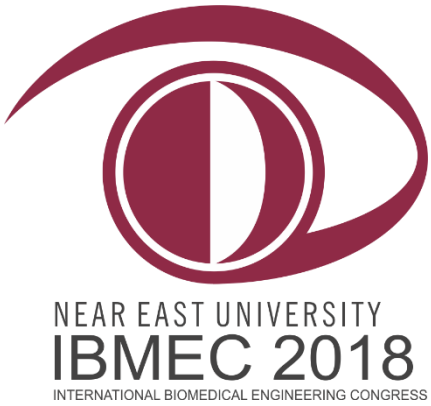


# ORAL PRESENTATIONS

# SESSION 1: BIOMATERIALS

# PHOTOCHEMICAL GRAFTING OF POLY (BENZYL METHACRYLATE) ONTO ALGINATE

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## ABSTRACT

Calcium alginate beads were copolymerized with poly (benzyl methacrylate) by photo initiation. The grafting methods were examined by evaluating benzyl methacrylate: alginate ratio, type and amount of initiator, reaction duration and type of solvent on grafting yield. Grafted alginate beads exhibited a pH-responsive swelling. The results indicated the swelling process followed different kinetic model depending on pH of swelling media. The swelling kinetics of the prepared beads are well in agreement with the pseudo second-order model in acidic aqueous media, on the other hand followed pseudo first-order kinetic model in neutral and alkaline media. Preliminary drug release of synthesized beads was studied. Their antibacterial activity was examined by determining inhibition zone. Grafted beads exhibited antibacterial activity with an inhibitory effect of 3.05±0.01cm however non-grafted alginate beads did not show any inhibition zone against E.coli.

**KEYWORDS**: Photo chemical initiation, alginate, benzylmethacrylate, grafting, copolymerization.

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# Titanium and its alloys used in biomedical Applications: A Review

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## ABSTRACT

Titanium and its alloys are the most important metallic materials for using biomedical applications due to their superior mechanical, physical and biological properties. The development of an appropriate microstructure with optimum mechanical properties is a challenging problem in the field of low modulus Ti and Ti-based alloys.Therefore, mechanical biocompatibilities such as the Young's modulus/tensile strength, shape memory property, fatigue property and fracture toughness should be considered in a critical point of view.

This paper focused on a review of recent developments of biomedical Ti and Ti-based alloys. The first section concentrated on the fundamental requirements for titanium biomaterials, its application fields in addition to the basic phases and effects of alloying elements on texture. The second section discussed the influence of microstructural on mechanical properties like hardness, tensile strength and young's modulus of porous Ti-based alloys. In the third section, design of implants, their manufacturing methods and challenges of the porous structures for alloys were reviewed. Finally, fatigue and fracture behaviour of Ti and Ti-based alloys were reported. It could be shown that fatigue characteristics of metallic biomaterials were affected by surface modification, microstructures, mechanical properties, applied process, contact pressure, stress amplitude, slip distance, friction coefficient, frequency and surface finishes of the tested samples.

**KEYWORDS:** Ti; Ti-alloys; Porous Ti-alloys; Microstructure; Mechanical properties; Biomaterial; Fracture/fatigue

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# FAILURE ANALYSIS OF AN ORTHOPEDIC FIXATION IMPLANT

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## ABSTRACT

Metallic orthopedic fixation implants are devices which are employed in and/or on the bone structure and used to accelerate the healing process after a fracture. Fixation implants may fail within short period of time as a result of the fatigue mechanism when they are improperly installed and subjected to a cyclic load. Since replacing failed implant places emotional, physiological and economic burden on the patient, failure analysis could be employed to understand reason of the implant fracture that helps to develop better implant devices.

In this study, an orthopedic fixation implant made of 316L stainless steel that failed prematurely was examined for determining the basic mechanism/s responsible for the fracture. Fixation implant that was mounted to a broken right femur of a 22 years old male patient was failed by fracture after seven months. Failed implant was examined visually and metallographically in order to analyze the failure mechanism and its cause(s). The results of the surface topology showed that fixation implant was failed due to low energy fracture behavior of fatigue and cleavage mechanism due to post operational malpractice without any deterioration by corrosion.

***KEYWORDS:***Orthopedic fixation implants, failure analysis, fracture, fatigue, cyclic load

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# MICROBIAL ASSESSMENT OF READY-TO-USE FOOD FOR THE REHABILITATION OF MALNOURISHED CHILDREN

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## ABSTRACT

Microbial growth and contamination are linked to several factors and there are superiority claims of Ready to Use Therapeutic Food (RUTF) and Ready to Use Supplementary Food (RUSF) over other complimentary foods in terms of susceptibility to microbial contamination and therefore use for the rehabilitation of malnourished individuals. This study focuses on microbial assessment of RUTF and RUSF used for the treatment of malnourished children. Samples were collected from three places in the northern part of Nigeria and analyzed by conventional culture methods. *Lysinibacillus sphaericus, Citrobacter youngae and Bacillus licheniformis* were further identified using BD phoenix$^{TM}$, while *Candida albicans* was identified with Vitek 2 Bio-Merieux. Among the investigated samples, RUTF are the most contaminated with *Citrobacter youngae* as the most prevalent.

Although these bacteria are not thought to be a causal agent of food poisoning, their presence may be hazardous since the malnourished children are immune-deficient. Furthermore, contamination of RUTF can be related lack of stringent food chain control. It is highly recommended that RUTF manufacturers both foreign and indigenous should increase use of Good Hygiene Practices, Good Manufacturing Practices and HACCP systems by food industry, authorities should enhance food monitoring programmes and set the limits in accordance with international recommendations to monitor outbreaks.

**KEYWORDS**: Malnutrition, Ready to Use Therapeutic Food, Ready to Use Supplementary Food, Low Moisture Food, Microbial Assessment

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# INVESTIGATION OF THE EFFECT OF BIOMIMETIC COLLAGEN: GELATIN NANOPILLAR FILMS ON OSTEOBLAST BEHAVIOUR

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## ABSTRACT

The main reason behind the rejection rate of dental implants by human body is that the jawbone cannot integrate with the implant at an optimum level. One of the methods that can be used to prevent rejection is providing similarity of the implant surface to the natural tissue. When the Sharpey fibers are examined, it is found that these structures extends perpendicular to the alveolar bone and supplies the connection between the bone and the tooth. Ordered nanopillared surfaces with collagen:gelatin mixture were obtained from the alumina membranes manufactured by the two-step anodization method. Flat films were handled as a control group and compared with nanopillar films in terms of their stability and mechanical properties. The adhesion, proliferation and mineralization behaviors of the SAOS-2 cell line on the collagen:gelatin nanopillar and flat films were investigated and compared with the TCP surface. If there is no cell adhesion on the nanopillar films, nano structure can be preserved for up to 24 hours. When there is cell adhesion, nanopillars are kept up for at least 21 days. Nanopillar films have also better adhesion and proliferation than the flat films and TCP surface, but induce less mineralization.

**KEYWORDS:** Alumina, Collagen, Gelatin, Osteoblast, Bone tissue engineering

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# MACROMOLECULARLY IMPRINTED COMPOSITE CRYOGELS FOR PROTEIN RECOGNITION

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## ABSTRACT

A new composite protein imprinted macroporous cryogel was prepared for depletion of human transferrin (H-Tf) from human serum prior to use in proteom applications. H-Tf surface imprinted beads were embedded into poly(hydroxyethyl methacrylate) (PHEMA) based cryogel. Molecularly imprinted (MIP) composite cryogel was prepared with high gel fraction yields up to 83%, and its morphology and porosity were characterized by Fourier Transform Infrared (FTIR) Spectrometer, Scanning Electron Microscopy (SEM), swelling studies, flow dynamics and surface area measurements. Selective binding experiments were performed in the presence of competitive proteins albumin and myoglobin. MIP composite cryogel exhibited a high binding capacity and selectivity for H-Tf in the presence of albumin and myoglobin. The competitive adsorption amount for H-Tf in MIP composite cryogel is 16.88 μg/g dry gel in the presence of competitive proteins. The MIP composite cryogel column was successfully applied in Fast Protein Liquid Chromatography (FPLC) system for selective depletion of H-Tf in human serum. The depletion ratio was highly increased by embedding beads into cryogel (75%). In addition, MIP composite cryogel can be reused many times with no apparent decrease in H-Tf adsorption capacity.

**KEYWORDS:** macromolecular imprinting, composite cryogels, protein recognition

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# NUCLEUS DEFORMATION ON MICROPATTERNED SUBSTRATES: A TOOL TO QUANTIFY NUCLEAR DEFORMABILITY OF CANCER CELLS

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## ABSTRACT

Elasticity of the cell nucleus affects various physiological and pathological processes, such as attachment, migration, differentiation, and metastasis. Elasticity of the nucleus is reflected on the nucleus morphology of cells. Micro- and nanoscale surface engineering technologies present unique opportunities to study the effect of cues such as dimension, organization and chemistry on such cellular processes. This study proposes that quantification of changes in nuclear morphology on surfaces with defined topography enables assessment of nuclear elasticity and deformability. A high content image analysis algorithm was developed to quantify the changes in nuclear morphology observed as a response to physical cues on the 3D substrate at the single-cell level. This approach, can be exploited to serve as a cancer cell-healthy cell screening and also in the systematic study of other mechanical characteristics of large cell populations. The method used in this study attained 81% sensitivity and 72% specificity at the single cell level. It is shown here that nuclear stiffness can be used as a physical parameter to evaluate and screen cancer cells based on their lineage and in comparison to non-cancerous cells originating from the same tissue type.

**KEYWORDS:** nucleus deformation, micropattern, cancer, image analysis, single cell analysis

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# SUBSTRATE TOPOGRAPHY ALTER PROSTATE CANCER EPITHELIAL TO MESENCYMAL TRANSITION

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## ABSTRACT

During prostate cancer progression, prostate extracellular matrix(ECM) undergoes drastic changes. Prostate epithelial cells start depositing excess collagen fibers and it is believed that cancer cells undergo epithelial to mesencymal transition (EMT) due the changes in ECM fibrils. Accumulating evidence suggests that EMT is leading cause for the formation of cancer stem cells and distant organ metastasis. Therefore, the link between the changes in ECM fibril diameter and cancer cell EMT will provide valuable information on cancer progression. Biomaterials can be used to create realistic *in vitro* structures that truly represents the architecture of prostate cancer ECM such as collagen fibers. In this study, we developed an *in vitro* cancer model by creating two different fiber structures reminiscent of healthy and metastatic prostate microenvironment. Polycaprolactone fibers with small (0.5 μm) and large (5 μm) diameter was fabricated using electrospinning technique. The fiber surface was biofunctionalized using RGD peptide by aminolysing the PCL and further adding maleimide groups using sulfosuccinimidyl 4-(N-maleimidomethyl)cyclohexane-1-carboxylate and further reacting with cysteine terminated RGD peptide. The synthetic fiber structures were built to understand the effect of ECM fiber diameter on EMT behavior of LnCaP prostate carcinoma cell line. We found only ECM mimetic fiber diameter is sufficient to transform LnCaP phenotype and alter EMT specific proteins.

**KEYWORDS:** prostate cancer, EMT, polycaprolactone, electrospinning

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# A NOVEL POROUS MAGNETIC CHITOSAN-g-RMF BEAD FOR PHENOL REMOVAL FROM AQUEOUS SOLUTION

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## ABSTRACT

A novel porous melamine-resorcinol-formaldehyde resin grafted magnetic chitosan bead was prepared and its potential on the adsorption of phenol and 4-chlorophenol (4-CP) in aqueous solution was investigated. The magnetic porous bead was characterized with Fourier Transfer Infrared (FT-IR), scanning electronic microscopy (SEM), vibrating sample magnetometer (VSM), Thermogravimetric (TG) and derivative thermogravimetric (DTG) analysis. The batch studies were conducted with adsorbent to optimize the conditions for the removal of phenol and 4-CP. Freundlich and Langmuir isotherm models were utilized to analyze the Equilibrium isotherms for the adsorption of phenolic compounds. The results indicated that the adsorption process fitted the Langmuir isotherm model well with the monolayer adsorption. The adsorption capacity was found found 180.9 mg/g and 95.5 mg/g for phenol and 4-CP, respectively. The kinetics of the adsorption process explained by the pseudo-second order. Thermodynamic parameters (i.e., $\Delta G°$, Gibbs free energy, $\Delta H°$, enthalpy, and $\Delta S°$, entropy) were also calculated. The overall adsorption process was spontaneous, exothermic, and feasible within the range of 298.15–318$^{o}$K. These results suggest that the magnetic bead prepared could be used as an efficient adsorbate for removal of phenol and 4-CP.

**KEYWORDS:** Chitosan; Melamine-Resorcinol-Formaldehyde Resin; Phenol; Removal; Magnetic Bead

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# EFFECT OF THE DIFFERENT SUBSTRATE TEMPERATURE ON THE DISSOLUTION BEHAVIOR IN HYDROXYAPATITE COATED Ti6Al4V ALLOYS

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## ABSTRACT

The Ti6Al4V alloys commonly used in spinal implants are coated with hydroxyapatite(HA) by thermal spray methods, which is a bioactive material to increase the biocompatibility of the Ti6Al4V alloys and to provide bond them to surrounding bone tissue. During the spraying in thermal spray methods, the HA undergoes thermal degradation and amorphous structure and different phases with HA are formed. The coexistence of these structures effect the dissolution behavior of the coatings in the body. Depending on the phases and composition of existing phases dissolution rate changes. While slow dissolution causes delay on the healing and bone regeneration, rapid dissolution causes defects the coating structural integrity. In this study, in order to evaluate coatings stability inside the body, at different substrate temperatures, splats were produced by flame spray method. The change in the phase structure and the microstructure of the produced splats according to the substrate temperature was determined by micro raman analysis, stereo microscope and scanning electron microscope, respectively. The effect of different substrate temperatures on the coating formation, phase structure and dissolution behavior was then determined by the in vitro test. According to the obtained results, the dissolution behavior was determined with the increasing substrate temperature

**KEYWORDS:** Hydroxyapatite, Ti6Al4V, Coating, Flame, Dissolution

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# BIOMIMETIC FISH SCALE COMPOSITE SCAFFOLDS FOR BONE TISSUE ENGINEERING

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## ABSTRACT

Fish scale is similar to bone tissue due to including type I collagen and hydroxyapatite and also have distinctive collagen arrangement. In the present study, it is aimed to design a novel composite scaffold with fish scale incorporation into chitosan matrix for bone tissue regeneration. First, fish scales were decellularized with the chemical method and disrupted physically as microparticles (100μm), following dispersed in chitosan with ultrasonic homogenization, chitosan/fish scale (FS/CS) scaffolds were fabricated by lyophilization technique. Scaffolds were characterized physically, chemically, mechanically, and morphologically. SEM and porosity results showed that FS/CS scaffolds have uniform pore structure showing high porosity. Mechanical properties and degradation rate are enhanced with increasing fish scale content. *In vitro* cytotoxicity, proliferation and osteogenic activity of the scaffolds were evaluated with Saos-2 cell line. FS/CH scaffolds did not show any cytotoxicity effect and the cells were gradually proliferated during culture period. Cell viability results showed that, FS microparticles had a proliferative effect on Saos-2 cells when compared to control group. ALP activity and biomineralization studies indicated that FS microparticle reinforcement increased osteogenic activity during culture period. In conclusion, FS microparticles are found as cytocompatible and show promising effects as reinforcement agents for bone regeneration.

**KEYWORDS:** Fish scale, Chitosan, Composite Scaffold, Bone Tissue Engineering

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# OSTEOBLASTIC AND CHONDROGENIC DIFFERENTIATION OF STEM CELLS OBTAINED FROM DIFFERENT SOURCES ON BIPHASIC SCAFFOLDS

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## ABSTRACT

Stem cells and their applications are significant because of their treatment benefits lately. Bone and cartilage tissue are important for human and animal health. We aimed to develop a biphasic scaffold to use bone-cartilage regeneration. Mesenchymal stem cells were isolated from rat bone marrow and adipose tissues; cultured and differentiated to osteoblast and cardiomyocytes on bi-phasic scaffolds. The distribution of markers (osteonectine, osteocalcine, collagen-II and SOX-9) were assessed using immunocytochemical analyses. The biphasic scaffold was developed using a modified 3D printer, using alginate hydrogel with 45S5 Bioglass for the area that is aimed to integrate with the bone. For the integration with cartilage, Bioglass ratio was reduced and hydrogel ratio was increased at each layer, finishing with a pure hydrogel structure with no mineral on top layer. Structure of cells and scaffolds were also performed SEM analyses. Differentiated cells were stained positively for all markers. SEM observations show that the scaffolds had a hybrid microstructure with micro- and macro-pores. In conclusion, biphasic scaffolds was obtained supporting both bone and cartilage differentiation in same culture condition. Stem cell applications using different type of scaffolds may an alternative treatment for joint disease that had injury both bone and cartilage tissues.

**KEYWORDS:** Biphasıc scaffold, stem cell, bone, cartilage, tissue engineering.

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# MULTIFUNCTIONAL BILAYER WOUND DRESSING WITH CONTROLLED RELEASE OF A PAIN RELIEVER AND AN ANTIMICROBIAL AGENT

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## ABSTRACT

The aim of this study was to develop an advanced wound dressing that simultaneously achieves controlled delivery of a pain reliever and an antimicrobial agent from microparticles to the wound bed. In this multifunctional bilayer wound dressing, hyaluronic acid hydrogel provides moist environment while the fibrous structure inside acts as a support and ion permeability filter between the environment and the damaged skin. This fibrous layer was prepared by electrospinning and located in between two microparticle loaded hydrogel layers. In this study, lidocaine was used as the pain reliever and rifampicin as the antimicrobial agent. These two drugs were separately encapsulated in alginate microparticles prepared by ionotropic gelation induced by $CaCl_2$. The release of these drugs from microcapsules were studied for 30 days. After integration of the microparticles into the wound dressing, it was tested for its antimicrobial activity against *S. aureus*, a leading pathogen in skin infections. Biocompatibility of the multifunctional bilayer wound dressing was evaluated with 3T3 cells using Alamar Blue assay. It was shown that pain reliver and antimicrobial agent were efficiently encapsulated in alginate microparticles, antimicrobial efficacy was high and this wound dressing incorporating a controlled drug delivery system represents an efficient tool in wound healing therapies.

**KEYWORDS:** wound dressing, controlled drug release, pain reliever, antimicrobial agent, hydrogel

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# THE EFFECTS OF HUMAN AMNIOTIC MEMBRANE ON FRACTURE HEALING: ANIMAL STUDY

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## ABSTRACT

### Objective:

The purpose of this study was to investigate the effect of human amniotic membrane (HAM) on fracture healing in animal model.

### Methods:

Standard tibial diaphysial fractures were created in twenty-eight Wistar-Albino rats and treated with intramedullary Kirschner wire (K-wire) and HAM (HAM + group) or K-wire only (HAM – group). Fracture healing was evaluated by histological analysis, radiologic X-ray views and callus diameter measurements at 3 and 6 weeks postoperatively.

### Results:

Histological analysis showed enhanced fracture healing in HAM + group both at 3 and 6 weeks postoperatively with statistical significance ($p < 0.05$). The highest scores were obtained and entire woven bone (Huo Grade 8) was observed in HAM + group at 6 weeks postoperatively. Callus diameters were greater in HAM + group both at 3 and 6 weeks postoperatively with statistical significance ($p < 0.05$). Although the difference of radiological scores in HAM + group only at third week reached statistical significance ($p < 0.05$), radiological scores seemed to be higher in HAM + group both at 3 and 6 weeks postoperatively.

### Conclusion:

HAM enhances fracture healing and this effect seems to be more prominent in the early phases of healing process. This effect may be due to paracrine properties of HAM.

**KEYWORDS:** amnion, amniotic membrane, fracture healing, bone, biomaterial

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# THE EFFECT OF DIFFERENT SILICA PARTICLES ON STRUCTURE AND BIOACTIVITY OF POROUS CHITOSAN SCAFFOLDS FOR HARD TISSUE REGENERATION

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## ABSTRACT

Recently, studies have focused on use of nanoparticles with defined size and shape to design favorable polymer nanocomposites, showing enhanced mechanical and surface properties for bone tissue regeneration. Among nanoparticles nanosilica as the second most abundant biogenic mineral, has an important effect on biomineralization. In this study, two different silica sources, diatomite and polyhedral oligomeric silsesquioxanes (POSS) were used. Effects of silica type and loading on the mechanical, morphological, surface properties and wettability were investigated by using SEM, AFM, contact angle analysis and swelling studies. The porosity of scaffolds was analyzed by micro-CT and mercury porosimeter and found in a range of 82-90%. Wet chitosan-silica composite scaffolds exhibited higher compression moduli compared to chitosan scaffold. Diatomite and POSS reinforced composite scaffolds were obtained with porosity range as 150-180μm and 220-300μm, respectively. AFM images showed that silica particles altered surface topographies and enhanced surface roughness. The pore size and surface area differences obtained with increasing silica content affected water uptake capacity of scaffolds positively. *In vitro* studies indicated that composite scaffolds are favorable for osteblast proliferation and differentiation. Fabricated scaffolds with tunable morphological properties and potential surface structure for biomineralization show promising effects for bone tissue engineering applications.

**KEYWORDS**: Diatomite, POSS, silica, bone, scaffold

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# HYRALURONIC ACID BASED BIOACTIVE PEPTIDE DECORATED SYNTHETIC HYROGELS INDUCE 3D EPITHELIAL POLARITY

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## ABSTRACT

Hyaluronic acid (HA) is an extracellular matrix glycosaminoglycan that has diverse biological functions. In this study, we created a two component synthetic hydrogel system that forms three dimentional network via Michael addition reaction between thiol (SH) functionalized HA and 2-hydroxyethyl Acrylate (HEA) modified HA. We incorporated synthetic peptide sequences from epithelial basement membrane (RGD, IKVAV, YIGSR, PlnDIV) with reactive acrylate groups. Standard Solid State Peptide Synthesis protocols performed and reactive acrylate groups added at the N-terminus. Peptides (RGD, IKVAV, YIGSR, PlnDIV) were crosslinked onto the HASH before the hydrogel formation. Madine Darby Canine Kidney (MDCK) epithelial cells that is widely used in cell biology studies were encapsulated in hydrogels and cultured for 10 days. 3D spheroids formed in hydrogels without addition of synthetic peptides. The incorporation of peptides upregulate $\alpha_2\beta_1$ integrin expression at MDCK spheroid basement membranes. In addition, expression of cell proliferation protein Ki67 also reported to be upregulated in hydrogels decorated with synthetic peptides. This study asserts that incorporation of synthetic basement membrane peptides with a bioinstructive HA-based synthetic hydrogel promotes polarity of epithelial spheroids and could be utilized for kidney cell biology studies.

**KEYWORDS:** Hyaluronic acid, hydrogel, polarity, peptide, kidney epithelial cell.

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# PHYSIOCHEMICAL CHARACTERISATION, ANTIOXIDATIVE, CANCER CELLS TOXICITY AND FOOD PATHOGEN ANTIBACTERIAL ACTIVITY OF CHITOSAN NANOPARTICLES LOADED WITH *CYPERUS ARTICULATES* ESSENTIAL OILS

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## ABSTRACT

Essential oil of *Cyperus. articulatus* has recognized fungicidal and antibacterial properties the qualitative chemical composition analysis by Gas chromatography mass spectrometry (GC-MS) revealed the presence of sesquiterpenes, monoterpenes, hydrocarbons and other esters. nootkatone, 6-methyl-3,5-heptadien-2-one, retinine, nopinone, cycloeucalenol, anozol, Toosendanin, Furanone, Ethanone and vitamin A. *Cyperus articulatus* essential oil (CPEO) loaded chitosan nanoparticles was successful synthesized using an oil-in-water emulsion and ionic gelation method. The samples were characterized by scanning electron microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR) and and UV-Vis spectrophotometry.

Trolox Equivalent Antioxidant Capacity (TEAC) values ranged from 7491 to 6421 mmol TE/g among treatments, where CPEO loaded chitosan nanoparticle showed the lowest ($P < 0.05$) antioxidant activity. Antimicrobial activity against *Escherichia coli* K12 *and Salmonella enterica serovar Typhimurium* LT2 showed that all CPEO loaded chitosan nanoparticle inhibited bacterial growth at lower ($P < 0.05$) CPEO loaded chitosan nanoparticle (values ranged from 300 to 350 mg/mL) compared to free CPEO (1000 mg/mL).

The novelty of incorporating *Cyperus. Articulatus* essential oil into chitosan nanoparticles and the study of cell toxicity effect on MDA-MB 231 and MCF-7 breast cancer cell lines were shown in the full paper.

**KEYWORDS:** Anticancer activity, Essential oils, Chitosan nanoparticles, food-borne pathogens, Antioxidant activity.

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NEAR EAST UNIVERSITY
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# ORAL PRESENTATIONS

# SESSION 2: THERAPEUTIC AND DIAGNOSTIC SYSTEMS

# UTILIZATION AND CHARACTERIZATION OF A PROTEASE TO PRODUCE ANTIMICROBIAL POLIPEPTIDES

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## ABSTRACT

In recent years, the health promoting effects of functional foods and nutraceuticals are taking attention in functional food and nutraceutical market. Because the bioactive peptides are known for their high tissue affinity, specificity and efficiency in promoting health, the search for food-derived bioactive peptides has increased exponentially. In this study, it is aimed to search for new proteases with novel properties and to characterize the industrial and biomedical applications of the enzyme. A 32 kDa molecular weight neutral metallo–serine protease from newly isolated *Bacillus* sp. BHC01 was partially purified 1,12–fold with a final 16861,6U/mg protein specific activity. Optimum reaction temperature and pH of the enzyme was determined. The possible use of the enzyme in bioactive peptide production with antimicrobial properties was investigated. The antimicrobial activities ofthe released protein fragments from protein substrates were determined against *K. pneumoniae,C. albicans,S. enteritidis,B. subtilis,E.faecalis*.Raw sheep hide and minced meat was used as protein substrates for the partially purified proteases.

**KEYWORDS:** Antimicrobial Polipeptides, Bioactive Peptides, Dehairing, Metallo-Serine Protease

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# CRYOGELS FOR AFFINITY THERAPY

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## ABSTARCT

Extracorporeal affinity treatment methods based on removal of potentially toxic materials such as; cholesterol, bilirubin, pathogenic antibodies, various immune system complexes, and human plasma. Plasma exchange, hemodialysis, hemofiltration and hemoperfusion are traditional extracorporeal treatment methods but they are non-selective and have various side effects; hepatitis, immune system reactions etc. Affinity chromatography may be an alternative to currently available extracorporeal treatment methods. Nanoparticles, microspheres, membranes, monoliths, fibers are affinity adsorbents and blood is directly interacted with these adsorbents in the column. Cryogels are novel adsorbents that can be used directly and without pretreatment for the removal of toxins from blood. The application of cryogel extracorporeal treatment method is very important in terms of high efficiency, simple and cheap. In the context of the presentation, cryogel applications designed for the removal of toxic substances in extracorporeal treatment methods and some biomedical uses of cryogels will be given as well.

**KEY WORDS**: Cryogels, Affinity Therapy

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# THE USE OF HIGH-THROUGHPUT DNA SEQUENCING TO IDENTIFY GENES FOR RARE DISEASES

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## ABSTRACT

The Human Genome Project was accomplished in draft form in 2001. In the last two decades, approximately 50% of genes causing 7,000 rare monogenic disorders, which are often difficult to diagnose based only on symptoms, have been identified. More than 50% of individuals with rare genetic disorders are yet to be diagnosed and treated in order to improve their quality of life. Generally, suggestive clinical features can be used to distinguish one condition from another; however, in some cases these clinical features overlap with a number of other genetic conditions. In our current study, the recent high-throughput genomic technology, which involves whole-exome sequencing (WES), was used to detect rare-genetic disease-causing variants and proved itself as a successful strategy for gene identification. Here, WES was used to sequence trios as well as larger pedigrees. An in-house bioinformatics pipeline was also employed to select pathogenic variants. Accordingly, we identified novel genetic variants each of which causes neonatal progeroid (Wiedemann–Rautenstrauch) syndrome, Treachers–Collins syndrome, or Joubert syndrome. The translational effects of these variants were predicted by *in silico* molecular modeling. Our study highlights the importance of discovering rare-disease-causing variants both in clinical diagnosis and in improved understanding of the underlying molecular mechanisms.

**KEYWORDS:** Rare genetic diseases; Whole-exome sequencing; Neonatal progeroid syndrome; Treachers–Collins syndrome; Joubert syndrome

# IN VITRO EVALUATION OF Er, Cr: YSGG LASER AND CONVENTIONAL ETCHING METHODS FOR THE MICROLEAKAGE AND ADAPTATION OF FISSURE SEALANTS

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## ABSTRACT

The aim of our study was to compare the conventional etching and alternative Er, Cr: YSGG laser etching techniques and evaluate the microleakage and SEM analysis of pit and fissure sealants.

Extracted teeth were divided into four experimental group (n=30/each). Group 1: Bur invasion and Conventional acid etching, Group 2: Bur invasion and Er, Cr:YSGG Laser etching, Group 3: Er,Cr:YSGG Laser etching and Group 4 : Er, Cr:YSGG Laser etching and Conventional acid etching. For acid etching 37% phosphoric acid was used. For Er, Cr:YSGG laser etching parameters were set at a 2780 wavelength with a pulse duration of 140 μs, pulse repetition rate of 20 Hertz and the power output was determined as 1.75 watts. No statistically significant difference in microleakage scores was determined between the experimental groups (*p>0.05*). The fissure sealant adaptation was detected to be higher in Group 1 and Group 4 compared with Group 2 and Group 3 and this difference was found statistically significant (***p<0,05***). Although Er, Cr: YSGG laser etching alone is not an alternative therapy instead of conventional acid etching., Er, Cr: YSGG laser and following acid etching combination can be a good choice and comparable to bur invasion.

**KEYWORDS:** Acid etching, Er, Cr: YSGG laser, Microleakage, SEM analysis, fissure sealant

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# ON THE CONTRIBUTION OF *GHRL* VARIANTS TO OBESITY IN A POPULATION OF TURKISH CYPRIOTS: A COMBINED GENETIC EPIDEMIOLOGY AND COMPUTATIONAL BIOCHEMISTRY APPROACH

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## ABSTRACT

The human *GHRL* gene encodes a precursor protein (preproghrelin), from which the bioactive peptide ghrelin is produced through proteolytic cleavage. Ghrelin has been demonstrated to regulate preprandial hunger, and variations in *GHRL* have been linked to obesity in some populations. To investigate the association of two non-synonymous polymorphisms, p.Arg51Gln (rs34911341) and p.Leu72Met (rs696217), in *GHRL* with the risk of obesity in the Turkish-Cypriot population, we drew a case–control comparison between obese and non-obese subjects. Following statistical analysis, we found that the Leu72 allele is significantly over-represented in non-obese subjects. The close proximity of Leu72 to Arg74, which is the single basic residue of a putative cleavage site for prohormone convertase 1/3 (PC1/3), raises the possibility that the substitution of the leucine with a methionine could disrupt the interaction between proghrelin and PC1/3. To test this hypothesis, we further docked a short peptide fragment of wild-type proghrelin on a homology model of PC1/3 and predicted the potentially destabilizing impact of the p.Leu72Met polymorphism on proghrelin–PC1/3 binding affinity. Our findings revealed that the protective effect of the Leu72 allele may be related to the normal processing of proghrelin to another bioactive peptide called obestatin.

**KEYWORDS:** Turkish Cypriot; preproghrelin; obesity; case–control comparison; protein–peptide docking

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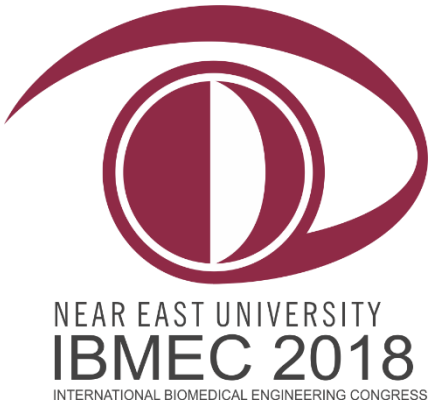


# ORAL PRESENTATIONS

# SESSION 3: CELLULAR AND TISSUE ENGINEERING

# ENGINEERING A PCL/HYDROGEL BASED 3D PRINTED MENISCUS

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## ABSTRACT

The meniscus is composed of mainly circumferentially oriented collagen fibers, and it is cartilaginous at the inner region and fibrous at the outer periphery. Engineering the meniscus is challenging due to this complex architecture. 3D printing is an efficient biofabrication method that enables production of reproducible, patient-specific constructs with customizable shape, porosity and pore structure, and could be used to engineer the meniscus.

We produced a 3D printed PCL scaffold with circumferentially oriented strands to be used as a meniscus implant. PCL scaffolds were embedded in agarose (Ag), gelatin methacrylate (GelMA), and GelMA-Ag blend hydrogels. GelMA and GelMA-Ag embedded constructs exhibited increased production of type I (COL 1) and type II collagen (COL 2), respectively. Then, the 3D printed, meniscus shaped constructs were embedded in GelMA at the outer region and in GelMA-Ag at the inner region to mimic the native meniscus. Immunohistochemical analyses revealed high levels of COL 1 and COL 2 deposition at the outer and inner regions of the constructs, respectively. We concluded that this construct is similar to the native meniscus in structural and biochemical organization, and could be further tested for use as a substitute for the injured meniscus.

**KEYWORDS:** meniscus, 3D printing, circumferential orientation, zonal biochemical composition

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# COMPARISON OF DIFFERENT *IN VITRO* STATIC BLOOD BRAIN BARRIER (BBB) MODELS

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## ABSTRACT

Blood brain barrier (BBB) is a protective system containing specialized structures of endothelial cells found in brain micro vessels to maintain brain homeostasis and ion balance and to protect central nervous system (CNS) from harmful substances. There are several BBB models but none of those are able to properly imitate the permeability of this special barrier.

In this study, it is aimed to achieve a structure that supports cells like basal lamina of the BBB by using bacterial cellulose (BC), which is not used for BBB models before. By means of BC's nano-porous structure, nutrient transfer can be enabled, while cell migration is restricted. Thus, brain micro vascular endothelial cells seeded on luminal section and astrocytes and/or pericytes seeded on abluminal section. Another important aim of this study is producing different BBB models with different cell combinations and comparison of their barrier properties. In order to observe the formation of tight junctions, junction proteins are monitored by immunoflorescence staining. Transendothelial electrical resistance (TEER) measurements are performed and sucrose and caffeine permeability are determined by chromatographic methods.

**KEYWORDS:** Blood Brain Barrier, Brain Microvascular Endothelial Cells, Astrocytes, Brain Microvascular Pericytes, Bacterial Cellulose

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# BIOCOMPATIBILTY STUDIES OF PVA/STARCH CRYOGELS

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## ABSTRACT

A major advantage using of cryogel scaffolds for tissue generation is that interconnected macropores support the migration and growth of cells, resulting in higher vascularization and better mass transfer. In this study, two kinds of biocomposites of Poly vinyl alcohol (PVA) and starch were fabricated by cryogelation method and biocompatibility of the scaffolds was investigated for tissue engineering applications. For direct test, MEF (CF-1) (ATCC1SCRC-1040™) cells were seeded on the scaffolds and cell growth rate was compared with traditional cell culture plates. In addition to this, for indirect investigations, scaffolds were placed into plates with 20 mL culture medium and then incubated for 4 days at 37°C. After the incubation period was completed, the medium that was incubated with scaffolds was used for the indirect cytotoxicity assays. 3-(4,5-dimethylthiazoyl-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay and SEM were used to investigate the cell viability and morphology, respectively. Genotoxicity test was performed to show DNA fragmentation. The overall results demonstrated that PVA/starch cryogels were biocompatible and could have potential application as scaffolds in tissue regeneration.

**KEYWORDS:** PVA, starch, cryogel, biocompatibility, scaffold

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# DRUG RESISTANCE EVALUATION AT 2D and 3D CANCER MODELS

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## ABSTRACT

The traditional two dimensional (2D) cell culture models and three dimensional (3D) animal models have been used to understand cancer biology and develop drug delivery systems for cancer therapy. Although, studies with these models have provided important contribution about disease mechanism, they have critical disadvantages. 3D animal models are expensive, time consuming, and inadequate to reflect human tumor biology, while 2D tissue culture models lack of 3D structure. As a potential alternative"3D culture systems" can be used as a bridge, between *in vitro* and *in vivo* cancer models. The morphology, growth kinetics, and protein expression profile of human tumors can be mimicked using an *ex vivo* 3D culture model. In addition to this, *ex vivo* 3D culture models are more resistant to traditional cytotoxic drugs than cells in 2D models and exhibit remarkable differences in the expression profile of the growth factors. In this study, 3D model of glioma tumor by culturing U-87 MG glioblastoma cells within highly porous Poly vinyl alcohol (PVA)/starch cryogel scaffolds was created. The drug resistance and cytotoxic effects of the drug "Temodal" at different concentrations were compared in 2D and 3D cultured models.

**KEYWORDS:** PVA, starch, cryogel, drug resistance, 3D cancer model

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# EXTRACTION OF PECTIN AND ITS UTILIZATION IN CHITOSAN: PECTIN CRYOGEL PRODUCTION

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## ABSTRACT

Pectin is a type of anionic polysaccharide naturally found in a number of fruits and vegetables. Although pectin is widely used for food industry, its biomedical applications such as wound dressing, drug delivery and cancer targeting has also been investigated. In our study; we mixed pectin with chitosan (as a natural polymer) to synthesize chitosan:pectin (Ch:Pec) cryogels. Lamas lemon was used for the extraction of pectin which grows at Erdemli-Silifke region in the west of Mersin province. The extracted pectin was then subjected to qualitative and quantitative analyses. Ch:Pec cryogels were produced by cryogelation method at different combinations (100:0, 80:20, 60:40 and 40:60, w/w). Polyelectrolyte interactions between pectin and chitosan, and crosslinking of cryogels with glutaraldehyde were verified by using FTIR. The porosity, swelling ratio and degradation behaviours of cryogels were determined. SEM analysis demonstrated the pore morphology of cryogels. After that, Ch-Pec (40:60) cryogel was selected to evaluate the biocompatibility.3-(4,5-dimethylthiazoyl-2-yl)-2,5-diphenyltetrazolium bromide assay was used to analyze the viability of the cells interacted with the scaffolds. Cell-scaffold interactions and cell morphology on the cryogels were demonstared by SEM analyses.

**KEYWORDS:** Pectin, chitosan, cryogel, biocompatibility, scaffold

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# DEVELOPMENT OF AN *IN VITRO* 3D BONE TUMOR MODEL

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## ABSTRACT

The aim of this study was to develop an *in vitro* 3D bone tumor model by tissue engineering approach and to investigate the ability of this construct to serve as a model for anticancer drug testing and to develop treatments for osteosarcoma. In this study, PLGA/TCP sponges serving as the exterior of the model were seeded with hFOB and HUVEC cells to mimic healthy bone tissue and the collagen sponge inserts were seeded with Saos-2 cells to mimic cancerous tissue. A variety of *in vitro* tests, SEM, μCT, mechanical testing, cell viability, histochemistry, and molecular biological analyses (RT-PCR) were performed to assess the ability of the model to mimic bone tumor. Vascularization profile was analyzed by using proangiogenic factors (VEGF, bFGF, IL-8). Responsiveness of the model to anticancer drug, doxorubicin, was studied using Alamar Blue cell viability, caspase-3 enzyme activity and live/dead assays. It was shown that the 3D bone tumor model had the potential to serve as a model for patient specific drug testing.

**KEYWORDS:** osteosarcoma, bone tissue engineering, bone tumor model, drug efficacy, spheroid

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# ANTI-METASTATIC ACTIVITY OF *ALBIZIA LEBBECK* STEM BARK EXTRACT AGAINST BREAST CANCER CELL MODELS

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## ABSTRACT

Breast cancer is the most usual cancer type and second most frequent cause of death among women worldwide. And the incidence is still increasing because of inadequate responsive treatments. *Albizia lebbeck* is an important plants that has medicinal properties and cultivated in different part of the world mainly the tropical and subtropical regions. Organic composition of the plant was analyzed using gas chromatography-mass spectrometry (GC-MS) and toxicity, anti-proliferation and anti-metastatic potential of *A. lebbeck* methanolic extract was studied in MDA-MB 231 and MCF-7 cell models using tryphan blue, MTT and wound heal assay. Both cells were treated with concentrations ranging from 2.5 to 200 µg/mL at different time intervals (24, 48 and 72 hours). The effect of the plant extract on toxicity and proliferation of MDA-MB 231 and MCF-7 cell was found to be both dose and time dependent. Lower doses of the extract 2.5, 5.0 and 10.0 µg/ml showed no significant difference ($P > 0.05$; $n \geq 3$) and higher doses showed significant difference when compared with the control group. The plant extract also revealed high anti-metastatic effect which is found to be dose dependent as well.

**Keywords:** Albizia lebbeck, Breast cancer, Anti-proliferative, Cytotoxic and Anti-migratory.

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# DIFFERENTIATION AND CHARACTERIZATION OF HUMAN SPERMATOGONIAL STEM CELLS FROM NON-OBESTRACTIVE AZOOSPERMIA PATIENTS IN THREE-DIMENSIONAL (3D) AND TWO-DIMENSIONAL (2D) CULTURE SYSTEMS

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## ABSTRACT

Azoospermia, which is one of the main causes of male infertility, is no sperm count in semen. Spermatogenesis begins in the male with puberty and occur both mitosis and meiosis stages to result for spermatid formation. It was aimed to differentiate and analyze spermatogonial stem cells which were obtained from testicular sperm extraction (TESE) in 2D or 3D culture systems.

The TESE samples were collected from non-obstructive azoospermia patients and routinely examined under the light microscopy after DIFF Qick staining. The remaining samples were digested in solution for overnight at + $4^0$C, cultured in Ham's F10 on gelatinous coated culture dishes. The cells that do not adhere to the culture dishes were collected and cultured 28 days on matrigel coated (2D) or on Soft Agar or collagen foam scaffolds for 3D culture. The cells were then fixed for 14, 21 and 28 days and distribution of GPR125, β1 integrin, acrosine, and α6 integrin were analyzed by indirect immunopheroxidase technique.

3D culture system were more effective than 2D for triggering the differentiation process and distributions of spermatogonial marker were more prominent in 3D cultured cells.

Because of 3D culture systems mimic *in vivo* condition, scaffolds may support proliferation and differentiation of spermatogonial stem cells rather than 2D culture systems.

**KEYWORDS:** Infertility, spermatogonium, 3D culture system, differentiation, characterization

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# ORAL PRESENTATIONS

# SESSION 4: BIOMEDICAL IMAGING AND IMAGE PROCESSING

# IMPLEMENTATION OF LEVEL SET ACTIVE CONTOUR MODEL ALGORITHM FOR AUTOMATIC IMAGE SEGMENTATION IN ABDOMINAL CT SCAN

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## ABSTRACT

Image segmentation technique is considered as one of the most significant steps in image analyses. Active Contour Model (ACM) methods are frequently being used in image segmentation due to their simplicity, robustness and speed. In this research, we carried out an experiment to demonstrate the use of ACM algorithm for automatic segmentation of an image. Selective binary and Gaussian filtering regularized level set (SBGFRLS) ACM algorithm was employed. The Left kidney, right kidney and aorta were segmented from an abdominal CT scan to manifest how the desired part can be obtained. The desired organs were successfully segmented with minimum number of iterations and at high speed. The experimental results indicated that SBGFRLS algorithm has high efficiency and accuracy over many other ACM algorithms. Hence, it can be utilized in applications where high speed is required.

**KEY WORDS**: *abdominal CT scan, ACM, SBGFRLS, automatic segmentation.*

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# SICKEL-CELL ANAEMIA DETECTION USING A WATERSHED TRANSFORM AND EDGE DETECTION PROCESSING TECHNIQUE

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## ABSTRACT

Erythrocytes otherwise known as the red blood cells constitutes the major parts of the blood cells in the human body, and the morphological nature of RBCs enhances its appropriate oxygen carrying capacity throughout the body cells, hence, loss of RBCs which alters its function is known as anemia. Anemia which affects approximately third of the global population needs improvised automated means in detection, processing, enhancement, segmentation, extraction and classification. In this paper we critically investigate into the micro-structural nature of RBCs to detect anemia through image processing technique using the Watershed Transform segmentation and edge-detection approach.

The result was based on data analysis through algorithm development with MATLAB. Analysis was carried out to examine the remover of salt and pepper noise with median filter; basic image enhancement techniques used are: histogram equalization, Histogram plotting, image negation, image subtraction as this improves the quality, sharpness, contrast and brightness characteristics of an image; geometric parameters like areas, cell perimeter, and circularity factor are bases for the anaemic cell shape features and cell count analysis applied to the real time application to identify the number of cells in a microscopic blood smears which is significant in clinical blood diagnosis.

**KEYWORDS:** Erythrocytes, Sickle cell anemia, Image processing techniques, Watershed transform, and Matlab.

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# AGE ESTIMATION FROM FACE IMAGES BY SEGMENTATION AND CLASSIFICATION OF WRINKLE REGIONS

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## ABSTRACT

Wrinkles that especially form on the face affect the quality of life directly because they are not features that people desire. For this reason, various methods are being developed for diagnosis and treatment of skin wrinkles in dermatology and aesthetic surgery fields. Treatment methods can include identification and grading of the wrinkle levels, or identification of any treatment for these wrinkles. In addition, for anti-aging cosmetic sector, determination and identification of wrinkles are important research areas. Analyzes conducted will contribute greatly the development of the effectiveness of the anti-aging products. This paper provides a methodology to realize the efficiency of treatment processes or drugs, etc. planned to be used for wrinkle treatments and anti-aging products. In this paper, a decision-support system that estimates the age of people via wrinkle regions from the face is presented. Image processing algorithms have been applied to the existing images to segment the wrinkles. Wrinkle geography areas are detected and wrinkle features are extracted from face images. By using different classification algorithms, each face image is clustered depending on wrinkle features. Then, estimated ages of the subjects are calculated from their clustering membership value and average age of each cluster.

**KEYWORDS:** Age Estimation, Face Wrinkles, Classification

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# INVESTIGATION OF THE EFFECTS OF ADAPTIVE IMAGE COMPRESSION WITH THE NEW COMPUTER-BASED APPROACH TO DETECT PELVIC FRACTURES

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## ABSTRACT

The subject of accurate detection of pelvic fractures on complex anatomical structures has become a popular research area in the orthopaedical field. There are different studies to diagnose pelvic fractures and one of the significant parameter is the distance difference between right and left side of pelvis which one part is healthy and the other one has a fracture. Additionally, there are some other important distances such as hip axis length (HAL) and femoral neck axis length (FAL) which are frequently used to detect femoral fractures. The main purpose of this study is the detection and evaluation of pelvic fracture automatically by use of distance differences between two sides of pelvis over the adaptively compressed and the non-compressed radiographs. Objective results are evaluated by measuring the mean distance difference for pelvic ring, HAL and FAL distances on the compressed and non-compressed images. In addition, compression ratio (CR), peak signal to noise ratio (PSNR) and bit per pixel (BPP) are calculated for the performance of compression algorithm. According to the results, there is no significant difference on measured distances. Consequently, proposed detection algorithm with adaptive compression approach can be used for saving memory and efficient use of PACS (Picture Archiving and Communication System).

**KEYWORDS:** Automated pelvic fracture detection, Image compression, Pelvic X-ray image, Radiography, Computer aided diagnosis

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# ORAL PRESENTATIONS

# SESSION 5: BIOSENSORS

# FABRICATION OF POLYMER-BASED SERS SUBSTRATES WITH TUNABLE PROPERTIES FOR BIOSENSING APPLICATIONS

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## ABSTRACT

Surface-enhanced Raman spectroscopy provides molecular fingerprint information and has the potential to detect down to a single-molecule. Despite the ultra-sensitivity and specificity, SERS cannot be used as a routine sensing tool for biomedical applications because of the poor reproducibility and low signal intensity, therefore the need for fabricating reproducible strong SERS-active substrates arises. The most important properties are high signal enhancement and signal reproducibility which periodic nanostructured arrays satisfy. Currently, these periodic nanostructures are usually created by lithography which is time consuming, high-cost and cannot be applied to large areas. Anodic alumina membranes are a class of special biomaterials that are produced from high purity aluminum via two-step anodization. It is possible with this procedure to produce AAMs with different column structures and thicknesses. AAMs could be used as a mold to obtain periodically decorated surfaces. In this study, the effect of AAMs pore-size is examined, as they are used to obtain periodically nanopillar-decorated polycarbonate surfaces. Two different pore-sized AAMs are used and silver reduction is performed by polydopamine coating, for the facile creation of plasmonic effect. The intensities of SERS signals from the obtained surfaces are compared by using Methylene Blue and also is verified with computer simulations.

**KEYWORDS:** SERS, AAMs, Periodicity, Reproducibility, Biosensing.

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# ELECTROCHEMICAL BIOSENSOR DEVICES FABRICATION: $AGIO_3$/MGO NANORODS-BASED GLUCOSE AND IMMUNOSUPPRESSANT DRUG DETECTION

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## ABSTRACT

Mycophenolate is an immunosuppressant drug widely used for the prevention of organ transplant rejection, also, a high glucose level in human blood is threatening. Hence, the detection of this drug and glucose level is utmost important. Magnesium oxide (MgO) is very interesting to biological sensing owing to its many favorable properties. In the present research, a sensitive voltammetric biosensor based on $AgIO_3$/MgO electrode was fabricated for determination of mycophenolate mofetil in the presence of tryptophan in aqueous solution. The biosensor were characterized by X-ray powder diffraction (XRD), transmission electron microscopy (TEM), scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDAX) methods. The $AgIO_3$/MgO showed linear responses in the range 0.1–287.0 μM with detection limit 0.04 μM for mycophenolate mofetil and 0.1–165.0 μM for glucose sesnsing analysis. The *F*-test and error analyses confirmed efficient ability of the as-fabricated $AgIO_3$/MgO bisensor for determination of mycophenolate mofetil and glusoe in real samples.

**KEYWORDS:** Nanomaterial, Uric acid detection, Electrochemical biosensor, Glucose sensing, $AgIO_3$/MgO

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# ORAL PRESENTATIONS

# SESSION 6: CARDIOVASCULAR AND RESPIRATORY SYSTEMS ENGINEERING

# THE EFFECT OF ALTITUDE ON VO$^2$MAX, VENTILATION FUNCTIONS AND HEART RATE OF 100m SPRINTERS

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## ABSTRACT

The aim of this study was to identify the effect of altitude on some physiological parameters of sprinters. Eight elite 100m sprinters participated to this study. The subjects aged was 24±3.6. The metabolic effect of altitude training was investigated in sprinters. Subjects were tested before and after altitude training as pre-post tests. Ventilation functions (FVC, FEV1FVC and VC) and VO²max were tested. Blood parameters (erythrocyte, hemoglobin, hemotocrite, MCH, and MCHC) and some physical characteristics (body weight, resting heart rate, and maximal heart rate) were measured and also the effect of altitude training was investigated on performance.

SPSS 16 statistical program was utilized for analyzing the data. Paired sample test was used for within the group difference. There were no differences between pre and post camp tests for VO²max, ventilation functions (FVC, FEV1FVC, and VC), blood parameters (erythrocyte, hemoglobin, and hemotocrite) and maximal heart rate.

There were significant differences ($p<0.05$) between pre and post camp tests for body weight, resting heart rate and blood parameters (MCH and MCHC).

It was concluded that there were no effect on VO²max and ventilation functions and also there were no significant differences resting heart rate, body weight, and blood parameters (MCH and MCHC) related to 4 week altitude training in sprinters.

**KEYWORDS:** VO²max, blood parameters, ventilation functions, altitude, heart rate

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# ORAL PRESENTATIONS

# SESSION 7: NEURAL AND REHABILITATION ENGINEERING

# GelMA-pHEMA HYDROGEL COMPOSITE NERVE GUIDE FOR PERIPHERAL NERVE REGENERATION

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## ABSTRACT

Peripheral nervous system can be damaged by mechanical, thermal, chemical factors and the damages could result in the interruption of communication between nerve cells. Nerve guides are used to bridge these gaps in the treatment of peripheral nerve injury. In this study, a methacrylated gelatin-polyhydroxyethylmethacrylate (GelMA-pHEMA) tubular nerve guide with inner guidance elements was produced. GelMA and pHEMA were mixed in various amounts (1:1-9:1, v/v) to optimize the properties of the hydrogel. Aligned gelatin-PHBV fibers (5, 10, 15%, w/v) were produced by electrospinning to provide inner guidance of the nerve construct. Schwann cells (SCs) were seeded on the GelMA-pHEMA as support cells, while PC12 cells were seeded on gelatin-PHBV5 fibers to serve as the nerve cells. Studies showed that SCs attached and proliferated on both pHEMA and GelMA-pHEMA (1:1) hydrogels and cell proliferation was higher on GelMA-pHEMA (1:1) hydrogel. Highest degree of alignment (7°) was achieved with 15% gelatin-PHBV5. *In vitro* studies revealed that PC12 cell attachment on these fibrous mats is good and cells were aligned along the fiber axis. In conclusion, both GelMA-pHEMA (1:1) hydrogel and gelatin-PHBV5 fibers enabled the cell attachment and growth. Combination of these two has promising potential for an improved nerve guide design.

**KEYWORDS:** Nerve tissue engineering, GelMA, pHEMA, nerve guide, peripheral nerve regeneration

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# EEG FOR CONTROLLING EXOSKELETON ROBOTIC SYSTEMS

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## ABSTRACT

The exoskeletons and orthoses are powered robotic systems first were used to increase the abilities of soldiers of carrying additional weights. This technology has been developed to be used for assisting or rehabilitating people with disabilities. The controlling methods of these systems are various like: using joysticks or shifting body weight. Researchers have been conducted to find the more natural way to control these systems using bio-generated command signal from the human body like Electromyography (EMG), Electrooculography (EOG) and Electroencephalography (EEG). Because of clinical cases, Brain-Machine Interface (BMI) based on EEG is the most popular control method. There are many studies and researchers on this topic, few of them consider a complete robotic system with experimental tasks and results. This paper will review these studies according to the device used, number of the test subject, type of neural feature and classification method. Also, the performances will be compared according to accuracy and time delay. Main results show that most of the studies focus on lower-limb exoskeleton systems, also there are many encounters needs to be resolved especially the delay time which effect on the system response.

**KEYWORDS:** EEG, Exoskeleton, BMI, Power-assist robot, rehabilitation.

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# ORAL PRESENTATIONS

# SESSION 8: HUMAN MACHINE / COMPUTER INTERFACE

# DESIGN OF MOUSE CONTROL WITH HEAD MOVEMENT AND EYE BLINK FOR THE SEVERELY DISABLED PEOPLE

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## ABSTRACT

In this paper, a human-machine interface using "head-mouse control" for disabled people injured with the spinal cord is proposed. The head-mouse control is based on the image processing including face recognition in particularly eyes, mouse, nose detection. The human-machine interface is an assistive system that uses head movement and eye blink for mouse control. The system is designed for the physical disabled people suffering from motor neuron diseases or severe cerebral palsy. By moving head the user move the mouse pointer to the required coordinates and using eye blink send command. Here left eye blink denotes mouse's left click, right eye blink denotes mouse's left click, Blinking both left and right eyes denotes Ok key. In the eye-blink mode, recognition system from low quality images which is captured from computer's camera based on convolutional neural network (CNN) is presented. The Convolutional Neural Network (CNN) includes convolutional layers, a pooling layer and fully connected network. In the head movement control mode, facial landmarks are used to predict head's movement. The combined system allows people with disabilities to control, mouse pointer with head movements and mouse buttons with eye blinks. The experiments have been providing using dataset demonstrates that this system is robust and accurate. This invention allows people with disabilities without wearing any component to freely control the movement of the mouse cursor and buttons.

**KEYWORDS:** computer mouse, people with disabilities, convolutional neural network, computer vision, deep learning.

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# A PROSTHESIS CONTROL APPROACH USING MOBILE PHONES AND ITS IMPLEMENTATION ON A BIONIC ARM

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## ABSTRACT

Prosthetics has developed in the recent years to the extent that give their users the ability to replicate natural human motion on certain limb disorders. These 'smart' limbs require the use of multiple technologies and knowledge from a broad field of areas including biomechanics, biomedical, electronics, mechanics, mechatronics and software engineering. In these bionic limb applications a multitude of sensors are required to measure and predict the user intent and then a set of mechatronic actuators are utilized to conduct the resulting motion or the gesture. However, for severely injured or disabled patients that can only move only finger or one hand, the use of such control techniques is very limited due to the restricted muscle movement of the users. In this paper, we propose a new command and control approach for bionic limbs based on a mobile phone platform. The mobile phones we use today include a number of inertial sensors such as accelerometers, angular speed sensors and magnetic field detectors. We implement and demonstrate the use of mobile phone inertial sensors to detect the gesture of the user to control a prototype robotic arm prosthesis.

**KEYWORDS:** Prosthetics, Control Systems, Mobile Platforms, Bionics, Robotic Arm

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# ORAL PRESENTATIONS

# SESSION 9: TECHNOLOGY COMMERCIALIZATION, INDUSTRY, EDUCATION

# BIOMEDICAL OUTREACH FOR HIGH SCHOOL STUDENTS: WINTER SCHOOL ON TISSUE ENGINEERING

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## ABSTRACT

The Genetics and Bioengineering program at Gaziosmanpasa University, Tokat hosted a two-day winter school on Tissue Engineering in January 2018 for high school students. A group of 10 students from Gaziosmanpasa High School sophomores was attended lectures and laboratory hands-on practices. The theme of the winter school was tissue engineering of tendons. First day, students were introduced to Engineering, Science and Bioengineering disciplines. Followed by lectures on anatomy and physiology of the tendon tissue. The laboratory section of the first day involved isolation of tendon tissue from rat tails and preserving them in the buffer solutions for the next day experiments. The second daylectures involved the concepts of tissue engineering and regenerative medicine, emulating tendon tissue biomechanics in tissue engineering models. Assessment of the program was performed using pre- and post-program surveys with both quantitative and qualitative questions. Results of the surveys indicated that program was successful in introducing participants to the field of tissue engineering, concepts of engineering and science.

**KEYWORDS:** Biomedical education, winter school, tissue engineering, outreach.

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# PASSIVE SAMPLERS AND MUSSELS IN POLLUTION MONITORING STUDIES

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## ABSTRACT

In recent years, passive samplers designed by using different polymers to mimic uptake of organic pollutants by marine organisms have been frequently used in monitoring studies. Passive samplers may be monophasic and biphasic; semi-permeable membrane devices (SPMDs) are biphasic systems and at present, they are the only standardized passive samplers. They contain triolein in a low density polyethylene tubing. Due to the ease of preparation and analysis, standardization studies of monophasic systems have become popular in pollution studies. Butyl rubber (BR) sorbents prepared via cryogelation for removal of oil spill from waters were tested as passive samplers together with SPMDs. Organic pollutants of polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and organochlorine pesticides (OCPs) were monitored in transplanted mussels, SPMDs and BRs deployed to the stations in the coastal areas of Turkey. A good correlation was found between the accumulation patterns of mussels and passive samplers. When comparing the samplers; although total PAH concentrations in SPMDs were found higher than the concentrations in BRs, BR sorbents were able to sample some higher molecular weight PAHs which could not be sampled by SPMDs. However, the concentrations of PCBs and OCPs in BRs were similar or higher than that of the SPMDs.

**KEYWORDS:** SPMDs; butyl rubber, marine pollution; monitoring; mussels.

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# APPLICATION OF PV FOR ELECTRICITY GENERATION IN TAJOURA HEART HOSPITAL ICU-LIBYA & APPLIED AT NEAR EAST HOSPITAL

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## ABSTRACT

Continuity in the energy resource is very important . The use of renewable energy sources such as solar is becoming beneficial investment from the commercial and the environmental point of view. The real wealth of Libya like the TRNC that receives very high solar irradiation around the year. This important fact has led strategic thinkers of the world to direct more investments in the clean solar energy. This work concentrates on the study of the power generation of a solar system for a hispital in the Libya and NEU hospital in TRNC. The study is directed toward the study of solar generation system adapted to generate the required power to feed the Tajoura Heart Intensive Care Unit in Libya. This system has become very important and vital for the hospital as a result of the economic, political and security problems that confronts the two countries to support finencial and technical problems in electrical systems. The study will also study the power generation of solar system in TRNC to show the differences and shedlight on the problem of energy in Libya and support financial and technical problems in electrical system. Results of experiments under taken are presented and discussed in detail.

**KEYWORDS:** Solar energy, grid tie inverter, solar cell, irradiation, interactive inverter

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# ORAL PRESENTATIONS

# SESSION 10: MODELLING AND SIMULATION, BIOMECHANICS

# FUZZY NEURAL SYSTEM APPLICATION TO DIFFERENTIAL DIAGNOSIS OF ERYTHEMATO-SQUAMOUS DISEASES

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## ABSTRACT

In medicine, one of the most important applications of intelligent systems is the fuzzy neural network (FNN) framework useful in the diagnostic-treatment decision making process. We implored a novel procedure in an integrated fuzzy neural structure; multi-input multi-output based on Takagi-Sugeno-Kang (TSK) type rule for the classification of erythemato-squamous diseases. Designing FNN system for this issue intelligently aimed at differentiating erythemato-squamous disease diagnosis. Dataset explored in this research contains detailed records of diagnosed patients. Considering a training set of given records, our proposed algorithm learns from the domain to differentiate a new case. Total performance of the inference system was empirically evaluated in terms of classification accuracy having the total accuracy of 98.37%. Comparison of this result with other algorithms by other researchers on same domain shows that our algorithm is very much outstanding and yet to be beaten.

**KEYWORDS:** Dermatology; differential diagnosis; erythemato-squamous; fuzzy logic; fuzzy neural network

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# THE METHODOLOGY OF RAPID PROTOTYPING AND 3D PRINTING OF OBSTETRIC MODELS FOR MIDWIFERY EDUCATION

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## ABSTRACT

**Objective**: Three-dimensional printing is a widespread technology and is being utilized in many fields of health industry. In this study we aimed to present two different approaches to production of obstetric models for midwifery students' education.

**Materials and Methods**: Two different models of female internal genital anatomy were selected in order to enhance students' visual and tactile perception. First model represented cross-sectional representation of the anatomic structures and was prepared in Fusion360 software (Autodesk, CA, USA). The second royalty free 3D model of female internal genital anatomy was downloaded from Thingiverse (Makerbot Industries, NY, USA). Both models were sliced in Cura software (Ultimaker, Geldermalsen, NL) and printed using polylactic acid in Ultimaker 2+ Extended 3D Printer. After printing both models were post processed and painted accordingly.

**Results**: First model's design time was 1 hour, and print time was 9 hours 20 minutes. The model weight was 146 gr and print cost was 8.4 Euros. The second model's print time was 3 hours 48 minutes. The model weight was 66 gr and print cost was 3.82 Euros.

**Conclusion**: Both models were designed and produced under 24-hour period. Three-dimensional printing is a fast and convenient method for producing obstetric educational models.

**KEYWORDS:** 3D printing, obstetrics, midwifery, education, model

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# ORAL PRESENTATIONS

# SESSION 11: BIOMEDICAL INSTRUMENTATION

# DEVELOPMENT OF ERGONOMIC CHAIR WITH LOAD CELL AND ARDUINO UNO R3 328P FOR SIGNIFICANT FACTORS AFFECTING OUR HEALTH AND MEDICAL TREATMENTS

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## ABSTRACT

Ergonomics; is a collection of researches and developments that naturally and technically research human compatibility with machinery and environment by examining physical and psychological characteristics of human beings. Ergonomics includes all enterprise aspects from physical stress to environmental factors. Ergonomic design is practice of constituting workplaces, machines and tasks that will meet human capabilities and limitations of human body. Ergonomic principles state that the chair must first conform to the user. Then it is appropriate to the relative, and then allows the position to change with different activities. Posture is most important aspect when looking at workstation design. A converter that converts the load cell, power or pressure into electrical output. The magnitude of this electrical output is directly proportional to the applied force. There is a strain gauge that deforms when pressure is applied on the load cells. And then the tensioner gives an electrical signal to the deformation as the effective resistance to deformation changes. In this study, Arduino UNO ATmega328P microcontroller was preferred because it is open source electronic platform based on, which simple to utilize software and hardware. In this article, using load cell and Arduino UNO R3 328P an ergonomic chair application has been designed.

**KEYWORDS:** Ergonomic Chair, Load Cell, Arduino Uno R3 328P, Health, Medical Treatments

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# BIOMECHANICAL EVALUATION OF A NOVEL SCREWLESS POSTERIOR STABILIZATION SYSTEM: AN EXPERIMENTAL STUDY

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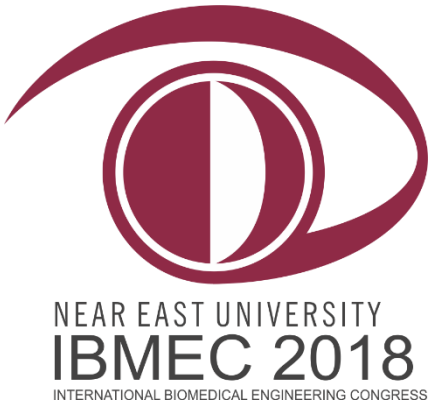
## ABSTRACT

The aim of this experimental study was to evaluate a novel screwless system in terms of its contribution to the biomechanical stabilization. For this purpose, nine cadaveric sheep lumbar vertebrae ($L_{3-6}$ segment) and eight live sheep vertebrae ($L_{2-7}$) were tested under four different mechanical loadings: flexion, extension, left and right bending. Cadaveric samples were divided into two groups: four samples for control group I (CGI) where only muscles were cleaned and five samples for control group II (CGII) where $L_4$ total laminectomy was performed following muscle removal. Similarly, live sheep samples were evaluated under two groups: five samples for experimental group I (EG I) where only L4 vertebra total laminectomy operation was performed under general anesthesia and three samples for experimental group II (EGII), where $L_{3-6}$ posterior stabilization was performed with the novel screwless system following $L_4$ total laminectomy. Routine radiological evaluations were performed in all samples and all live samples were sacrificed at the end of first month after stabilization operation, and their lumbar segment were en-bloc removed for biomechanical evaluations. Magnetic resonance images of the segments were also checked for possible complications and evaluation of vertebral foramen. Biomechanical tests were conducted using a universal testing machine (Schimadzu AG-Xplus, 250 kN) and vertical load is converted into desired moment load using a custom designed apparatus. Load vs displacement values were recorded and moment vs rotation angle values were obtained using conversion formulas. All tests were conducted up to 5° of rotation and an approximately linear moment-angle relation was detected for all specimens. Stiffness values for all specimens were obtained as the slope of linear fit of the moment-angle graphs.

When average stiffness against each motion is compared, there is no meaningful difference between stiffness against flexion/extension and left/right bending and this is true for all groups. When the average values for the groups are compared, CG I shows the smallest stiffness and EG II shows the highest stiffness and this is valid for all motions. It is obvious that sample size is very limited for a conclusion that new screwless posterior system contributes to the stabilization however, the data suggests that new system shows a potential that is needed to be investigated further for probable use in the future.




# ORAL PRESENTATIONS

# SESSION 12: EDUCATIONAL GLOBALIZATION

# INCIDENCE AND AWARENESS OF PRE-ECLAMPSIA IN NORTH CYPRUS POPULATION

**P. Tulay[1], M.C. Ergoren[2], R. Kalkan[1]**

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## ABSTRACT

Pre-eclampsia is categorized as a hypertensive disorder occurring during pregnancy. Mild forms of preeclampsia generally do not possess any symptoms, whereas the severe forms may cause renal insufficiency and even fetal and maternal death. The incidence of pre-eclampsia varies between 2% to 10% of pregnancies globally. However, WHO reported that this rate is almost seven times more in the developing countries. This study aims to investigate awareness, screening methods and the incidence of pre-eclampsia in North Cyprus.

Questionnaire based survey were conducted to women at least 18 years of age. The maternal variables including age and previous pregnancy associated complications were collected from all the volunteers. The socia-economic and educational status of the women were taken into consideration for this analysis.

The overall awareness of pre-eclampsia was 53% and 39% had experienced pre-eclampsia themselves. Due to the lack of knowledge on the complications, women with pre-eclampsia specified that they experienced substantial panic and stress upon diagnosed. The awareness was associated with the level of education.

Lack of awareness translates to worse health outcomes, including fetal and maternal death or pre-term births. Therefore, proper counselling should be provided to the community about the incidence and the indication of this threatening condition.

**KEYWORDS:** pre-eclampsia, awareness, counselling

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# ORAL PRESENTATIONS

# SESSION 13: HEALTCARE INFORMATION SYSTEMS, E-HEALTH, TELEMEDICINE

# FORECASTING MEASLES IN EUROPEAN UNION BY USING ADAPTIVE NEURO-FUZZY INFERENCE SYSTEM

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## ABSTRACT

Measles is one of the causes of child mortality. Measles forecasting is essential to plan ahead to facilitate the fight against the disease and reduce the risk of expiring of the vaccine stocks. Governments and health institutions estimate measles vaccine requirements using some formulae generally based on the size of the target population and the history of the amount of consumption. There are several previous studies related measles forecasting and vaccine requirement assessment. This study uses a forecasting model that employs an adaptive neuro-fuzzy inference system (ANFIS) based on fuzzy c-means clustering (FCM). In this study the measles data is derived using The World Health Organization (WHO) Measles and Rubella Surveillance Data which covers the period from January 2011 to March 2018 originated from 28 European Union member countries. Out of total 87 monthly measles data, 80% are used for training and 20% of them are chosen for testing. In addition to the mean square error (MSE), the root mean square error (RMSE), normalized root mean square error (NRMSE), mean absolute error (MAE) and mean absolute percentage error (MAPE) are calculated.

**KEYWORDS:** Measles, Forecasting, European Union, ANFIS, FCM.

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# ORAL PRESENTATIONS

# SESSION 14: GENETIC ENGINEERING

# INVESTIGATION OF THE CYTOTOXIC EFFECT OF *LAVANDULA ANGUSTIFOLIA* ON GLIOBLASTOMA CELL CULTURE

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## ABSTRACT

Glioblastoma (GBM) is the most frequent and lethal type of primary brain tumors. In this study, it was aimed to investigate the cytotoxic effect of the Lavandula angustifolia which is an aromatic and medicinal plant, on glioblastoma cell culture. Studies were carried out with U-87 MG (Glioblastoma) and MEF (Mouse Embryonic Fibroblast cells) cell lines. Lavandula angustifolia infusion solution was prepared and given to the cell cultures in various concentrations (1/1000, 1/100, 1/75, 1/50 and 1/25 (v/v)). Cell cultures were exposed to infusion solution for 1 and 3 days and cell viabilities were measured by neutral red assay.

According to neutral red assay it was observed that GBM cell numbers were diminished at the increasing concentrations of *Lavandula angustifolia* infusion solution. Also it was seen that the *Lavandula angustifolia* infusion solution was more effective in three day incubation than one day. However the infusion solution decreased the number of MEF cells also, but the reduction rate was not much as in the tumor cells. Our results indicate that, *Lavandula angustifolia* infusion solution has cytotoxic effect on glioblastoma cells.

**KEYWORDS:** Glioblastoma, U-87 MG, *Lavandula angustifolia*, Cytotoxicity.

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# ORAL PRESENTATIONS

# SESSION 15: BIOMEDICAL MECHANICS ON VETERINARY MEDICINE

# ANTEBRACHIAL ANGULAR DEFORMITIES TREATED WITH LATEST TECHNOLOGY

# COMPUTER-ASSISTED HEXAPOD EXTERNAL FIXATOR SYSTEMS IN DOGS

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## ABSTRACT

With the advancement of the technology every day in the field of medicine, both in the diagnosis and treatment of the diseases and treatment and prognosis are very new and successful results can be obtained. A flight simulator is inspired by the second-generation computer-aided external fixators, which is defined as Spatial Fixators, complex deformities of the sensitivity of success in the hotfix with the type of a revolution in the field of orthopedics and evaluated, and in the nature of first-generation external fixators quickly. The revolutionary nature in the field of medicine of spatial fixators, veterinary platform deformity can be used in patients brought to the question of whether, particularly physicians, in terms of patients and clinical complicated approach to be disposed of, patients routine can be operated as a patient in increasing the visibility of the owners and the patient without hesitation deformity their pets patients to the clinic to bring is of great importance in order to increase. The aim of this study is to investigate the applicability of spatial fixators with computer-assisted on animals, the advantages and/or disadvantages considered during implementation, the adequacy and success of eliminating deformations, and the new techniques planned to be presented and to share the results on an international platform. Multiple limb radiographs were taken of the limbs of the patients and evaluating the deformities made correction plan. All measurements were uploaded to the "Click$^2$Correct" software program. This data has been adapted to be used in operation with the Radiographic Navigation Software. All analyzes were planned and the patient was selected. Immediately postoperative radiograms were uploaded to the software system and a correction regimen was created. After the correction was completed, the spatial fixators were removed. While there is not yet a clinical study in the literature, it has been concluded that spatial fixators can even complex antebrachial deformities in dogs, and the system and software program can be used practically in deformed patients. In dogs, especially in complexes with antebrachial deformities, the ability to perform six axis corrections at the same time is a huge advantage. More extensive work on the subject can be made.

**KEYWORDS:** Computer-assisted fixator, Radiographic navigation software, Antebrachial deformity, Corrective osteotomy

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# ORAL PRESENTATIONS

# SESSION 16: RADIOLOGY, RADIATION ONCOLOGY AND BIOLOGICAL EFFECT

# A NEW CT-BASED AND VOXELIZED HUMAN PHANTOM MODEL FOR REFERENCE DOSE CALCULATIONS IN RADIOTHERAPY

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## ABSTRACT

Modern radiotherapy treatment planning systems rely on Computer tomography (CT) data, obtained from a real patient, for accurate radiation dose calculations. For an individual patient, CT-images are combined into a 3d computational model of the patient's body. The geometry model is usually in a voxelized form and require a segmentation process before it is constructed. The physical properties of organs and tissues are estimated from the CT number of every voxel.

In this study, we prepared a voxelized male human phantom model (SpilMan) for reference dose calculations in radiotherapy. Different organs such as prostate, bladder, rectum, urethra, bones, etc. are identified preciously from CT images of a male individual. Each organ is segmented in various voxel sizes, from 0.5x0.5x0.5mm to 2.0x2.0x2.0mm and saved in a separate file. For a particular dose calculation scenario, those structures can be combined in a particular order to constitute the model of a patient's body. An in-house computer program is also developed in order to manipulate the voxel properties of organs. Our new human phantom model is suitable to use in any radiotherapy dose calculation system. It also provide a well-defined 3d-geometry for model based dose calculation algorithms to test their dose calculation efficiencies.

**KEYWORDS:** human phantom model, segmentation, CT, radiotherapy.

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# ORAL PRESENTATIONS

# SESSION 17: SUSTAINABILITY ON QUALITY OF EDUCATION

# THE EFFECT OF ALTITUDE ON VO$^2$MAX, VENTILATION FUNCTIONS AND HEART RATE OF 100m SPRINTERS

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## ABSTRACT

The aim of this study was to identify the effect of altitude on some physiological parameters of sprinters. Eight elite 100m sprinters participated to this study. The subjects aged was 24±3.6. The metabolic effect of altitude training was investigated in sprinters. Subjects were tested before and after altitude training as pre-post tests. Ventilation functions (FVC, FEV1FVC and VC) and VO²max were tested. Blood parameters (erythrocyte, hemoglobin, hemotocrite, MCH, and MCHC) and some physical characteristics (body weight, resting heart rate, and maximal heart rate) were measured and also the effect of altitude training was investigated on performance.

SPSS 16 statistical program was utilized for analyzing the data. Paired sample test was used for within the group difference. There were no differences between pre and post camp tests for VO²max, ventilation functions (FVC, FEV1FVC, and VC), blood parameters (erythrocyte, hemoglobin, and hemotocrite) and maximal heart rate.

There were significant differences ($p<0.05$) between pre and post camp tests for body weight, resting heart rate and blood parameters (MCH and MCHC).

It was concluded that there were no effect on VO²max and ventilation functions and also there were no significant differences resting heart rate, body weight, and blood parameters (MCH and MCHC) related to 4 week altitude training in sprinters.

**KEYWORDS:** VO²max, blood parameters, ventilation functions, altitude, heart rate

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# ORAL PRESENTATIONS

# SESSION 18: TISSUE ENGINEERING APPLICATIONS ON VETERINARY MEDICINE

# METHACRYLATED GELATIN HYDROGELS AS CORNEAL STROMA SUBSTITUTES: AN *IN VIVO* STUDY

**Cemile Kilic Bektas[1,2,3], Ayse Burcu[4], Gokhan Gedikoglu[5], Hande H. Telek[4], Firdevs Ornek[4], and Vasif Hasirci[1,2,3]**

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## ABSTRACT

Human cornea, exterior transparent surface of the eye, serves as its principal optical element. Over 10 million people worldwide suffer from corneal blindness and due to donor cornea shortage new approaches like tissue engineering are developed. In this study, methacrylated gelatin (GelMA) hydrogels were studied in vivo (rabbit) for their potential to serve as a corneal stroma substitute

Reaction of gelatin and methacrylic anhydride yielded 70% methacrylation as calculated from NMR data. GelMA solution (15%) was prepared with Irgacure and crosslinked with UV for 5 s. GelMA disk (2r= 4 mm, h= 150 μm) was inserted to mid-stroma corneal pocket of one eye (other eye served as sham) without suture fixation. No ulcer, edema or infection was observed in either eye. Minimal vascularization was treated with topical prednisolone acetate (1%, 4x1), and one sub-conjunctival dose of anti-VEGF in the 3$^{rd}$ week. After 2 months, the corneas were removed and diameter of the implant was found to be decreased (from 4 mm to 3 mm) as expected from the biodegradability of GelMA. Cryosections (6 μm thick) stained with Hematoxylin and Eosin showed minimal foreign material reaction. In conclusion, GelMA appears to be a viable alternative for the treatment of corneal blindness.

**KEYWORDS:** corneal Stroma, tissue engineering, in vivo, rabbit, methacrylated gelatin, GelMA

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# ORAL PRESENTATIONS

# SESSION 19: BIOMEDICAL SIGNAL PROCESSING

# DETECTION OF PARKINSON'S DISEASE WITH KEYSTROKE DATA AND SUPPORT VECTOR MACHINES

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## ABSTRACT

Parkinson's Disease (PD) is a neurological disorder that occurs in the hands and feet with tremor, hardness in the muscles, slowing of movements and difficulty walking. Generally; the measures from force sensors, accelerometers and inertia measurement units used to gain the information about gait, posture and disorderly movements have been studied for analyzing the PD characteristics. In the last years, moving from the human-computer interaction approach, the data obtained from keystroke dynamics has been utilized to detection of PD. In this study, the new keystroke (finger movements on computer keyboard) data (available at Physionet database from October 2017) obtained from over 200 subjects (PD/non-PD), have been studied to determination of PD. The Shannon entropy and histograms were calculated for hold and flight time keystroke data, respectively. It was found that some bins of flight time histograms and hold time Shannon entropy values of PD and non-PD groups have significantly different each other ($p<0.05$, one-way ANOVA). These features applied to the inputs of two-class support vector machines. The classifier accuracies were found as 76.05% and 76.44% for training and testing, respectively. These results shown that keystroke data are able to be used for PD diagnosis instead of other sensor measures.

**KEYWORDS:** Parkinson's Disease, Diagnosis, Keystroke, Shannon entropy, Support Vector Machines

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# ORAL PRESENTATIONS

# SESSION 20: CLINICAL ENGINEERING

# THE *SETDB1* PROMOTES THE METASTASIS OF HEAD AND NECK SQUAMOUS CELL CARCINOMA

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## ABSTRACT

Head and neck squamous cell carcinoma (HNSCC), which includes cancers of oral cavity, oropharynx, larynx, and hypopharynx accounts for approximately 600,000 new cases every year and is the sixth most common cancer type worldwide. Head and neck cancer is usually not diagnosed at an early stage, has a strong capacity for metastasis and relapse rates are high. The main treatment modalities for head and neck cancer are surgery and chemotherapy. These cause deformities in the patient's face, mouth and nasopharyngeal region which can significantly affect their ability to swallow and talk. For all these reasons, the patient's quality of life is seriously affected by this disease. Furthermore, chemotherapy is not only toxic to both cancer and healthy cells but also does not always succeed in the complete removal of tumors. Also, it is not possible to predict the efficacy of a particular treatment in individual patients. Therefore, the development of alternative diagnosis and therapy modalities are of utmost importance.

Genetic factors play a large role in cancer and thus there is a great desire to understand the effects of different genes in cancer and to also develop gene therapy for better treatments. SETDB1 is a major histone methyltransferase that methylates histone H3 at lysine 9. SETD1 plays a critical role in tumor growth and metastasis. To date, deregulation of *SETDB1* has never been investigated in HNSCC. We investigated the effect of the *SETDB1* as a potential therapeutic target in HNSCC. We used cell lines generated from head and neck primary tumors and lymph node metastases taken from the same patients. We evaluated gene and protein expression levels by qRT-PCR and western blot analysis in order to better understand the effects of the *SETDB1* gene in these cell lines. We demonstrated SETDB1 to be overexpressed in metastatic cancer cells in HNSCC. SETDB1 is a powerful predictive biomarker because of its central role in carcinogenesis and metastasis, and it has a high potential for the development of target SETDB1 molecules

**KEYWORDS:** Head and neck squamous cell carcinoma, SETDB1, metastasis

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# CORRELATION OF BREATH SOUND ANALYSIS WITH PULMONARY FUNCTION TESTS IN ASTHMATIC AND HEALTHY CHILDREN

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## ABSTRACT

Auscultation of breath sounds in asthmatic attacks differ from normal lung sounds but, auscultation is a subjective diagnostic tool. The object of the present work was to analyze breath sounds of asthmatic patients and control group in the terms of frequency and amplitude to evaluate usability in diagnosis. For this purpose '3 Channel Digital Stethescope' (3CDS) had developed in connection with Biomedical Department of Gazi University; analysing breath sounds and giving results in terms of amplitude and frequency. Breath sounds and pulmonary function tests of asthmatic patients attending to policlinic with asthma attack between ages 6 to 18 (N:32) and healthy controls (N:30) were recorded simultaneously within one year period. Asthmatic patients' records taken at the time of attendence, 1$^{st}$ , 4$^{th}$ hours and at control (3$^{rd}$ to 7$^{th}$ days). There was a significant correlation between minimum amplitude of breath sounds and 3 of the parameters of pulmonary function tests ($p<0.05$). Those related ones were forced expiratory volume at the end of 1st second (FEV1), peak expiratory flow (PEF), maximal expiratory flow (MEF25-75). There was a significant difference between means of minimum amplitude values of asthmatic and control group at the time of attendence ($p<0.05$). Indicating that minimum amplitude values can be used to distinguish asthmatic patients at attack from control group. No correlation between frequency and pulmonary function test results was found. Within asthmatic group of patients, control values of minimum amplitude were not correlated with FEV1 and PEF. Showing that minimum amplitude values are not propriate for follow up.

**KEYWORDS:** breath sounds, pulmonary function test, asthma, childhood, FEV

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