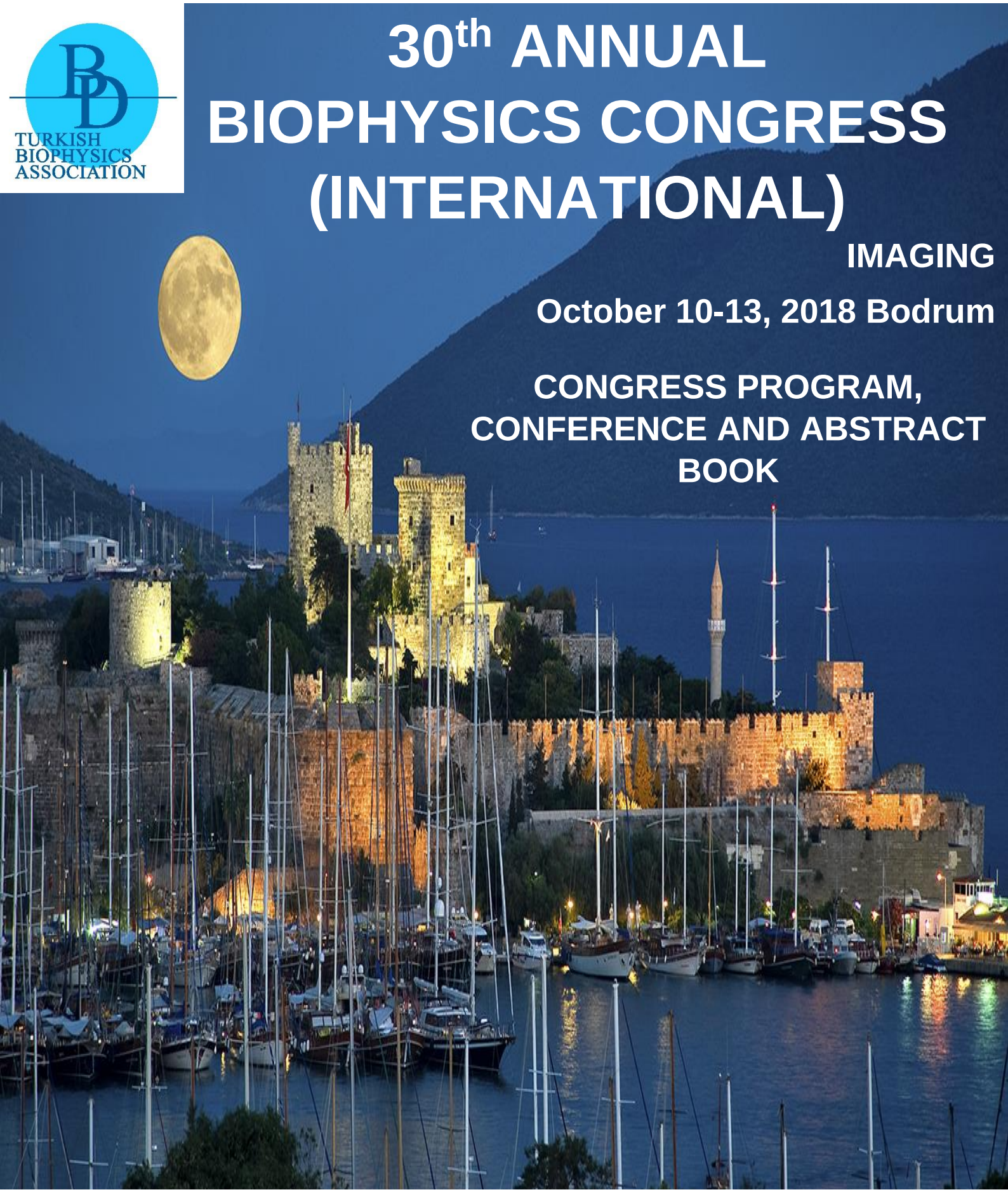
TURKISH BIOPHYSICS ASSOCIATION

30th ANNUAL BIOPHYSICS CONGRESS (INTERNATIONAL)

IMAGING

October 10-13, 2018 Bodrum

CONGRESS PROGRAM, CONFERENCE AND ABSTRACT BOOK



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October 10-13, 2018 Bodrum

Royal Asarlik Beach Hotel Conference Center

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CONTENTS

CONGRESS PROGRAMME WEDNESDAY 10 OCTOBER 2018	
09:00 18:00	**Congress Registration**
19:00 23:00	**Welcome Cocktail**

THURSDAY 11 OCTOBER 2018		
Opening Session		
08:30 08:40	**Opening Speech**	**Mehmet Can AKYOLCU** **(Congress Chair)**
08:40 09:25	**Opening Conference** Chairpersons: AKYOLCU M.C. (Istanbul, TR), PEHLIVAN F. (Ankara, TR)	**C-I** **Mechanobiological control of the immune response** Speaker: COLIN-YORK H. (Oxford, UK) (Sponsored by EBSA)
09:25 09:35	**Questions & Answers**	
09:35 10:00	**Coffee Break**	
10:00 10:45	**Conference** Chairpersons: OZTURK N. (Istanbul, TR), OZ ARSLAN D. (Istanbul, TR)	**C-II** **Signaling by immune receptors: Developing an imaging toolkit to observe the very early events in receptor triggering** Speaker: SANTOS A.M. (Oxford, UK)
10:45 10:55	**Questions & Answers**	
Oral Presentation Session-1 (OPS-1)		
	Conference Saloon	**Meeting Saloon**
11:00 12:30	**OPS-1** Chairpersons: ESEN F. (Eskisehir, TR), GARIP A.I. (Istanbul, TR)	**OPS-1** Chairpersons: ESEN H. (Eskisehir, TR), KUCUKKAYA B. (Istanbul, TR)
11:00 11:15	**OP-1** **H_2O_2 differently effects to the contractions of thoracic aorta in vivo magnetic field exposure**	**OP-7** **Intracellular traffic of mutant diphtheria toxin, CRM197**

	Speaker: COSKUN C. (Adana, TR)	Speaker: OZERMAN EDIS B. (Istanbul, TR)
11:15 11:30	**OP-2** **Investigation the efficacy of pulsed magnetic field in the treatment of disuse atrophy** Speaker: COSKUN C. (Adana, TR)	**OP-8** **Biochemical characterization of propeptide of pregnancy associated plasma protein A (pro-PAPP-A) and its cellular effects** Speaker: DURER Z. (Istanbul, TR)
11:30 11:45	**OP-3** **Modeling and dynamics of the full-length structure of the factor XII protein: Insights into the mechanism of activation through zinc binding** Speaker: KILINC E. (Istanbul, TR)	**OP-9** **Shotgun metaproteomics of the sediment samples from Armutlu Geothermal Spring, Turkey** Speaker: OZTUG M. (Kocaeli, TR)
11:45 12:00	**OP-4** **Effect of titanium dioxide nanoparticles of different shapes and sizes on intrinsic pathway of coagulation** Speaker: KILINC E. (Istanbul, TR)	**OP-10** **Determination effects of diosgenin and dactolisib in breast cancer cell lines** Speaker: TIBER MEGA P. (Istanbul, TR)
12:00 12:15	**OP-5** **Characterization short length multi wall carbon nanotubes and toxicity on caernohabditis elegans** Speaker: ONSU K.A. (Istanbul, TR)	**OP-11** **Investigation of apoptotic gene expressions for two novel hydrazide derivatives of etodolac in K562 leukemia cell line** Speaker: TIBER MEGA P. (Istanbul, TR)
12:15 12:30	**OP-6** **Development of thermal shift assay via nucleotide binding on actin cytoskeleton** Speaker: ONSU K.A. (Istanbul, TR)	**OP-12** **The role of NF-kB inflammatory response of RFR-exposed colon cancer cell lines** Speaker: OZGUR E. (Ankara, TR)
12:30 13:30	**Lunch Break**	
13:30 14:15	**Conference** Chairpersons: Chairpersons: DURDAGI S. (Istanbul, TR), DURER Z.A. (Istanbul, TR)	**C-III** **Single virion STED microscopy studies of broadly neutralizing anti-HIV**

		antibodies Speaker: CARRAVILLA P. (Bilbao, Spain)
14:15 14:25	**Questions & Answers**	
14:25 14:40	**Coffee Break**	
14:40 15:25	**Conference** Chairpersons: SEZGIN E. (Oxford, UK), DALKILIC N. (Konya, TR)	**C-IV** **Visualising molecular structures in food** Speaker: CLAUSEN M.P. (Odense, DK)
15:25 15:35	**Questions & Answers**	
15:35 16:00	**Coffee Break**	
Oral Presentation Session-2 (OPS-2)		
	Conference Saloon	**Meeting Saloon**
16:00 17:30	**OPS-2** Chairpersons: GUNAY I. (Adana, TR), OZGUR E. (Ankara, TR)	**OPS-2** Chairpersons: MEGA TIBER P. (Istanbul, TR), TUNCER S. (Eskisehir, TR)
16:00 16:15	**OP-13** **Levetiracetam treatment in presence of low frequency magnetic field restored the alterations in white matters of injured spinal cords: An FTIR imaging study** Speaker: BOZKURT GIRIT O. (Aydın, TR)	**OP-17** **The influence of 50 Hz pulsed magnetic field on contraction proteins and parameters of uterus muscle in pregnancy terms of rats** Speaker: OCAL I. (Adana, TR)
16:15 16:30	**OP-14** **A study on the role of CDP-Choline in mitochondrial dynamics** Speaker: OZ ARSLAN D. (Istanbul, TR)	**OP-18** **The role of calcium ions on uterus muscle of exposed to pulsed magnetic field pregnant rats** Speaker: OCAL I. (Adana, TR)
16:30 16:45	**OP-15** **Scanning acoustic microscopy of quantum dots** Speaker: PARLAK M. (Istanbul, TR)	**OP-19** **Determination of residual stress with diffusion MR method in cortical and trabecular section of human vertebral bone tissue** Speaker: SERT C. (Sanlıurfa, TR)
16:45 17:00	**OP-16** **Effect of electromagnetic field on whole blood,**	**OP-20** **Effect of electromagnetic field originating from high**

	biochemical and hormone level in human Speaker: YAVAŞ M.C. (Kırsehir, TR)	**voltage lines on malondialdehyde level** Speaker: YAVAŞ M.C. (Kırsehir, TR)

FRIDAY 12 OCTOBER 2018		
08:30 09:15	**Conference** Chairpersons: ILHAN B. (Konya, TR), GURGUL S. (Gaziantep, TR)	**C-V** **Lipoprotein/cholesterol interaction with biomembranes studied at the nanoscopic level using super resolution techniques** Speaker: PLOCHBERGER B. (Linz, Austria)
09:15 09:25	**Questions & Answers**	
09:25 10:10	**Conference** Chairpersons: KAN B. (Istanbul, TR), MEGA TIBER P. (Istanbul, TR)	**C-VI** **Elucidating the nanoscale architecture of the plasma membrane with super-resolution spectroscopy** Speaker: SEZGIN E. (Oxford, UK)
10:10 10:20	**Questions & Answers**	
10:20 11:00	**Coffee Break**	
Oral Presentation Session-3 (OPS-3)		
	Conference Saloon	**Meeting Saloon**
11:00 12:30	**OPS-3** Chairpersons: PEHLIVAN M. (Izmir, TR), BOZKURT GIRIT O. (Aydın, TR)	**OPS-3** Chairpersons: OCAL I. (Adana, TR), ZEREN T. (Istanbul, TR)
11:00 11:15	**OP-21** **Fractal analysis method indicates that streching exercise alters the dynamics of semg of rectus femoris and vastus medialis differently** Speaker: OZTURK N. (Istanbul, TR)	**OP-27** **Investigation of the role of MMP-1-1607 1G/2G gene polymorphism in the development of ischemic stroke disease** Speaker: AY A. (Edirne, TR)
11:15 11:30	**OP-22** **A new mitochondria specific agent reserves conduction velocity parameters of**	**OP-28** **Determination of relationship between interleukin-18 (-137G/C) gene polymorphism**

	sciatic nerve under ischemia/reperfusion: MitoTEMPO Speaker: CELEN M.C. (Konya, TR)	**and development of ischemic stroke disease** Speaker: ALKANLI N. (Istanbul, TR)
11:30 11:45	**OP-23** **Some innovative methods to record olfactory evoked potentials: A preliminary study** Speaker: PEHLIVAN M. (Izmir, TR)	**OP-29** **Association of IL-4 and IL-10 with asemptomatic organ damage in hypertensive patients** Speaker: BAHTIYAR N. (Istanbul, TR)
11:45 12:00	**OP-24** **Does abdominal ischemia-reperfusion alter action potential of papillary muscle?** Speaker: TUNCER S. (Eskisehir, TR)	**OP-30** **IL-10 and TNF- α in grading of essential hypertension** Speaker: BAHTIYAR N. (Istanbul, TR)
12:00 12:15	**OP-25** **Protective effect of Mito-Tempo against dysfunction of rat isolated papillary muscle caused by abdominal ischemia-reperfusion** Speaker: AKKOCA A. (Konya, TR)	**OP-31** **Lipid profile and oxidative stress in premenopausal and postmenopausal women** Speaker: SARIBAL D. (Istanbul, TR)
12:15 12:30	**OP-26** **Selenium supplementation recovered sciatic nerve function in menopause and in peripheral nerve injury in menopause** Speaker: BOZKURT GIRIT O. (Aydın, TR)	**OP-32** **Status of trace elements and antioxidants in premenopausal and postmenopausal women** Speaker: SARIBAL D. (Istanbul, TR)
12:30 13:30	**Lunch Break**	
13:30 14:15	**Conference** Chairpersons: ILHAN B. (Konya, TR), KILINC E. (Istanbul, TR)	**C-VII** **Cooperative mechanism for improving discriminating ability in olfactory receptor neuron** Speaker: VIDYBIDA A. (Kyiv, Ukraine)
14:15 14:25	**Questions & Answers**	
14:25 15:00	**Coffee Break**	

Oral Presentation Session-4 (OPS-4)		
	Conference Saloon	**Meeting Saloon**
15:00 16:15	**OPS-4** Chairpersons: SERT C. (Sanlıurfa, TR), ALKANLI N. (Istanbul, TR)	**OPS-4** Chairpersons: DEMIREL C. (Gaziantep, TR), CALISKAN S.O. (Usak, TR)
15:00 15:15	**OP-33** **Novel TNF-α inhibitor scaffolds against rheumatoid arthritis: A combined ligand-based and structure-based resources pipeline** Speaker: DURDAGI S. (Istanbul, TR)	**OP-35** **Protective effect of vildagliptin against oxidative stress and liver degeneration in neonatal STZ-diabetic rats** Speaker: SARIBAL D. (Istanbul, TR)
15:15 15:30	**OP-34** **A comparison between methods of the lyapunov exponents, boltzmann-gibbs entropy and scale index by the evaluating the chaotic activity of the cardiopulmonary signals of rats** Speaker: ZEREN T. (Istanbul, TR)	**OP-36** **The effects of ZnPc-liposome mediated photodynamic therapy on molecular pathways in cancer** Speaker: CALISKAN S.O. (Usak, TR)
15:30 16:30	**Coffee Break**	
Closing Session		
16:30 17:00	**Closing Speech Award Ceremony**	**Mehmet Can AKYOLCU (Congress Chair)**
17:00 19:00	**General Assembly of Turkish Biophysics Association**	

SATURDAY 13 OCTOBER 2018	
10:00 17:30	**Sungulet Bodrum Yacht Group Activities**

Opening Speech

Welcome Address to the 30th Annual Biophysics Congress

October 10, 2018

Bodrum

Mehmet Can Akyolcu

President of the Turkish Biophysical Society

Girne American University

Good morning, Ladies and Gentlemen, Dear Colleagues,

It is a great honor for me to welcome all of you to Bodrum.

On behalf of the organizers of the 30th Annual Biophysics Congress (International) I would like to express my most sincere gratitude for your presence in this Opening Ceremony as the gateway to the initiation to our Scientific Program.

First of all, as a respect to art and an artist, I want to make some reminders about the history of this region where we organized present scientific activity.

As you know, science and art have faced various difficulties in making progress throughout history.

It can be said that, in a sense, those who deal with science and art have the similar fate.

I would like to tell a little history of Halicarnassus Fisherman and Bodrum.

Cevat Şakir Kabaağaçlı was born in Crete during a warm April rain. His father was a high commissioner and Uncle The grand vizier of II. Abdulahamit is Cevat Şakir Pasha. His mother was Sare İsmet Hanım.

He lives in Athens where Şakir Pasha served as envoy. He completed his primary and secondary education in Princess Islands, middle and high school in 1907 at Robert College. He then went to Oxford University with family pressure.

Because he is the biggest of six brothers, it was enormous pressure in terms of success. Like all his siblings, Cevat Şakir has an extraordinary talent and a fine talent for fine arts, poetry, and literature.

As he returned back to Istanbul, he can make translations in weekly magazines, painting, making new-style gildings, drawing cartoons and preparing colorful magazine covers.

Then he will start his journey to Bodrum because he writes that writing with the name Hüseyin Kenan.

He had been judged because; regarding the misfortune of the four soldiers. The title of the story he wrote in the Karagöz and Akbaba periodicals on 1925, was '' how to go to hanging with their own feet prisoners sentenced to death''

And he was exiled to Bodrum. He wrote the most important works in literature in Bodrum. That time the only source of living in Bodrum and its surroundings was maritime and sailors 'fishing so his writings mostly involve maritime and fishery issues. Listening to the small stories of the people he had mythologized them. The fate of the village named Bodrum changes with the beginning of the life of Halicarnassus fisherman. After its discovery, it became one of the world's leading tourism destinations.

As long as you are here, I hope you can create time for yourself to enjoy the beauties of Bodrum

The first National Biophysics Congress was held on September 1986 in Istanbul University Faculty of Medicine Biophysics Hall and student classrooms with the leadership of Prof. Engin Bermek who later became chair of Turkish Academy of Sciences. We also proud of members of our society as a member of the Turkish Academy of Science Prof. Pekcan UNGAN and Prof. Aslı Tolon

In the following years, even though some of our congresses were realized with the participation of important international scientists the language of them was Turkish.

We are glad, despite all the negative conditions in our country this congress will be the first international congress organized by the Turkish Biophysical Society.

We decided to determine the theme of this Congress as "Imaging" and I can't imagine a more suitable or beautiful location than Bodrum which to explore the aesthetic of nature as well as the scientific dimensions of that biophysics.

On your behalf, and ours, I want to thank Congress Scientific Program Chair Prof. Nizamettin Dalkılıç and committee members for the huge amounts of time and energy they have dedicated to ensuring that this event is a success.

The most important criticism of our congresses in our relationship with EBSA was the Turkish language of our congresses. Being congress language Turkish was an obstacle to our efforts to reach the world scale scientific competition. A new development about our congress will be publishing the presentations in American Institute of Physics magazine which is included in the leading databases of scientific & engineering literature.

By the way, we would like to thank Dr. Erdinç Sezgin for his efforts in this Congress to gain international quality.

The reason for not being able to reach the desired level of participation of biophysicists in this congress suggests that the language is English. We are aware

that we will stay away from the interaction and solidarity on the international platform without experiencing these beginning difficulties.

We know that Turkish biophysicists work hard and produce a lot. We understand the signs of these hard and important works in articles published in international journals. But we are also aware of the need to increase our self-confidence in joining international biophysics congresses.

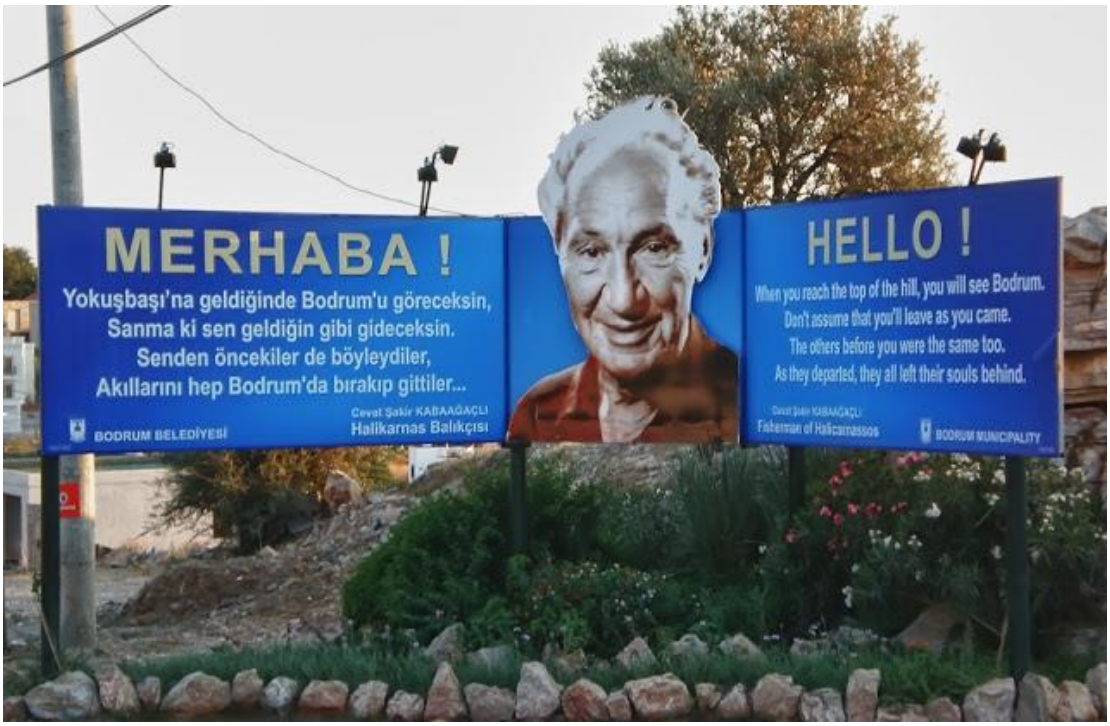
We hope that this Congress will help us to open the roads.

In the meantime, we would like to thank to the visitor scientists who have honored us for their dedication.

The fact that a large percentage of Nobel prizes have been won by biophysicists for the last 30 years is a pride for all of us as biophysicists. It is not difficult to predict that this situation will continue in the coming years. As the needs related to understanding the behavior of biomolecules and their role in the organism increases, the importance of biophysics inevitably will arise.

I would like to encourage delegates to participate actively in the interesting discussions over the next two days. I wish everyone a successful and fruitful congress.

Thank you very much for your attention.



CONFERENCES

C-I Mechanobiological control of the immune response

Huw Colin-York[1], Yousef Javanmardi[2], Mark Skamrahl[1], Sudha Kumari[3], Veronica T. Chang[4], Satya Khuon[5], Aaron Taylor[5], Teng-Leong Chew[5], Eric Betzig[5], Emad Moeendarbary[2,6], Vincenzo Cerundolo[1], Christian Eggeling[1], Marco Fritzsche[1,7]

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[5]Howard Hughes Medical Institute, Janelia Research Campus, 19700 Helix Drive, Ashburn, VA 20147, USA.

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[7]Kennedy Institute for Rheumatology, Roosevelt Drive, University of Oxford, Oxford, OX3 7LF, United Kingdom.

Cytoskeletal actin dynamics are essential for T-cell activation, a key step in the adaptive immune response. The intimate cell-cell contact that forms between the T-cell and antigen presenting cell during activation, known as the immunological synapse, has been shown to be a dynamic, physical structure where complex mechanical forces are generated. Using a range of biophysical techniques, we show evidence that the binding kinetics of the antigen engaging the T-cell receptor controls the nanoscale actin organization and mechanics of the immune synapse. By stimulating T-cells expressing a specific T-cell receptor by a range of antigens, force measurements revealed that the peak force experienced by the T-cell receptor during activation was independent of the kinetics of the stimulating antigen. Conversely, quantification of the actin retrograde flow velocity at the synapse revealed a striking dependence on the antigen kinetics. Taken together, these findings suggest that the dynamics of the actin cytoskeleton actively adjusted to normalize the force experienced by the T-cell receptor in an antigen specific manner. Consequently, tuning actin dynamics in response to antigen kinetics may thus be a mechanism that allows T cells to tune their activation response by adjusting the length- and time-scale of T-cell receptor signaling.

Key words: Mechanobiology, T-cell activation, Traction force microscopy, actin cytoskeleton

C-II Signaling by immune receptors: Developing an imaging toolkit to observe the very early events in receptor triggering

Mafalda Da Cunha Santos[1]

[1]Weatherall Institute of Molecular Medicine, John Radcliffe Hospital, Headington, University of Oxford, United Kingdom

Our immune system is built is such a way that it can quickly respond to harmful threats. The exact triggering mechanism that leads to initiation of immune response is still not completely understood. In our lab we have been interested in studying the behaviour and functions of molecules that are present at the membrane of lymphocytes, we have further suggested that changes in their organization will be a key event in the process of triggering a lymphocyte. Knowing that some of the most important receptors (TCR, BCR, FcR) lack intrinsic enzymatic activity we have proposed the kinetic segregation model for receptor triggering that postulates that the state of receptors phosphorylation is maintained by an equilibrium between kinases and phosphatases. This equilibrium is disturbed locally in favour of kinases when a given receptor engage their ligands, that in turn leads to the exclusion of large phosphatases such as CD45 from the regions of contact. Importantly, the KS model predicts that receptor triggering can happen even in the absence of a ligand. In order to confirm and validate our model we have been taking advantage in breakthrough developments in imaging that allow us to study molecular behaviour at single-molecule level in real-time at these very early stages of lymphocyte's triggering. Holding the knowledge of how exactly the immune response starts places us in a better position to develop ways to boost our immune system against cancer or to block it and protect it from causing autoimmunity.

C-III Single virion STED microscopy studies of broadly neutralizing anti-HIV antibodies

Pablo Carravilla[1], Jakub Chojnacki[2], Edurne Rujas[1], Sara Insausti[1], Eneko Largo[1], Dominic Waithe[2], Beatriz Apellaniz[1], Taylor Sicard[3,4], Jean-Philippe Julien[3,4,5], Christian Eggeling[2,6] and José L. Nieva[1]

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[6] Institute of Applied Optics, Faculty of Physics and Astronomy, Friedrich-Schiller University & Leibniz Institute of Photonic Technology, Jena, Germany

Antibodies against the highly conserved Membrane-Proximal External Region (MPER) of the Env gp41 subunit neutralize HIV-1 with exceptional breadth and potency, and protect against infection when administered passively in vivo. Due to the lack of knowledge on the MPER native structure and accessibility, different and exclusive models have been proposed for the molecular mechanism of MPER specific recognition by broadly neutralizing antibodies (bnAbs).

Accessibility of antibodies to the native Env MPER has been addressed through super-resolution stimulated emission depletion (STED) microscopy of fluorescently labelled Fabs in the context of single virions.

STED imaging revealed a common pattern of native Env recognition for HIV-1 bnAbs targeting MPER or the solvent-exposed surface subunit gp120. In the case of anti-MPER antibodies the process evolves with extra contribution of interactions with the viral lipid membrane to binding specificity.

Our results suggest that structural adaptations that sustain anti-MPER antibody-lipid interactions and increase neutralization potency, have arisen to enhance affinity toward an MPER helix already accessible within the membrane-anchored pre-fusion Env complex. These observations will inform approaches to design vaccines that emulate the neutralization-competent MPER structure, and clarify what elements of

anti-MPER antibodies can be subject to optimization when used as templates for immunotherapeutic agent development.

Basque Government, Spanish MINECO, EBSA, Wellcome Trust, MRC, BBSRC,

Wolfson Foundation, EPA Cephalosporin Fund, John Fell Fund and Canadian

Institutes of Health Research.

Key words: HIV-1, super-resolution, antibodies

C-IV Visualing molecular structures in food

Mie Thorborg Pedersen[1], **Mathias Porsmose Clausen[1]**

[1] Department for Chemical Engineering, Biotechnology and Environmental Technology, University of Southern Denmark

Novel optical microscopy techniques have proven to be very powerful tools for resolving molecular details in a range of different biological systems. Most applications are found within the biomedical sciences. In this presentation, we will show a number of applications of novel microscopy on the biological systems that we eat – the complex materials that constitute food.

Our appreciation of food is closely related to the texture of food. Yet, the understanding of texture, and how texture changes during cooking, is very limited. Especially, fundamental scientific explanations of the molecular origin of textural phenomena are missing. Part of the reason for this has been the lack of appropriate technique for investigating molecular structures at the right spatial scale.

We have used a range of optical microscopy techniques including 2-photon microscopy, stimulated emission depletion (STED) microscopy, coherent anti-Stokes Raman scattering (CARS) microscopy, and second harmonic generation (SHG) microscopy, to image e.g. collagen, lipids, and water in different foods.

We find that a number of different food systems such as squid, cheese and jellyfish readily can be imaged choosing the appropriate optical technique to provide new insight to the (re-)arrangements of molecular structures during cooking.

We have introduced a biophysical methodology and novel types of optical microscopy to the field of food science to shed light on the fascinating transformations of biological material happening during cooking.

We thanks the imaging facility DaMBIC for use of microscopy equipment.

Key words: Bioimaging, food, texture

C-V Lipoprotein/cholesterol interaction with biomembranes studied at the nanoscopic level using super resolution techniques

Markus Axmann[1], Andreas Karner[2], Erdinc Sezgin[3], Jirka Novacek[4], Johannes Preiner[2], Herbert Stangl[1], **Birgit Plochberger[2]**

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Cholesterol is a crucial constituent of all cellular membranes - as it cannot be degraded by mammals, its distribution in the whole organism has to be tightly regulated. One major player are lipoprotein particles, which provide peripheral cells with cholesterol and lipids. Thus, the exchange of lipids between lipoproteins and cells is a crucial process. Critical is hereby to understand with precise detail the structure and function of lipoproteins leading to diseases like hypercholesterolemia, cardiovascular disease, stroke and neurodegenerative disorders.

Here, we address the cellular and biomolecular mechanisms driving lipoprotein interaction and cargo exchange using a combination of biophysical, cell biological and analytical techniques. As the relationship between function and structure of the cell membrane is extraordinarily complex, its interactions are difficult to determine unequivocally. Additionally, super-resolving (temporal and spatial) techniques demand without exception well defined systems to gain deeper insights into the biological function. For reduction of these intricacies, artificial membrane systems are applied for the investigation of defined lipid-lipid or lipid-protein interactions. Moreover, to follow the delivery of water-insoluble molecules to biomembranes and to understand their basic interaction principle we use a combination of single-molecule-sensitive force and fluorescence microscopy. This allowed us to directly visualize the time-course of the transfer process of fluorescently labelled amphiphilic cargo molecules from lipoprotein particles into the lipid bilayer. Fluorescence-Cross-Correlation-Spectroscopy (FCCS) and C-Laurdan polarization measurements confirmed independently the overall transfer.

High-speed-Atomic-Force-Microscopy and Cryo-Electron-Microscopy/Tomography visualized with unprecedented spatial resolution the successful membrane integration of the lipoprotein particle. Particle incorporation and cargo transfer was abolished at increased membrane cholesterol levels as a consequence of the cholesterol-induced reduction of the membrane elasticity.

Taken together, these techniques in combination allow probing fundamental biological processes at a previously unprecedented level. In summary, these observations are revealing a new mechanism for regulation of lipid uptake based on sensing plasma membrane cholesterol levels, allowed novel insights into how single cell biophysical properties control lipoprotein interactions and how mechanical cell properties are contributing to the nature of cargo uptake. The function of the corresponding lipoprotein receptor (SR-B1) is primarily to be an anchor which holds the particle close to the plasma membrane; once in proximity, elastic properties of the membrane regulate the particle fusion. Additionally, assemble and manipulation of lipoproteins provide a new possibility for therapeutic agents. These naturally occurring particles could be designed to carry out many beneficial tasks.

Key words: Lipoprotein, cholesterol, super-resolving (temporal and spatial) techniques

C- VI Elucidating the nanoscale architecture of the plasma membrane with super-resolution spectroscopy

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Diffusion and interaction dynamics of molecules at the plasma membrane play an important role in cellular signalling. Nanoscale mobility of lipids and proteins in the plasma membrane is highly heterogeneous. This heterogeneity gives invaluable information on the bioactivity of these molecules. Thus, it is crucial to accurately measure the diffusion dynamics of the membrane molecules. Here, I will explain how we utilize super-resolution STED microscopy combined with single molecule fluorescence correlation spectroscopy (STED-FCS) to access the diffusion characteristics of fluorescently labelled lipid analogues and proteins in the live cell plasma membrane. I will also address whether the diffusion behaviour of the proteins is a direct measure for the bioactivity.

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C-VII Cooperative mechanism for improving discriminating ability in olfactory receptor neuron

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Primary perception of odors takes place in olfactory receptor neurons (ORN). Each ORN has on its membrane a large number of identical receptors (R) able to bind odor molecules selectively. Selectivity of a receptor with respect to two odors is expressed as different affinity to different odors. Selectivity of ORN is expressed as different firing rate when different odors are presented at equal concentrations. Our goal is to compare selectivity of ORN with that of its individual receptors.

The two facts are utilized: (1) The spike initiation mechanism is of cooperative nature. This results in the threshold-type behavior: some threshold number Th of Rs must be bound with odor for triggering spikes; (2) The total number of bound Rs in a single ORN is subjected to the adsorption-desorption noise. In this work, the properties of that noise are studied mathematically. Especially, how often the number of bound Rs is equal to the Th or higher. Comparing the mean time the number of bound Rs spends above the Th for two odors allows to calculate the ORN's selectivity and to compare it with receptor's selectivity.

A simple mathematical expression is found for comparing ORN's selectivity with that of its individual receptors.

Due to threshold-type cooperative behavior and adsorption-desorption noise, the ORN's selectivity can be much higher than that of its receptors. For this to happen the odors must be applied in low concentrations. The idea can be used for constructing artificial highly selective nanosensors (electronic nose).

Key words: Olfaction, Selectivity, Electronic nose

ORAL PRESENTATIONS

OP-1

H_2O_2 differently effects to the contractions of thoracic aorta in vivo magnetic field exposure

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Introduction: *In vivo* exposure of Pulsed Magnetic Field (PMF) is widely investigated for its therapeutic uses in experimental and clinical studies, especially in wound and bone healing. However, the effect of PMF exposure on the vascular system is not clear. Therefore, in this study we tried to identify its possible effects through the H_2O_2 induced thoracic aorta contractions.

Methods: In our study, PMF was applied to the rats *in vivo* for 30 days (40 Hz, 1.5 mT, 1 hour/day). Then thoracic aortas of the animals were removed and cut into 2-3 mm rings, hanged on to isometric force transducers and the responses recorded. Rings were stabilized, and contractility examined in the presence of KCl 60 mM.

Results: PMF exposure did not affect contraction responses at different doses of KCl and phenylephrine with or without endothelium. However, H_2O_2 administration decreased contractions of the endothelium-intact (e+) PMF exposed group. We also investigated the effect of PMF on H_2O_2 induced apoptosis. Contraction responses to KCl and Phe were significantly affected after H_2O_2 incubation in (e+) PMF group.

Conclusion: As a result, this study may demonstrate that, *in vivo* exposure of PMF exhibits effects on vascular system through the endothelium, which is monitored in apoptotic pathways.

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Key Words: H_2O_2, Pulsed magnetic field, thoracic aorta, apoptosis

OP-2

Investigation the efficacy of pulsed magnetic field in the treatment of disuse atrophy

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Introduction: Muscle atrophy is the deterioration of muscle tissue due to long-term decrease of muscle function. Disuse atrophy is generally encountered with primary or secondary locomotor system pathologies. Basic etiology may depend on different sources such as mechanical troubles, the central or peripheral nervous system, neuromuscular junction or directly muscle dysfunction. In this study, we investigated the effect of pulsed magnetic field (PMF) on the treatment of experimentally formed disuse atrophy.

Methods: In our study, we first performed a total tenotomy (full fold cut of the tendon) on the quadratus femoris tendon at the lower extremity of the experimental group of the rats. Then, disuse atrophy formed at the rectus femoris by inhibiting knee extension for 6 weeks. Surgical application was not performed in the control group. Then each group was divided into subgroups as PMF applied or not. Animals separated for the PMF will be exposed to magnetic field (1.5 mT and 40 Hz, 1 hour/day) for 45 days. All experimental groups were sacrificed at the end of 6 weeks. Experimental measurements were then performed by excising whole rectus femoris muscles from all groups.

Results: Each muscle held in normal tension placed vertically in organ bath in contact with platinum electrodes and combined with a transducer. According to our data, we measured decreased weight and contraction parameters in atrophy formed muscles. However, in PMF applied atrophy group we observed greater contraction, which may suggest PMF as a treatment option for disuse atrophy that needs further researches.

Key Words: Disuse Atrophy, Pulsed Magnetic Field, rectus femoris.

OP-3

Modeling and dynamics of the full-length structure of the factor XII protein: Insights into the mechanism of activation through zinc binding

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Introduction: Zinc, the second most abundant transition metal in blood, plays a crucial role in coagulation as zinc deficiency has been associated with bleeding disorders. Essentially, zinc has been shown to bind to the initiator of the contact pathway, factor (F) XII. Zinc binding induces conformational changes in the structure of F XII, which augments its activation. F XII consists of two chains, the heavy and light chain. The structure of the light chain has been determined by X-ray crystallography, albeit accurate biophysical characterization of the full-length structure remains to be a challenge due to the presence of intrinsically disordered regions in the heavy chain. Prompted by mutagenesis studies that identified 4 zinc binding sites in the heavy chain of F XII, we underscore the necessity of acquiring the full-length structure of F XII in order to comprehend the structural role of zinc in the activation of F XII.

Methods: To this end, we recruited comparative modeling tools to obtain the the full-length structure of human Factor XII, and molecular dynamics simulations to refine the structural model.

Results: Modeling and dynamical analysis of the full-length structure strikingly indicated potential zinc coordination sites compliant with the experiments.

Conclusions: Overall, this study proposes a molecular mechanism for the zinc-induced activation of Factor XII, highlighting the potential use of computational approaches for addressing biophysical questions.

Key words: Factor XII, Zinc, Blood Coagulation, Molecular Dynamics, Comparative Modeling

OP-4

Effect of titanium dioxide nanoparticles of different shapes and sizes on intrinsic pathway of coagulation

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Introduction: Titanium dioxide (TiO_2) nanoparticles are manufactured in different size/shape and widely used in cosmetic industry (toothpaste, shampoo, sun cream etc.), biomedical implants, pharmaceutical field and as food additive (chewing gum, chocolates, white sugar etc.). Blood coagulation is an important physiological process to stop bleeding in case of tissue damage. However, if it becomes pathologic (excessive clotting) then may lead to thrombosis, stroke and myocardial infarction. It is not yet known whether TiO_2 nanoparticles in the plasma system activate blood coagulation via the intrinsic pathway of blood coagulation (via factor XII). It is aimed to investigate the effects of TiO_2 nanoparticles in different shape, size and concentration on blood coagulation via factor XII activation.

Methods: Particles were purchased in sizes of 5, 40 and 200 nm and shape-surface analysis has been done by scanning electron microscopy (SEM). All particles were suspended in Hepes-NaCl (HN) buffer at final concentrations of 2.08, 4.2, 8.3 and 16.6 µg/ml and thrombin generation was recorded after addition into human platelet poor plasma.

Results: Thrombin generation was increased dose dependently for 5nm and 200nm TiO_2 nanoparticles through the intrinsic pathway. However thrombin curves for 40 nm particles at all concentrations were similar to control (buffer).

Conclusion: It is concluded that TiO_2 particles in certain shape activates blood coagulation with concentration and size dependent manner.

Key words: Factor XII, TiO_2, Blood Coagulation, SEM, intrinsic pathway of coagulation

OP-5

Characterization short length multi wall carbon nanotubes and toxicity on caernohabditis elegans

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Introduction and Aim: Carbon nanotubes (CNTs) have superior properties; their applications are expanding from drug delivery to solar cells. It is important to investigate the toxic effects on *Caernorhabditis elegans (C. elegans);* a free-living nematode mainly found in the liquid phase of soils. It is possible to see both the effect of CNTs on a soil living organism. CNTs are produced 2-8 nm in diameter, 0.5 nm in length and applied to this 1 mm worms. Nutrition orientations of worms when CNTs are added to their broth; acute exposure of CNTs to the agar of *C. elegans* can be followed. Length and number of eggs gives information about toxicity values.

Methods: CNTs were functionalized with acid treatment to increase solubility. Properties were characterized by taking TEM images. -COOH groups on the surface were investigated by using FT-IR spectroscopy after functionalization. Short time exposure of CNTs were investigated for two days at concentrations 10 ug/ml and 100 ug/ml. Number of alive animals and eggs, their length and general behavior was noted. The images were taken to show CNTs' way inside of the animals.

Results: FT-IR results were showed, successful -COOH groups on the surface. After exposure from adults for 48 hours, CNTs did not reduce the body length, eggs and viability in nematodes significantly ($p<0.05$). Their locomotion behavior did not change and the animals did not show a tendency to escape from the CNTs.

Conclusion: The results are crucial to see the toxicity effects of produced CNTs on these soil living organisms. CNTs were produced with low toxic effects and suitable for medical applications.

Key words: Carbon Nanotube, Toxicity, *C. elegans*

OP-6

Development of thermal shift assay via nucleotide binding on actin cytoskeleton

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Introduction: Actin is one of the most abundant proteins in eukaryotic cells. It plays an important role in many cellular functions such cell motility, chemotaxis, secretion and cell division as well as structural function. Although actin can be polymerized in the nucleotide-free state, the binding of adenosine 5′-triphosphate (ATP) following hydrolysis into adenosine 5′-diphosphate (ADP) is known to be a critical factor in controlling the interaction of actin both with itself and with other proteins. Thermal Shift Assay (TSA) can provide a full thermodynamic description of binding events. In this study, we aimed to clarify protein-ligand interactions for subsequent drug development studies by calculating the melting curves of actin with different concentrations of ATP, ADP and GTP.

Methods: In this study, Globular actin monomer (G-actin) was purified from the rabbit skeletal muscle acetone powder. Thermal Shift Assay was performed with actin and fluorophore SYPRO Orange with different concentrations (0.2 mM and 1 mM) of ATP, ADP and GTP, respectively by quantitative PCR instrument. GraphPad 6 and Excel 2016 were used for analyzing melting curve data.

Results: It has been shown that actin had greater stability with ATP than ADP and GTP alone.

Conclusion: In our study, we observed the same binding kinetics of actin to nucleotides as in previous biochemical results. It has been shown that TSA method can be used for such protein-ligand studies in a similar and inexpensive way to research.

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Key words: Actin, thermal shift assay, protein, ligand

OP-7

Intracellular traffic of mutant diphtheria toxin, CRM197

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Introduction: Cross-reacting material 197 (CRM197), non-toxic mutant of diphtheria toxin (DTx), is used as a carrier protein for pediatric vaccine production. In this study, we aimed to investigate intracellular trafficking of CRM197-loaded endosomes in endothelial cells.

Methods: Cell culture was used for CRM197 treatment. The effective incubation time was determined by transmission electron microscopy (TEM) in DTx-treated human umbilical vein endothelial cells (HUVECs) and the presence of catalytic fragment (FA) was validated by ADP-ribosylation assay. CRM197-loaded endosomes were purified by density gradient equilibrium centrifugation and FA of mutant toxin was determined by Western bloting. Possible interactions between CRM197 and G-actin were studied by Molecular Dynamics simulation. Immunofluorescence microscopy was used for imaging of CRM197 distribution in the cell, actin cytoskeleton and Rab peptides residing in CRM197-loaded endosomes.

Results: Following 15 minutes of treatment, TEM findings revealed DTx-loaded endosomes as enlarged vesicles. Enzymatic activity was validated and FA was determined in DTx-loaded endosomal fractions. In the CRM197-loaded endosomal fractions, actin and Hsp90 were also identified in addition to FA by immunoblotting. Molecular dynamics simulation revealed T-domain of CRM197 interacts with G-actin. Fluorescent images revealed CRM197-loaded endosomes were co-localized with actin filaments and Rab11, signaling the recycling pathway, was prominent.

Conclusion: These results suggest that CRM197-loaded endosomes, and the dragged actin, will return to the plasma membrane after FA delivery to the cytosol.

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Key words: Actin, CRM197, Diphtheria Toxin, Endosome, HUVEC

OP-8

Biochemical characterization of propeptide of pregnancy associated plasma protein A (pro-PAPP-A) and its cellular effects

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Introduction and aim: Pregnancy-associated-plasma protein-A (PAPP-A) is expressed in various tissues to regulate the bioavailability of insulin like growth factors. The biological and catalytic activity of PAPP-A (aa residues 81-1627) is well characterized and it serves as a biomarker for various conditions in clinical practice. However, limited information is available about the structure and function of its N-terminal propeptide, i.e. pro-PAPP-A (aa residues 23-80). Here we report the bacterial expression, purification, and characterization of pro-PAPP-A. Also, we investigated potential biological activity of pro-PAPP-A on monocytic cell lines (U937).

Methods: The coding sequence for pro-PAPP-A was subcloned into a p-GEX-6P-2 vector and the peptide was expressed in bacteria. Far-UV spectra measurements were performed using a Jasco-J-715 spectropolarimeter. To test if the purified peptide has cellular effects, U937 cells were treated with pro-PAPP-A in a dose dependent manner and their metabolic activity levels were assessed by MTT assays and flow cytometry measurements of mitochondrial membrane potential, mass and superoxide production.

Results: We purified pro-PAPP-A and confirmed its molecular weight by MALDI-TOF. The pro-PAPP-A was primarily a random coil as determined by circular dichroism. At the cellular level, pro-PAPP-A decreased cell proliferation which was accompanied by an increase in mitochondrial superoxide level and a reduction in mitochondrial membrane potential.

Conclusions: Due to its small size, pro-PAPP-A may be introduced into clinical practice in future as a possible biomarker to evaluate the metabolism of PAPP-A and related disorders. In addition, our study indicates a potential biological activity of pro-PAPP-A that merits further investigation.

Key words: PAPP-A, U937, bacterial purification, peptides

OP-9

Shotgun metaproteomics of the sediment samples from Armutlu Geothermal Spring, Turkey

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Introduction: Thermophilic microorganisms, which could survive in harsh environmental conditions such as temperatures above 50°C, are of great importance for industrial processes since they express heat resistive enzymes with the potential to serve as a biocatalyst in future. These microorganisms are well studied over the last decade providing insight to the functional potential of the microbial communities. Developing proteomic approaches to discover novel enzymes from environmental samples is a growing research of interest owing to the advanced mass spectrometry (MS) based techniques. In this work, metaproteomic approaches were applied to discover novel enzymes from thermophilic bacteria obtained from harsh environmental conditions.

Methods: In this study, thermophilic organisms that survive above 65°C were screened and selected using microbiology techniques from Armutlu hot spring in Turkey. The protein extracts of these microorganism were analyzed with a high throughput, non-targeted mass spectrometry (MS) approach. The method involves the enzymatic digestion of the entire proteome, separation of the resulting peptides by two dimensional liquid chromatography (2D-LC-MSMS) and direct infusion of the entire samples into a high resolution tandem mass spectrometer.

Results: Thousands of peptides and proteins were identified by the 2D-LC-MSMS analysis. The taxonomy information obtained from the proteomic analysis was well matched with the results obtained from the sequencing information of the cultivated thermophilic microorganisms.

Conclusions: A shotgun metaproteomics approach was developed to analyze the metaproteome of the sediment samples. The organisms that are found to be thermostable will be screened for novel thermostable enzymes which might be a better alternative to the ones already being used in industry.

Key words: Mass Spectrometry, Liquid Chromatography, HPLC, Thermophiles, LC-MSMS

OP-10

Determination effects of diosgenin and dactolisib in breast cancer cell lines

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Introduction and Aim: The mammalian target of rapamycin (mTOR) complex is a serine-threonine kinase that is a member of the phosphatidylinositol 3-kinase (PI3K) - related kinase (PIKK) family and plays an important role on many cell functions such as cell growth, proliferation, autophagy, survival. In many types of cancer, this complex is highly active, suggesting that it may be an effective target for cancer treatment. In this study, we aimed to determine the effects of diosgenin and dactolisib which are inhibitors of mTOR complex in MCF7 breast cancer cell lines.

Methods: The MCF7 cells were cultured with DMEM medium. Cells were incubated for 24 h at 37 ^{o}C, 5% CO_2 at different concentrations of diosgenin and dactolisib respectively,(50-150 μM, 5-50 nM). Growth inhibition of diosgenin and dactolisib was evaluated in vitro using the MTT colorimetric method against MCF7 cell lines. Apoptotic effects of diosgenin and dactolisib in different concentrations on MCF7 breast cancer cell lines were determined by using Tali image-based cytometer and mitochondrial membrane potential change assay.

Results: The concentration of 50% inhibition were 85 μM and 20 nM, for diosgenin end dactolisib, respectively. Apoptosis was found to be approximately 5% and 7% at concentration corresponding to the IC50 value 85 μM and 20 nM and 39% and 90% decrease in JC-1 absorbance for diosgenin and dactolisib, respectively for TALI and MMP assay.

Conclusion: Our results show that diosgenin and dactolisib inhibited cell viability, induced enhanced apoptotic effects.

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Key Words: Diosgenin, Dactolisib, MCF7, Breast Cancer

OP-11

Investigation of apoptotic gene expressions for two novel hydrazide derivatives of etodolac in K562 leukemia cell line

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Introduction and Aim: Though commonly used as anti-analgesic and anti-inflammatory agents, many studies have shown that nonsteroidal anti-inflammatory drugs (NSAIDs) also have anti-carcinogenic effects, mainly through COX-2 inhibition. Etodolac is one of the first NSAIDs approved by FDA. It has three-fold higher selectivity for COX-2, but full dose could be inhibitory for COX-1, too, which results in side-effects. To improve the efficiency, here, we introduced two novel hydrazide derivatives of etodolac (SGK-205 and SGK-216) and investigated their apoptotic effects on leukaemia cell line K562.

Methods: The K562 cells were cultured in RPMI medium. Cell pellets were prepared 24 h after drug administration at different concentrations (10-100 μM). Following RNA purification and cDNA synthesis, real-time PCR was performed via a custom plate panel to reveal gene expression levels of 16 apoptotic protein.

Results: Three proteins of the panel showed significant regulation in expression. There were 1.2, 2.8 and 1.3 fold upregulation in COX-2 for 100 μM etodolac, SGK-261 and SGK-205, respectively. Similarly, corresponding values for HER2 were 4.5, 1.7 and 0.4. Anti-apoptotic SAG expression was found to be increased in all drugs, too. Upregulation was markedly high in SGK-216 (7.6) and relatively less in SGK-205 (2.35).

Conclusion: Anti-proliferative and apoptotic actions of SGK-205 and SGK-216 were previously found to be higher compared to etodolac. Here, we show that Cox-2/Her-2 is upregulated upon addition of drugs, as a part of a feedback mechanism. We also found that SAG could have an important role in the response of these cells.

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Key words: Etodolac, COX-2, HER-2, K562, Cancer

OP-12

The role of NF-kB inflammatory response of RFR-exposed colon cancer cell lines

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Introduction: The potential risks of radiofrequency radiation (RFR) for human health have become a growing concern for the society. Colorectal cancer is one of the most common malignancies in developed countries due to environmental factors. Although inflammation, induced by tissue injury and environmental stimuli is a biological response, extended exposure to such stimuli like RFR might lead to chronic inflammation, which is an inducer of inflammatory diseases and cancer. This study investigates the effects of RFR on NF-kB levels in colon cancer cell lines.

Methods: RFR exposure system at 900, 1800, 2100 MHz was produced by a vector signal generator and a horn antenna in a temperature-controlled shielded room. Elisa assay was used to measure NF-kB expression levels. Experiments were performed in triplicates. Statistical analysis was performed by using GraphPad Prism 7 software. $P<0,05$ and less were considered as statistically significant.

Results: After 1h and 4h RFR exposure of DLD-1 cells to to 900 and 2100 MHz a significant increase in NF-kB levels was observed. However, in HCT-116 cells, 1h exposure to 900 and 1800 MHz led to increased whereas 2100 MHz result in reduced NF-kB levels and 4h exposure was accompanied by increase in all frequencies with respect to sham groups.

Conclusion: Activation of NF-kB playing a well-known function in the regulation of immune responses and inflammation. As a result of this study, RFR may induce activation of NF-kB. The extracellular stimulus such as RFR may lead to overexpression of NF-kB that might be associated with several pathological conditions, including cancer.

Key words: NF-kB, RFR, DLD-1, HCT-116

OP-13

Levetiracetam treatment in presence of low frequency magnetic field restored the alterations in white matters of injured spinal cords: An FTIR imaging study

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Introduction: Different approaches have been proposed for treatment of spinal cord injury (SCI), however only methylprednisolone, having some limitations, is used routinely in the clinics. Recently, antiepileptics and magnetic field were proposed to have neuroregenerative properties. This study aims to investigate the efficiency of combined magnetic field and levetiracetam treatment in experimental SCI.

Methods: Adult Wistar rats were subjected to laminectomy and spinal cord contusion injury at T10 level. Treatments of levetiracetam (100mg/kg/day) and 50 Hz 1 mT magnetic field (30 min/day) was applied separately or in combination (LEVMF) for 21 days and results were compared with methlyprednisolone administration (single dose of 30mg/kg). Functional behaviour of rats were assessed using BBB scores. Fourier transform infrared (FTIR) images of 12 µm thick spinal cord sections were analyzed in grey (GM) and white matter (WM) of spinal cords.

Results: The treatments led to an improvement in the behavioural functions of the rats, but not as prominent as methylprednisolone treatment. SCI led to a decrease in the amount of phosphate, ester containing lipids and ethyl groups in lipids, especially in WM, together with an increase in unsaturation in lipids, indicative of lipid peroxidation. Combined LEVMF treatment restored these alterations, especially in WM, more effectively compared to methylprednisolone.

Conclusion: The combined strategy of levetiracetam treatment in the presence of magnetic field was efficient in restoring SCI-induced alterations in lipid structure of spinal cords, especially in WM, and warrants further investigations.

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Key words: Spinal cord injury, methylprednisolone, levetiracetam, low frequency magnetic field, FTIR imaging

OP-14

A study on the role of CDP-Choline in mitochondrial dynamics

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Introduction and aim: CDP-Choline is a nutritional supplement and an intermediate in the biosynthesis of membrane phospholipids. Recent studies point to its potential protective effects on several diseases but the mechanism remains elusive. Our aim is to investigate the effects of CDP-Ch on mitochondrial dynamics in monocytes.

Methods: To address mitophagy induction, several mitophagy related proteins (LC3-II/I ratio, Mfn2, Pink1, Drp1 and CoxIV levels) were analysed by western blotting after CCCP treatment of U937 cells at different time points. Mitochondrial membrane potential (MMP), mass and superoxide production were measured by flow cytometry and confocal microscopy using mitochondrial specific dyes.

Results: To examine protective effects of CDP-Ch on mitophagy induced cells, we pre-treated U937 cells with CDP-Ch prior to treatment with CCCP. The increase of LC3B level observed upon CCCP treatment was augmented in the presence of CDP-Ch. Drp1 protein level diminished with CCCP and started to increase with further CDP-Ch treatment. Pink1 levels increased with CCCP and decreased slightly with CDP-Ch. Mitochondrial superoxide production significantly increased upon mitophagy induction and addition of CDP-Ch resulted in further increase. The decrease in mitochondrial mass upon mitophagy induction was rescued by CDP-Ch. Furthermore, MMP increased with CCCP and decreased with CDP-Ch treatment.

Conclusion: CDP-Ch caused an increase in mitochondrial mass and the level of mitochondrial fission in mitophagy induced U937 cells, suggesting its modulatory role in mitochondrial dynamics. Our findings indicate that CDP-Ch may have protective effects in mitophagy induced cells.

Key words: Mitophagy, CDP-Choline, U937 Cells, CCCP, Mitochondrial Dynamics.

OP-15

Scanning acoustic microscopy of quantum dots

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Summary: Quantum dots (QDs) compared with organic dyes and fluorescent proteins, due to their unique size and surface features, QDs have many advantages such as enhanced fluorescence brightness and strong resistance to photobleaching, and therefore they could serve as an excellent tool for theranostics. Scanning Acoustic Microscopy (SAM) is a non-invasive and rapid imaging modality, which is used to obtain the qualitative and quantitative features of cells and tissues without a requirement of staining or special preparation. In our study, acoustic impedance microscopy of QDs is performed by SAM for evaluating the potential of lead-sulphide (PbS), graphene and cadmium-telluride/cadmium sulphide (CdTe/CdS) quantum dots as a contrast agent. An inverted fluorescence microscope of better lateral resolution was used to investigate the fluorescence properties and size distributions of QD aggregates.

Introduction: Quantum dots (QDs) possess unique optical and electrical properties, including narrow and symmetric emission spectra of light, good light stability, strong fluorescence intensity and a changing emission wavelength with the QD size, and have thus great potential in the fields of biological imaging and molecular markers.

Methods: Scanning Acoustic Microscopy (SAM), Fluorescence Microscopy

Results: A relation between size and acoustic impedance is established.

Conclusion: The relation between acoustic impedance values of QDs and size of the aggregates was established. QDs have the tendency to form aggregates of various sizes, whose acoustic impedances change accordingly. The success of imaging these quantum dot aggregates by SAM together with the correlation established between size and acoustic impedance demonstrate the potential of SAM in monitoring QDs as contrast agents.

Key words: Quantum dots, scanning acoustic microscopy

OP-16

Effect of electromagnetic field on whole blood, biochemical and hormone level in human

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Introduction: The aim of our study is to investigate the effects of magnetic fields generated by the hair dryers devices used by women working in the same job on their serum biochemistry, whole blood and hormone values.

Methods: The sixteen women working continuously in hairdressing salons were included in the study. Two groups of studies were designed: control (n:8, mean age: 22.25±6.04) and experimental group (n:8, mean age:23,62±6.67).

Results: The biochemical (median values of alanine amino transferase, aspartate aminotransferase, triglycerides and very low density lipoprotein were found high) and hormonal results of the experimental group were compared with the biochemical (cholesterol, low-density lipoprotein and very high-density lipoprotein had high median values) and hormonal results of the control group and no significant difference was found ($p>0.05$). When the whole blood parameters were examined, the white blood cells and mean platelet volume results of the experimental group were significant ($p<0.05$), while there was a meaningless difference between red blood cell, hemoglobin, hematocrit, mean corpuscular volume, red cell distribution width and platelet values ($p>0.05$).

Conclusion: It is evident from the results that occupational exposure to magnetic fields constantly leads to changes in the biochemistry, hormone and whole blood parameters of the female.

Key Words: Electromagnetic field, hair dryers, whole blood, biochemical, hormone

OP-17

The influence of 50 Hz pulsed magnetic field on contraction proteins and parameters of uterus muscle in pregnancy terms of rats

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Introduction: The purpose of this study is to examine whether acute or chronic y exposure to 50 Hz frequency pulsed magnetic field (PMF) has adverse effects on contraction proteins and parameters of the uterine muscle in pregnancy terms of rats.

Methods: Pregnant fifty-six rats were divided into 8 groups (in each group, n= 7) according to pregnancy terms of rats as: Exposed-pulsed magnetic field (Control, Early-PMF, Middle-PMF and Late-PMF of pregnancy terms) and unexposed groups. At the end of the pregnancy terms of rats, blood samples were collected blood to measure the levels of myosin light chain kinase (MYLK) and calmodulin (CAM)), then, uterine rings were mounted in an organ bath. Uterine rings were allowed to equilibrate at 1.5 g tension for 60 min. The amplitude of contraction-force and contraction-frequency in uterine rings were measured with isometric force transducers and MP35 systems.

Results: The uterine contraction force and contraction frequency were analyzed as gram-force and contraction frequency (per 5-minute (frequency). At early and late terms of pregnancy, contraction force and frequency decreased in the groups exposed to pulsed magnetic field when compared to the control groups. Myosin light chain kinase (MYLK) and calmodulin (CAM) levels of early and late pregnancy terms of rats in exposed to pulsed magnetic field groups were found to decrease significantly compared to control groups.

Conclusion: Our findings suggest that acute or chronically non-invasive pulsed magnetic field exposure have no adverse effects in terms of pregnancy if the mother does not have any other symptomatic problem. Therefore, there is a need for more detailed investigations to conclude the effects of acute or chronic exposure to pulsed magnetic field.

Acknowledgements: This study was supported by the Çukurova University Scientific Research Foundation (Project no. TSA 2018-10573).

Key words: Calmodulin, Myosin light chain kinase, catalase (CAT), super oxidase dismutase (SOD), Uterine contraction, pulsed-magnetic field

OP-18

The role of calcium ions on uterus muscle of exposed to pulsed magnetic field pregnant rats

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Introduction: Functional impairments that occur in uterine contractions lead to many gynecological disorders in pregnancy terms. The present study was aimed at determining the role of concentrations of calcium ion how uterine smooth muscle contraction parameters were modulated by pulsed-magnetic field (PMF) with respect to varying contraction parameters in pregnancy terms of rats.

Methods: Pregnant fifty-six Wistar Albino divided into 8 groups (in each group, n= 7) according to pregnancy terms; Exposed-pulsed magnetic field (Control, Early-PMF, Middle-PMF and Late-PMF of pregnancy terms) pregnant rats and unexposed pregnant rats groups. Uterine rings were allowed to equilibrate at 1.5 g tension for 60 min, after which the preparations were challenged twice by administration of a maximally effective concentration of oxytocin(1mU/mL). When the contractions became regular, they were exposed to increasing cumulative manner calcium concentrations (10^{-4}, 10^{-3} and 10^{-2} M) in Ca^{2+}-free Krebs solution.

Results: The uterine contraction parameters were analyzed as gram force (gf) and area under the curve (AUC). At the early-term of pregnancy, contraction force and AUC increased in exposed to pulsed magnetic field groups compared to the control groups. While uterine rings treated with 10^{-4} and 10^{-3} M Ca^{2+} could not observe any considerable values, it was found significant results in those treated with 10^{-2} M Ca^{2+}.

Conclusion: Findings suggest that non-invasive pulsed magnetic field application may help prevent unpleasant symptomatic progression in late terms of gestation. Detailed examination of the L-type Ca^{2+} channels which play an important role in the contraction will be death with later on.

Acknowledgements: This study was supported by the Çukurova University Scientific Research Foundation (Project no.TSA-2018-10573).

Key words: Uterine contraction, pulsed-magnetic field, gestation rat, smooth muscle, calcium ion, oxytocin

OP-19

Determination of residual stress with diffusion MR method in cortical and trabecular section of human vertebral bone tissue

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Introduction: All of the residual stress measurement techniques are used to measure the residual stress by taking the measured samples into small pieces in the measurement environment. These methods cannot measure live tissue. The aim of this study is to develop a new measurement method for residual stress by measuring the diffusion coefficient of living (human) vertebral bone tissue cortically using the diffuse MR method

Methods: A total of 75 healthy and non-bone subjects were selected for this study as 3 groups, each group consisting of 25 individuals. Subjects were in Group 1, 15-20, Group 2, 40-50, and Group 3 in the 60-70 age range. No medication was applied to the subjects, and vertebral images were taken with diffuse MR. On these images, diffusion coefficient from cortical and medullar (trabecular) regions was measured and the results were compared with appropriate statistical methods (Kruskal Wallis). In addition, bone densitometry of all subjects was measured and groups (ANOVA) were compared.

Results: The cortical section diffusion coefficient (k) and medullary (trabecular) section diffusion coefficient (m) parameters were compared in groups 1, 2, and 3. Both diffusion parameters were significantly decreased in groups 1, 2 and 3. This shows that there is a decrease in diffusion with age increase. DXA and Crush values increased significantly with X-ray densitometer measurements. BMC, BMD, T and Z values were not significantly changed.

DXA and crush values were observed to be increased with age, although the values of diffusion coefficient at cortical and trabecular sites were decreased with age, BMD (bone mineral density) and BMC (bone mineral cell) values did not change. Despite the unchanged BMD and BMC values, the reduction of the diffusion causes an increase in residual stress. The fact that the DXA and Crush values have increased indicates that this is true.

Conclusion: According to the results of this study, it is possible to measure the residual stress levels in vertebral bone tissue in living tissues by determining the diffusion coefficient with diffusion MR method.

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Key words: Residuel stres, Vertebral bone, Diffusion coefficient, Diffusion MR

OP-20

Effect of electromagnetic field originating from high voltage lines on malondialdehyde level

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Introduction: The aim of our study was to investigate the effect of electromagnetic fields originating from high voltage lines on serum malondialdehyde level of male rats with wistar albino.

Methods: A total of 32 rats were randomly assigned to study in 4 groups. Groups were; Group 1: high voltage, Group 2: high voltage + ganoderma l., Group 3: high voltage + melatonin, Group 4: control. Experimental groups were exposed to high voltage for 8 hours daily for 52 days. The electric field and the magnetic field were measured. Ganoderma was administered 20 mg/kg/day as a gavage and melatonin intraperitoneally as 10 mg/kg/day.

Results: In the study, the malondialdehyde (MDA) levels of the experimental and control groups were compared. There was no significant difference between the groups. According to the control group, it was found that the MDA level of the high voltage group increased, while the Ganoderma and Melatonin groups had a small decrease at the MDA level.

Conclusion: These results show that electromagnetic fields originating from high tension increase the MDA serum level, which is found to decrease in the presence of ganoderma and melatonin.

Key words: Malondialdehyde, high voltage, melatonin, ganoderma, electromagnetic field

OP-21

Fractal analysis method indicates that streching exercise alters the dynamics of semg of rectus femoris and vastus medialis differently

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Introduction: In the rehabilitation of the patella-femoral pain, stretching exercises are widely used to decrease the stiffness of the quadriceps. The aim of the study is to determine whether rectus femoris (RF) and vastus medialis (VM) muscles of quadriceps have different dynamic behavior to stretching exercises by using fractal analysis method.

Methods: Experiments were conducted on 10 healthy subjects. Subjects were seated on the device with the knee at 15 degrees of flexion angle. Subjects were requested to produce 5 consecutive maximum voluntary isometric contractions, each lasting 5 seconds with a resting period of 10 seconds between contractions. Surface EMG signals (sEMG) from RF and VM muscles and force generated by the quadriceps muscles were recorded simultaneously. After the experiments, initially, state vectors (X_i) were constructed according to Takens's theory from the surface electromyography. Then the correlation dimension was computed according to the algorithm proposed by Grassberger and Procaccia.

Results: The means of the fractal dimensions for RF before and after the stretching exercises were 1.392 $\pm$0.005 and 1.383$\pm$0.003 (N=8), respectively. There was a main effect between pre- and post-stretching exercise (p=0.041). The means of the fractal dimensions for VM before and after the stretching exercises were 1.378 $\pm$0.006 and 1.387$\pm$0.010 (N=10), respectively. Although the fractal dimension of VM increased after stretching exercises, that increase was not significant.

Conclusion: The passive stretching exercise altered the dynamics of RF and VM in opposite direction such that the complexity of the RF muscle decreased while the complexity of VM muscle increased.

Key words: fractal dimension, rectus femoris, vastus medialis, sEMG, stretching exercise

OP-22

A new mitochondria specific agent reserves conduction velocity parameters of sciatic nerve under ischemia/reperfusion: MitoTEMPO

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Introduction: Changes in the nervous system affect many physiological parameters of the body. One of the most reliable methods of measuring these changes is to measure the delivery speed and the combined action potential (BAP). Therefore, measurements made with the sciatic nerve in the isolated organ duct mimic true pathogens.

Methods: Abdominal ischemia-reperfusion model is an animal model that mimics the side effects that often occur in humans after surgical operations. It involves clamping the abdominal aorta for 1 hour followed by a 2-hour reperfusion procedure. Finally, the sciatic nerve is dissociated when the rat is in an exhalation state. In our study, it was investigated whether mitochondria-specific antioxidant mitoTEMPO, a new generation chemical, exhibits a protective effect in such a situation. The drug was delivered at a dose of 0.7 mg/kg/day for 28 days via i.p. injection.

Results: The results are remarkable; a change in the rate of nerve conduction within 3 groups did not occur. On the other hand, in the ischemia-reperfusion group, the maximum depolarization significantly decreased compared to the control group, In the group of mitoTEMPO, maximum depolarization did not decrease but exceeded the control level. In addition to these, it seems that the same situation is also true in the field parameter that shows the fibers that are contributing to the conduction. It was also seen that the same applies to the + dV / dt and -dV / dt parameters.

Conclusion: Although our results show perfect protection of nerve conduction during I/R via mitoTEMPO, the probable side effects and applications need more detailed studies.

Key words: Conduction velocity, maximum depolarization, sciatic nerve

OP-23

Some innovative methods to record olfactory evoked potentials: A preliminary study

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Introduction: Olfactory evoked potentials are usually difficult to record because of some physiological restrictions. Some well-known problems are habituation to olfactory stimuli and trigeminal nerve stimulation. The object of this study is to introduce some methods for getting significant and reliable olfactory evoked responses.

Methods: A query of medical history, application of nebulized water and Xylometazoline Hydrochloride to nostrils was partially new processes. Odor delivery system through a diffuser mask (OxyMask®) with respiration synchronization was another novel process which enhanced the quality of the evoked response among other improvements. Sixty-five trauma patients who were sent to our test laboratory by law courts officially for the examination of their olfactory responses were included. The evoked responses and patient odor sense declarations in the anamnesis before and after the test were compared to observe the consistency.

Results: Patients, who declared that they have a sense of odor, had an apparent and sharp evoked potential response at least in one of the records. Patients, who had evoked responses, but declared that they have no sense of odor without any trauma to their face-nose region, had an anamnesis of a head trauma and coma. All the patients, who have evoked responses, lost the evoked response when odor was given unsynchronized to respiration.

Conclusion: It is concluded the methods described helps to get clear, consistent and significant evoked responses in contrary to literature. Respiration synchronization plays the most important role with the diffuser mask. The methods described here should also be studied independently for their effectiveness.

Key words: Olfactory evoked potential, inspiration, synchronization, diffuser mask

OP-24

Does abdominal ischemia-reperfusion alter action potential of papillary muscle?

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Introduction: Abdominal aortic aneurysms (AAA) have a high prevalence rate and surgical treatment still seems to be the best option. Surgical treatment requires abdominal blood flow to be discontinued, which in turn leads to secondary complications of ischemia reperfusion.

Post-treatment deaths are largely heart-based as a result of the effect of distant organ damage caused by abdominal ischemia-reperfusion. We aimed to investigate the alterations in action potential of papillary muscle after abdominal ischemia-reperfusion injury.

Methods: Wistar Albino rats were randomly divided into two groups: SHAM (only laparotomy was performed) and I/R (abdominal aorta was clamped for 1 hour and reperfused for 2 hours). Following the operational period left ventricle papillary muscles were isolated and action potential recording experiments were carried out in-vitro.

Results: Resting membrane potential was found to be hyperpolarized significantly. There was no change in the general shape of the action potential after ischemia-reperfusion. Many delayed-after-depolarizations were recorded which suggests an impaired persistent Na+ channel activity when interpreted with resting membrane potential findings.

Conclusion: Based on the findings, it can be said that the underlying cause of IR-induced heart diseases is not the changes in papillary muscle action potential.

Key words: Ischemia reperfusion, papillary muscle, action potential, rat

OP-25

Protective effect of Mito-Tempo against dysfunction of rat isolated papillary muscle caused by abdominal ischemia-reperfusion

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Introduction: In this study we investigated the protective effect of mitochondria-targeted antioxidant Mito-TEMPO against damage caused by increased amount of free radicals that is due to abdominal ischemia-reperfusion on myocardial papillary muscle contractile function.

Methods: Wistar Albino male rats weighing 350-400 g were used for the experiment. Rats were randomly divided into 3 groups as SHAM, ischemia-reperfusion (IR) and Mito-TEMPO+ ischemia-reperfusion (MT+IR). MT+IR group were received intraperitoneal injection of Mito-TEMPO (0.7 mg/kg/day) for 28 days. SHAM and IR groups were injected with ultrapure water. Incision were made from abdominal region for SHAM group while abdominal aorta were clamped for 1 hr and reperfused for 2 hrs for IR an MT+IR groups. Abdominal regions were sutured during reperfusion and papillary muscles were isolated from left ventricle following the reperfusion period. Blood samples for biochemical assays were collected from each group.

Results: The isometric contraction results have shown that Mito-TEMPO injection has protective effects on all contraction parameters impaired by abdominal ischemia-reperfusion. Histological and biochemical findings have also shown same protective effect of Mito-TEMPO on papillary muscle against structural and chemical deformity caused by abdominal ischemia-reperfusion.

Conclusion: People can be exposed to ischemia-reperfusion in many attempts to treat, such as bypass, aneurysm and organ transplantations as well as injuries. Therefore, the results of the present study may be important in understanding the underlying causes of many secondary complications encountered in the clinic.

Key words: Ischemia-reperfusion; Mito-TEMPO; papillary muscle

OP-26

Selenium supplementation recovered sciatic nerve function in menopause and in peripheral nerve injury in menopause

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Introduction and aim: Menopause is linked with neurological disorders of the central nervous system mainly through altering antioxidant-free radical balance. This study aims to investigate the effects of menopause and peripheral nerve injury in menopause on the functions of sciatic nerve and to elucidate the recovery potential of selenium supplementation.

Methods: Wistar-albino female rats were divided into seven groups as control, ovariectomized (OVX), low-dose (1 µmol/kg) selenium treated OVX, high-dose (5 µmol/ kg) selenium treated OVX, sciatic nerve injured OVX, low-dose selenium treated nerve injured OVX, high-dose selenium treated nerve injured OVX. For the development of menopause, rats were maintained for 5 months after ovariectomy. After the injury in sciatic nerves, selenium was administered for 5 weeks. Sciatic functional index (SFI) was measured at regular intervals after ovariectomy. Sciatic nerve conduction velocities (NCVs), serum estradiol, tissue malondialdehyde levels and catalase activity were determined.

Results: Ovariectomy-induced menopause resulted in the decrease of NCVs and variations in SFI values revealing neurodegeneration, and sciatic nerve injury in menopause have worsen these effects. Selenium treatment, especially at low-dose, led to an increase in NCVs and a recovery of menopause-induced alterations in functions of sciatic nerves monitored by SFI. Moreover, selenium supplementation resulted in an increase in serum estradiol levels in ovariectomized rats.

Conclusion: Menopause leads to neurodegeneration in peripheral nervous system and selenium can be beneficial in the recovery of menopause-induced neurodegeneration and nerve injuries in menopause.

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Key words: Menopause, sciatic nerve injury, nerve conduction velocity, sciatic functional index, selenium

OP-27

Investigation of the role of MMP-1-1607 1G/2G gene polymorphism in the development of ischemic stroke disease

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Introduction: Ischemic stroke is a complex, multi-factorial disease that is the result of the interaction between genetic and environmental factors. There are many genes that have been shown to be associated with ischemic stroke, one of the three types of stroke. Of these matrix metalloproteinases (MMP), has been determined as a genetic risk factor in the development of ischemic stroke in some populations. MMP gene polymorphisms, which are known to be associated with various diseases such as ischemic stroke, are also known to play an important role in gene transcription. The MMP-1 gene is a 53 kilodalton protein playing an important role in the mechanism of atherosclerotic stroke. The -1607 1G/2G polymorphism in the promoter region of the MMP-1 gene is thought to increase transcriptional activity, especially of the 2G allele. Therefore, the purpose of our study is to investigate the role of MMP-1 -1607 1G/2G gene polymorphism in the development of ischemic stroke.

Methods: Our study included 58 ischemic stroke patients and 60 healthy controls. DNAs of ischemic stroke patients and healthy control groups were isolated from blood containing ethylenediaminetetraacetic acid (EDTA). MMP-1 -1607 1G/2G gene polymorphism genotype distributions were determined using Polymerase Chain Reaction (PCR) and Restriction Fragment Length Polymorphism (RFLP) methods.

Results: Significant difference was not determined between the patient and control groups in terms of MMP-1 -1607 1G/2G genotype distributions.

Conclusion: MMP-1 -1607 1G/2G gene polymorphism has not been found as a genetic risk factor in the development of ischemic stroke.

Key words: Ischemic stroke, MMP-1 -1607 1G/2G gene polymorphism, PCR, RFLP

OP-28

Determination of relationship between interleukin-18 (-137G/C) gene polymorphism and development of ischemic stroke disease

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Introduction: It is a complex, multifactorial disorder that is thought to be a combination of stroke, genetic and environmental factors known as the third major cause of deaths after ischemic heart disease and cancer worldwide. Neuroinflammation is a general process of various neurological diseases and this process plays an important role in the pathogenesis of ischemic stroke. In an ischemic area where cerebral damage occurs, a large number of proinflammatory cytokines are secreted. Interleukin-18 (IL-18) gene containing proinflammatory properties is localized on chromosome 11q22.2-q22.3. This gene polymorphism, occurring in the promoter region of gene, is characterized by a Guanine/Cytosine base substitution at position -137 of the gene. It is thought that this polymorphism may be effective on the binding of transcription factors and consequently may modulate IL-18 mRNA expression. The purpose of this study is to determine the role of IL-18 (-137G/C) gene polymorphism in the development of ischemic stroke disease.

Methods: Our study was conducted with 55 patients with ischemic stroke and 50 healthy controls. DNA isolation was carried out from peripheral blood containing ethylenediaminetetraacetic acid of patient and control groups. Polymerase chain reaction (PCR) and restriction fragment length polymorphism (RFLP) methods were used to detect IL-18 (-137G/C) gene polymorphism.

Results: The significant difference was not found in terms of IL-18 (-137G/C) gene polymorphism genotype distributions between patients with ischemic stroke and healthy control groups.

Conclusion: IL-18 (-137G/C) gene polymorphism was not determined as a genetic risk factor in the development of ischemic stroke.

Key words: Ischemic stroke, IL-18 (-137G/C) gene polymorphism, PCR, RFLP

OP-29

Association of IL-4 and IL-10 with asemptomatic organ damage in hypertensive patients

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Background: Hypertension is a multifactorial disorder and the major risk factor for cardiovascular disease. Hypertension may exist several years before its clinic symptoms emerge. In this clinically silent period it may cause asymptomatic organ damages. It is possible to show these damages with some electro and echocardiographic and laboratory tests. In recent years, several studies have indicated that inflammation plays an important role in the development of essential hypertension. Our aim in this study was to investigate the role of certain inflammatory cytokines in determining asymptomatic organ damages in hypertensive patients.

Materials/Methods: 153 hypertension patients were 45 healthy subjects were included in the study. IL-4 and IL-10 serum levels were measured using an ELISA assay kit. Asymptomatic organ damages were evaluated by using some indicators according to the European Society of Cardiology (ESC) guidelines.

Results: Asymptomatic target organ damage was detected in 118 (%77.1) of 153 hypertensive patients. IL-4 (pg/ml) levels were 26.58±16.29 pg/ml in asymptomatic damage (+) and 38.13±15.26 pg/ml in asymptomatic damage (-) patients ($p<0.048$). The diagnostic performance of IL-4 was evaluated by using Receiver Operating Characteristic (ROC) curve analysis. It showed statistically significant AUC (±standard error) values, 0.716 (±0.099) (95% CI- 0.523 to 0,910); ($P< 0.041$). The cut-off point was found to be 30.7 pg/ml with a sensitivity of 68% and specificity of 63.6 %. We obtained similar results for IL- 10.

Conclusion: Our results showed that cytokines such as IL-4 and IL-10 may help identification of asymptomatic target organ damage in patients with hypertension.

Key words: Hypertension, IL-4, IL-10, cytokines, asymptomatic organ damage

OP-30

IL-10 and TNF- α in grading of essential hypertension

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Background: Hypertension is serious public health problem associated with significant morbidity and mortality. According to European Society of Cardiology (ESC/ESH) Arterial Hypertension Management Guidelines, hypertension is categorized in to three grades that is related with the highest level of blood pressure (Systolic: 140-159, diastolic: 90-99 mmHg in grade 1; Systolic: 160-179 mmHg, diastolic: 100-109 mmHg in grade 2; and Systolic: more than 180 mmHg, diastolic: more than 110 mmHg in grade3). In recent years, several studies have indicated that inflammation plays an important role in the development of essential hypertension. Our aim in this study was to investigate the relation of certain inflammatory cytokines with grading of hypertension.

Materials/Methods: 153 hypertension patients were 45 healthy subjects were included in the study. IL-10 and TNF-α serum levels were measured using an ELISA assay kit. Blood samples were collected in the morning following a 12-h fasting and separated serums were stored at -80°C until analyzed.

Results: Hypertensive patients were %16.3 in grade 1 (n=25), %58.2 in grade 2 (n=89) and %25.5 grade 3 (n=39). IL-10 and TNF-α levels were statistically different between the groups according to hypertension grades ($P<0.01$, and $P<0.043$, respectively). When multivariate logistic regression where staging is dependent and IL-10, TNF-α, weight of patients were independent factors, was performed. IL-10, and weight of patients were statistically significant predictor ($P<0.008$, and $P<0.04$, respectively). Nagelkerke R^2 was 54.3%.

Conclusion: Our results showed that cytokines such as IL-10 and TNF-α were closely related with staging of hypertension.

Key words: Hypertension, TNF-α, IL-10, cytokines

OP-31

Lipid profile and oxidative stress in premenopausal and postmenopausal women

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Introduction: Menopausal phase in a woman's life is an important physiological phenomenon, which is associated with cessation, of menstrual cycle due to loss of ovarian function. The presence of oxidative stress can negatively impact a women's health in long term. The deficiency of estrogen in postmenopausal women develops oxidative stress (OS), due to release of free radical or reactive oxygen species (ROS) and becomes the cause of various pathologies. Free oxygen radicals have been proposed as important causative agents of aging. Aging increases because of free radical damage.

In postmenopausal women, there are usually increased serum levels of total cholesterol (TC), low-density lipoprotein cholesterol (LDL), and triglyceride (TG). Free radicals generate the lipid peroxidation process in an organism. Malondialdehyde (MDA) is one of the final products of polyunsaturated fatty acids peroxidation in the cells. An increase in free radicals causes overproduction of MDA measurement. MDA level is commonly known as a marker of OS. In this study, to evaluate the effect of premenopausal (pre-men) and postmenopausal (post-men) women on lipid profile and OS in women.

Methods: This study included 96 women classified as pre-men (n=56) , post-men (n=40). Blood samples were drawn after 12-h overnight fast from antecubital venipuncture. Tubes containing the heparin were used for MDA, dry tube for an appropriate lipid profile. In serum, we analyzed lipid profile (TC, LDL, HDL, TG) with autoanalyzer. In plasma, MDA was determined as method of Buege and Aust.

Results: There were no differences in the changes between groups for TG, TC, and HDL levels. However, a significant increase in LDL and TC levels were noted in post-men compared to pre-men women ($p<0.005$). MDA values were significantly increased by in post-men compared to pre-men women ($P <0.05$).

Conclusion: This study was undertaken to evaluate the effect of pre- and postmenopause on lipid profile and OS in women. We found that TG and HDL were similar in the two groups. However, LDL, TC, and MDA higher in post-men group. Lack of estrogen is an essential contributory factor in the developing dyslipidemia in women. Furthermore, it has been reported that OS defined as a disturbance in the balance between the production of ROS and antioxidant defenses was prevalent in menopause causing significant damage.

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Key words: Menopause, MDA, lipid profile, oxidative stress

OP-32

Status of trace elements and antioxidants in premenopausal and postmenopausal women

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Introduction: Menopause is a natural step in the process of aging. Women face various physiological, psychological and sociological changes that impair quality of life during menopause. The risk of nutritional disturbances, particularly trace elements and vitamin deficiencies is high during menopause. Several trace elements are essential in bone metabolism. Some trace elements are cofactors of many enzymes. It has been observed that there is increased production of free radicals after menopause which is due to sudden alterations in hormonal status. There is enhanced oxidative stress and decreased antioxidant defense in postmenopausal females as compared to premenopausal females which can play an important role in the pathogenesis of the various diseases related to menopause. These antioxidants can be enzymatic catalase (CAT) or non-enzymatic which includes glutathione (GSH).

The aim of the study was to determine the antioxidant status (GSH, CAT) and correlate with trace element levels zinc (Zn), copper (Cu), selenium (Se), and iron (Fe) in postmenopausal females as compared to premenopausal women.

Methods: The study was carried out in 40 postmenopausal women (50-60 years) and 56 premenopausal women (30-40 years). Premenopausal women were treated as control group. Postmenopausal women had at least one year of amenorrhea. None had received estrogen therapy or any supportive treatment for menopausal symptoms for at least 6 months prior to the study. Blood samples were drawn after 12-h overnight fast from antecubital venipuncture. Tubes containing the heparin were used for antioxidant parameters, dry tube for an appropriate elements. In serum, trace elements (Cu, Zn, Se, and Fe) analyzes done by inductively coupled plasma optical emission spectrometry (ICP-OES). In plasma, CAT activity was measured by the breakdown of hydrogen peroxide catalysed by CAT enzym, GSH concentration was determined according to the method of Beutler et al. For statistical analysis, post-menopausal women were compared to premenopausal women treated as control.

Results: A significant increase in CAT activity and GSH level were noted in pre-men women compared to post-men women ($p<0.05$). There were no differences in the changes between groups for Zn. However, a significant increase in Cu, Fe and decrease Se levels were in post-men compared to pre-men women ($p<0.05$).

Conclusion: This study shows that there are changes in the serum biochemical profiles in postmenopausal women. It is evident from this study that there is enhanced decreased antioxidant defense in postmenopausal females as compared to premenopausal females which can play an important role in the pathogenesis of the various diseases related to menopause. Since all enzymes are metalloprotein, the level of metals in blood could be correlated with the activity of enzymes.

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Key words: Menopause, trace elements, antioxidants

OP-33

Novel TNF-α inhibitor scaffolds against rheumatoid arthritis: A combined ligand-based and structure-based resources pipeline

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Introduction: Tumor necrosis factor alpha (TNF-α) is a multifunctional cytokine that acts as a central biological mediator for critical immune functions, including inflammation, infection, and antitumor responses. It plays pivotal role in auto-immune diseases like rheumatoid arthritis (RA). The synthetic antibodies etanercept, infliximab, and adalimumab are approved drugs for the treatment of inflammatory diseases bind to TNF-α directly, however they cause serious side effects such as triggering an autoimmune anti-antibody response or the weakening of the body's immune defenses. Therefore, alternative small-molecule based therapies for TNF-α inhibition is a hot topic both in academia and industry. In this study, combined *in silico* approaches have been applied to better understand the important direct interactions between TNF-α and small inhibitors.

Methods: High-throughput structure-based and ligand-based virtual screening methods are applied to identify TNF-α inhibitors from 3 different small molecule databases (~256.000 molecules from Otava drug-like green chemical collection, ~500.000 molecules from Otava Tangible database, ~2.500.000 Enamine small molecule database) and ~240.000 molecules from ZINC natural products libraries. Moreover, therapeutic activity prediction, as well as pharmacokinetic and toxicity profiles are also investigated using MetaCore/MetaDrug platform. Molecular Dynamics (MD) simulations were also performed for selected hits to investigate their detailed structural and dynamical analysis beyond docking studies.

Results and Conclusion: As a result, at least one hit from each database were identified as novel TNF-α inhibitors after comprehensive virtual screening, multiple docking, e-Pharmacophore modeling (structure-based pharmacophore modeling), MD simulations, and MetaCore/MetaDrug analysis. Identified hits show predicted promising anti-arthritic activity and no toxicity.

Key words: Rheumatoid arthritis, TNF-α, molecular docking, Molecular Dynamics (MD) simulation, binary QSAR models

OP-34

A comparison between methods of the lyapunov exponents, boltzmann-gibbs entropy and scale index by the evaluating the chaotic activity of the cardiopulmonary signals of rats

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Introduction: Nonlinear analysis methods have been successfully applied to determine the chaotic behaviors and explain the dynamics of the biological systems too. Lyapunov exponent is also one of the well-known measurement methods to understand the sensitive dependency of the biological systems on initial conditions which is a primary characteristic of the chaotic systems. Pneumocardiogram (PNCG) is the recording method of the cardiac excited tracheal airflow in the respiratory tract and might be an efficient method for estimate of the cardiac and respiratory efficiency.

Methods: In a recent work, the PNCG signals were recorded from spontaneously breathing rats under anesthesia and largest Lyapunov exponents were calculated. Then, the time-dependent Boltzmann-Gibbs entropy has been also calculated by the wavelet entropy method and the scale index parameters have been calculated from the normalized inner scalogram for PNCG time series of rats.

Results: We had found positive largest Lyapunov exponent of signals of the healthy rats. The Boltzmann-Gibbs entropy calculated from the PNCG data was continuous and irregular in a certain scale range and the system was chaotic. Scale index parameters were between 0.5 and 1 and the PNCG signals were aperiodic.

Conclusion: The PNCG signals have been determined as chaotic by the three methods. Boltzmann-Gibbs entropy and scale index methods supported the findings of the Lyapunov exponent analysis results for the PNCG signals. Additionally, by the PNCG signals we understand that the scale index analysis and largest Lyapunov exponent methods might be used instead of each other because of their quantitative properties.

Key words: Largest Lyapunov exponent; Boltzmann-Gibbs entropy; Scale index analysis.

OP-35

Protective effect of vildagliptin against oxidative stress and liver degeneration in neonatal STZ-diabetic rats

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Introduction: Streptozotocin (STZ) is a beta-cell toxin that can produce diabetes mellitus and it is induces hyperglycemia. Hyperglycemia promotes auto-oxidation of glucose to form free radicals. Increased oxidative stress and oxidative damage are present in diabetes mellitus (DM). Oxidative stress results from an imbalance between radical- generating and radical-scavenging systems. Several studies have shown that diabetes mellitus is accompanied by increased formation of free radicals and decreased antioxidant capacity, leading to oxidative damage of cell components. Vildagliptin (VG), a DPP-4 inhibitor, regulates plasma glucose levels and insulin secretion. We aimed to observe the effects of short term VG treatment on liver morphology and oxidative stress in neonatal STZ-diabetic (nSTZ) rats.

Methods: Wistar albino newborn rats were divided into (1) control, (2) diabetic (n2STZ) (STZ;100mg/kg, ip injected second day after birth), (3) VG treated diabetic (n2STZ+VG) (VG; 60mg/kg/day, oral during 8 days), and (4) only VG (VG; 60mg/kg/day, oral during 8 days). Blood glucose levels and body weights were measured. All liver tissue sections were stained with hematoxylin and eosin and PAS, also were immunohistochemically stained with PCNA (for proliferation index). Plasma malondialdehyde (MDA), glutathione (GSH) levels, and catalase (CAT) activity were measured with spectrophotometric methods.

Results: Blood glucose levels significantly increased in n2STZ groups compared to the other groups. After VG treatment in n2STZ diabetic group glycogen deposits are increased in the hepatocytes versus n2STZ group. In VG group glycogen distribution is similar to control group. The proliferation index was significantly improved in the n2STZ+ VG and VG groups versus the nSTZ group. The mean plasma levels of MDA

showed an significantly decrease, CAT activity, and GSH levels were significantly increase in diabetic rats treated with vildagliptin as compared to diabetic rats.

Conclusion: Our findings indicate that vildagliptin treatment increases liver proliferation, decreases oxidative stress and liver tissue damage. According to our findings, vildagliptin may be a useful therapeutic agent to a certain extent of Type-2 diabetic condition.

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Key words: Diabet, STZ, vildagliptin, immunohistochemical, antioxidant

OP-36

The effects of ZnPc-liposome mediated photodynamic therapy on molecular pathways in cancer

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Introduction: Photodynamic therapy (PDT) has reached the level of being a treatment option that has been accepted for several types of cancer and approved for use in many countries. We investigated altered molecular pathways between cancer cells after ZnPc-mediated PDT. For this purpose, detailed bioinformatic analysis was performed for the perihilar cholangiocarcinoma cell line (SK-ChA-1) and epidermoid carcinoma cell line (A431) to demonstrate which molecular pathways the cancer treatment of ZnPc-liposome mediated PDT.

Methods: Two microarray datasets were downloaded from the NCBI Gene Expression Omnibus (GEO) database (Accession number: GSE84756 and GSE84758). The post PDT survival pathways and metabolism were studied following lethal dose (LC_{90}) of PDT. Data were analyzed using the GEO-2R bioinformatics program. P-value $p<0.0001$ was considered to be significant. Target gene lists were analyzed using DAVID and KEGG pathway analysis programs and significant pathways were determined.

Results: In the PDT applied A431 cells, 203 genes were changed according to the control group, 125 genes were downregulated, 78 genes were upregulated. When compared to the PDT applied SK-ChA-1 cells and control group, 127 genes were downregulated, 66 genes were upregulated. When altered genes in both cancer cells were compared after PDT, 62 genes were found to overlap. These genes were detected to play a role particularly in different pathways such as cancer, apoptosis, MAPK and metabolic pathway.

Conclusion: Investigation of the genes associated with PDT provides a new perspective on the treatment of cancer and may be used as biomarkers for the development of novel diagnostic and therapeutic strategies.

Key words: PDT, cancer, microarray, bioinformatic analysis

List of speakers in alphabetical order

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