy, organic aciduria).

Conclusions: The preliminary results of the using TMS for the diagnosis of IMD have shown the need for implementation of selective screening IMD using TMS, which is able to conduct diagnosis of 75 metabolites of 49 IMD in single blood spot, which were not detected in RK previously. Taking into the consideration economic expenses of the government, related to the costs of the systematic treatment, medical service, life expectancy and lifelong support of the disabled children with IMD, early detection of orphan metabolic diseases is the vital condition of the decrease of newborn and children death rate, sickness rate and disability.

This research study was carried out as a part of a scientific project funded by West Kazakhstan Marat Ospanov Medical University.

QUESTIONS OF TEACHING MEDICAL BIOCHEMISTRY AS PART OF AN INTEGRATED EDUCATIONAL PROGRAM IN A MEDICAL UNIVERSITY

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ABSTRACT

Current global trends in the development of medical education determine the need to develop integrated educational programs that focus on the needs of the healthcare system and to achieve the final results of training. An integrated approach to the teaching and teaching of medical biochemistry ensures the integrity and systematic study of the biochemical processes of the body. In this article, the authors share their experience in teaching medical biochemistry as part of an integrated educational program developed in conjunction with a strategic partner - Bashkent University. A new educational program in medical biochemistry according to a certain system is combined into modules and studied in integration with several basic disciplines. Examples of the development of learning outcomes based on Bloom's taxonomy and depending on the level of complexity are given. The use of situational tasks in the form of mini-cases to achieve high-level end results and apply knowledge in solving certain problems is considered. The experience of using innovative teaching methods to improve teaching methods is described. This ensures the formation of a theoretical basis for the further assimilation of clinical disciplines and thereby ensures a close relationship between basic and clinical disciplines; a basis is formed for applying the obtained theoretical knowledge to the solution of a specific clinical problem.

Keywords: medical biochemistry, integrated educational program, learning outcomes, Bloom's taxonomy, innovative teaching methods.

MODERN METHODS TO DIFFERENTIATE BETWEEN CHEST PAIN AND CARDIAC ISCHEMIA

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Acute coronary syndrome (ACS) is a group of conditions which often present with similar signs and symptoms while having different outcomes and complications. Therefore it is essential to differentiate between them as soon as possible and provide appropriate management.

Acute coronary syndromes are classified into two categories: STE-ACS (ST segment Elevation Acute Coronary Syndrome) and NSTE-ACS (Non ST segment Elevation Acute Coronary Syndrome). STE-ACS stands for ST Elevation Acute Coronary Syndrome all of which demonstrate significant ST elevations on ECG due to complete blockage of artery by thrombus, while NSTE-ACS is due to partial occlusion of artery which exhibit ST segment depression and/or T wave inversions. Patients with NSTE-ACS who do not develop infarction are diagnosed with unstable angina, which itself is a precursor of myocardial infarction.

Acute coronary syndromes are considered multifactorial and risk factors most commonly associated with development of acute coronary syndromes include: hypertension, smoking, diabetes, obesity, sedentary life-style, hereditary conditions etc. Chronic stress to the coronary endothelium eventually leads to inflammation and atherosclerotic plaque formation. Plaque at some point with additional stress will rupture and trigger thrombus

formation. Probability of plaque rupture depends on its composition: stable plaques contain small fatty core and thick fibrous cap, unstable plaque have larger fatty cores and thin fibrous cap.

Patients with acute coronary syndromes present with chest pain and/or discomfort and may experience tightness and pressure sensation; pain may radiate to left or both arms, jaw, back or stomach, sweating, dyspnea and dizziness are also common complaints.

Whenever we suspect ACS first diagnostic tests is always ECG (Electrocardiography). If ST segment is persistently elevated STEMI (ST Elevation Myocardial Infarction) can be diagnosed and reperfusion therapy is indicated; but if ST segment is depressed and/or T wave inversion is present laboratory tests are necessary for diagnosis. Cardiac biomarkers mainly used in the clinic are Troponins and CK-MB (Creatine Kinase MB), yet LDH (lactate dehydrogenase), B-type natriuretic peptide and C-reactive protein can be used additionally.

Several studies have been conducted in hopes to find other myocardial markers useful for diagnosis of ACS, one of which tested candidate biomarkers such as hFABP (Heart-type fatty acid binding protein), GPBB (Glycogen Phosphorylase Isoenzyme BB), S100, PAPP-A (Pregnancy-associated plasma protein A), TNF (Tumor Necrosis Factor), IL6 (Interleukin 6), IL18 (Interleukin 18), CD40 (Cluster of differentiation 40) ligand, MPO (Myeloperoxidase), MMP9 (Matrix metallopeptidase 9), cell-adhesion molecules, oxidized LDL (Low Density Lipoprotein), glutathione, homocysteine, fibrinogen, and D-dimer, procalcitonin. The idea of this study was to estimate usefulness of combining enzymatic markers with nonenzymatic ones in the clinical settings.

Keywords: cardiac ischemia, enzymatic biomarkers, STEMI.


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