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P001
ANALIZA SHBG I POVEĆANE SLOBODNE βHCG U PRVOM TROMESEČJU TRUDNOĆE U GLIKOREGULACIJI

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Gestacijski diabetes mellitus (GDM) se definiše kao bilo koji stepen glukozne intolerancije koji se javlja prvi put u trudnoći. Značaj ranog otkrivanja GDM kod trudnica predstavlja prevenciju od komplikacija koje ova bolest nosi po zdravlje trudnica i ploda. SHBG (sex hormon binding globulin) je glikoprotein koji je transportni protein za polne hormone, a njegove niske vrijednosti se povezuju sa povećanom insulinskom rezistencijom i hiperinsulinemijom. Cilj rada je bio ispitati biohemijske markere glikoregulacije kao i nivo SHBG kod trudnica sa povećanom slobodnom beta βhCG u kombinovanom skrining testu prvog tromjesečja trudnoće. Prospektivna studija je izvedena u periodu od novembra 2015. do februara 2018. u Zavodu za laboratorijsku dijagnostiku Univerzitetskog kliničkog centra Republike Srpske. U ispitivanje je uključeno ukupno 89 trudnica, podjeljene u dvije grupe: ispitivana grupa (n= 43) obuhvata trudnice koje su u kombinovanom skrining testu u prvom tromjesečju trudnoće imale povećanu vrijednost slobodne βhCG ≥ 2.0 MoM i kontrolna grupa (n=46). Hormoni su određivani u serumu elektrohemiluminiscentnom metodom (ECLIA, Cobas, Roche Diagnostics, Mannheim, Germany). Statistička analiza rezultata je rađena pomoću SPSS programa verzija 22.0. U ispitivanoj grupi dobijene srednje vrijednosti naspram kontrolne grupe bile su: SHBG (nmol/L) 297,41±109,02 vs. 314,64±78,74 (p=0.277); glukoza (mmol/L) 4,80±0,57 vs. 4,79±0,45 (p= 0,902); insulin (μU/mL) 15,23±13,50 vs. 10,33± 5,43 (p=0,081) i C-peptid (ng/mL) 2,29±1,22 vs. 1,95±0,68 (p=0.549). Takođe, nije postojala korelacija slobodne βhCG sa ispitivanim parametrima glikoregulacije. Postojala je korelacija između SHBG

P001
ANALYSIS OF SHBG AND INCREASED FREE BETA HCG IN THE FIRST TRIMESTER OF PREGNANCY IN GLYCOREGULATION

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Gestational diabetes mellitus (GMD) is defined as any degree of glucose intolerance with the first recognition during pregnancy. The importance of early detection of GDM in pregnant women is a prevention of the complications that this disease carries to the health of pregnant women and fetus. SHBG (sex hormone binding globulin) is a glycoprotein who represent a transport protein for sex hormones and its low values are associated with increased insulin resistance and hyperinsulinemia. The aim of this study was to examine biochemical markers of glycoregulation as well as SHBG level in pregnant women with increased free beta βhCG in the commbined screening test in the firs trimester of pregnancy. The prospective study was performed between Novembar 2015. and Februar 2018. in the Institute of Laboratory Diagnostic, University Clinical Centre of the Republic of Srpska. The study include 89 pregnant women divided into the two groups: the examined group of pregnant women (n = 43) who had free βhCG ≥ 2.0 MoM in the commbined screening test in the first trimester of pregnancy and control group (n = 46). Hormons were determined in serum electrochemiluminescence immunoassay (ECLIA, Cobas, Roche Diagnostics, Mannheim, Germany). Statistical analysis results is performed using SPSS program version 22.0. The mean values obtained in the examined group vs. the control group were: SHBG (nmol/L) 297.41±109.02 vs. 314.64±78.74 (p = 0.277); glucose (mmol/L) 4.80±0.57 vs. 4.79±0.45 (p = 0.902); insulin (μU/mL) 15.23± 13.50 vs. 10.33±5.43 (p=0.081) i C-peptid (ng/mL) 2.29±1.22 vs. 1.95±0.68 (p=0.549). Likewise, there was not correlation of free βhCG with the examined

i indeksa tjelesne mase (BMI) (r = - 0,486; p = 0,001 vs. r = - 0,359; p = 0,018) kao i korelacija između SHBG i PAPP-A (r = 0,296; p = 0,054 vs. r = 0,400; p = 0,006) u obe grupe trudnica. Između BMI i PAPP-A je bila korelacija u obe grupe. Dvije trudnice su imale spontani pobačaj u ispitivanoj grupi. Kod trudnica sa slobodnom βhCG ≥ 2,0 MoM u prvom tromjesečju trudnoće nije postojala značajna razlika u biohemijskim markerima glikoregulacije kao i SHBG proteina u odnosu na trudnice koje su imale normalnu vrijednost slobodne βhCG.

Ključne riječi: gestacionalni, dijabetes, trudnoća.

glycoregulation parameters. There was a correlation between SHBG and body mass index (BMI) (r = - 0.486; p = 0.001 vs. r = - 0.359; p = 0.018), as well as the correlation between SHBG and PAPP-A (r = 0.296; p = 0.054 vs. r = 0.400; p = 0.006) in both groups of pregnant women. Between BMI and PAPP-A was correlation in both groups. Two pregnant women had spontaneous abortion in the examined group. Pregnant women with free βhCG ≥ 2.0 MoM in the first trimester of pregnancy there was not significant difference in the biochemical markers of glycoregulation and SHBG proteins compared to pregnant women who had a normal value of free βhCG.

Key words: gestational, diabetes, pregnancy.

P002
REFERENTNI INTERVAL ZA TIROKSIN NA ADVIA CENTAUR ANALIZATORU

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Laboratorijsko merenje tiroidnih hormona je poželjno sredstvo za dijagnozu i praćenje pacijenta sa disfunkcijom štitaste žlezde. Referentni intervali su neophodni u ocenjivanju rezultata ispitivanja. Većina društava za kliničku hemiju preporučuje da svaka laboratorija treba da odredi svoje lokalne referentne vrednosti. U našoj laboratoriji koristimo referentne intervale koje daju proizvođači. Tiroidni hormoni se mere na dva analizatora: Siemens Advia Centaur XP i Roche Cobas e601. Uočeno je, pregledom laboratorijskih podataka, u slučajevima kada su svi tiroidni testovi bili u referentnom intervalu, u približno 7% slučajeva, određivanje tiroksina (T4) pomoću Centaur metode dalo je visoke vrednosti. Dakle, cilj ove studije bio je upoređivanje vrednosti T4 sa dva analizatora i verifikacija referentnog intervala za T4 za Centaur metodu. Poređenje vrednosti T4 izmerenih Centaur i Cobas metodama pokazalo je da nije postojala značajna razlika između vrednosti za merni opseg od 63,1–208,5 nmol/L. Međutim, vrednosti T4 iz Centaur metode bile su veće od vrednosti iz Cobas metode u rasponu od 124,7–172,0 nmol/L (t-test, p < 0,05). 95% referentni interval (normalna distribucija) za vrednosti Centaur T4, dobijenih od 160 očigledno zdravih osoba (73 muškaraca i 87 žena, od 21 do 79 godina starosti), iznosio je 73,5–149,3

P002
THE REFERENCE INTERVAL FOR THYROXINE ON ADVIA CENTAUR ANALYSER

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The laboratory measurement of thyroid hormones is the preferred means to diagnose and monitor patient with thyroid dysfunction. The reference intervals are indispensable in evaluating test results. Most of the societies for clinical chemistry have recommended that each laboratory should determine its own local reference values. In our laboratory we use the reference intervals provided by the manufacturers. Thyroid hormones are measured on two analyzers: Siemens Advia Centaur XP and Roche Cobas e601. It was observed, by reviewing laboratory data, in the occasions when all thyroid tests were within reference interval, in about 7% of cases, the determination of thyroxine (T4) using Centaur method gave high values. So, the aim of this study was to compare the T4 values from two analyzers and to verify Centaur reference interval for T4. The comparison of T4 values measured by Centaur and Cobas methods showed that there was no significant difference between values for measuring range of 63.1–208.5 nmol/L. However, T4 values from Centaur method were higher than values from Cobas method in range of 124.7–172.0 nmol/L (t-test, p < 0.05). The 95% reference interval (normal distribution) for Centaur T4 values, obtained from 160 apparently healthy subjects (73 men and 87 women, aged 21–79 years)

nmol/L, sa srednjom vrednošću od 108,3 nmol/L. Ovaj interval nije sasvim u skladu sa referentnim intervalom koji je obezbedio proizvođač Centaur (58,1–140,6 nmol/L), a srednja vrednost je značajno veca od vrednosti koju je dao proizvođač (90,3 nmol/L). Dobijena srednja vrednost se nije statistički razlikovala od medijane date za Cobas metodu (105,0 nmol/L), što ukazuje da su blago povišene vrednosti određene Centaur metodom, više u saglasnosti sa referentnim intervalom koji je dao Cobas proizvođač (66–181 nmol/L). Rezultati studije predlažu referentni interval od 73,5–149,3 nmol/L za određivanje T4 korišćenjem Advia Centaur analizatora.

P003
ZNAČAJ ODREĐIVANJA GLIKOZILIRANOG HEMOGLOBINA U PROCENI RIZIKA OD AMPUTACIJA KOD PACIJENATA SA SINDROMOM DIJABETESNOG STOPALA

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Glikozilirani hemoglobin (HbA_{1c}) je važan parametar za praćenje dugoročne metaboličke kontrole i procenu rizika za razvoj hroničnih komplikacija kod osoba sa dijabetes melitusom (DM). U ovoj studiji ispitivali smo povezanost postignute metaboličke kontrole u DM sa rizikom za razvoj i primenjenim modalitetom lečenja sindroma dijabetesnog stopala (SDS). U istraživanju je učestvovalo 111 pacijenata (80 muškaraca i 31 žena) sa tipom 2 DM, starosti 65,5 ± 9,8 godina. Razvoj SDS nastupio je 13,9 ± 8,8 godina nakon postavljene dijagnoze dijabetesa. Kod 41 pacijenta SDS je lečen neoperativnim (konzervativnim) pristupom. Hirurška intervencija manjeg obima (amputacija u predelu stopala) je izvršena kod 41, a opsežna hirurška intervencija (amputacija u predelu potkolenice) kod 29 pacijenata. Koncentracije biohemijskih parametara i HbA_{1c} su određene standardnim laboratorijskim metodama. U ispitivanoj grupi najučestaliji faktor rizika za nastanak SDS (82% pacijenata) bila je loše regulisana glikemija (HbA_{1c} >8%). Utvrdili smo da su pacijenti koji su lečeni hirurškim putem imali statistički značajno više vrednosti HbA_{1c} u poređenju sa pacijentima koji su lečeni neoperativnim pristupom ($P<0,05$). Ukupan broj

was 73.5–149.3 nmol/L, with mean value of 108.3 nmol/L. This interval is not completely in line with the reference interval provided by the Centaur manufacturer (58.1–140.6 nmol/L), and the mean was significantly higher than the manufacturer's mean (90.3 nmol/L). The obtained mean didnžt statistically differ from median given in Cobas method (105.0 nmol/L), which indicates that slightly elevated values determined by Centaur method are more in accordance with the reference interval provided by Cobas manufacturer (66–181 nmol/L). The results of study suggested the reference interval of 73.5–149.3 nmol/L for determination of T4 using Advia Centaur analyzer.

P003
SIGNIFICANCE OF GLYCOSILATED HEMOGLOBIN DETERMINATION FOR THE ASSESSMENT OF LOWER-EXTREMITY AMPUTATION RISK IN PATIENTS WITH DIABETIC FOOT

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Glycosylated hemoglobin (HbA_{1c}) is important parameter for the assessment of long term metabolic control and risk for development of chronic complications in patients with diabetes mellitus (DM). This study investigates associations between achieved metabolic control in DM with the risk for the development of diabetic foot (DF) and its treatment modalities. The study included 111 patients (80 men and 31 women) with type 2 DM, aged 65.5 ± 9.8 years. DF lesions occurred 13.9 ± 8.8 years after diagnosis of DM. In 41 patients DF was treated by conservative approach, 41 patients underwent a minor limb amputation (foot amputation) and 29 patients underwent a major limb amputation (below-knee amputation). The levels of HbA_{1c} and serum biochemical parameters were measured by standard laboratory methods. The most frequent risk factor for DF in the examined group (82% patients) was poor glycaemic control (HbA_{1c} >8%). The level of HbA_{1c} value was significantly higher in surgically treated patients than in conservative treated group ($P<0.05$). The number of patients who underwent surgical treatment were significantly higher in group with poor glycaemic control (62.8% patients with poor glycaemic control vs.

pacijenata koji je podvrgnut hirurškom lečenju bio je značajno veći u grupi sa lošom glikoregulacijom (68,2% pacijenata sa loše regulisanom vs. 40% pacijenata sa dobro regulisanom glikemijom; P<0,05). Utvrdili smo da je verovatnoća za amputaciju 3,2 puta veća ukoliko pacijent ima loše regulisanu glikemiju (OR=3,21; 95%CI:1,18–8,69; P<0,05). Takođe, rezultati su pokazali da rizik za amputaciju raste za 54% ukoliko se koncentracija HbA_{1c} poveća za 1% (OR=1,54; 95% CI:1,02–2,31; P<0,05). Naši rezultati su pokazali da se održavanjem dobre metaboličke kontrole u tipu 2 DM smanjuje rizik za razvoj SDS, ali i stepen invazivnosti postupka lečenja SDS.

P004
IZVEŠTAJ O SLUČAJU IGG NETOLERANCIJE HRANE

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IgG netolerancija hrane (ili alergija hrane tipa III) je kada imunološki sistem proizvodi specifična IgG antitela nakon konzumacije triger hrane. Ova IgG antitela mogu dovesti do inflamatornih procesa koji izazivaju specifične (npr. migrena, sindrom iritabilnog creva, psorijaza, ekzem) ili nespecifične (npr. umor, zadržavanje vode, variranje telesne težine) simptome. IgG test hrane pomaže u ograničavanju sumnje na tipu hrane. Posle ovog testiranja preporuka je da se izbegava hrana sa povećanim titrom IgG 10–12 nedelja. Devetogodišnje dete žalilo se na gubitak kose i nelagodnost u stomaku. Redovno se vakciniše, u dobrom je opštom stanju bez ikakve bolesti ili alergije. Dermatološki nije bilo parazita ili mikrospora na skalpu. Napravio je sve biohemijske parametre za autoimune bolesti (ANA, ANCA, anti dsDNA, RF...), enzime (AST, ALT) i total IgE. Rezultati su bili negativni. Zatim, pedijatar predlaže da se testira IgG netolerancija hrane. Naša IgG netolerancija hrane sadrži 90 namirnica. Titar IgG bio je veoma visok za lešnike, pšenice i gluten; visok za kravlje mleko, kravlje kiselo mleko, ovčji sir, jaja i kikiriki, i povećani titar IgG bili su za kravljeg sira, kozjeg sira, semena suncokreta, bibera, vanile i narandže. Posle ovih rezultata, majka deteta rekla je da pacijent u dužem vremenskom periodu konzumira proizvode koji sadrže lešnike (čokolade sa lešnicima), a istovremeno se poklapa sa intenzivnijim gubicima kose. Mi smo mu dali preporuke za izbegavanje hrane sa visokim titrom IgG u toku 3 meseca, a hrana sa IgG vrednostima u porastu da se uključuje u 4 dnevan ciklus rotacije. Posle 6 meseci, dete je došlo na kontrolu. Anamnestički podaci, koje je dala njegova majka, su bili da se pacijent

40% patients with optimal glycaemic control; P<0.05). We found that the patients with poor glycaemic control had 3.2 times higher risk for amputation (OR=3.21; 95%CI: 1.18–8.69; P<0.05). Also, our results have shown that an increase of HbA_{1c} level by 1% was associated with 54% higher risk for amputation (OR=1.54; 95%CI: 1.02–2.31; P<0.05). In conclusion, our results demonstrated that optimal metabolic control in type 2 DM reduces the risk for DF development, as well as the invasiveness of DF treatment.

P004
CASE REPORT OF IGG FOOD INTOLERANCE

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IgG food intolerance (type III food allergy) is when the immune system produces specific IgG antibodies after the consumption of a trigger food. These IgG antibodies can lead to inflammatory processes causing specific (e. g. migraine, Irritable Bowel Syndrome, psoriasis, eczema) or unspecific (e.g. fatigue, retention of water, variation of body weight) symptoms. An IgG food screen test helps to limit the suspecting food. After this testing the recommendation is to avoid foods with elevated IgG titer 10–12 weeks. 9 years old twin child is complaining on hair loss and discomfort in the abdomen. He is regularly vaccinated. He is in good general condition without any illness or allergy. Dermatologically, there were no scalp parasites or microspores. He made all biochemical parameters for autoimmune diseases (ANA, ANCA, anti dsDNA, RF...), the enzymes (AST, ALT) and total IgE. The results were negative. Next, the pediatrician suggests him for IgG food intolerance testing. The IgG food screen plate contains 90 foods. The IgG titer were very high for hazelnuts, wheat and gluten; high for cow's milk, cow's sour milk, sheep's cheese, eggs and peanuts, and increased IgG titer were for cow's cheese, goat's cheese, sunflower seeds, pepper, vanilla and orange. After this results child's mother said that the patient for a long period consume products that contains hazelnuts (chocolates with hazelnuts), and at the same time it coincides with a more intense hair loss. We gave him recommendations for avoiding foods with high IgG titer for 3 months and including foods with increased IgG values in 4 day rotating cycle. After 6 months, child came into control. Anamnestic data, given by his

pridržavao preporuka i promene u rastu kose su bile vidljive. Posle 6 meseci, titar IgG hrane sa visokim vrednostima IgG I IgG u porastu značajno je smanjen. U skladu sa dobijenim rezultatima nakon IgG netolerancija hrane, kod deteta vidljive su kliničke promjene.

mother, was that child have complied with the recommendations and there were visible changes in the scalp and hair growth. After 6 months, the IgG titer of foods with high and elevated IgG values were significantly decreased. In accordance with the obtained control results in the child, a visible clinical changes are observed.

P005
BIOHEMIJSKA LABORATORIJA TREBA DA OBJAVLJA VERIFICIRANE REFERENTNE INTERVALE

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Kvalitet referentnih intervala u kliničkoj hemiji je veoma važan za tumače rezultata. ISO 15189 kaže da referentne rangove treba pregledati periodično. Kako je u praksi nemoguće izvesti ekstenzivne studije za sve svoje testove, široko je prihvaćeno da se ovi podaci preuzmu iz literature, proizvođača, ili drugih laboratorija. Cilj ove studije je da se uradi verifikacija referentnih intervala najčešćih laboratorijskih testova (glukoze, lipida, urea, kreatinina, mokraćne kiseline, ukupnih proteina, albumina, kalcijuma, natrijuma, kalijuma, neorganskog fosfata, i nekoliko enzima) utvrđenih od strane proizvođača testova za in vitro dijagnozu (IVD), a koji se obavljaju u našoj laboratoriji. Za verifikaciju je primenjen pristup koji su preporučili IFCC and CLSI. Skupili smo 20 uzoraka od zdravih osoba koje smo analizirali sa standardnim metodama na Gesan Chem 200 analizatoru, pri čemu smo prihvatili da 20 osoba prestavljaju lokalnu populaciju, utvrdili da su pre-analitički uslovi kao i ranije, a da analitički rad na dan testiranja pretstavlja dugoročni analitički performans. Skoro za sve testove, 18 od 20 rezultata su bili unutar referentnih intervala koji su ranije bili prihvaćeni i uključeni u izveštaju o rezultatima. Samo za obe transaminaze, 3 rezultata su bili van dometa, tako da smo po istom postupku analizirali novi izbor od 20 bioloških uzoraka. Samo je jedan uzorak bio van referentnog ranga, čime su referentni intervali proizvođača bili verificirani. Zaključak je izveden iz IFCC preporuke: … pregled ili verifikacija objavljenih referentnih granica omogućava prenos podataka proizvedenih od druge laboratorije ili IVD proizvođača, koristeći pri tom veoma jednostavan process validacije što može da bude od velike pomoći.

P005
BIOCHEMICAL LABORATORY SHOULD REPORT VERIFICATED REFERENCE INTERVALS

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The quality of the reference intervals in clinical chemistry is very much important in result interpretation. ISO 15189 states that reference ranges should be reviewed periodically. As in practice it is impossible for any single laboratory to perform their own extensive studies for all of the tests it is widely accepted that this data may come from the literature, manufacturers, or other laboratories. The aim of this study was to review the reference intervals of the most common laboratory tests (glucose, lipids, urea, creatinine, uric acid, total protein, albumin, calcium, sodium, potassium, inorganic phosphate, and several enzymes) established by a manufacturer of in vitro diagnostic devices (IVD) performed in our laboratory. Verification was done from a sample of apparently healthy subjects using the approach proposed in the recommendations of the IFCC and CLSI. 20 samples were collect and analyzed with standard methods on Gesan Chem 200 analyzer. The assumptions considered were that the 20 individuals represented the local population, the pre-analytics conditions as before and analytical performance on the day of testing represented the long term analytical performance. For almost all tests, 18 to 20 results were within the range that had been previously accepted to be included in the results report. Only for both transaminases 3 results were out of range so a new selection of 20 biological samples had been analyzed with the same procedure, after which the proposed reference limits were accepted with only one of 20 out of range. Conclusion is derived from IFCC recommendation: …it is proposed that only a »review or verification« of the published reference limits shall be made transfer of data produced by other laboratories or IVD manufacturers, combined with a simple validation process, could be a great help.

P006
STATUS OKSIDATIVNOG STRESA I GENSKA EKSPRESIJA IZOENZIMA SUPEROKSID-DISMUTAZE KOD PACIJENATA U TERMINALNOJ FAZI BUBREŽNE BOLESTI

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Brojne studije su ukazuju na to da su mnogi faktori uključeni u nastanak oksidativnog stresa kod pacijenata sa hroničnom bubrežnom bolešću (HBB) na hemodijalizi. Osim metaboličkih i funkcionalnih poremećaja mnogih organa koji se javljaju u HBB, sama procedura hemodijalize dodatno doprinosi povećanom oksidativnom stresu, koji se odnosi na povećanu produkciju reaktivnih jedinjenja kiseonika i oslabljenu enzimsku i ne-enzimsku antioksidativnu zaštitu. Cilj ove studije je bio da se ispita povezanost genske ekspresije izoenzima superoksid-dismutaze (Cu/Zn SOD i Mn SOD) u mononuklearnim ćelijama periferne krvi (M PK) sa markerima oksidativnog stresa i antioksidativne zaštite kod pacijenata na hemodijalizi. Nivoi informacione ribonukleinske kiseline (iRNK) izoenzima SOD su određeni *Real time* PCR metodom. Totalni antioksidantni status (TAS), koncentracija tiobarbituratna kiselina-reagujućih supstanci (TBKRS) i nivoi superoksid-anjon radikala ($O_2^{\cdot-}$) su, takođe, određeni. Nivoi Cu/Zn SOD i Mn SOD iRNK su bili značajno veći kod pacijenata na hemodijalizi nego u kontrolnoj grupi ($p<0,001$ i $p=0,011$). Značajno veće koncentracije TBKRS ($p<0,001$), nivoi $O_2^{\cdot-}$ ($p<0,001$) i niži TAS ($p<0,001$) su dobijeni kod pacijenata na hemodijalizi u odnosu na kontrolnu grupu. Multivarijantna linearna regresiona analiza je pokazala da je TAS nezavisno povezan sa smanjenjem nivoa iRNK Cu/Zn SOD ($\beta=-0,317$, $p=0,036$) kao i sa smanjenjem nivoa iRNK Mn SOD ($\beta=-0,331$, $p = 0,041$). TAS predstavlja nezavistan prediktor za gensku ekspresiju izoenzima SOD u M PK.

P006
OXIDATIVE STRESS STATUS AND SUPEROXIDE DISMUTASE ISOENZYMES' GENE EXPRESSIONS IN PATIENTS WITH END-STAGE RENAL DISEASE

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Strong evidences indicate that many factors are involved in the pathogenesis of oxidative stress in patients with chronic kidney disease (CKD) on hemodialysis. Besides metabolic and functional disorders of many organs which occur in CKD, the haemodialysis procedure itself additionally contributes to enhancing oxidative stress, which involves an increased production of reactive oxygen species and weakened enzymatic and non-enzymatic antioxidant protection. The aim of this study was to examine possible associations of superoxide dismutase isoenzymes' (Cu/Zn SOD and Mn SOD) gene expressions in peripheral blood mononuclear cells (PBMC) with oxidative stress and antioxidative protection parameters in patients on hemodialysis. SOD isoenzymes messenger ribonucleic acid (mRNA) levels were determined by Real-time PCR method. Total antioxidant status (TAS), thiobarbituric acid-reactive substances (TBARS) and superoxide anion radical ($O_2^{\cdot-}$) were also determined. Cu/Zn SOD and Mn SOD mRNA levels were significantly higher in patients on hemodialysis than in the control group ($p<0.001$ and $p=0.011$, respectively). The significantly higher TBARS ($p<0.001$), $O_2^{\cdot-}$ ($p<0.001$) levels and significantly lower TAS levels ($p<0.001$) were found in hemodialysis patients than in control group. Multivariate linear regression analysis demonstrated that TAS was independently associated with a decrease in Cu/Zn SOD mRNA ($\beta=-0.317$, $p=0.036$) and, as well as, with a decrease in Mn SOD mRNA levels ($\beta=-0.331$, $p=0.041$). Only TAS could serve as an independent predictor for both SOD isoenzymes gene expression levels in PBMC.

P007
POVEZANOST ANTROPOMETRIJSKIH PARAMETARA I LIPIDA U SERUMU KOD DECE

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Aterosklerotski proces, hronična i inflamatorna bolest, počinje u detinjstvu i prethodi kliničkim manifestacijama kao što su kardiovaskularne bolesti kasnije u životu. Nepovoljan lipidni status, definisan kao povišeni nivoi holesterola u lipoproteinima niske gustine (LDL-c), triglicerida (TG) i smanjeni nivoi holesterola u lipoproteinima visoke gustine (HDL-c), je važan faktor rizika za ubrzanu aterosklerozu u ranom životu i obično je povezan sa gojaznošću. Stoga, cilj ove studije je bio da se utvrdi povezanost između antropometrijskih parametara i lipidnog statusa kod dece. Studija je obuhvatila 186 zdrave dece (95 dečaka i 91 devojčicu) od 7 do 15 godina života. Devojčice i dečaci su podeljeni u podgrupe prema godinama starosti i indeksu telesne mase (ITM). Koncentracije HDL-c i TG su određene rutinskim enzimskim metodama, a koncentracija LDL-c je izračunata Friedewald-ovom formulom. ITM i odnos obima struka i kuka (S/K) su izračunati pomoću formula. Pokazane su značajne razlike u koncentracijama HDL-c i LDL-c između starosnih i ITM podgrupa devojčica. Kod devojčica, LDL-c je bio u pozitivnoj korelaciji sa ITM i obimom kukova. Kod dečaka, postojale su značajne razlike samo u koncentraciji HDL-c između različitih starosnih podgrupa. Kod dečaka, HDL-c je bio u negativnoj korelaciji sa svim antropometrijskim parametrima osim sa S/K. Ordinalna regresiona analiza je pokazala nezavisnu negativnu prediktivnu ulogu starosti na koncentracije HDL-c kod oba pola. ITM je bio značajan nezavisni prediktor za koncentracije HDL-c i LDL-c samo kod devojčica.

P007
RELATIONSHIPS BETWEEN ANTHROPOMETRIC PARAMETERS AND SERUM LIPIDS IN CHILDREN

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The atherosclerotic process, as chronic and inflammatory disease, begins at childhood and precedes its clinical manifestations, such as cardiovascular diseases later in life. Unfavourable lipid status, defined as elevated levels of low density lipoprotein-cholesterol (LDL-c), triglycerides (TG) and decreased levels of high density lipoprotein-cholesterol (HDL-c), have been well established as important risk factor for accelerated atherosclerosis in early life and it is usually associated with a high percentage of body fat. Therefore, the aim of this study was to determine associations between anthropometric and lipid status parameters in children. The study included 186 apparently healthy children (95 boys and 91 girls) from 7 to 15 years of age. Girls and boys were divided in age and in body mass index (BMI) subgroups. HDL-c and TG concentrations were assayed by routine enzymatic methods and LDL-c concentration was calculated by Friedewald formula. BMI and waist-to-hips ratio (WHR) were calculated. There were significant differences in HDL-c and LDL-c in girls' age and BMI subgroups. In girls, LDL-c positively correlated with BMI and hip circumference. In boys, there were significant differences only in HDL-c concentrations between different age subgroups. In boys, HDL-c negatively correlated with all anthropometric parameters except WHR. Ordinal regression analysis showed independent negative predictive role of ages on HDL-c concentrations in both genders. BMI was significant independent predictor for HDL-c and LDL-c concentrations only in girls.

P008
GENSKA EKSPRESIJA RECEPTORA ZA KRAJNJE PRODUKTE GLIKACIJE I TRANSFORMIŠUĆI FAKTOR RASTA B1 KOD DECE SA TIPOM 1 DIJABETES MELITUSA

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Dijabetes melitus tipa 1 (T1DM) je jedna od najčešćih autoimunih bolesti mladih. Hronične vaskularne komplikacije su glavni uzrok morbiditeta i mortaliteta u T1DM. Pored toga što su receptor za krajnje produkte glikacije (RAGE) i transformišući faktor rasta (TGF-β1) uključeni u razvoj i progresiju mikro- i makrovaskularnih komplikacija u dijabetesu, oni imaju važnu ulogu i u regulaciji funkcija imunskog sistema. Interakcija RAGE-AGE ima ulogu u regulaciji inflamatornih citokina, dok je TGF-β1 ključni regulator u osiguranju imunološke tolerancije. Cilj ove studije je bio da se ispita ekspresija gena za RAGE i TGF-β1 u mononuklearnim celijama periferne krvi kod 74 zdrava i 203 deteta sa T1DM. Nivoi informacione ribonukleinske kiseline (iRNA) RAGE i TGF-β1 su određeni Real time PCR metodom. Takođe, određeni su i osnovni biohemijski parametri i C-reaktivni protein visoke osetljivosti. Nivoi iRNK RAGE i TGF-β1 bili su značajno veci kod zdrave dece nego kod dece sa T1DM. Univarijatna logistička regresiona analiza je pokazala značajnu povezanost nivoa iRNK TGF-β1 sa prisustvom T1DM; OR=0,312, 95% CI (0,215–0,453), p<0,001. Multivarijantna logistička regresiona analiza pokazala je da su nivoi iRNK TGF-β1 nezavisno povezani sa prisustvom T1DM; OR = 0,319, 95% CI (0,162–0,628), p<0,001 kada su testirani u modelu sa drugim kliničkim markerima. Primenom logističke regresione analize nije pokazana značajna povezanost između nivoa iRNK RAGE i prisustva T1DM (p=0,699). Naši rezultati bi mogli da ukažu na poremećaj regulacije ekspresije gena za RAGE i TGF- β1 kod dece sa T1DM.

P008
RECEPTOR FOR ADVANCED GLYCATED ENDPRODUCTS AND TRANSFORMING GROWTH FACTOR B1 GENE EXPRESSIONS IN CHILDREN WITH TYPE 1 DIABETES MELLITUS

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Diabetes mellitus type 1 (T1DM) is one of the most frequent autoimmune diseases in youth. Chronic vascular complications are responsible for major morbidity and mortality in T1DM. Although, rreceptor for glycated end products (RAGE) and transforming growth factor-β1 (TGF-β1) are implicated in developement and progression of diabetic micro- and macrovascular complications, they also have important roles in immune system regulation. RAGE-AGE interaction is involved in regulation of inflammatory cytokines and TGF-β1 is a key regulator of ensuring immune tolerance. The aim of this study was to determine RAGE and TGF-β1 gene expressions in peripheral blood mononuclear cells in 74 healthy children and 203 children with T1DM. RAGE and TGF-β1 messenger ribonucleic acid (mRNA) levels were determined by Real-time PCR method. Basic biochemistry parameters and high sensitivity C-reactive protein were also determined. RAGE and TGF-β1 mRNA levels were significantly higher in control group than in children with T1DM. Univariate logistic regression analysis revealed significant association of TGF-β1 mRNA levels with the presence of T1DM, OR=0.312; 95%CI (0.215–0.453), p<0.001. Multivariate logistic regression analysis demonstrated that TGF-β1 was independently associated with the presence of T1DM; OR=0.319, 95%CI (0.162–0.628), p<0.001 when used in model with other clinical markers as confounders. No significant association between RAGE mRNA levels and presence of T1DM (p=0.699) were determined in tested population. Our results could indicate gene expression dysregulation of RAGE and TGF-β1 in children with T1DM.

P009
IgG – MARKER ZA TOLERANCIJU HRANE

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Postoje različiti razlozi zbog kojih hrana može prouzrokovati probleme, među njima klasična IgE alergija na hranu i odložena IgG alergija na hranu. Alergija hrane tipa III je kada imuni sistem proizvodi specifična IgG antitela protiv uobičajeno bezopasnih namirnica. Imunološki sistem lažno smatra da su to štetne supstance, jer se crevni zid može oštetiti ili postati propustljiv kao rezultat stresa, infekcije ili lekova, a velike količine neprilagođene hrane mogu proći kroz krvotok. IgG antitela i antigena formiraju imuni kompleksi koji se talože u organima i tkivima i aktiviraju sistem komplementa. Kada su imuni kompleksi razgrađeni, okolna tkiva su takođe oštećena, što dovodi do niskog stepena inflamatornog stanja. Redovnim unosom hrane koja je u pitanju može izazvati hroničnu upalu. Približno 45% ljudi ima netoleranciju za hranu, mnogi od njih pate od hroničnih simptoma (gastrointestinalne, kožne, glavobolje, migrene, prekomerne težine itd.) sa odloženom pojavom (nakon nekoliko sati ili čak i dana), što bi moglo biti smanjeno ili eliminisano samo ako se utvrdi uzrok problema kroz testiranje netolerancije hrane. Naš interes je da saznamo koja vrsta hrane najčesto daje porast ili visok titar antitela slučajnim pacijentima iz naše zemlje. Analiza se radi sa ELISA metodom. IgG titar se može kvantifikovati u nekoliko grupa (negativno, nisko, povećano i visoko). Našim testom se analizira 90 vrsta hrane. U našoj laboratoriji, analiza je uvođena u januaru 2014. Od tada je izvršeno 740 analiza. Analizirali smo 160 random pacijenata na uzrast od 18 do 65 godina. Od svih 90 vrsta hrane, naši pacijenti su obično netolerantni na kravlje mleko (p(povećan)-10,6%, v(visok titar)-44,4%), kravlje kiselo mleko (p-11,9%, v-41,9%), kozji sir (p-16,3%, v-23,1), ovči sir (p-15,0%, v-25,6%), jaja (p-18,1%, v-42,5%), pšenicu (p-26,3%, v-36,3%), gluten (p-22,5%, v-48,8%), badem (p-15,0%, v-21,9%), crni biber (p-37,5%, v-29,4%) i vanilu (p-11,3%, v-32,5%). Gluten je jedan od najčešćih uzroka intolerancije hrane. Pacijent može da izbegava da jede problematičnu hranu navedenu u nalazima i zameni je hranom koju organizam toleriše.

P009
IgG – MARKER FOR FOOD TOLERANCE

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There are various reasons why a food can cause problems, among them a classic IgE food allergy (type I) and a delayed IgG food allergy (type III).A type III food allergy is when the immune system (B cells and plasma cells) produces specific IgG antibodies against usually harmless foodstuffs. The immune system falsely considers these to be harmful substances, because the intestinal wall can be damaged or become permeable as a result of stress, infection or medication and large quantities of undigested foods can make their way into the bloodstream. IgG antibodies and the antigens agglomerate to form immune complexes, which adhere to organs and tissues and activate the complement system. When the immune complexes are destroyed, the surrounding tissues are also damaged, which leads to low-grade inflammatory condition. A regular intake of the concerned food may then cause a chronic inflammation. Approximately 45% of people have an intolerance to a food, many of these people suffer with chronic symptoms (gastrointestinal, skin, headache, migraine, overweight etc.) with delayed appearance (after a few hours or even days), that could be reduced or eliminated if only they could pinpoint the cause of the problem through food intolerance testing. Our interest is to find out which type of food often gives an increase or high titer of antibodies to random patients from our country. Food screen analyses is works whit ELISA method. IgG titer can be quantified in several groups (negative, low, increased and high). Our food screen analyses IgG antibody reactions to 90 possible type of foods. In our laboratory, the analysis was introduced in January 2014. Since then, 740 analysis have been made. We analyzed 160 randomized patients aged 18 to 65 years. Of all 90 type of foods, our patients are usually intolerant of cow's milk (increased-i 10.6% high-h 44.4%), cow sour milk (i-11.9% h-41.9%), goat cheese (i-16.3% h-23.1%), sheep cheese (i-15.0% h-25.6%), eggs (i-18.1% h-42.5%), wheat (i-26.3% h-36.3%), gluten (i-22.5% h-48,8%), almond (i-15.0% h-21,9%), black pepper (i-37.5% h-29.4%) and vanilla (i-11.3% h-32.5%). Gluten is one of the most common causes of food intolerance. The patient can avoid eating the problematic foods listed in the findings and replace them with foods he tolerates.

P010
PRAĆENJE PRE-ANALITIČKIH GREŠAKA U KLINIČKOJ LABORATORIJI

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Procenjeno je da pre i post-analitičke greške čine 93% od svih grešaka u laboratorijskom radu. Greške u bilo kojoj fazi procesa prikupljanja, testiranja i interpretiranja rezultata mogu da dovedu do ozbiljne greške u postavljanju dijagnoze pacijenta. Greške tokom procesa prikupljanja nisu neizbežne, ali mogu se sprečiti primenom kontrole kvaliteta, kontinuiranog obrazovanja i efikasnosti sistema za prikupljanje podataka. U ovom radu vršena je perspektivna analiza dobijenih rezultata iz Centra za medicinsku biohemiju, Kliničkog centra u Nišu, Srbija o greškama u preanalitickoj fazi i izvršeno je sumiranje i obrada dobijenih podataka. Osoblje u laboratoriji je evidentiralo greške i sam prijem uzoraka koji su prihvatani ili odbijani za dalju laboratorijsku obradu. Od 48 328 pristiglih epruveta u laboratoriju za skrining u periodu od 8 meseci, pre analitičke greške su primećene kod oko 4,9% od ukupnog broja primljenih uzoraka. Zatim su izračunati procenti različitih tipova pre-analitičkih grešaka. Većina odbijenih uzoraka pristiglih na analizu u laboratoriju je usledila usled postojanja hemolize uzoraka, što čini 1,1% od ukupnog broja uzoraka pristiglih tokom ovog perioda. Količina krvi koje nije bilo dovoljno za potpunu analizu je činila 0,08% svih evidentiranih grešaka. Ukupno 0,4% od svih primljenih uzoraka sa odeljenja donošeno je u laboratoriju u pogrešnoj epruveti. Ljudska uloga u sakupljanu uzoraka krvi i drugih telesnih tečnosti može imati za cilj potpunu eliminaciju grešaka u vezi sa laboratorijskim ispitivanjima. Dobra praksa i usklađenost sa novim strategijama za sprečavanje grešaka može dovesti do značajnog smanjenja pre-analitičkih grešaka. Praksa vođenja evidencije o greškama u svim fazama analize i korektivne strategije za njihovu prevenciju može postepeno sprečiti laboratorije od postojanja takvih grešaka a samim tim i unaprediti kvalitet rada u biomedicinskim laboratorijama.

P010
FOLLOWING THE PRE-ANALYTICAL ERRORS IN THE CLINICAL LABORATORY

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Pre- and post-analytical errors are estimated to constitute 93% of errors in the biomedical laboratory. Errors at any stage of the collection, testing and reporting process can potentially lead to a serious patient misdiagnosis. Errors during the collection process are not inevitable but can be prevented with a diligent application of quality control, continuing education and effective collection systems. A perspective analysis of the results obtained from the biomedical laboratory of Clinical centre of Nis, Serbia for errors of the preanalytical phase has been carried out to summarize data. Laboratory personnel were asked to register rejections, and causes for rejection of wards. Out of the 48328 blood collection tubes screened over a period of 8 months, pre-analytical errors were observed in approximately 4.9% of the total number of samples received. The distribution of the different types of errors was then calculated. The majority of the rejected samples were haemolysed, which accounts for 1.1% of the total number of samples received during this period. The amount of blood was insufficient for complete analysis in 0.08%. A total of 0.4% samples in the wards were accompanied by inappropriate requisition slips. The human role in sample collection makes complete elimination of errors associated with laboratory testing unrealistic. However, good practise and compliance with the new strategies for error prevention can lead to a substantial reduction in pre-analytical errors. A practice of keeping a record of the errors at all stages of analysis and then devising corrective strategies for their prevention can gradually free a laboratory from such errors.

P011
UNAPREĐENJE INTERNE I EKSTERNE KOMUNIKACIJE U SLUŽBI LABORATORIJSKE DIJAGNOSTIKE UVOĐENJEM LABORATORIJSKOG INFORMACIONOG SISTEMA (LIS)

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Dom zdravlja Pančevo

Komunikacija u okviru laboratorije je jedan od osnovnih vidova uspostavljanja kvalitetne saradnje i odnosa između kolega, kao i odnosa sa drugim službama i deljenja informacija koje su bitne za samu laboratorijsku dijagnostiku pacijenata. Procedurom o internoj i eksternoj komunikaciji usaglašena su pravila u Domu zdravlja Pančevo. Interna komunikacija se odvija između zaposlenih u vezi sa informacijama o pacijentima, uzorcima kao i dobijenim rezultatima i nalazima za izdavanje. Vode se posebne sveske, koje olakšavaju komunikaciju između zaposlenih, kao što je sveska hitnih pacijenata, sveska neusaglašenosti, sveska opisa seruma, sveska primopredaje smene. Standardizacijom i uvođenjem procedure poboljšava se kvalitet rada laboratorijske dijagnostike, putem evidentiranja podataka o pacijentima dobija se celokupna slika i međusobna usaglašenost. Eksterna komunikacija se dešava između zaposlenih laboratorije sa pacijentima i lekarima. U Domu zdravlja Pančevo ona je redovna i regulisana procedurom, a odvija se u situacijama kada je potrebno izveštavanje/telefonom o alarmantnim laboratorijskim nalazima, kao i kad je uočena velika razlika između dva uzastopna nalaza (delta ček). Svaki poziv se evidentira u svesci za obaveštavanje o alarmantnim vrednostima. Ovaj vid komunikacije je usavršen i poboljšan uvođenjem laboratorijskog informacionog sistema (LIS-a), putem kojeg je moguća komunikacija lekara sa biohemičarem, unošenjem napomena u elektronskom uputu. Na ovaj način i medicinski biohemičar može komunicirati sa lekarom preko rezultata koji direktno stiže u elektronski karton pacijenta posle validacije. Time je ubrzano dobijanje i izdavanje rezultata hitnih pacijenata, poboljšanje zadovoljstva pacijenata i efikasno izdavanje terapije od ordinirajućeg lekara. Komunikacija sa pacijentima se obavlja putem sveske evidencije o neusaglašenosti kao i putem napomena ukoliko je potrebno ponoviti vađenje krvi, uz moguću napomenu ili sugestiju o pripremi pacijenta za ponovno uzorkovanje. Svakodnevna komunikacija između pacijenata i laboratorijskog osoblja je utvrđena etičkim principima i pravima pacijenata, a to se evidentira u Knjizi utisaka koja je dostupna svim pacijentima i nalazi se na vidnom mestu. Posle uvođenja procedure i njene primene, urađena je anketa zadovoljstva i poboljšanja komunikacije i saradnje između biohemičara i kliničara na nivou Doma zdravlja Pančevo, gde

P011
IMPROVING INTERNAL AND EXTERNAL COMMUNICATION IN LABORATORY DIAGNOSTICS BY INTRODUCING THE LABORATORY INFORMATION SYSTEM (LIS)

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Communication within the laboratory is one of the basic aspects of establishing good cooperation and relationships between colleagues, as well as relationships with other services and the sharing of information that are essential for the laboratory diagnostics of patients. The procedure for internal and external communication harmonized the rules in the Health Center Pančevo. Internal communication takes place between employees about patients, samples, as well as the results obtained and the findings for the issue. Special notebooks are guided, which facilitate communication between employees, such as emergency patients, non-compliant notebook, serum description notebook, shift handbook. By standardizing and introducing the procedure, the quality of laboratory diagnostics is improved, by recording the data on patients, the overall picture and mutual compliance are obtained. External communication occurs between the laboratories with patients and doctors. In the Pancevo Health Center it is common and regulated by the procedure, and it occurs in situations when reporting by phone about alarming laboratory findings, as well as when there is a big difference between two successive findings (delta check). Each call is recorded in the Notification Alarm Alerts. This type of communication has been checked and improved by the introduction of a laboratory information system (LIS), through which physician communication with a biochemist is possible, by introducing notes in an electronic instruction. In this way, a medical biochemist can communicate with a physician through the results that directly arrive at the patient's electronic card after validation. This is an accelerated acquisition and release of the results of emergency patients, improvement of patient satisfaction and efficient delivery of therapy by an ordinating physician. Communication with patient is done through a non-compliance record and as a reminder if blood extraction is required, with a possible remark or suggestion on the patient's preparation for re-sampling. Daily communication between patients and laboratory staff is established by ethical principles and patients' rights, which is recorded in the Book of impressions that is available to all patients and is holded in a visible place. Following the introduction of the procedure and its application, a survey of satisfaction and improvement of communication and cooperation

su zabeleženi veoma pozitivni rezultati. Zaključak je da je standardizacija komunikacije u laboratorijama jedan od vrlo značajnih faktora koji doprinosi obezbeđivanju kvaliteta laboratorijskog ispitivanja i formiranju baze podataka kao vida informacija koje su u najboljem interesu za konačno zbrinjavanje pacijenata.

P012
POREĐENJE VREDNOSTI NATRIJUMA I KALIJUMA DOBIJENIH SA ANALIZATORA BECKMAN COULTER AU680® I ILYTE® INSTRUMENTATION LABORATORY

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Određivanje elektrolitnog balansa je neophodno za procenu ozbiljnih poremećaja homeostaze. Naš cilj je bio da se uporede vrednosti koncentracija natrijuma i kalijuma dobijene sa analizatora AU680® proizvodjača Beckman Coulter i sistema Ilyte® proizvođača Instrumentation Laboratory. Analizirano je ukupno 216 uzoraka pacijenata primljenih u Klinički centar Kragujevac. Za dobijanje seruma za svakog pacijenta korišćene su epruvete sa klot aktivatorom. Uzorci su prvo analizirani na Ilyte® sistemu, i odmah nakon toga na analizatoru AU680®. Oba analizatora koriste isti metod – jon selektivne elektrode (ISE) koji omogućava direktno merenje svakog jona od interesa u uzorku. Procena korelacije između rezultata merenja je izvedena pomoću Pearson-ovog testa korelacije. Za poređenje vrednosti ispitivanih parametara dobijenih sa različitih analizatora korišćen je t-test za uparene uzorke. Vrednosti koncentracije natrijuma sa oba analizatora koreliraju jedne sa drugim uz koeficijent korelacije 0,639 ($p<0,01$). Koeficijent korelacije za koncentracije kalijuma bio je viši 0,986 ($p<0,01$). Poređenje vrednosti ispitivanih parametara dobijenih sa različitih analizatora ukazalo da nije bilo značajne razlike u koncentracijama natrijuma dobijenih sa AU680® (M=136,44, SD=12,70) i Ilyte® (M=137,57, SD=8,01); t(215)=-1,704 ($p=0,09$). Rezultati koncentracija kalijuma nisu pokazali značajnu razliku – AU680® (M=3,82, SD=1,18), Ilyte® (M=3,83, SD=1,23); t(215)=-0,258 ($p<0,796$). Naši rezultati su pokazali da između rezultata koncentracija natrijuma i kalijuma dobijenih sa analizatora AU680® i Ilyte® sistema postoji slaganje.

between biochemists and clinicians at the health center Pancevo was done and where very positive results were recorded. The conclusion is that standardization of communication in laboratories is one of the most important factors that contributes to ensuring the quality of laboratory testing and the establishment of a database as the kind of information that is in the best interest for the ultimate care of patients.

P012
COMPARISON OF SODIUM AND POTASSIUM LEVELS OBTAINED BY BECKMAN COULTER AU680® ANALYZER AND ILYTE® SYSTEM BY INSTRUMENTATION LABORATORY

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Electrolytes balance is an essential measurement in the assessment of several homeostasis disease. Our purpose was to compare the levels of sodium and potassium obtained by AU680® analyzer by Beckman Coulter, Inc. with the levels obtained using ILyte® system by Instrumentation Laboratory. A total of 216 samples from the patients admitted in the Clinical Center Kragujevac were analyzed. Serum samples, using clot activator tubes, had been collected from each participant. Samples were first processed by ILyte® system, and immediately thereafter by AU680® analyzer. Both analyzers used same method – Ion Selective Electrode (ISE) which offers direct measurements for each ion of interest in the sample. The correlation study was performed using Pearson correlation test. A paired-samples t-test was conducted to compare examined parameters obtained by different analyzers. Sodium levels quantified using both analyzers were significantly related with correlation coefficient of 0.639 ($p<0.01$). Correlation coefficient for potassium was higher 0.986 ($p<0.01$). The comparison of the values of examined parameters obtained by two analyzers suggested that there was not a significant difference in the scores for Na^+AU680® (M=136.44, SD=12.70) and Na^+ ILyte® (M=137.57, SD=8.01); t(215)=-1.704 ($p<0.09$). K^+ results were not show significant difference – K^+ by AU680® (M=3.82, SD=1.18) and K^+ by ILyte® (M=3.83, SD=1.23); t(215)=-0.258 ($p<0.796$). Our results indicate acceptable concordance between the results of sodium and potassium obtained from AU680® analyzer and ILyte® system.

P013
NIVOI SERUMSKE KREATIN KINAZE U HIPOTIREOZI

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Cilj ovog istraživanja je da se utvrdi nivo serumske kreatin kinaze (CK) u izraženoj i subkliničkoj hipotireozi. Zatim da se istraži promena nivoa CK nakon primenjene hormonske terapije i da se proceni odnos između slobodnog trijodtironina (FT3), slobodanog tiroksina (FT4) i tireotropnog hormona (TSH), kao i stepen oštećenja skeletnih mišića. Drugi uzroci promene nivoa CK su bili isključeni. U istraživanje je bilo uključeno 26 pacijenata (24 žene i 2 muškarca, starosti 41,63 +/- 11,55 godina) sa izraženom hipotireozom, 36 pacijenata (35 žena, 1 muškarac, starosti 40,53 +/- 11,45 godina) sa subkliničkom hipotireozom, kao i 30 kontrola (27 žena, 3 muškarca, uzrasta od 39,71 +/- 11,10 godina). U serumu su odredjivani sledeći biohemijski parametri: TSH, FT4, FT3, i CK. Povećan nivo serumske kreatin kinaze je pronađen kod 17 pacijenata (58%) sa izraženom hipotireozom i kod 4 pacijenta (10%) sa subkliničkom hipotireozom. Iako je pronađeno statistički značajno povećanje nivoa CK kod pacijenata sa izraženom hipotireozom u poređenju sa pacijentima sa subkliničkom hipotireozom i kontrolama (p = 0,0001, p = 0,01, respektivno), razlika je pronađena između subkliničke hipotireoze i kontrolne grupe (p = 0,14). Kod hipotiroidnih pacijenata, utvrđena je pozitivna korelacija između CK i TSH (R = 0,423; p = 0,04), i negativna korelacija između CK i FT3 (R = 0,525; p = 0,002) i između CK i FT4 (r = 0,435; p = 0,04). Nivo serumske kreatin kinaze je smanjen na normalan nivo posle primene adekvatne hormonske terapije i funkcija štitne žlezde je normalizovana tretmanom. Oštećenje skeletnih mišića je bilo izraženije kod pacijenata sa izraženom hipotireozom.

P013
SERUM LEVELS OF CREATINE KINASE IN HYPOTHYROIDISM

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The aim of this study was to determine serum levels of creative kinase (CK) in overt and subclinical hypothyroidism. To investigate the change in CK levels with treatment and to evaluate the relationship between free triiodothyronine (FT3), free thyroxine (FT4), and thyrotropin (TSH) levels and the degree of skeletal muscle involvement, as determined by serum CK levels. Patients with other causes of CK elevation were excluded. We included 26 patients (24 women and 2 men, ages 41.63 +/- 11.55 years) with overt hypothyroidism, 36 patients (35 women, 1 man, ages 40.53 +/- 11.45 years) with subclinical hypothyroidism, and 30 age- and gender-matched controls (27 women, 3 men, ages 40.81 +/- 11.20 years) in the study. Serum levels of TSH, FT4, FT3, and CK were measured in all subjects. Creatine kinase elevation was found in 17 patients (58%) with overt hypothyroidism and in 4 patients (10%) with subclinical hypothyroidism. Although a statistically significant elevation of CK levels was found in patients with overt hypothyroidism when compared with patients with subclinical hypothyroidism and controls (p=0.0001, p = 0.01, respectively), no difference was found between the subclinical hypothyroidism and control groups (p = 0.14). In hypothyroid (overt and subclinical) patients, a positive correlation was found between CK and TSH (r = 0.423; p = 0.04), and a negative correlation between CK and FT3 (r = 0.525; p = 0.002) and between CK and FT4 (r =0.435; p = 0.04). Creatine kinase levels decreased to normal levels after thyroid function normalized with treatment. In conclusion, skeletal muscle is affected by hypothyroidism more profoundly in cases of overt hypothyroidism, less so when subclinical hypothyroidism is present.

P014
LAŽNO POVIŠENA VREDNOST SLOBODNOG TIROKSINA IZMERENOG ELEKTROHEMILUMINISCENTNOM METODOM: PRIKAZ SLUČAJA

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Prikazan je slučaj žene, u dobi od 65 godina, sa dijagnozom Hypothyreosis supclinica, Thyroiditis chr. susp. i Struma multinodosa gl. thyroidea (dijagnoza postavljena prije devet godina), na redovnoj kontroli hormona tireotropina (TSH) i slobodnog tiroksina (FT4) u našoj laboratoriji. Pacijentica je svih proteklih devet godina imala usklađene nalaze hormona, sa urednom kliničkom slikom. U serumu je izmerena visoka koncentracija FT4 (>100 pmol/L), a normalna vrednost TSH (3,67 mIU/L). Za merenje je korišten elektrohemiluminiscentni immunoesej (ECLIA, Cobas e 601, Roche Diagnostics GmbH, Germany). U razgovoru sa ordinirajućim lekarom dobijena je informacija da se naš nalaz FT4 ne uklapa u kliničku sliku pacijenta. Takođe, pacijentica nije uzimala biotin koji bi mogao interferirati u ECLIA metodi. Nakon tri dana iz novog uzorka napravljen je kontrolni nalaz koji je bio isti. Uzorak smo sačuvali, te naknadno analizirali sa još dve metode različitih proizvođača (preporuka kod sumnje na interferencije). Dobijeni rezultati za FT4 su bili na ARCHITECT ci8200 Abbott-u 13,22 pmol/L, a na ADVIA Centaur-u 14,05 pmol/L (Siemens dijagnostika), dok nije bilo većih promena u rezultatima TSH. Time smo potvrdili da se radi o interferenciji u metodi ECLIA, najverovatnije uzrokovanoj prisutnošću heterofilnih antitela ili autoantitela. Interferencije koje se javljaju u imunohemijskim metodama neophodno je pravodobno uočiti kako bi se izbeglo postavljanje pogrešne dijagnoze kao i pogrešne terapije.

Ključne reči: slobodni tiroksin; interferencija; prikaz slučaja.

P014
FALSELY ELEVATED VALUE OF FREE THYROXINE MEASURED BY ELECTROCHEMILUMINESCENCE METHOD: CASE REPORT

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Here, it is shown the case of a 65-year-old female patient diagnosed with Hypothyreosis subclinical, Thyroiditis chr. susp. and Struma multinodosa gl. thyroidea (this diagnosis was set nine years ago) on regular control of thyrotropin (TSH) and free thyroxine hormone (FT4) in our laboratory. The patient has had harmonized hormonal findings with an orderly clinical picture for the past nine years. The high concentration of FT4 (> 100 pmol/L) and the normal value of TSH (3.67 mIU/L) were measured in the serum. Hormones were measured by electrochemiluminiscence immunoassay (ECLIA, Cobas e 601, Roche Diagnostics, Mannheim, Germany. We got information that our FT4 finding was inconsistent with the clinical picture of the patient in conversation with a doctor. Also, the patient did not take a biotin that could interfere with the ECLIA. A control finding made from a new sample was the same after three days. We were preserved the sample and then analysed it with two other methods of different manufacturers (the recommendation when interference is suspected). The gained values for FT4 using ARCHITECT ci8200 Abbott Diagnostics were 13.22 pmol/L and the gained values for FT4 using ADVIA Centaur SIEMENS Diagnostics were 14.05 pmol/L while there were no major changes in TSH results. Herewith, we confirmed that this is interference most likely caused due to the presence of heterophile antibodies or autoantibodies using the ECLIA method. It is necessary to perceive the interferences in immunochemical methods on time in order to avoid misdiagnosis as well as wrong therapy.

Keywords: free thyroxine; interference; case report.

P015
POREĐENJE DVA TESTA ZA ODREĐIVANJE ANTI-XA AKTIVNOSTI

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Niskomolekularni heparini (LMWH) su lekovi koji se koriste u prevenciji i terapiji tromboembolijskih bolesti. Efekat ovih lekova se prati određivanjem anti-Xa aktivnosti. U Zavodu za laboratorijsku dijagnostiku BioMedica su korišćena dva testa: Berichrom® Heparin proizvođača Siemens i STA®- LIQUID ANTI-Xa proizvođača Stago. Anti-Xa aktivnost testom Berichrom® Heparin je određivana end-point metodom na spektrofotometru StatFax, a STA®-LIQUID ANTI-Xa testom kinetičkom metodom na analizatoru STA Compact Max. Kod 46 pacijenata koji primaju LMWH, određivana je anti-Xa aktivnost i statistički su obrađeni rezultati. Iz uputstava proizvođača, analitičke karakteristike za Berichrom® Heparin i STA®-LIQUID ANTI-Xa su redom: analitička osetljivost (za oba testa je 0,10 IU/mL), merni opseg (zavisi od lota kalibratora, do 2 IU/mL) i preciznost (CV 4–7 %, CV 2,9–3,7%). Neparametarskom korelacionom analizom je dobijen statistički značajan Spirmanov koeficijent korelacije ($\rho = 0{,}776$, $p < 0{,}01$), što ukazuje na pozitivnu povezanost između ova dva testa. Regresionom analizom je dobijena jednačina prave: $y = -0{,}01 + 0{,}79x$ (x: aktivnost dobijena Berichrom® Heparin testom, a y: aktivnost dobijena STA®-LIQUID ANTI-Xa testom). Statistička analiza ukazuje da je anti-Xa aktivnost određivana STA®-LIQUID ANTI-Xa testom proizvođača Stago oko 20 % niža, što je u dobroj korelaciji sa kliničkim efektom LMWH.

P015
COMPARISON OF TWO ASSAYS FOR DETERMINATION OF ANTI-XA ACTIVITY

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Low molecular weight heparins (LMWH) are medicinal products used in prevention and treatment of thromboembolic diseases. Pharmacological effect of these products is monitored by determining anti-Xa activity. At the Institute for Laboratory Diagnostics BioMedica, two assays were used: Siemens Berichrom® Heparin and Stago STA®-LIQUID ANTI-Xa. Anti-Xa activity with Berichrom® Heparin assay was determined using the endpoint method on the StatFax spectrophotometer, and with STA®-LIQUID ANTI-Xa assay using the kinetic method on the STA Compact Max analyzer. The anti-Xa activity was measured in 46 patients receiving LMWH and the results were statistically processed. The analytical performance characteristics of Berichrom® Heparin and STA®-LIQUID ANTI-Xa are listed respectively: analytical sensitivity (for both assays is 0.10 IU/mL), measuring range (depending on the calibrator lot, up to 2 IU/mL) and precision (CV 4–7%, CV 2.9–3.7%). Non-parametric correlation analysis showed a statistically significant Spearman's correlation coefficient ($\rho = 0.776$, $p < 0.01$), indicating a positive correlation between these two assays. Comparison of assays using regression analysis obtained the following equation: $y = -0.01 + 0.79x$ (x: activity obtained by Berichrom® Heparin assay, and y: activity obtained by STA®-LIQUID ANTI-Xa assay). Statistical analysis indicates that the anti-Xa activity obtained by the Stago STA®-LIQUID ANTI-Xa assay is approximately 20% lower, which correlates well with the clinical effect of LMWHs.

P016
EFEKAT OLANZAPINA NA MITOHONDRIJALNE KOMPLEKSE 1, 2 I 3 I ATP-SINTAZU U TKIVU MOZGA

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Olanzapin pripada grupi lekova atipičnih antipsihotika. Antimanični i antipsihotični efekti olanzapina verovatno su posredovani blokadom dopaminskih D2 i serotoninskih 5HT2A receptora, naročito u mezolimbičkom putu u mozgu. Pored toga, primećeni su i poremećaji energetskog metabolizma ili disfunkcije mitohondrija kod pacijenata sa bipolarnim poremećajem i šizofrenijom. Nije tačno poznato da li olanzapin može imati terapeutsko dejstvo na mitohondrijalnu respiraciju u moždanim ćelijama. Iz ovog razloga, ova studija ima za cilj ispitivanje efekata olanzapina na mitohondrijalni kompleks 1, 2, 3 i 5 ATP-sintaze u tkivima prednjeg desnog korteksa mozga pacova. U našoj studiji korišćeno je 30 odraslih vistar-albino pacova. Eksperimentalno, pacovi su podeljeni u dve grupe: kontrolnu i olanzapin grupu. Olanzapin i izotonični fiziološki rastvor davani su intraperitonealno tokom 30 dana. Na kraju eksperimenta, pacovi su bili žrtvovani. Desni prefrontalni korteksi su potopljeni u SET pufer (250 mmol/L saharoza, 2 mmol/L EDTA, 10 mmol/L TRIS pH 7,4). Homogenizacija je zatim izvršena u laboratoriji za biohemiju. Frakcija supernatanta iz homogenata koja sadrži delove mitohondrija uzeta je za biohemijske analize. Mitohondrijalni kompleksi 1, 2, 3 i ATP-sintaza su određeni komercijalnim testovima, a proteini Lowry metodom. Prema rezultatima statističke analize, nije postojala statistički značajna promena za parametre kompleksa 1, 2, 3 i aktivnosti ATP-sintaze između kontrolne i olanzapinske grupe. U zaključku, sadašnji rezultati pokazuju da tretman olanzapina ne dovodi do promena u kompleksima 1, 2, 3 i ATP-sintazne aktivnosti transportnog lanca elektrona u tkivima mozga pacova.

P016
THE EFFECT OF OLANZAPİNE ON MITOCHONDRIA COMPLEXES 1, 2, 3 AND ATP-SYNTASE IN BRAIN TISSUE

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Olanzapine belongs to the group of medicinal drugs called atypical antipsychotics. The primer antimanic and antipsychotic effect of olanzapine are likely regulated by the blockade of dopamine D2 and serotonin 5HT2A receptors particularly in the mesolimbic pathway in the brain. In addition, a distubance of energy metabolism or disfunction of mitochondria in patients with bipolar disorder and schizophrenia are observed frequently in these disorders. It is exactly unknown whether olanzapine may have theropeutic potential on mitochondrial respiration in the brain cells. For this reason, the present study aims at examining the effects of olanzapine on mitochondrial complex 1, 2, 3 and 5 ATP-synthase in the brain right frontal cortex tissues of rats. In our study, 30 adult wistar-albino rats were used. Experimentally, rats were divided into two groups: control and olanzapine groups. Olanzapine and isotonic saline solution were administered intraperitoneally for 30 days. At the end of the experiment, the rats were decapitated. Brain right prefrontal cortices were taken into SET buffer (250 mmol/L sucrose, 2 mmol/L EDTA, 10 mmol/L tris-base pH 7.4). Homogenization was then carried out in biochemistry laboratory. Supernatant fraction from homogenate containing mitochondria parts were taken for biochemical analyzes. Mitochondria complex 1, 2, 3 and ATP-synthase were measured by using kits and protein amount was measured by using Lowry method. According to statistical analyse results, no statistical alteration was observed for studied parameters complexes 1, 2, 3 and ATP-synthase activities between the control and olanzapine groups. In conclusion the present results show that olanzapine treatment does not lead to any changes in complexes 1, 2, 3 and ATP-synthase activity of the electron transport chain in brain tissues of rats.

P017
POREĐENJE NOVOG POINT-OF-CARE INCLIXTM PCT TESTA I KOMPARATIVNE IMUNOHEMIJSKE METODE ZA ODREĐIVANJE PROKALCITONINA

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Prokalcitonin (PCT) se smatra osetljivim biomarkerom za rano utvrđivanje postojanja bakterijske infekcije i sepse, jer u prisustvu sistemske infekcije dolazi do značajnog i naglog porasta njegove koncentracije. Poslednjih godina posebna pažnja se poklanja razvoju brzih testova za određivanje PCT koji značajno skraćuju vreme dobijanja rezultata, što omogućava brže postavljanje dijagnoze i započinjanje tretmana pacijenta. INCLIXTM PCT test se koristi na point-of-care INCLIXTM analizatoru (Sugentech, Inc., Korea) gde se kvantifiacija nivoa PCT vrši analiziranjem slika dobijenih primenom imunohromatografske metode. Cilj ovog rada je poređenje rezultata INCLIXTM PCT testa sa već postojećom imunohemijskom metodom koja se primenjuje u laboratoriji. Uzorci pacijenata (n = 47) su sakupljeni u laboratoriji Kliničko-bolničkog centra »Zvezdara«, gde je nivo PCT izmeren upotrebom Elecsys BRAHMS PCT testa ECLIA metodom (Roche Diagnostics). Određivanje nivoa PCT uz pomoć INCLIXTM PCT testa izvršeno je u Centru za laboratorijsku medicinu Farmaceutskog fakulteta u Beogradu. Prema uputstvu proizvođača, redom su navedene za point-of-care i imunohemijsku metodu analitička osetljivost (0,13 ng/mL i 0,02 ng/mL) i dinamički opseg (0,25–40 ng/mL i 0,02–100 ng/mL). Poređenje metoda je izvršeno uporednom analizom uzoraka čije su koncentracije utvrđene upotrebom obe navedene metode, isključujući uzorke PCT van dinamičkog opsega. Neparametarskom korelacionom analizom dobijen je statistički značajan koeficijent korelacije (ρ=0,96, p<0,01), što ukazuje na linearnu povezanost ispitivanih metoda. Primenom Passing i Bablok regresione analize dobijena je sledeća jednačina prave: y = 0,02+1,19x (95%CI za odsečak je -0,29–0,26, 95%CI za nagib je 0,84–1,53). Dobijeni interval pouzdanosti od 95% za nagib prave i odsečak ukazuju da nema konstantnog i proporcionalnog odstupanja u merenju dve metode. Cusum-ovim testom linearnosti nije utvrđeno značajno odstupanje od linearnosti (p=1.00). Na osnovu prikazanih podataka može se zaključiti da nema sistematskog odstupanja između rezultata dobijenih primenom INCLIXTM PCT testa i Elecsys BRAHMS PCT zbog čega je moguća uporedna upotreba ispitivanih metoda.

P017
COMPARISON OF A NEW POINT-OF-CARE INCLIXTM PCT TEST AND COMPARATIVE IMMUNOASSAY FOR PROCALCITONIN QUANTIFICATION

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Prokalcitonin (PCT) is considered as a sensitive biomarker for early diagnose of bacterial infection and sepsis, due to its significant and quick increase in systematic infection. During last several years there is a growing interest for development of rapid tests for PCT determination, which would considerably shorten turnaround time, allowing faster diagnose and treatment of patients. INCLIXTM PCT test is used with the point-of-care INCLIXTM Analyzer (Sugentech, Inc., Korea) which gives quantitative assessment of PCT by analyzing images obtained with immunochromatographic method. The aim of this work was to compare the results of INCLIXTM PCT test with the immunoassay currently used in laboratory. Patient samples (n = 47) were collected in the laboratory of University Medical Center »Zvezdara«, where PCT concentrations were measured using Elecsys BRAHMS PCT test with ECLIA method (Roche Diagnostics). Measurements of PCT using INCLIXTM PCT test were conducted in The Center for laboratory medicine at The Faculty of pharmacy in Belgrade. According to manufacturers' instructions for point-of-care and immunochemistry assay, analytical sensitivity (0.13 ng/mL and 0.02 ng/mL) and dynamic range (0.25–40 ng/mL and 0.02–100 ng/mL) are given respectively. Comparison of methods was performed based on PCT results available from both methods, excluding samples with PCT outside the reportable range. Nonparametric correlation analyses showed statistically significant coefficient of correlation (ρ=0.96, p<0.01), indicating linear correlation of examined methods. The Passing and Bablok regression analysis gave the following regression equation: y=0,02+1,19x (95%CI for intercept was -0.29–0.26, 95%CI for slope was 0.84–1.53). Based on 95%CI for intercept and slope, it can be concluded that there is neither constant nor proportional difference between two methods. Cusum test for linearity indicates no significant deviation from linearity (p=1.00). According to presented data, it can be concluded that there is no systematic deviation between results determined by INCLIXTM PCT test and Elecsys BRAHMS PCT, so both methods can be used interchangeably.

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P001
ODREĐIVANJE ANTIOKSIDATIVNE AKTIVNOSTI DODATAKA ISHRANI NA BAZI GLJIVA

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Gljive imaju dugu istoriju medicinske upotrebe. Cenjene su zbog svog izvrsnog ukusa i medicinskih svojstava. Divlje ili kultivisane, pored svojih nutritivnih svojstava, povezane su sa značajnim antioksidativnim osobinama zbog sadržaja bioaktivnih jedinjenja, kao što su polisaharidi, polifenoli, vitamini i minerali. Cilj ovog rada bio je da se ispita antioksidativna aktivnost dodataka ishrani na bazi gljiva na našem tržištu, koji se koriste primarno kao izvor beta glukana sa imunomodulatornim svojstvima. Istraživanje je obuhvatilo 8 komercijalnih dodataka ishrani i 5 različitih sirovina na bazi gljiva koje služe za proizvodnju dodataka ishrani. Pripremane su tri vrste ekstrakata: vodeni, metanolni (80%) i etanolni (50%). Određivan je sadržaj ukupnih polifenolnih jedinjenja, kao i antioksidativna aktivnost FRAP, ABTS i CUPRAC spektrofotometrijskim metodama. Antioksidativni kompozitni indeks (ACI) dobijen je računskim putem. Sadržaj ukupnih polifenolnih jedinjenja je bio najveći u uzorcima dodataka ishrani na bazi Čaga i Reishi gljiva. Najviše vrednosti ukupnih polifenolnih jedinjenja utvrđene su u etanolnim (50%) ekstraktima i kretale su se u rasponu 382,8–1508,0 μgGAE/g. Sva tri testa za ispitivanje antioksidativne aktivnosti su pokazala konzistentne rezultate, pri čemu su uzorci sa većim sadržajem polifenolnih jedinjenja pokazali i najveću antioksidativnu aktivnost. Utvrđene su statistički značajno više vrednosti ACI za 80% metanolne ekstrakte u odnosu na vodene i 50% etanolne ekstrakte ($p<0,05$). U sve tri vrste analiziranih ekstrakata, utvrđena je pozitivna Spearman-ova korelacija između ukupnog sadržaja polifenolnih jedinjenja i vrednosti ACI ($\rho=0,883$ za vodu, $\rho=0,889$ za 80% metanol i $\rho=0,950$ za 50% etanol, $p<0,0001$ za sva tri). Rezultati istraživanja ukazuju na postojanje antioksidativnog potencijala dodataka ishrani na bazi gljiva kao i na njihove moguće zdravstveno protektivne efekte.

P001
DETERMINATION OF ANTIOXIDATIVE ACTIVITY OF DIETARY SUPPLEMENTS BASED ON MUSHROOMS

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Mushrooms have a long history of medical use. They are appreciated for their excellent taste and medical properties. Wild or cultivated, in addition to their nutritional properties, they are associated with significant antioxidant properties due to the content of bioactive compounds, such as polysaccharides, polyphenols, vitamins and minerals. The aim of this study was to investigate the antioxidant activity of nutritional supplements based on mushrooms on our market, used primarily as a source of beta glucan with immunomodulatory properties. The study included 8 commercial nutritional supplements and 5 different mushroom-based raw materials for the production of nutritional supplements. Three types of extracts were prepared: aqueous, methanolic (80%) and ethanolic (50%). The content of total polyphenolic compounds as well as the antioxidative activity of FRAP, ABTS and CUPRAC was determined with spectrophotometric methods. The antioxidative composite index (ACI) was obtained by calculation. The content of total polyphenolic compounds was the highest in the samples of dietary supplements based on Chaga and Reishi mushrooms. The highest values of total polyphenolic compounds were found in eth nolic (50%) extracts in the range of 382.8-1508.0 μgGAE/g. All tests for antioxidant activity testing showed consistent results, where samples with higher content of polyphenolic compounds showed the highest antioxidant activity. Statistically significantly higher ACI values for 80% methanol extracts relative to aqueous and 50% ethanolic extracts ($p<0.05$) were determined. In all three types of extracts, a positive Spearman correlation between the total content of the polyphenolic compounds and the ACI value was observed ($\rho=0.883$ for water, $\rho=0.889$ for 80% methanol and $\rho=0.950$ for 50% ethanol, $p<0.0001$ for all three). The results of the study indicate the existence of an antioxidant potential of nutritional supplements based on mushrooms, as well as their possible health-protective effects.

P002
PROTEKTIVNI EFEKAT POVRŠINSKI MODIFIKOVANIH NANOČESTICA TIO2 KAFEINSKOM KISELINOM NA OŠTEĆENJA DNK IN VITRO

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Uvod: Kafeinska kiselina (KK) je prirodni antioksidant i zahvaljujući sposobnosti uklanjanja slobodnih radikala ostvaruje svoj antigenotoksični efekat. Upotreba antigenotoksičnih jedinjenja posredstvom nanočestica je namenjena povećanju njihove bioraspoloživosti uz održanje njihovih karakteristika.

Cilj rada: Cilj ove studije je bio da se, po prvi put, uporede antigenotoksični efekti KK i ST kompleksa (TiO2/KK), pod identičnim eksperimentalnim uslovima.

Materijal i metode: Nanočestice 45-Å TiO2 sa većim udelom kristaličnosti anataza oblika su cintetizovane hidrolizom titanijum (IV) hlorida. Sintetizovane nanočestice TiO2 su okarakterisane pomoću prenosne elektronske mikroskopije i rentgenske difrakcione analize. Formiranje kompleksa sa prenosom naelektrisanja (charge transfer (CT) kompleks) između površinskih Ti atoma i KK identifikovano je neposrednom pojavom crvene boje. Spektrofotometrijska DŽob metoda – metod kontinuiranih varijacija - primenjena je za određivanje sastava ST kompleksa. Prilikom evaluacije antigenotoksičnosti, praćena je sposobnost rastvora KK, nanočestica TiO2 i CT komplesa da smanje broj ćelija sa H2O2 indukovanim DNK oštećenjima na leukocitima pune krvi, in vitro. Stepen oštećenja DNK procenjen je primenom komet testa.

Rezultati: Kao što je očekivano, rezultati su pokazali da je prisustvo KK izazvalo značajno smanjenje oštećenja DNK u opsegu upotrebljenih koncentracija. Slični rezultati su dobijeni i za ST kompleks.

Zaključak: Možemo zaključiti da površinski modifikovane nanočestice TiO2 sa KK ili sličnim jedinjenjima mogu biti iskorišćene za poboljšanje njihove bioraspoloživosti uz održanje korisnih karakteristika, jer značajne razlike između antigenotoksičnih svojstava KK i ST kompleksa nisu primećene.

Ključne reči: kafeinska kiselina; nanočestice TiO2; antigenotoksičnost; antioksidativna svojstva

P002
PROTECTIVE EFFECT OF SURFACE-MODIFIED TIO2 NANOPARTICLES WITH CAFFEIC ACID AGAINST DNA DAMAGE IN VITRO

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Inroduction: The caffeic acid (CA) is a natural antioxidant and its radical scavenging properties also appear to be responsible for its antigenotoxic properties. Nanoparticle-mediated delivery of antigenotoxic compounds is intended to increase their bioavailability while maintaining their effectiveness.

The Aim: The aim of this study was to compare, for the first time, antigenotoxic effects of free and bound CA to the surface of TiO2 NPs under identical experimental conditions.

Material and Methods: Colloids consisting of the 45-Å TiO2 nanoparticles (NPs) with anatase crystal structure were prepared by acidic hydrolysis of TiCl4. The synthesized TiO2 NPs were characterized using transmission electron microscopy and X-ray diffraction analysis. The interstitial charge transfer (ICT) complex formation between surface Ti atoms and CA is indicated by immediate appearance of red color. The spectrophotometric Job's method the continual variations method was applied for determination of the composition of ICT complex. During the evaluation of antigenotoxicity, the ability of free CA, TiO2 NPs and ICT complex to reduce the number of cells with H2O2-induced DNA damage in leukocytes of whole blood cells was observed, in vitro. The level of DNA damage was evaluated by comet assay method.

Results: As expected, the data indicated that the presence of free CA induced significant reduction of DNA damage in entire investigated concentration range. Similar results were also obtained for surface-modified TiO2 NPs with CA.

Conclusion To summarize, we suggest that surface-modified TiO2 NPs with CA and/or similar compounds can be used to improve their bioavailability while maintaining its beneficial activities, since no significant differences between the antigenotoxic properties of free and bound CA to the TiO2 NPs were noticed.

Keywords: ascorbic acid; TiO2 nanoparticles; antigenotoxic properties; antioxidative properties

P003
ANTIOKSIDATIVNA AKTIVNOST KOMERCIJALNIH ČAJEVA I PROIZVODA NA BAZI ČAJA

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Uvod: Oksidativni stres, kao poremećaj ravnoteže oksidanasa i antioksidanasa, igra važnu ulogu u patogenezi različitih hroničnih i degenerativnih bolesti. Određeni dijetetski suplementi privlače sve veću pažnju kao potencijalni agensi za prevenciju mnogih bolesti uzrokovanih oksidativnim stresom. Osim toga, postoji značajno interesovanje za utvrđivanje ukupnog sadržaja fenola i antioksidativnog kapaciteta različitih vrsta čajeva kao namirnica koje značajno doprinose ukupnom dijetarnom unosu antioksidanasa.

Cilj rada: Cilj rada je određivanje antioksidativne aktivnosti čajeva i biljnih dijetetskih suplemenata na bazi ekstrakta lista zelenog čaja. Takođe, određivan je sadržaj ukupnih polifenola i flavonoida koji značajno učestvuju u antioksidativnosti ovih proizvoda.

Materijali i metode: U eksperiment je bilo uključeno sedam vrsta biljnih i pet vrsta voćnih čajeva, kao i tri vrste biljna suplementa. Za procenu sadržaja ukupnih polifenola i flavonoida korišćeno je spektofotometrijsko određivanje na polistirenskim mikrotitracionim pločama. Za određivanje antioksidativnog kapaciteta korišćeni su DPPH, ABTS, FRAP i CUPRAC test, te da bi se upotpunio profil antioksidativnog kapaciteta čajeva i suplemenata na bazi zelenog čaja, primenjena su dva matematička modela – ukupni antioksidativni skor i relativni indeks antioksidativnog kapaciteta.

Rezultati: Rezultati eksperimenta su pokazali da voćni čajevi imaju veći sadržaj polifenola i flavonoida, kao i antioksidativni kapacitet po dozi u odnosu na biljne čajeve i analizirane suplemente.Međutim, analizom rezultata antioksidativne aktivnosti, korišćenjem dva pomenuta modela, pokazano je da je ukupni antioksidativni skor suplemenata veći od ukupnog antioksidativnog skora biljnih čajeva.

Zaključak: Shodno dobijenim rezultatima može se izvesti zaključak da doza voćnih čajeva ima protektivnije dejstvo u smislu antioksidativnog kapaciteta i sadržaja polifenola i flavonoida, u odnosu na analizirane biljne čajeve i suplemente. Osim toga, analizom rezultata dobijenih upotrebom novih matematičkih

P003
ANTIOXIDATIVE ACTIVITY OF COMMERCIAL TEAS AND DIETARY SUPPLEMENTS BASED ON TEA

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Introduction: Oxidative stress plays an important role in pathogenesis of chronic and degenerative diseases. Certain dietary supplements are drawing attention based on their antioxidant potential, which signifies that they can be used in prevention of diseases caused by oxidative stress. Besides that, there is growing interest in determination of total polyphenol and flavonoid content and antioxidant activity in numerous types of tea, as foods that significantly contribute to total dietary antioxidants intake.

The Aim: Determine antioxidant activity of various tea types and dietary supplements based on green tea leaves, along with total polyphenol and flavonoid content, which partially participate in their antioxidant potential.

Material and Methods: This study was conducted on seven types of herbal, five types of fruit tea and three dietary supplements based on green tea leaves. Total polyphenol and flavonoid content were determined using spectrophotometry in polystyrene microtitration plates. DPPH, ABTS, FRAP and CUPRAC assays were used to investigate antioxidant capacity and two more mathematical models were applied to provide a more complete antioxidant profile – relative antioxidant capacity index (RACI) and global antioxidant score (GAS).

Results: In comparison to herbal teas and analysed supplements, results from this study showed that fruit teas have had higher polyphenol and flavonoid content, as well as antioxidant capacity per one dose. However, the results from applying mentioned mathematical models show higher GAS values in supplements than the herbal teas.

Conclusion: From the results of this study it can be concluded that a dose of fruit tea (in comparison to the herbal teas and analysed supplements) has a more protecting effect in regard to antioxidant capacity, along with antioxidant protection from polyphenols and flavonoids. Also, higher GAS values in analysed supplements bring us to conclusion that,

modela koji otvaraju nove mogućnosti istraživanja antioksidativnog kapaciteta hrane i pića, dolazi se do zaključka da kod analiziranih suplemenata postoji verovatnoća prisustva drugih antioksidativnih jedinjenja u uzorcima suplemenata.

Ključne reči: čajevi; suplementi; antioksidativna aktivnost; polifenoli; flavonoidi

probably, those supplements a presence of another antioxidans.

Keywords: tea; supplements; antioxidant activity; polyphenols; flavonoids

P004
ODREĐIVANJE NIVOA OLOVA KOD STANOVNIKA BEOGRADA: PILOT ISTRAŽIVANJE HUMANOG BIOMONITORINGA

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Uvod: Humani biomonitoring je metod kojim se procenjuje izloženost ljudi hemikalijama određivanjem njihovog sadržaja u biološkim uzorcima. Intenzivno se sprovodi na području Evropske unije kako bi se utvrdili referentni nivoi za različite zemalje. Među hemikalijama od značaja za humani biomonitoring su toksični metali, posebno olovo (Pb), koje zbog svojih štetnih efekata predstavlja opšti zdravstveni problem. Prema Svetskoj zdravstvenoj organizacije ne postoje bezbdeni nivoi Pb u krvi jer su brojne studije pokazale povezanost Pb i prevalence za nastanak oštećenja na skoro svih organskim sistemima, posebno nervnom sistemu i kardiovaskularnom sistemu.

Cilj rada: Odrediti sadržaj Pb kod stanovnika Beograda i uporediti dobijene vrednosti sa nivoima toksičnog metala u evropskim zemljama.

Materijal i metode: Istraživanje je uključilo 52 osobe, oba pola, starosti između 30 i 74 godine koje žive na teritoriji grada Beograda. Uzorkovana je venska krv i izdvojeni eritrociti (99% Pb se nalazi u eritrocitima). Nakon mineralizacije uzoraka u mikrotalasnoj pećnici (START D, Milestone, SAD) u prisustvu HNO_3 i H_2O_2 (7:1; v/v), koncentracija Pb je određena metodom ICP-MS (masena spektrometrija s induktivno spregnutom plazmom).

Rezultati: Izmerene vrednosti Pb su se kretale u opsegu od 0,4 do 34 μg/dL, što je značajno više u odnosu na nivoe toksičnog metala u populacijama

P004
DETERMINATION OF LEAD LEVELS IN BELGRADE POPULATION: A PILOT STUDY OF HUMAN BIOMONITOING

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Introduction: Humane biomonitoring is a method for assessing human exposure to chemicals by determining their content in biological samples. It is intensively implemented in European Union to determine reference levels for different countries. Among important chemicals for human biomonitoring are toxic metals, especially lead (Pb). Its harmful effects are a general health problem. There are no safe levels of Pb in the blood according to the World Health Organization. Numerous studies have shown the association of Pb and the prevalence of damage to almost all organ systems, especially the nervous system and cardiovascular system.

The aim: To determine Pb content in Belgrade population and to compare the obtained values with the levels of Pb in European countries.

Methods: The study included 52 individuals, of both sexes, aged between 30 and 74 years living in Belgrade. Venous blood samples were taken and erythrocytes were separated (99% Pb is found in erythrocytes). After mineralization of samples in a microwave oven (START D, Milestone, SAD) in the presence of HNO_3 and H_2O_2 (7:1; v/v), the concentration of Pb was determined by ICP-MS (inductively coupled plasma mass spectrometry).

Results: Pb values ranged from 0.4 to 34 μg/dL, which is significantly higher than the levels of toxic metals in the populations of European countries

evropskih zemalja (2,47–11,7 μg/dL u Belgiji, 2,48-22,14 μg/dL u Češkoj, 4,11–12,39 μg/dL u Poljskoj itd). Nivoi Pb kod stanovnika Beograda su bliski dobijenim vrednostima u Hrvatskoj, što je u saglasnosti sa činjenicom da su Hrvatska i Srbija među poslednjim zemljama u Evropi zabranile upotrebu olovnog benzina. Sadržaj Pb kod muškaraca je značajno viši nego kod žena ($p<0,05$). Osim toga, uočene su značajne razlike u sadržaju Pb kod žena različite starosne dobi ($p<0,05$).

Zaključak: Sadržaj Pb kod osoba koje žive na teritoriji Beograda varira u odnosu na pol i starost i viši je u odnosu na nivoe toksičnog metala u zemljama Evropske unije.

Ključne reči: humani biomonitoring; olovo; Beograd

(2.47–11.7 μg/dL in Belgium, 2.48–22.14 μg/dL in the Czech Republic, 4.11–12.39 μg/dL in Poland, etc.). Pb levels in the Belgrade population are close to the values obtained in Croatia, probably because Croatia and Serbia among the last countries banned the use of lead gas. Pb content in male group was significantly higher compared to female group ($p<0.05$). In addition, there were significant differences in Pb level in women of different age groups ($p<0.05$).

Conclusion: Pb content in Belgrade population varies in relation to gender and age and is higher in relation to the levels of toxic metals in the countries of European Union.

Keywords: human biomonitoring; lead; Belgrade

P005
UTICAJ IZLOŽENOSTI FTALATIMA NA RAZVOJ GOJAZNOSTI – ANALIZA TOKSIKOGENOMIČKIH PODATAKA

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Uvod: Gojaznost je jedan od značajnih problema javnog zdravlja i predstavlja faktor rizika za razvoj mnogih bolesti. Značajan mehanizam u nastanku gojaznosti predstavlja promena ekspresije i aktivnosti gena prouzrokovana supstancama koje ometaju funkcije endokrinog sistema. U ove supstance ubrajaju se i ftalati, kojima su ljudi izloženi svakodnevnim korišćenjem različitih proizvoda.

Cilj rada: Ispitati povezanost između izloženosti ftalatima i razvoja gojaznosti analizom toksikogenomičkih podataka.

Metode: Ispitivani ftalati podeljeni su u dve grupe. Prvu grupu ftalata čine-di(2-etilheksil) ftalat (DEHP), dibutil ftalat (DBP), butilbenzil ftalat (BBP), kojima su veća ograničenja za upotrebu, a drugu- di-izo-nonil ftalat (DINP), di-izo-decil ftalat (DIDP) i di-n-oktil ftalat (DNOP). Korišćena je CTD (Comparative Toxicogenomic Database) baza podataka za dobijanje informacija o interakcijama ftalata i gena povezanih sa gojaznošću, a podaci o funkciji gena preuzeti su iz GeneCards i STITCH baza podataka.

P005
THE INFLUENCE OF PHTHALATES EXPOSURE ON OBESITY DEVELOPMENT – ANALYSIS OF TOXICOGENOMIC DATA

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Introduction: Obesity is one of the significant public health issues and is considered a risk factor for the development of many diseases. An important pathogen mechanism in the onset of obesity is change in the expression and activity of genes caused by chemicals that interfere with the functions of the endocrine system. These chemicals also include phthalates.

The Aim: To examine a correlation between exposure to phthalates and the development of obesity by analyzing toxicogenomic data.

Methods: The investigated phthalates were divided into two groups. The first group of phthalate consists of di(2-ethylhexyl) phthalate (DEHP), dibutyl phthalate (DBP) and butylbenzyl phthalate (BBP), which are more potent and have greater restrictions in use, and di-iso-nonyl phthalate (DINP), diisodecyl phthalate (DIDP) and di-n-octyl phthalate (DNOP). Comparative Toxicogenomic Database (CTD) was used to obtain information on phthalate and gene interactions (gene products)/proteins and their association with obesity. Additional used tools for studying

Rezultati: Prva grupa ftalata (DEHP, DBP, BBP) učestvuje u 87% ispitivanih interakcija, pri čemu DEHP intereaguje sa 59, DBP sa 82, a BBP sa 20 gena (dobijeno pomoću CTD Batch Query alata). Pomoću MyVenn alata izdvojeno je 13 gena na koje sva tri ftalata deluju. Ovi ftalati intereaguju sa genima odgovornim za sintezu PPAR peceptora. PPARA ima uticaj na metabolizam lipida i ugljenih hidrata, dok PPARG ima ključnu ulogu u adipogenezi i više je zastupljen od PPARA. Ova tri ftalata dejstvom na INS3 gen remete ekspresiju insulinskog receptora, što takođe može pogodovati razvoju gojaznosti. Ftalati iz druge grupe međusobno deluju samo na jedan gen – PPARA.

Zaključak: Analiza toksikogenomičkih podataka ukazuje da se izloženost ispitivanim ftalatima može dovesti u vezu sa razvojem gojaznosti, posebno za prvu grupu ftalata. Dobijene in silico rezultate neophodno je potvrditi ispitivanjima kod ljudi, odnosno određivanjem nivoa ftalata kod gojaznih osoba i ispitivanjem ekspresije i aktivnosti gena od značaja.

Ključne reči: ftalati; gojaznost; toksikogenomika

interactions are Batch Query, MyVenn, VennViewer, MyGeneVenn. Data on the function of genes were obtained from GeneCards: The Human Gene Database and STITCH databases.

Results: he first group of phthalates (DEHP, DBP, BBP) was involved in 87% of the studied interactions (295 interactions with 161 genomes). hese phthalates interacted with the peroxisome proliferator activated receptors (PPAR) (a particularly important interaction with peroxisome proliferator receptor alpha (PPAR)-the greatest effect on the carbohydrate and lipid metabolism and peroxisome proliferator receptor gamma (PPAR)-a key role in adipogenesis) and disturb the expression of insulin receptor 3 by interacting with INS3 gene. This gene participates in the regulation of insulin sensitivity and glucose homeostasis, which can lead to metabolic dysfunction and favor obesity development.

Conclusion: The toxicogenomic analysis indicates that exposure to the examined phthalates can be linked to the development of obesity. The obtained in silico results need to be confirmed in human studies.

Keywords: phthalates; obesity; toxicogenomics

P006
UTICAJ OKSIDATIVNOG I INFLAMATORNOG SKORA (OI SKOR) NA STANJE PACIJENATA NAKON KARDIOHIRURŠKE OPERACIJE

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Praćenje oksidativnog i inflamatornog statusa kod pacijenata je pokazano kao važan parametar u praćenju progresije različitih bolesti i/ili efikasnosti terapije. Cilj rada je bio da se stekne uvid u nivo OI skorova kod pacijenata i kontrolne grupe, kao i testiranje uticaja ranije preležanog infarkta miokarda, pušenja i vrste kardiohirurške operacije na skor. Studija je obuhvatila 63 pacijenta koji su podvrgnuti operaciji ugradnje koronarnog bajpasa na Klinici za kardiohirurgiju Vojnomedicinske akademije u Beogradu.

P006
INFLUENCE OF OXIDATIVE AND INFLAMMATION SCORE (OI SCORE) ON PATIENTS' CONDITION AFTER CARDIAC SURGERY

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Monitoring of oxidative and inflammation status in patients has shown to be important parameter in monitoring of progression of various diseases and/or effectiveness of therapy. The aim was to gain insight of patients' and control group's levels of OI scores and to test influence of previously survived myocardial infarction, smoking and type of cardiac surgery on that score. Study included 63 patients who undergo aortocoronary bypass surgery at the Department for Cardiac Surgery at Medical Military Academy in

Parametri su analizirani korišćenjem SPSS programa (Statistical package for Social sciences 11.5) i Majkrosoft Eksela (Microsoft Excel 2007) Od 63 pacijenta bilo je 13 žena (21%) i 50 muškaraca (79%), sa rasponom godina 41–78 godina (u proseku 61,8 godina), a od 289 zdravih ispitanika bilo je 168 žena (43%) i 221 muškarac (57%), sa rasponom godina 41–80 godina (u proseku 59,4 godine). OI skor za pacijene je izračunat u 6 različitih perioda i to pre, po samom završetku operacije i 6, 24, 48 i 96 sati kasnije. Prosečna vrednost skorova se kretala u rasponu 15,43 (11,6-19,37) do 33,41 (25,98–39,31) i u svakom trenutku su te vrednosti bile značajno različite od kontrolne grupe čija je srednja vrednost OI skorova 1,23 (-0,22 do 5,89) pa je i pronađena je značajna razlika u OI skorovima ($r<0,001$) između pacijenata i kontrolne grupe. Pronađena je i značajna razlika između pacijenata sa i bez preležanog infarkta miokarda u preoperativnom OI skoru ($p<0,05$) gde su veće skorove imali pacijenti koji su preležali infarkt miokarda, dok razlika između pušača i nepušača i između vrsta izvršenih operacija nije uočena. Konstantno povećanje OI skora posle operacije ukazuje na masovno generisanje slobodnih radikala i činilaca inflamacije nakon kardiohirurških operacija zbog čega je neophodno duže praćenje ovih faktora kako bi se uočilo kada dolazi do njihovog snižavanja od čega i zavisi brzina oporavka pacijenata.

Belgrade. Parameters were analyzed by SPSS (Statistical Package for Social Sciences 11.5) and Microsoft excel 2007. Out of 63 patients, 13 were females (21%) and 50 were males (79%), in the 41–78 age range (average 61.8 years), and out of 289 healthy participants 168 were females (43%) and 221 were males (57%), in the 41–80 age range (average 59.4 years). Patients' scores were calculated in 6 different periods – before, immediately after and 6, 24, 48 and 96 hours after surgery. Mean values of scores were ranging from 15.43 (11.6–19.37) to 33.41 (25.98–39.31) and in every moment values were significantly different from control group whose median of OI scores was 1.23 (from -0.22 to 5.89) and patients' OI scores were significantly different ($p<0.001$) from control group. Statistically significant difference was found between patients who had survived myocardial infarction and those who hadn't had it in preoperative OI score ($p<0.05$) where patients, who had survived myocardial infartion, had higher OI scores, difference was not observed between smokers and non-smokers and between types of surgeries. Constant increase of OI scores after surgery indicates massive generation of free radicals and inflammation factors after cardiac surgeries which is why is needed to longer observe this factors to determine when it comes to their reductions which depends on the speed of recovery of patients.

P007
ANALIZA TOKSIKOGENOMIČKIH PODATAKA O UTICAJU OLOVA NA GOJAZNOST

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Uvod: Etiologija mnogih hroničnih bolesti uključuje interakcije između faktora spoljašnje sredine i gena koji modulišu fiziološke procese. Razumevanje interakcija između hemikalija koje se nalaze u životnoj sredini i gena, odnosno proteina, može pružiti uvid u mehanizme hemijskih reakcija, osetljivost prema bolestima, toksičnost i inetrakcije sa lekovima. Brojnim istraživanjima je pokazano da olovo (Pb), kao jedan od najznačajnijih zagađivača životne sredine, utiče na razvoj gojaznosti, ali su mehanizami nastanka ovih promena nedovoljno poznati.

P007
TOXICOGENOMICS ANALYSIS OF LEAD INFLUENCE ON OBESITY

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Introduction: The etiology of many chronic diseases involves interactions between the environmental factors and genes that modulate physiological processes. Understanding of interactions between environmental chemicals and genes/proteins may provide insights into the mechanisms of chemical actions, disease susceptibility, toxicity, and therapeutic drug interactions. Numerous studies have shown that lead (Pb), as one of the most significant environmental pollutants, affects the development of obesity,

Cilj rada: Cilj ovog rada bio je da se pomoću analize toksikogenomičkih podataka (pronalaženje relacija hemikalija-gen-bolest) ispita povezanost između izloženosti olovu i nastanka gojaznosti.

Metode: Komparativna toksikogenomička baza podataka (Comparative Toxicogenomics Database-CTD) je korišćena da bi se ispitali metabolički putevi povezani sa ekspozicijom Pb i razvojem gojaznosti. Interakcije između Pb sa različitim genima preuzete su korišćenjem izvoznih i »batch query« alatki u CTD bazi. Dobijena lista gena analizirana je na protein/bolest povezanost i uključenost u različite metaboličke puteve.

Rezultati: Dobijeno je da Pb stupa u interakciju sa čak 3 049 gena. Od tog broja, daljom analizom je utvrđeno da Pb ispoljava dejstvo na 43 gena koji su povezani sa razvojem gojaznosti. Identifikovana 43 gena su uključena u 41 molekularni put, uključujući metabolizam lipida i lipoproteina, metabolizam masnih kiselina, triglicerida i ketonskih tela, metabolizam ugljenih hidrata, itd. Od najvećeg značaja su geni koji učestvuju u signalnom putu adipocitokina i metabolizmu lipida i lipoproteina, kao što su: acetil koenzim A karboksilaza beta (ACACB), leptin (LEP), faktor nekroze tumora (TNF) i receptor aktiviran proliferacijom peroksizoma – gama (PPARG).

Zaključak: Dobijeni rezultati ukazuju da Pb utiče na gene od značaja za razvoj gojaznosti. Osim toga, ovi rezultati ukazuju na dalja ispitivanja da se kod gojaznih osoba odrede nivoi toksičnog metala i ispita aktivnost gena od značaja u cilju potvrde ovih rezultata i pojašnjenja mehanizama nastanka gojaznosti pri izloženosti olovu.

Ključne reči: gojaznost; olovo; toksikogenomika

although mechanism of these changes is not sufficiently explained.

The aim: The aim of this study was to examine a correlation between Pb exposure and obesity on the bases of toxicogenomic analysis (chemical–gene–disease testing).

Methods: The Comparative Toxicogenomics Database-CTD was used to obtain metabolic pathways associated with lead exposure and obesity development. Interactions between lead with different genes were downloaded using export and »batch query« tools on the CTD base. The gene list was analyzed for the »KEGG« annotation of pathways and the protein/disease association.

Results: It was found that lead interacts with 3 049 genes. A further analysis of this gene set was aimed at identifying those associated with the development of obesity. Lead was found to interact with 43 such genes involved in 41 molecular pathway, including metabolism of lipids and lipoproteins, fatty acid, triglycerids and keton bodies metabolism, carbohydrate metabolism, etc. Of particular importance are the genes involved in the signal pathway of adipocytokines and metabolism of lipids and lipoproteins, such as: acetyl coenzyme A carboxylase beta-ACACB, leptin-LEP, tumor necrosis factor-TNF and peroxisome-gamma proliferation receptor activated-PPARG.

Conclusion: The obtained results indicate that Pb affects the obesogenic genes. In addition, these results indicate further studies in obese individuals (determination of Pb level and activity of identificated genes) in order to confirm these results and clarify the mechanisms of obesity occurrence in lead exposure.

Keywords: obesity; lead; toxicogenomics

P008
ODREĐIVANJE KONCENTRACIJE VISOKO MOLEKULARNOG ADIPONEKTINA KOD PACIJENATA SA KOLOREKTALNIM KARCINOMOM

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Uvod: Adiponektin je protektivni adipokin, čija se koncentracija u kolorektalnom karcinomu značajno smanjuje. Naša studija se bavila praćenjem visokomolekularne frakcije.

Cilj rada: Određivanje koncentracije visokomolekularnog adiponektina kod pacijenata sa kolorektalnim karcinomom.

Materijal i metode: Za određivanje koncentracije visokomolekularnog adiponektina korišćen je «dvostruki sendvič imunotest« (The Quantikine ELISA Human HMW Adiponectin/Acrp30 Immunoassay), dok su koncentracije glukoze, triglicerida i HDL holesterola određene standarnim enzimskim metodama.

Rezultati: Detektovane su značajno niže vrednosti visokomolekularnog adiponektina kod ispitanika sa kancerom kolona (p=0,039) i kancerom rektuma (p=0,033) u odnosu na zdrave osobe. Dokazana je statistički značajna negativna korelacija visokomolekularnog adiponektina sa indeksom telesne mase (ITM), R=-0,457, koncentracijom glukoze (R=-0,257) i triglicerida (R=-0,308) kao i pozitivna korelacija sa HDL holesterolom (R=0,584) i starošću pacijenata (R=0,392) u kontrolnoj grupi. U grupi pacijenata sa kancerom kolona utvrđena je negativna korelacija visokomolekularnog adiponektina sa glukozom (R=-0,382). Kod pacijenata sa kancerom rektuma nije utvrđena slična zavisnost. Takođe, rezultati pokazuju da vrednosti visokomolekularnog adiponektina (OR=0,955 za kolon i OR=0,935 za rektum), godine pacijenata (OR=1,147 za kancer kolona i OR = 1,116 za kancer rektuma) i vrednost HDL holesterola (OR=0,191 za kolon i OR=0,172 za rektum) predviđaju rizik za nastanak kolorektalnog karcinoma. Nezavisni prediktori kako kancera kolona tako i kancera rektuma su starost pacijenata i koncentracija visokomolekularnog adiponektina.

P008
HIGH MOLECULAR WEIGHT ADIPONECTIN IN PATIENTS WITH COLORECTAL CANCER

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Introduction: Adiponectin has a protective role in the human metabolism, however its concentrations seem to be significantly lower in patients with colorectal cancer. Our study examined the high molecular form of adiponectin in colorectal patients.

The Aim: Determining concentrations of high molecular weight (HMW) adiponectin in colorectal cancer patients.

Material and methods: HMW adiponectin was measured by ELISA Human HMW Adiponectin Immunoassay. Glucose, HDL cholesterol and triglyceride levels were measured using standard enzyme methods.

Results: Our study detected significantly lower HMW adiponectin concentrations in patients with colon cancer (CC) (p=0.039) and rectal cancer (RC), p=0.033 compared to the control group. The obtained results indicated a statistically significant negative correlation between HMW adiponectin and body mass index R=-0.457, glucose (R=0.257) and triglycerides (R=0.308) levels, and positive correlation with HDL cholesterol concentrations (R=0.584) and patients' age (R=0.392) in control group. In the CC group there was a negative correlation of HMW adiponectin with glucose concentrations (R=0.382). Also, the results indicated that HMW adiponectin-concentrations (OR=0.995 in CC group, and OR=0.935 in RC group), patients' age (OR=1.147 in CC group, and OR=1.116 in RC group), and HDL cholesterol concentrations (OR=0.191 in CC group and OR=0.172 in RC group) predicted the risk for colorectal cancer. The independent predictors for CC and RC were patients' age and HMW adiponectin concentrations.

Zaključak: Kod pacijenata sa kolorektalnim karcinomom pokazano je značajno smanjenje koncentracije visokomolekularnog adiponektina, kao i njegova sposobnost da zajedno sa HDL holesterolom i godinama pacijenata predviđa rizik za nastanak istog.

Ključne reči: kolorektalni karcinom; adiponektin

Conclusion: Patients with colorectal cancer had significantly lower HMW adiponectin concentrations than subjects in control group. The results also showed that HMW adiponectin, HDL cholesterol concentrations and the patients' age were independent predictors for colorectal cancer.

Keywords: adiponectin; colorectal cancer

P009
VEZA IZMEĐU DISLIPIDEMIJE, OKSIDATIVNOG STRESA I INFLAMACIJE KOD PACIJENATA SA KANCEROM PLUĆA

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Uvod: Stvaranje reaktivnih kiseonikovih jedinjenja remeti redoks ravnotežu u respiratornom sistemu što povećava produkciju medijatora inflamacije pluća i promoviše kancerogenezu. Pluća su izložena oksidansima koji se endogeno ili egzogeno stvaraju (zagađenje, pušenje cigareta).

DOI (dislipidemija, oksidativni stres, inflamacija) skor je kombinacija tri različita faktora rizika uključena u razvoj mnogih bolesti kao u kanceru pluća i izračunava se primenom Z-skor statistike.

Materijal i metode:Naša studija ja uključila 29 zdravih ispitanika kao kontrolnu grupu (KG) i 91 pacijenta sa kancerom pluća (KP): 14 sa mikrocelularnim karcinomom i 77 sa nemikrocelularnim karcinomom (46 sa adenokarcinomom i 31 pacijent sa skvamocelularnim karcinomom, prema patohistološkoj klasifikaciji)

Rezultati: Izračunati skorovi: DOI skor, kao i njegovi elementi Oksi skor (OS) i Inflamatorni skor (IS) su bili značajno viši kod pacijenata u poređenju sa KG (P<0,001). ROC analizom, sva tri skora su pokazala odličnu (IS, AUC=0,884, P<0,001) i izvanrednu dijagnostičku tačnost (OS i DOI, AUC=0,994, P<0,001 i AUC=0,940, P<0,001, redom) za predikciju pripadnosti zdravim osobala ili bolesnicima. Poređenjem skorova između različitih patohistološki klasifikovanih kancera uočili smo značajno povećan

P009
RELATIONSHIP BETWEEN DYSLIPIDEMIA, OXIDATIVE STRESS AND INFLAMMATION IN LUNG CANCER PATIENTS

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Introduction: Reactive oxygen species generation disturbs redox balance in the respiratory system and thus increases the production of mediators of pulmonary inflammation and promote carcinogenesis. The lungs are exposed to oxidants generated either endogenously or exogenously (pollution, cigarette smoking).

DOI (dyslipidemia, oxidative stress and inflammation) score is a combination of three different risk factors, involved in many disease development such as lung cancer, calculated with Z score statistics.

Material and Methods: Our study included 29 healthy control group (CG) subjects and 91 lung cancer (LC) patients: 14 small cells lung cancer – SCLC and 77 non-small cells lung cancer – NSCLC patients (46 adenocarcinoma and 31 squamocellular according to pathohystological classification).

Results: Calculated scores: DOI score, so as its elements Oxy score (OS) and Inflammatory score (IS) were significantly higher in patients compared to CG (P<0.001). According to ROC analysis all three scores showed excellent (IS, AUC=0.884, P<0.001) and outstanding diagnostic accuracy (OS and DOI, AUCs= 0.944, P<0.001 and 0.940, P<0.001, respectively) in control-patients status prediction. Comparing scores between different pathohistological tumor classes we noticed significantly increased

IS kod podgrupe pacijenata sa skvamocelularnim u odnosu na adenokarcinom (P<0,05) a takođe kod KP sa višim stadijumom bolesti (IV u odnosu na II stadijum, P<0,05) i kod preminulih u odnosu na žive pacijente, tokom jednogodišnje studije. Što se tiče generalnog odgovora na hemioterapiju zabeležili smo najniži OS, IS i ukupan DOI skor kod pacijenata sa potpunim odgovorom u odnosu na pacijente sa progresijom bolesti, stabilnom bolešću i pacijente sa delimičnim odgovorom na hemioterapiju.

Korelaciona analiza je pokazala značajnu pozitivnu korelaciju između OS i IS skora (ρ=0,660, P<0,001) i negativnu korelaciju između IS i ukupnog vremena preživljavanja (ρ= –0,306, P<0,05).

Zaključak: Naši rezultati su dokazali zajedničko učešće oksidativnog stresa i inflamacije u patogenezi kancera pluća, u predikciji statusa pacijenata i njihovom preživljavanju, a takođe i u odgovoru na primenjenu terapiju.

Ključne reči: dislipidemija; oksidativni stres; inflamacija; DOI skor; kancer pluća (KP)

IS in squamocellular vs. adenocarcinoma NSCLC patients subgroups (P<0.05), as well as in LC patients in higher disease stadium (IV vs. II stadium, P<0.05), so as in deceased compared to live patients during one year of the study duration. Regarding patients' overall response rate to hemotherapy (ORR-HT) we reported the lowest OS, IS and summary DOI score in patients with complete response than in patients with progressive disease, stable disease and partial response.

Correlation analysis showed significant positive correlation between OS and IS (ρ=0.660, P<0.001) and negative correlation between IS and overall survival time (ρ= –0.306, P<0.05).

Conclusion: Our results explicitly evidenced mutual involvement of oxidative stress and inflammation in lung cancer pathogenesis, even in patients' status/survival prediction and also in response to implemented therapy.

Keywords: dyslipidemia; oxidative stress; inflamation; DOI score; lung cancer (LC)

P010
GENSKA EKSPRESIJA ADIPONEKTINSKIH RECEPTORA U MONONUKLEARNIM ĆELIJAMA KRVI KOD PACIJENATA SA KOLOREKTALNIM KARCINOMOM

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Kolorektalni karcinom (eng. Colorectal carcinoma, CRC) je u vrhu liste učestalosti malignih tumora digestivnog trakta. Niske vrednosti adiponektina su povezane sa insulinskom rezistencijom i rizikom za razvoj CRC-a. Zbog svojih antionkogenih i antiinflamatornih osobina, smatra se da adiponektin može imati ulogu u smanjenju proliferacije tumora. Cilj ovog istraživanja je bio da se ispita genska ekspresija adiponektinskih receptora (AR) kod pacijenata sa CRC-om u odnosu na zdravu populaciju i da se utvrde razlike u genskoj ekspresiji AR između različitih stadijuma i

P010
ADIPONECTIN RECEPTORS GENE EXPRESSION LEVELS IN PERIPHERAL BLOOD MONONUCLEAR CELLS IN PATIENTS WITH COLORECTAL CARCINOMA

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Colorectal carcinoma (CRC) is in the top of incidence list of the digestive tract's malignant tumors. Low adiponectin levels are associated with insulin resistance and the risk for CRC development. Due to its anti-oncogenic and anti-inflammatory characteristics, adiponectin is considered to play a role in reducing the proliferation of tumors. The aim of this study was to determine adiponectin receptors (AR) gene expression levels in patients with CRC and healthy population and to determine differences in AR gene expression levels between different stages and grades

gradusa bolesti. U istraživanju je bilo uključeno 85 pacijenata sa CRC-om (64,87±10,76 godina) i 109 zdravih osoba (54,73±7,65 godina). Pacijenti su podeljeni prema Dukes-ovoj klasifikaciji na stadijume B, C, D i prema stepenu diferentovanja tumorskih ćelija na graduse 1, 2, 3. Nivoi informacione ribonukleinske kiseline RNK (iRNK) AR1 i AR2 su mereni u mononuklearnim ćelijama periferne krvi metodom lančane reakcije polimeraze u realnom vremenu (Real time PCR). Nivoi iRNK AR1 su bili statistički značajno niži kod osoba sa CRC-om u odnosu na zdravu populaciju ($p<0,001$), dok su nivoi iRNK AR2 bili na granici statističke značajnosti ($p=0,0510$). Utvrđena je statistički značajna razlika u nivoima iRNK AR1 između svih stadijuma bolesti i zdrave populacije ($p<0,001$), a najniži nivoi iRNK AR1 uočeni su kod pacijenata u stadijumu C. Takođe, postojala je statistički značajna razlika u nivoima iRNK AR1 između zdravih ispitanika i pacijenata u različitim gradusima bolesti ($p<0,001$), a najniži nivoi iRNK AR1 su pokazani kod pacijenata u gradusu 3. Pozitivna korelacija uočena je između nivoa iRNK AR1 i AR2 ($r=0,282$, $p<0,001$). Rezultati ovog istraživanja su pokazali da je kod pacijenata sa CRC-om smanjena genska ekspresija AR1 što verovatno može biti razlog zbog čega adiponektin vezivanjem za njih ne može u potpunosti da ispolji svoja antiinflamatorna i antiproliferativna dejstva kao kod zdravih osoba.

of disease. The study included 85 patients with CRC (64.87±10.76 years) and 109 healthy controls (54.73±7.65 years). The patients were divided according to the Dukes classification to stages B, C, D and to the degree of tumor cells differentiation to grades 1, 2, 3. AR1 and AR2 messenger ribonucleic acid's (mRNA) levels were measured in peripheral blood mononuclear cells using polymerase chain reaction in real time (Real time PCR). AR1 mRNA levels w r significantly lower in patients with CRC than in healthy population ($p<0.001$), while AR2 mRNA levels didn't differ significantly between tested populations ($p=0.0510$). There were significant differences in the AR1 mRNA levels between all stages of the disease and the healthy population ($p<0.001$), the lowest AR1 mRNA levels were observed in patients in C stage. Also, there were significant differences in AR1 mRNA levels between healthy population and patients in different grades of disease ($p<0.001$), where grade 3 AR1 mRNA levels were the lowest. A positive correlation was observed between AR1 and AR2 mRNA levels ($r=0.282$, $p<0.001$). Results of this study showed that patients with CRC had decreased AR1 expression which could be the reason why adiponectin binding to them cannot completely express its anti-inflammatory and antiproliferative effects as expected.

P011
PROFIL LIPOPROTEINSKIH SUBFRAKCIJA U SINDROMU OPSTRUKTIVNE APNEJE U SNU

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Opstruktivna apneja u snu (obstructive sleep apnea, OSA) je poremećaj spavanja koji se karakteriše ponavljanim kolapsom gornjih disajnih puteva tokom sna, koji može biti potpun (praćen apnejom) ili parcijalan (praćen hipopnejom). Poremećaj u koncentraciji lipidnih parametara doprinosi povećanom riziku za nastanak kardiovaskularnih bolesti (KVB) kod pacijenata sa OSA. U OSA se mogu javiti i kvalitativne promene lipoproteinskih čestica, stoga je cilj

P011
LIPOPROTEIN SUBFRACTIONS PROFILE IN OBSTRUCTIVE SLEEP APNEA

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Obstructive sleep apnea (OSA) is a sleeping disorder, characterised by a repeated upper airway collapse during sleep that can be total (apnea) or partial (hypopnea). The disorder in lipid parameters concentrations contributes to the increased risk of cardiovascular diseases development (CVD). Qualitative changes of lipoprotein particles may occur in OSA patients as well, therefore the aim of our study was to determine size and distribution of low-density (LDL)

našeg istraživanja bio ispitati veličinu i raspodelu subfrakcija lipoproteina niske (LDL) i visoke (HDL) gustine kod ovih pacijenata, i to u zavisnosti od prisustva KVB.

Ispitivanje je obuhvatilo 105 pacijenata sa OSA, od čega 40 pacijenata sa KVB i 65 pacijenata bez KVB. Učesnici u studiji su podvrgnuti testu polisomnografije u Univerziteteskoj bolnici »Louis Pasteur« (Košice, Slovačka). Razdvajanje LDL i HDL subfrakcija je vršeno metodom vertikalne elektroforeze na poliakrilamidnom gradijent gelu. Koncentracije parametara lipidnog statusa (triglieridi, ukupan i holesterol u lipoproteinima niske i visoke gustine - LDL-h i HDL-h) i glukoze su određene standardnim laboratorijskim metodama.

Statističkom analizom rezultata uočeno je da se vrednosti lipidnih parametara nisu razlikovale između grupa, izuzev koncentracije LDL-h, koja je bila niža u grupi sa KVB ($P<0,01$). Relativni udeo LDL I je bio niži ($P<0,05$), a LDL III subfrakcija značajno viši ($P<0,001$) kod pacijenata kod kojih je OSA udružena sa KVB. Kod pacijenata sa KVB dominantni LDL dijametar je bio značajno manji ($P<0,001$). Dodatno, dijametar LDL čestica je negativno korelirao sa koncentracijama triglierida ($P<0,05$) i glukoze ($P<0,001$).

Razmatrajući sve rezultate našeg ispitivanja, možemo zaključiti da je razvoj KVB u OSA praćen promenama u profilu LDL subfrakcija, koje se ogledaju u povećanju udela malih gustih LDL čestica, pri čemu je teži stepen bolesti praćen većim smanjenjem dijametra LDL čestica, još izraženijim u grupu sa KVB. Dalje ispitivanje distribucija LDL i HDL subfrakcija kod pacijenata sa OSA može imati značaj u proceni rizika za KVB.

and high-density (HDL) lipoprotein subfractions in patients with OSA, depending on the presence of CVD.

Study included 105 patients with OSA, of which 40 with and 65 without CVD. Participants in the study were subjected to polysomnography test at the University Hospital 'Louis Pasteur' (Kosice, Slovakia). Vertical electrophoresis on polyacrylamide gradient gel was used for separation of lipoprotein subfractions. Lipid parameters (triglycerides, total and cholesterol in low-density (LDL-C) and high-density (HDL-C) lipoproteins) and glucose concentrations were determined with standard laboratory methods.

Using statistical analysis it was observed that lipid parameters did not differ between the groups, except LDL-C concentration, which was lower in the group with CVD ($P<0.01$). Relative proportion of LDL I subfractions was significantly lower ($P<0.05$), but the proportion of LDLIII particles was higher ($P<0.001$) in OSA patients with CVD. Also, the dominant LDL diameter was lower ($P<0.001$) in patients with CVD. LDL diameters showed negative correlations with triglycerides ($P<0.05$) and glucose concentrations ($P<0.001$).

Considering results of our study, we can conclude that LDL subfractions profile was significantly altered in OSA, which is more pronounced as the disease progresses and in the group with CVD. Further analysis of LDL and HDL subfractions in OSA patients may be significant in estimating the risk of CVD.

P012
HB-EGF KAO INFLAMATORNI PARAMETAR KOD KOLOREKTALNOG KARCINOMA ODREĐEN DUOSET ELISA METODOM

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Uvod: Heparin-vezujući epidermalni faktor sličan faktoru rasta (HB-EGF), igra ključnu ulogu u mnogim fiziološkim i patološkim ćelijskim procesima, uključujući proliferaciju, apoptozu, migraciju ćelija, invaziju, diferencijaciju, morfogenezu i razvoj. U ovoj studiji, merena je koncentracija HB-EGF u uzorcima dobijenih od zdravih dobrovoljaca i pacijenata sa kolorektalnim karcinom različitog stadijuma.

Cilj rada: Određivanje koncentracije HB-EGF kod pacijenata sa kolorektalnim karcinomom.

Materijali i metode: Istraživanje je obuhvatilo 44 pacijenata sa dijagnozom kolorektalnog karcinoma i 50 osoba bez istorije malignih bolesti. Na osnovu patohistološkog nalaza određen je stepen diferentnosti kancera i izvršena je podela pacijenata na tri grupe (slaba, srednja i dobra diferentovanost tumora). Za određivanje nivoa HB-EGF korišćena je DuoSet sendvič ELISA (DY008, DuoSet ELISA Ancillary Reagent Kit 2) metoda.

Rezultati: U odnosu na diferentnost tumora najviše su bili zastupljeni pacijenti sa srednje diferentovanim adenokarcinomom (61%), zatim pacijenti sa dobro (27%) pa oni sa slabo diferentovanim karcinomom (12%), p<0,001. Postoji razlika u vrednostima HB-EGF između pacijenata i kontrolne grupe (p<0,001), vrednosti su više kod pacijenata 10,93 μg/mL (7,76–16,42) u odnosu na kontrolnu grupu 1,91 μg/mL (0,73–4,82). Dokazana je razlika u odnosu na diferentnost tumora (p=0,030). Vrednosti HB-EGF-a kod pacijenata sa dobro diferentovanim karcinomom bile su značajno niže 7,42 μg/mL (5,40–11,58) u poređenju sa vrednostima kod pacijenata sa slabo diferentovanim karcinomom 13,92

P012
HEPARIN-BINDING EGF-LIKE GROWTH FACTOR IN PATIENTS WITH COLORECTAL CANCER

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Introduction: Heparin-binding EGF-like Growth Factor (HB-EGF), plays the key role in many physiological and pathological cellular processes including proliferation, apoptosis, cell migration/invasion, differentiation, morphogenesis and development. In this study, we measured HB-EGF concentrations in serum samples obtained from healthy volunteers and patients with colorectal carcinoma with different stages.

The Aim: Determining concentrations of HB-EGF in colorectal cancer patients.

Materials and methods: The study included 44 patients who were diagnosed colorectal cancer and 50 people without a history of malignant disease. Based on the pathohistological findings, the degree of differentiation of cancer is determined and the patients were divided into three groups (poorly, medium, and a high differentiated tumor). The levels of HB-EGF were quantified with DuoSet sandwich ELISA (DY008, Duos ELISA Ancillary Reagent Kit 2) method.

Results: In relation to differentiation of tumors the most patients were with medium differentiated adenocarcinoma (61%), followed by patients with high differentiated (27%) then those with poorly differentiated carcinoma (12%), p <0.001. There was a difference in the values of HB-EGF among the patients and the control group (p <0.001), the values were higher in patients 10.93 mg/mL (7.76 to 16.42) compared to the control group 1.91 mg/mL (0.73–4.82). The difference in relation to differentiation of the tumors was proven (p = 0.030). The values of HB-EGF in patients with high-differentiated

μg/mL (12,76–32,23), p=0,037 i značajno više u odnosu na vrednosti u kontrolnoj grupi (p=0,001).

Zaključak: HB-EGF može biti koristan dijagnostički serološki biomarker za kolorektalni karcinom. Vrednosti HB-EGF značajno su više kod slabo, srednje i dobro diferentovanog karcinoma u odnosu na kontrolnu grupu što je potvrdilo važnost njegovog daljeg ispitivanja kao prognostičkog markera.

Ključne reči: HB-EGF; kancer; serološki biomarkeri; DuoSet ELISA

P013
E-KADERIN U KOLOREKTALNOM KARCINOMU

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Uvod: E-kaderin je kalcijum-zavisni transmembranski glikoprotein koji se sastoji iz ekstracelularnog, transmembranskog i intracelularnog domena i nalazi se na bazolateralnoj membrani epitelijalnih ćelija. Učestvuje u međućelijskom povezivanju tako što se ekstracelularni domen E-kaderina jedne ćelije vezuje za ekstracelularni domen E-kaderina druge ćelije gradeći homodimer. Funkcija E-kaderina je usko povezana sa citoplazmatskim proteinima kateninima. Pod dejstvom različitih faktora dolazi do destabilizacije kompleksa E-kaderin-katenin i posledično do aktivacije gena za deobu i rast ćelije i tumorigeneze.

Cilj rada: Cilj ovog rada je određivanje koncentracije E-kaderina i ispitivanje potencijalne veze između E-kaderina i oksidativno-stresnog statusa kod pacijenata sa kolorektalnim karcinomom.

Materijal i metode: U studiji je učestvovalo 105 pacijenata sa kolorektalnim karcinomom i 109 zdravih ispitanika. Osnovni biohemijski parametri su određeni komercijalnim biohemijskim testovima. Parametri oksidativno-stresnog statusa (totalni oksidativni status, totalni antioksidativni status i prooksidativno-antioksidativni balans) su određeni spektrofotometrijskim metodama. E-kaderin je određen sendvič ELISA metodom.

carcinoma were significantly lower 7.42 mg/mL (5.40 to 11.58) compared to values in patients with poorly differentiated carcinoma 13.92 mg/mL (12.76 to 32.23) , p = 0.037, and significantly higher compared to the values in the control group (p = 0.001).

Conclusion:HB-EGF may be a useful diagnostic serological biomarker for colorectal cancer. The values of HB-EGF were significantly higher in poorly, medium and high-differentiated carcinoma as compared to the control group which confirmed the importance of its examination as prognostic marker.

Keywords: HB-EGF; Cancer; Serological biomarker; DuoSet ELISA

P013
E-CADHERIN IN COLORECTAL CARCINOMA

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Introduction: E-cadherin is calcium-dependent transmembrane glycoprotein composed of extracellular, transmembrane and intracellular domain and is localised at the basolateral surface of epithelial cells. It is involved in cell-cell adhesion so the extracelluar domain of one E-cadherin binds the extracellular domain of the E-cadherin from neighboring cell forming homodimer. E-cadherin function is tightly connected with cytoplasmatic proteins known as the catenins. Due to variety of factors, destabilisation of E-cadherin-catenin complex may occur leading to the activation of gens for cell growth and tumorigenesis.

The Aim: The aim of this study was to determine concentrations of E-cadherin and to examine the connection between E-cadherin and oxidative stress status paremeters in patients with colorectal carcinoma.

Material and methods: 105 patients with colorectal carcinoma and 109 healthy volunteers participated in this study. Basic biochemical parameters were determined using commercial biochemical tests. Oxidative stress status parameters (prooxidant-antioxidant balance, total oxidant status and total antioxidant status) were measured by spectrophotometric assays. E-cadherin was measured by ELISA method.

Rezultati: Mann-Whitney U-testom je dokazano da je koncentracija E-kaderina kod pacijenata značajno viša u odnosu na kontrolnu grupu ($p<0,0001$). Koncentracija prooksidativno-antioksidativnog balansa (PAB) je značajno veća kod pacijenata ($p<0,0001$), a pokazana je i značajna korelacija između vrednosti E-kaderina i PAB-a ($p<0,05$). Koncenracija E-kaderina se pokazala značajnim parametrom koji razdvaja kontrolne ispitanike i pacijente, nezavisno od uticaja starosti i pola.

Zaključak: Ova studija je potvrdila vezu između koncentracije E-kaderina i kolorektalnog karcinoma, kao i značajnu povezanost ovog parametra sa parametrima oksidativno-stresnog statusa.

Ključne reči: E-kaderin; kolorektalni karcinom; oksidativno-stresni status.

Results: Mann-Withney U test showed that concentrations of E-cadherin were significantly higher in CRC patients compared with the control group ($p<0.0001$). Concentration of prooxidant-antioxidant balance (PAB) was significantly higher in patients group ($p<0.0001$), and there was a significant correlation between E-cadherin and PAB ($p<0.05$). E-cadherin concentrations showed significant ability in discrimination control group and patients, independent of gender and age.

Conclusion: This study confirmed the relation between concentrations of E-cadherin and colorectal carcinoma, as well as significant link between this parameter and parameters of oxidative stress and antioxidant defens.

Keywords: E-cadherin; colorectal carcinoma; oxidative stress status.

P014
REZISTIN: KONCENTRACIJA, GENSKA EKSPRESIJA I POLIMORFIZAM RETN RS1862513 KOD PACIJENATA SA KOLOREKTALNIM KANCEROM

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Uvod: Kolorektalni kancer (KRK) je treći najčešći tip kancera kod muškaraca i drugi najčešći tip kancera kod žena u svetu, čime je odgovoran za 10% ukupnih slučajeva kancera kod oba pola. Smatra se da je rezistin, adipokin kojeg u humanom organizmu luče monociti i tkivne makrofage, povezan sa razvojem ove bolesti.

Cilj: Ispitati promene serumske koncentracije i genske ekspresije rezistina kod pacijenata sa kolorektalnim kancerom u odnosu na zdrave osobe, izvršiti genotipizaciju kod učesnika u studiji i ispitati uticaj prisustva G alela u RETN C-420G polimorfizmu na gensku ekspresiju i koncentraciju rezistina.

P014
RESISTIN: CONCENTRATION, GENE EXPRESSION AND POLYMORPHISM RETN RS186251 IN PATIENS WITH COLORECTAL CANCER

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Introduction: Colorectal cancer (CRC) is the world third most common type of cancer in men and the second most common in women, which makes it responsible for 10% incidence of cancer in both sexes. Resistin, an adipokine secreted by monocytes and tissue macrophages, is considered to be associated with this cancer.

The Aim: To examine changes in concentration and gene expression of resistin in patients with CRC versus healthy individuals, as well as to examine the effect of the presence of G alleles in the RETN C-420G single nucleotide polymorphism on gene expression and protein concentration.

Pacijenti i metode: U istraživanju je učestvovalo 94 pacijenta Klinike za opštu hirurgiju Vojnomedicinske akademije sa dijagnostifikovanim KRK, a kontrolnu grupu je činilo 106 zdravih osoba. Koncentracija rezistina u serumu određena je primenom ELISA testa. Genska ekspresija je izvršena korišćenjem 7500 Real-Time PCR analizatora i TaqMan hemije. Detekcija SNP-a (-420 C/G) u promotorskom regionu RETN gena je izvršena reakcijom zasnovanoj na 5'- egzonukleaznoj aktivnosti DNK polimeraze primenom specifičnih VIC/FAM obeleženih MGB proba.

Rezultati: Serumska koncentracija rezistina je povišena u grupi pacijenata sa KRK u odnosu na kontrolnu grupu (P<0,001). Genska ekspresija za rezistin u M PK u grupi pacijenata je snižena u odnosu na kontrolnu grupu (P<0,001). Kroz sva tri gradusa bolesti koncentracija rezistina ostaje približno konstantna, nasuprot genske ekspresije rezistina u perifernoj krvi koja ima trend opadanja. Genotipizacija za SNP (-420 C/G) pokazuje da CC genotip dominira u obe grupe.

Zaključak: Naše istraživanje je potvrdilo prisustvo povišenih koncentracija rezistina kod pacijenata sa KRK. Istovremeno, genska ekspresija u M PK bila je snižena, što ukazuje na moguću nishodnu regulaciju ovog gena u perifernoj krvi u prisustvu povišenih koncentracija proteina sintetisanog i sekretovanog u malignom tkivu. Potrebne su opsežnije buduće studije sa većim brojem ispitanika različitih etničkih grupa da bi se preciznije definisala veza između rezistina, njegove ekspresije i kolorektalnog kancera.

Ključne reči: koncentracija rezistina; ekspresija RETN gena; polimorfizam RETN rs1862513; kolorektalni kancer

Patients and Methods: We recruited 94 patients with CRC at Clinic of General Surgery, Military Medical Academy in Belgrade. The control group consisted of 106 healthy individuals. Serum resistin concentration was determined by ELISA test. The PCR experiment was done using 7500 Real-Time PCR Analyzer and TaqMan chemistry. SNP detection (-420C/G) in the promoter region of RETN gene was performed by the reaction based on the 5'-exonuclease activity of DNA polymerase using specific VIC/FAM labeled MGB probes.

Results: Resistin concentration was increased in CRC patients compared to the control group (P <0.001). Resistin gene expression in the patients was lower in relation to the control group (P <0.001). Through cancer grades, concentration of resistin remains approximately constant, opposed to the gene expression that has a declining trend. Genotyping indicates that the CC genotype dominates both groups.

Conclusion: Our results confirmed increased resistin serum concentration in patients with CRC. In contrast, expression of resistin in PBMC was decreased, suggesting downregulation of peripheral blood resistin synthesis in the presence of increased resistin secretion in malignant tissue. More extensive studies, with a larger number of respondents of different ethnic groups are needed to define a deeper link between resistin concentration, gene expression and colorectal cancer.

Keywords: resistin serum levels; gene expression; SNP RETN rs1862513; colorectal cancer

P015
POREĐENJE ANTIOKSIDATIVNOG EFEKTA PREPARATA N-ACETILCISTEINA SA KOMBINOVANIM PREPARATOM N-ACETILCISTEINA I PROPOLISA

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Uvod: Oksidativni stres predstavlja stanje narušene ravnoteže između prooksidanasa i endogenih sistema antioksidativne zaštite. N-acetilcistein (NAC) je

P015
COMPARISON OF THE ANTIOXIDANT EFFECT OF N-ACETYLCISTEINE PREPARATION WITH THE COMBINED SUPPLEMENT PRODUCT OF N-ACETYLCISTEINE AND PROPOLIS

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Introduction: Oxidative stress reflects a state of disturbed balance between pro-oxidants and endogenous systems of antioxidative protection. N-

dobro poznat antioksidans zbog svojih redukcionih osobina, koje potiču od sulfhidrilnih grupa cisteina. Mukolitičko dejstvo ostvaruje raskidajući disuflidne mostove mukopolisaharida. Olakšava iskašljavanje, ublažava disanje i smanjuje viskoznost bronhijalnog sekreta. Propolis je smeša smola koje sakupljaju pčele sa biljaka, koristi se za različite svrhe zbog svog antibakterijskog i antiinflamatornog efekta. Kompleksna smeša različitih jedinjenja iz propolisa sinergistički doprinosi njegovom ukupnom efektu, a bioflavonoidi koji ulaze u sastav propolisa, ispoljavaju antioksidativni efekat.

Cilj: Ispitivanje antioksidativnog efekta propolisa poređenjem oksidativno – stresnog statusa ispitanika pre i posle suplementacije NAC-om ili kombinovanim preparatom NAC-a i propolisa.

Materijal i metode: Studija obuhvata 20 zdravih ispitanika (18 pušača i 2 nepušača), podeljenih na dve grupe. Prva grupa čini 10 ispitanika opredeljenih na kombinovani preparat NAC-a sa propolisom, a druga grupa obuhvata 10 ispitanika opredeljenih na jednokomponentni preparat NAC-a. Krv je uzorkovana pre i nakon desetodnevne suplementacije preparatima. Određeni su sledeći parametri prooksidativnog efekta u serumu: produkti uznapredovale oksidacije proteina (AOPP), malondialdehid (MDA), totalni oksidativni status (TOS), prooksidativno – antioksidativni balans (PAB) i parametri antioksidativne zaštite: totalni antioksidativni status (TAS), ukupne sulfhidrilne grupe (SHG), aktivnost enzima superoksid – dizmutaze (SOD) i paraoksonaze – 1 (PON1).

Rezultati: Nakon suplementacije, kombinovani preparat je statistički značajno povećao parametre antioksidativne zaštite SOD, PON i TAS kod svih ispitanika, dok je jednokomponenti značajno uticao na povećanje SOD, SHG i smanjenje AOPP, takođe kod svih ispitanika u grupi.

Zaključak: Oba preparata poboljšavaju antioksidativnu zaštitu i dokazan je značajan doprinos efekta propolisa u kombinaciji sa NAC-om.

Ključne reči: oksidativni stres; antioksidativna zaštita; N-acetilcistein; propolis.

acetylcysteine (NAC) is well-known antioxidant for its reduction properties which originate from sulfhydryl group of cysteine. It is used as a mucolytic because it reduces viscosity of the bronchial secretion. Also, it alleviates expectoration and hard breathing by disrupting disulfide bonds of mucopolysaccharide. Propolis is used for various purposes due to its antibacterial and anti-inflammatory effects. Complex mixture of various compounds synergistically contributes its overall effect, and bioflavonoids, which are part of propolis, manifest antioxidant effects.

Aim: The goal was to examine antioxidative effect of propolis by comparing the oxidative stress status of the respondents before and after supplementation of NAC or combined supplement product of NAC and propolis.

Material and Methods: The study includes 20 healthy respondents (18 smokers and 2 nonsmoker), divided into two groups. The first group consists of 10 respondents defined on the combined supplement product of NAC and propolis and the second group consists of 10 respondents defined on one-component preparation of NAC. The blood samples were taken before and after a ten-day supplementation of preparations. The following parameters of the prooxidative effect in the serum were determined: products of advanced protein oxidation (AOPP), malondialdehyde (MDA), total oxidative status (TOS), protoxidative-antioxidant balance (PAB). Also, the parameters of antioxidant protection were determined: Total antioxidant status (TAS), total sulfhydryl groups (SHG), activity of superoxide-dismutase enzyme (SOD) and paraoxonase 1 (PON1).

Results: After supplementation, the combined preparation has significantly increased the parameters of antioxidant protection: SOD, PON and TAS for all subjects in the group. Moreover, one-component preparation of NAC has significantly influenced on the increase of SOD, SHG and on decrease of AOPP.

Conclusion: Both preparations improve antioxidant protection and it is showed significant contribution of effect of propolis in combination with NAC.

Keywords: oxidative stress; antioxidant protection; N-acetylcysteine; propolis.