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Wounds, Scar and Life

FEBRUARY
1-4 **2022**

8th WTR

Eighth International Congress of Wound and Tissue Repair

Tehran, Iran

Virtual / live broadcast

- ◆ Scar Management
- ◆ Wound and Microbiome
- ◆ Wounds and Lifestyle
- ◆ Wounds and Pain
- ◆ Wounds and Economy
- ◆ Wounds and Cancers
- ◆ Invisible Wounds
- ◆ Artificial Intelligence

Organizers:



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Lasers in Medicine

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Contents

Message of Congress President	1
Masoud Habibi	
Message of Congress Chairman	2
Seyed Mehdi Tabaie	
Message of Scientific Chair in Clinical Sciences	3
Parvin Mansouri	
Message of Scientific Chair in Basic Sciences	4
Mansour Jamali Zavareh	
Congress Scientific Committee	5
Congress Executive Committee	6
Congress Scientific Program	7
Oral Presentations	13
Poster Presentations	27



Masoud Habibi MD

President of 8th Annual Congress of **WTR**

Dear researchers and companions

It is a great pleasure that, by the grace of God, we have been able to hold the eighth National Congress and the sixth International Congress on Wound and Tissue Healing for the eighth consecutive year. Wound and Tissue Healing Congress tries to create a scientific atmosphere with the approach of exchanging findings and experiences in order to improve treatment methods and the application of new technologies and world-class knowledge in wound and tissue repair.

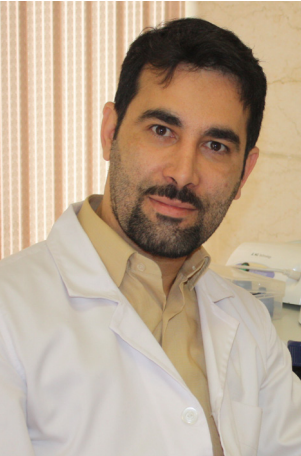
It is hoped that the scientific achievements of basic and clinical researches can be measured by two criteria of science and the experience of professors and can lead to scientific advancement and development of wound care methods. We are pleased to inform you, dear ones, that this congress will be held for 4 days from 1 to 4 February 2022 in Avicenna Hall affiliated to Tehran University of Medical Sciences and P Publication (The first digital media of medical science). We invite you, dear ones, to accompany us in holding this congress with your active and warm presence. The message of this year's congress is "Wounds, Scars and Life" and aims to present the recent research and highlight important milestones in wound healing and tissue repair.

I and my hard-working colleagues in the scientific and executive committees of the Congress hope to provide the necessary platform for the exchange of scientific information between the participants by the presence and speeches of foreign and domestic professors and experts, workshops, and side exhibitions. We shake your loving hands to accompany and empathize in the implementation of this great scientific event, and we look forward to your active and full-fledged presence.

Sincerely

Dr. Massoud Habibi

President of the 8th WTRC-2022



Dr. Seyed Mehdi Tabie

Chairman of 8th Annual Congress of **WTR**

Dear Researchers and Colleagues

Diabetic foot ulcers are not only a challenge in health systems, but also a social and economic threat to health-related organizations. The latest statistics for 2020 estimate the prevalence of diabetic foot ulcers in the world at 6.5 percent of the population, and the number of people who increase this number annually is estimated at 26 million. Diabetes, population growth and aging, as well as obesity are major causes of ulcers. It is estimated that about 463 million people in the world have diabetes, and if this population wants to form a country, the country of diabetics is the third most populous country in the world (after China and India). It is also projected that by 2045, the population of diabetics will be 700 million, which is a wake-up call for all communities. One in four foot ulcers results in amputation, and more than 30% of amputations lead to death, which is competitive with many cancers. The obesity rate in the world is estimated at 13% and Iran is the sixth most obese country in the world after the United States, Saudi Arabia, Turkey, Egypt and Libya. According to many national analyzes, Iran is an aging country. One of the side effects of aging is increased diabetes. The prevalence of diabetes in people under 44 is about 4%, but with age, the prevalence increases to the point that in people over 65%, the prevalence of diabetes is close to 28%.

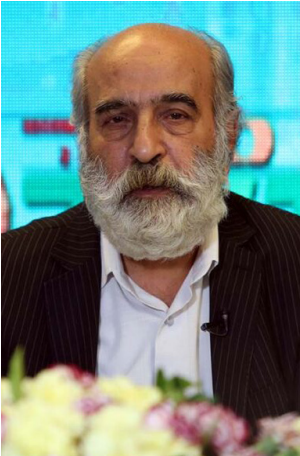
These statistics show the importance of addressing wound-causing factors. Tehran University of Medical Sciences Jihad, as a leading organization, has realized the importance of this issue, and in this regard, the 8th Wound and Tissue repair Congress will be held by the Yara Wound Research Institute. It is hoped that with the presentation of the latest scientific and educational achievements by esteemed professors and researchers in this congress, new steps will be taken in the field of serving wound patients

Sincerely,

Dr. Seyed Mehdi Tabaie

Chairman of 8th WTRC-2022

Tehran, Iran



Dr. Mansour Jamali Zavareh

Scientific Chair in Basic Sciences of 8th Annual Congress of WTR

Dear Researchers and Colleagues

Welcome to the Sixth International Congress and the Eighth National Congress of Wound and Tissue Healing. We are happy to announce the “6th International and 8th National Wound & Tissue Repair Congress” that will be held 1-4 February 2022, in Tehran, Iran. The Congress will lay a platform for the interaction between experts around the world and aims to accelerate recent researches and major milestones in the field of wound and tissue repair and regeneration. Scientists, researchers, professors, industrialists, nurses and health care providers, students, and other professionals will be participating from Iran and all around the world, and presenting new findings, technology, management and experiences about wound healing. Wound healing and tissue repair is a collaborative research field between different sciences, and our congress team is honored to host the scientists of various research fields in both basic sciences and clinical scientists. It is clear that the evolution of medicine and medical technology in wound healing and tissue repair hinges on the successful translation of basic science research from the bench to clinical implementation at the bedside.

I would like to cordially invite you all to this international research festival and also, I hope that this upcoming “6th International and 8th National Wound & Tissue Repair” congress will be a memorable event for your research career.

Sincerely,

Prof. Mansour Jamali Zavvareh

Scientific Secretary (basic sciences) of 8th WTRC-2022



Parvin Mansouri MD

Scientific Chair in Clinical Sciences of 8th Annual Congress of **WTR**

Dear scientists and researchers

Wound healing and tissue damage is one of the serious problems in the field of healthcare. The frequency of problems related to the occurrence of chronic wounds shows an increasing trend because of the change in lifestyle of people in the community, a slight increase in population, and change in the pattern of diseases. Any delay in the healing process of wounds and tissue injuries imposes great costs on individuals in the economic and social sectors. Complications that affect not only the lives of patients, but also their families, the community, and the organizations responsible for providing health care.

We are pleased to announce you that the Sixth International Congress and the Eighth National Congress of Wound and Tissue Healing will be held for 4 days from February 1 to 4, 2022. I invite you, dear ones, to actively attend the 6th International Congress. According to the routine of every year, we warmly shake your loving hands to accompany and empathize in the implementation of this great scientific event, and we look forward to your active and comprehensive presence.

Sincerely,

Dr. Parvin Mansouri

Scientific Secretary of the 8th WTRC-2022

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Seyed Mehdi Tabaie, *Chairman*

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Parvin Mansouri, *Scientific Chair in Clinical Sciences*

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Tuesday, February 1, 2022 (8:30 - 16:25)

Opening Session

8:30 - 10:30

Session 1	Informative technology in wound care	Chairperson	Dr. Mansour Jamali Zavareh
Dr. Naser Mahdavi	Invisible wounds		10:30 - 10:50
Dr. Arash Roshanpour	An introduction to deep learning for wound diagnosis and treatment		10:50 - 11:20
Dr. Mahmood Hajipour	Artificial intelligence, opportunities, threats and requirements in the field of health		11:20 - 11:40
Dr. Mehdi Hosseinian-Sarajehlou	Wound registry in USA & Iran		11:40 - 12:00

Pray and Lunch

12:00 - 13:30

Session 2	ATMP: Advanced therapy medicinal procedure in wound management	Chairperson	Dr. Mina Sadat Naderi
Dr. Mina Sadat Naderi	Effect of low-level laser irradiation on stemness of human hair follicle stem cells		13:30 - 13:55
Dr. Nasrin Takzare	Histopathologic evaluation of Umbilical cord stem cells in wound healing		13:55 - 14:20
Dr. Banfshah Heidari	Cell-free therapy in wound healing and tissue regeneration (secretum and exosome therapy)		14:20 - 14:45
Dr. Roya Karimi	GUT regeneration		14:45 - 15:10
Dr. Kamyar Ghaffari Dafchahi	Investigating of the synergistic effect of emulsion nanoparticles and Bone Marrow-Derived Stem Cells (BM-MSCs) in accelerating wound healing due to burns in male rats		15:10 - 15:35
Dr. Tahere Abbasi Moayyer	Evaluation of Combination Treatment of Lotion containing honey, Aloe, propolis and BM-MSCs in the Healing of Second Degree Burns in Animal Models		15:35 - 16:00
Dr. Farzane Rezaei Yazdi	The Combined Effect of Topical Aloe vera Gel with Locally Administered Adipose-derived Mesenchymal Stem Cells on Burn Wound Healing in Rat		16:00 - 16:25

Poster Presentation

Evaluation of the Economic Burden of Health in Patients with Chronic Wounds	Hamed Fereidooni
Educational and Medical Center of ghaen	Mohammad Hadi Sarvari
Biological effects of concentrated growth factor in tissue regeneration	Zahra Aghamohamadi
Exosomes derived from human adipose mesenchymal stem cells accelerates cutaneous wound healing	Arezo Azari
Comparison of the effect of bone marrow mesenchymal stem cells and mouse fat on collagen-fibrin hydrogel scaffold on Pseudomonas aeruginosa infection in In Vivo burns	Shabnam Razavi
Enzymes role in wound healing at a glance	Hajieh Lotfi
Small molecules in wound healing: opportunities and challenges	Ahmad Vaez
Assessment Of The Exosome's Role On the Repairing Of Spinal Cord Injury	Akbargharalari
Role of miRNAs from MSC-derived in skin wound healing: A meta-transcriptomics analysis	Narges Bagherishakib
Therapeutic effects of exosomes on inflammatory phase of wound healing	Maryam Ghahremani-Nasab

Wednesday, February 2, 2022 (8:35 - 18:15)

Session 3	Future Dressing	Chairperson	Dr. Gholamreza Esmaili Djavid
Dr. Reyhane Mirkhani	Study on the Controlled - Release of Lawsone as an Antibacterial Agent from Electrospun Mats Based on Sodium Alginate for Wound Application		8:35 - 9:00
Dr. Hajar Sadeghi	Nanoantibacterial dressing in the treatment of diabetic foot A protocol for systematic review and meta-analysis		9:00 - 9:25
Dr. Atefeh Oshaghi	Transparent pH-responsive Eudragit nanofibrous layers for wound healing		9:25 - 9:50
Dr. Shafiqh Khaljan	Ciprofloxacin hydrogels to control of bacterial wound infection		9:50 - 10:15
Dr. Hamideh Moravej	Experiences of wound treatment in Iran		10:15 - 10:35
Dr. Melika Sharahi	Development of poly(caprolactone)/gelatin blend nanofibrous scaffold reinforced with hydrolyzed walnut shell nanoparticles & investigation resultant composite webs properties		10:35 - 11:00
Dr. Hossein Shahsavarani	A novel bio-inspired regenerative dressing from okra fruit accelerates wound healing in a diabetic rat model ...		11:00 - 11:25
Dr. Mojtaba Ansari	Fabrication of Multifunctional Chitosan Based Gel to Promote Wound Healing		11:25 - 11:50
Dr. Bahareh Behrouznejad	Fabrication and characterization of Bacterial cellulose / Gelatin hydrogel as a potential candidate for wound healing		11:50 - 12:15

Pray and Lunch

12:15 - 13:00

Session 4	Clinical Pathway of Diabetic Foot Ulcers	Chairperson	Dr. Maryam Alaa
Dr. Neda Mehrdad	Guideline based Model of diabetic foot ulcer services		13:00 - 13:20
Dr. Maryam Alaa	principle of Screening for diabetic foot ulcer		13:20 - 13:40
Dr. Mohammadreza Amini	Types and classification of diabetic foot ulcer		13:40 - 14:00
Dr. Mahnaz Sanjari	diabetic foot ulcer assessment		14:00 - 14:20
Dr. Mohammadreza Mohajeri-Tehrani	principle of treatment for diabetic foots		14:20 - 14:40

Session 5	Life style medicine in wound management	Chairperson	Dr. Mohsen Fateh
Dr. Koroush Jafarian	Latest in nutrition and wound care		14:40 - 15:00
Dr. Farhad Seif	Immunologic effects of lifestyle in wound healing		15:00 - 15:20
Dr. Hossein Yari	Exercise and wound healing		15:20 - 15:50
Dr. Manijeh Soleimanifar	Impact of lifestyle factor on wound healing		15:50 - 16:10
Dr. Parisa Amdjadi	Biomimetic approaches in prevention and treatment of Demineralized Enamel		16:10 - 16:30
Dr. Elahe Ghadimi	Evaluation of the effect of vitamin D3 supplementation in doses on hyperglycemic control, wound healing, wound infection and sepsis incidence, and length of stay in hospital in burn patients		16:30 - 16:50

Session 6	Wound and pain	Chairperson	Dr. Siamak Bashardoust Tajali
Dr. Reza FekrAzad	The role of Photobiomodulation in Oral & Maxillofacial Nerve Injury management		16:50 - 17:10
Dr. Alireza Partoazar	Nanoliposomes in wound and pain treatment		17:10 - 17:30
Dr. Nasrin Zand	Non-thermal CO2 laser Therapy (NTCLT): A novel approach for pain management of chemotherapy- induced oral mucositis, the final results		17:30 - 17:50
Dr. Siamak Bashardoust Tajali	Effects of high-power lasers on pain control		17:50 - 18:15

Poster Presentation	
Treatment of diabetic foot ulcer using advanced wound dressing (a case report)	Mehdi Shirzaei Jalali
Fabrication and characterization of electrospun polyvinyl alcohol/polyaniline scaffold for skin tissue engineering	Zahra Akbari Kheirabadi
Evaluation of Chitosan Gel on Burn Wound Healing and Keratinocytes Function	Mojtaba Ansari
A novel bio-inspired regenerative dressing from okra fruit accelerates wound healing in diabetic rat model	Alireza Fattahpour
Bacterial cellulose based wound dressing with moisture retention capability and antimicrobial property for chronic wound infection	Amirhossein Mohammadikia
Preparation and evaluation of antibacterial non-isocyanate-polyurethane-gelatin wound dressing containing silver nanoparticles	Hamid Yeganeh
Polyhydroxyurethane-siloxane containing quaternary ammonium moieties surface modified by gelatin as wound dressing for low exuding wound	Hamid Yeganeh
Improving chronic diabetic wound ulcers by applying chitosan platformed PRP	Razieh Gholizadeh
Effective nanosilver-based nanogel dressings as bioactive antimicrobial surfaces for enhancing the wound healing process	Esmat Azizipour
Management of Infectious Diabetic Foot Wounds (Case Report)	Nasim KhoshKholgh
Evaluation of risk factors in patients with diabetic foot ulcers referred to shohada Educational and Medical Center of ghaen	Mohammad hadi Sarvari
Treatment of Diabetic Foot Ulcer with propolis and Olive Oil	Mahsa Mohajeri
Choice of wound dressings in diabetic foot ulcer	Hamed Farzaneh
Quality of life in elderly patients with diabetic foot ulcers: A systematic review	Hamed savadkahi
Management of some post surgery dehiscence wounds	Mohammad Javad Baradaran Kenari
Management of abdominal wound dehiscence using vacuum assisted closure in a patient(case report)	Mehdi Shirzaei Jalali
Pressure ulcers; Risk factors and treatment	Mohammad hadi sarvari
The pressure ulcer treatment with rosemary extract compounds and olive oil	Mahsa Mohajeri
Pathophysiology of Pressure Ulcers in Patients Undergoing Coronary Bypass Surgery: A Review Study	Ali Rajabi
The role of implant properties on macrophage polarization (Focusing on physical and mechanical properties)	Hekmat Farajpour
Spirulina platensis gastroprotective property in gastric ulcer patients	Somayeh Jafari



Thursday, February 3, 2022 (8:35 - 16:45)

Session 7	Frontiers in wound management	Chairperson	Dr. Seyed Mehdi Tabaie
Dr. Aziz Ghahary	Application of a nutritional liquid dermal scaffold improves the healing outcome of the Hard-To-Heal wounds		8:35 - 9:00
Dr. Kavosh Zand Salimi	Antibacterial nanomaterial for wound healing		9:00 - 9:25
Dr. Lobat Tayebi	3D-printed constructs with potential applications in tissue repair		9:25 - 9:50
Dr. Gholamreza Esmaili Djavid	collagen matrix dressing		9:50 - 10:15
Dr. Naisana Seyedasli	Assessing cellular Heterogeneity and drug response using single cell technology: Lessons from human epithelial carcinoma		10:15 - 10:35
Dr. Hajar Sadeghi	Lived experiences of caregivers of the elderly with burn wounds: A qualitative study		10:35 - 11:00
Dr. Leila Zarei	Wound Healing Effect of Hydroalcoholic Extract of Linum usitatissimum in Adult Rats		11:00 - 11:25
Dr. Abulfazl Abbaszadeh	Evaluation of the effects of nitric oxide on the burn healing in rats		11:25 - 11:50

Pray and Lunch

11:50 - 12:30

Session 8	Melanoma: New trends in diagnosis and treatment	Chairperson	Dr. Mohsen Esfandbod
Dr. Mohsen Esfandbod	Adjuvant and new adjuvant in cutaneous melanoma		12:30 - 12:55
Dr. Amir Mohsen Jalaeifar	Surgical management of cutaneous melanoma		12:55-13:20
Dr. Faezeh Khorasanizadeh	Imaging studies in melanoma		13:20 - 13:45
Dr. Mostafa Farzin	radiation therapy in cutaneous melanoma		13:45 - 14:10
Dr. Zahra Safaei Naraghi	New diagnostic biomarkers in melanoma		14:10 - 14:35



Session 9	Surgery and interventional approaches in wound	Chairperson	Dr. Mohammad Nazari
Dr. Hosein Ghanaati	Endovascular approaches in diabetic foot ulcer		14:35 - 15:05
Dr. Mohammad Nazari	Management of varicose veins		15:05 - 15:30
Dr. Homan Riazi 	Vascular management of arterial and venous Ulcerations		15:30 - 15:55
Dr. Ali Mahdizadeh 	Emergency in wound care		15:55 - 16:20
Dr. Ali Akbar Mohammadi	New aspect of acute burn wound management		16:20 - 16:45

Poster Presentation

Preparation and characterization of Lawson-loaded poly (vinyl alcohol)/sodium alginate electrospun nanofibers	Javad Ahmadishoar
Fabrication and evaluation of PCL/PVP electrospinning nanofibers incorporating henna for wound dressing applications	Nahid Khazdouz
Fabrication of electrospun polyvinyl alcohol/Ziziphus spina christi extracts for wound dressing applications	Mahsa Janmohammadi

A review on application of Nano-materials for skin regeneration and wound treatment	Soraya Babaie
Electrospun polyhydroxyurethane-graft-poly(ϵ -caprolactone) containing quaternary ammonium moieties as antibacterial material suitable for skin wound healing	Hamid Yeganeh
Decellularized plants as perfusable tissue engineering scaffolds	Ali Mohammad Amani
Bioactive Glasses for Wound Healing	Ahmadreza Farmani
Application of Cationic nanopolymer for Anti-inflammatory and Wound Healing effect on mice	Arefeh Ebadati

Friday, February 4, 2022 (8:35 - 18:15)

Session 10	Dermatology	Chairperson	Dr. Parvin Mansouri
Dr. Hassan Vahidnezhad 	epidermolysis bullosa in Iran		8:35 - 9:00
Dr. Zahra Saffarian	Wounds and internal disease		9:00 - 9:25
Dr. Uotto 	New treatment modality and diagnosis in epidermolysis bullosa		9:25 - 9:50
Atefeh Alipour	Crossing kingdoms: Herbal derived natural cellulosic scaffolds for human skin tissue regeneration		9:50 - 10:15
Dr. Marzieh Moazenzadeh	Holistic approaches in wound healing		10:15 - 10:40
Dr. Asiye Rahimi	Common Ulcerations of the Oral Cavity (Any mouth sore is not aphthous ulcer)		10:40 - 11:05

Session 11	Wound and microbiome	Chairperson	Dr. Parvin Mansouri
Dr. Parvin Mansouri	topical probiotic in skin repair		11:05 - 11:30
Dr. Seyed Davar Siadat	Microbioa pattern in wound		11:30 - 11:55
Dr. Saeedeh Keyvani	The effect of probiotic in control of infected wound		11:55 - 12:20
Dr. Samira Tarashi	Biofilm versus microbiome		12:20 - 12:45
Dr. Naser Ebrahimi Daryani	Microbiota in colon cancer		12:45 - 13:10
Dr. Hanieh Sadat Ejtahed	Microbiome and diabetic foot ulcer		13:10 - 13:35

Pray and Lunch

13:35 - 14:05

Session 12	wound and scar management	Chairperson	Dr. Parvin Mansouri
Dr. Seyed Mehdi Mirghazanfari	Wound repair and scar treatment in traditional medicine		14:05 - 14:30
Dr. Mohammadali Nilfroshzadeh Dr. Sona Zare	Cell therapy in scar management		14:30 - 14:55
Dr. Alimohammad Alimohammadi	Legal medicine of scar and wounds		14:55 - 15:20

Dr. Arash Mahvashi	Comparison of PHMB-containing dressing and silver dressings in patients with critically infected wounds	15:20 - 15:45
Dr. Kamran Balighi	Dermatologic approaches in scar management	15:45 - 16:10
Dr. Alireza Firooz	PIH after wound healing	16:10 - 16:35
Dr. Ebrahim Mirzadegan	Efficient Scar Prevention by Using Menstrual Blood Stem Cells in Comparison to Fibroblast/Keratinocyte in Diabetic Mice Model	16:35 - 17:00
Dr. Nosratollah Boddouhi	Post injuries Scar Management: my experiences	17:00 - 17:25

Session 13	Light and physical approaches in wound management	Chairperson	Dr. Afshan Shirkavand
Dr. Khatereh Khorsandi	An update on photodynamic therapy in wound healing		17:25 - 17:50
Dr. Afshan Shirkavand	Terahertz Technology in wound and diabetic foot monitoring		17:50 - 18:15
Dr. Leila Ataie Fahshtami	Wearable biosensor technology for chronic wound monitoring		18:15 - 18:40
Dr. Seyed Mehdi Tabaie	New Imaging technologies in skin cancers		18:40 - 19:05

Poster Presentation	
Treatment of axillary pressure ulcer in a patient with Covid 19 with advanced wound dressing (case report)	Mehdi Shirzaei Jalali
The effect of <i>Elaeagnus Angustifolia</i> L fruit extract on making skin collagen precursors and wound healing- A Review Study	Ali Rajabi
Various applications of platelet-rich plasma in increasing surgical wound healing as a biomimetic approach	Azizeh Rahmani Del Bakhshayesh
The application of novel based microneedle approaches for promoting wound healing	Ali Mohammad Amani
Autologous platelet gel as biological tool in soft tissue regeneration	Mahdieh Ghiasi
Electrospun Asymmetric Membranes with Antibacterial Activity: Novel Strategies to Fight Against Wound Infections	Mehdi Akbarzadeh Amirdehi
Antibacterial and antibiofilm activities of <i>Lucilia sericata</i> secretions / extractions against wound pathogens	Samaneh Shahrokh
Comparison of the effect of vaginal cream with combination of honey, olive, propolis (Nika) accompanied by antibiotic treatment on the improvement of cervicitis symptoms in women of reproductive age	Zahra Masoumi
<i>Spirulina platensis</i> microalga in wound healing and scar management	Somayeh Jafari
Organoid technology and applications in wound healing	Zeinab Zarei Behjani
The role of fluorescent imaging in the management of wound infection and reduction of antibiotic use	Omolbani Rahimi
Effect of carboxytherapy on tissue and wound healing	Niloufar Raftgoftar
Application of photosensitizer compounds in tissue and wound healing	Shirin Khalaji
Choice of wound dressings in diabetic foot ulcer	Hamed Farzaneh

Oral Presentations

An Introduction to Deep Learning for Wound Diagnosis and Treatment

Arash Roshanpoor

We as human - being have the power to decide by predicting the future. Saving the life of a person is a challenging task and so needs a serious and accurate decision. For this reason, Clinical Decision support systems have been implemented to help experts for making better decisions. Without having a sufficient amount of knowledge, the proper decision could not be taken and so providing enough level of knowledge for these intelligent systems is critical. There is a relationship between knowledge and patterns, in a way that patterns in data indicate meaningful abstract concepts that can be regarded as knowledge. Today, concerning the increase in the volume of data, having access to patterns is not easy since each sample is only a tiny piece of the whole big picture.

Accordingly, this is a place where Machine Learning techniques, methods, and algorithms can be valuable. These models can be trained with some samples to have access to their internal patterns and related knowledge to be used for deciding on new cases. But, sometimes deciding on detailed features, such as pixels of an image, can mislead the algorithm. Therefore, the model at first should be trained to extract higher-level features and then decide upon them that brings up Deep Learning concepts and techniques into the action. In this presentation, we show some applications of deep learning techniques for wound detection and treatment. Some of these articles focus on wound segmentation for providing metrics such as %TBSA for the wound segmented area. The other ones apply Machine Learning techniques for predicting the risk of the acute wound to be cured after a period that helps experts to make better decisions as soon as possible. All in all, the goal of this presentation is to reveal the power of these techniques and their applications to wound experts for making them familiar to the computer intelligent systems that could not be ignored in the future.

Effect of Low - level Laser Irradiation on Stemness of Human Hair Follicle Stem Cells

Mina Sadat Naderi*, Seyed Mehdi Tabaie

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skin papilla cells are multipotent stem cells that have the ability to stemness and induce the formation of hair follicles. The hair follicle provides a source from which adult stem cells can be isolated and cultured. A modern approach to hair transplantation can be provided by cell therapy using dermal stem cells. Low-level lasers are currently used for many medical applications, such as regenerative medicine, wound healing, and also hair loss treatment.

In this study, we investigate the effect of low-level laser irradiation on gene expression of ZFX, Snail, Nanog, and Oct4 at RNA level of hair follicle stem cells (HFSCs), which are genes that regulate the self-renewal property of hair follicle stem cells. Hair follicle stem cells were extracted by enzymatic and mechanical methods. To prove multipotent stem cells, surface markers were used via flow cytometry. The effect of low-level laser with different doses from 1 to 15 J/cm² on HFSCs the expression of stemness genes.) was investigated.

The results showed a significant increase in stemness characteristics at an energy dose of 5 J/cm² at the transcription level. The results of this study can be a useful step towards cell therapy methods as well as hair transplantation and also wound healing.

Keywords: stem cell, wound healing, stemness, hair follicle

Cell-free Therapies in Wound Healing and Tissue Regeneration (Secretome and Exosome Therapies)

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Wound healing and tissue regeneration requires «synchronization of a vital network» consisting of various growth factors, chemokines, proteases, soluble proteins, precursors and immune cells that produce inflammatory cytokines. Recently, cell-free therapy has been proposed as a new alternative to cell-based therapies in repairing damaged tissue, due to its advantage compared to cells' therapy. SC-secretomes (stem cell-derived secretomes) as cell-to-cell messengers have received much attention for the fact that they are important paracrine mediators in tissue regeneration.

Secretome contains a cargo bring soluble proteins (growth factors, chemokines, cytokines, proteases) and extracellular vesicles (exosomes and micro vesicles containing miRNA, mRNA, DNA, and other proteins from their cells of origin). Exosomes are novel frontiers of intercellular communication regulating the biological behaviors of cells by encapsulating various types of bioactive cargoes. They are endowed with great application potential in tissue regeneration and regulate angiogenesis, neovascularization, immune modulation, re-epithelialization, cell proliferation and migration and the other specific functions.

It is well documented that SC-derived exosomes can enhance proliferation and migration of repair cells (fibroblasts and keratinocytes), and optimize collagen deposition through the PI3K/Akt and WNT- β catenin signaling pathways to further accelerate wound healing.

This manuscript elucidated the research progress of secretome and exosome therapy on tissue regeneration in plastic and cosmetic surgery, including anti-aging skin treatment, dermatitis healing, wound healing, scar removal, flap transplantation, and skin reconstruction.

Deciphering the biological properties of secretome will provide further insights for exploring novel therapeutic strategies of tissue regeneration in wound healing and tissue regeneration.

Investigating of the Synergistic Effect of Emulsion Nanoparticles and Bone Marrow-derived Stem Cells (BM-MSCs) in Accelerating Wound Healing due to Burns in Male Rats

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Introduction: Skin burns and complications are one of the leading causes of death and disability in the world. Despite significant advances in woun healing and the use of modern medical techniques including cell therapy, tissue engineering, biological and nano, and traditional medicin techniques, wound healing in a shorter time with fewer side effects also is one of the important goals of medical science. This study was designed to investigate the synergistic effect of emulsion nanoparticles and stem cells derived from BMSCs in accelerating wound healing due to burns in male rats

Materials and Methods: This study was performed on 72 adult male Wistar rats with a weight range of 200-200 g and an age range of 3 to 4 months. Rats were divided into 6 groups: control, DMEM injection, stem cell injection, daily intake of emulsion nanoparticles, combination of stem cell injection and daily intake of emulsion anoparticles, daily treatment of silver sulfadiazine ointment. Wound closure percentage and histopathological parameters were measured. Immunohistochemistry technique was used to examine fibroblast cells and RT-PCR technique was used to measure β -TGF expression. The results were analyzed using Spss software and one-way ANOVA and Tukey test.

Results: The results showed that the number of fibroblasts, the number of blood vessels, the amount of collagen deposition and the percentage of wound healing in the combination group with stem cells and nanoemulsion had a significant increase compared to other groups. In addition, the number of inflammatory cells and the size of the wound surface were significantly reduced in the combination group.

Conclusions: Based on the results of this study, it can be concluded that bone marrow-derived stem cells and emulsion nanoparticles with synergistic effect can improve the healing process of burn wounds and as a low-complication treatment strategies should be considered.

Keywords: Emulsion Nanoparticles, Bone Marrow-Derived Stem Cells, wound healing

Evaluation of Combination Treatment of Lotion Containing Honey, Aloe, Propolis and BM-MSCs in the Healing of Second Degree Burns in Animal Models

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Background: One of the most important issues in medical science is the healing of burn wounds. The use of medical plants has been common and today cell therapy offers new approaches to the management of skin wound healing. The aim of the present study was to evaluation of combination treatment of lotion containing honey, Aloe, propolis with BM-MSCs in the healing of second degree burns in animal models.

Method: In this experimental study, 72 rats with an age range of 3-4 months and a weight of about 200-250 gr, after burns were randomly divided in to 6 groups of 12 with study periods of 7, 14 and 21 days: Witness (no treatment), Positive control (SSD1%), First experimental (Stem cells), Second experimental (Lotion), Third experimental (Combination of lotion and stem cells), Fourth experimental (DMEM). Tissue samples were prepared on days 7, 14 and 21 for staining H&E and Trichrome Masson, s, as well as RT-PCR examinations. The results were analyzed using Graph Pad Prism8 software and tukey ,one-way and two-way variance tests.

Results: According to macroscopic and microscopic

images, the results of statistical analysis and expression of TGF- β gene, in the group treated with lotion and stem cells, epithelialization and granulation tissue formation were faster. Also, TGF- β gene expression, angiogenesis and fibroblast cell proliferation increased and inflammation decreased. ($P < 0/05$)

Conclusion: Combination treatment of lotion and bone marrow-derived stem cell has synergistic effects on the healing of second degree burn wounds in the animal model and accelerates the healing of burn wounds.

Keywords: Bone marrow-derived stem cell, Honey, Aloe vera, Propolis, Burn wound healing

The Combined Effect of Topical Aloe vera Gel with Locally Administered Adipose - derived Mesenchymal Stem Cells on Burn Wound Healing in Rat

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Background: Treatment of burn wounds by the help of stem cells is a promising approach, still needs to be improved. Previous studies have shown that the topical use of several plant extracts have great potential for wound healing. In this study, we investigated whether the combination of topical Aloe vera gel and locally administered adipose-derived stem cells (ASCs) regimen could improve burn wounds healing in rat.

Methods: Burn wounds with a radius of 20 mm (314mm²) were created on the back of adult male Wistar rats. 54 rats were divided into 6 groups as follows: adipose stem cells group (ASCs), DMEM group, a combination of stem cell and Aloe vera gel group (A/ASCs), Aloe vera gel group and silver sulfadiazine ointment group (SSD), as well as an untreated control group. DMEM and ASCs injections were performed on day 0 and the rats were evaluated

for 21 days. Histopathological parameters, wound closure percentage and the number of fibroblasts were evaluated by immunohistochemistry assay and the TGF β gene expression in burn wounds was evaluated by RT-PCR (P Value <0.05).

Results: The results showed that the combination of Aloe vera with adipose stem cells (A/ASCs) effectively increased the level of fibroblasts, wound closure, vascular buds, TGF β gene expression and collagen production. Besides, less inflammation was observed in A/ASCs group compared with the individual treatments and control groups.

Conclusion: Based on the findings, the concomitant application of Aloe vera gel and adipose stem cells effectively improve burns healing process.

Keywords: Aloe vera; Adipose stem cell; Wound healing

Study on the Controlled - release of Lawsonsone as an Antibacterial Agent from Electrospun Mats Based on Sodium Alginate for Wound Application

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This investigation aims to study the characteristics and release properties of Lawsonsone- loaded sodium alginate (SA): polyvinyl alcohol (PVA) blends nanofibers prepared by electrospinning. Different concentration of Lawsonsone (2.5%, 5%, 10%, 15%, 30%) were electrospun. The SEM images show that the optimum contents of Lawson were 2.5% and 5% wt resulting in fibers with average diameter of 328 \pm 52, 316 \pm 53nm, respectively. FTIR spectra was used to demonstrate the presence of the Lawson in fibrous mats. The Lawson release from the nanofibers mats measured by an ultraviolet absorption spectrophotometer, which showed sustained- release significantly controlled by non-fickian-diffusion mechanism as indicated by diffusion exponent value

obtained from the Korsmeyer–Peppas equation. Disc diffusion assay proved the antibacterial activity of the Lawson loaded nanofibers mats towards Gram-positive bacterium (*Staphylococcus aureus*) and Gram-negative bacterium (*Escherichia coli*), which enhanced with increasing the Lawson content. The results indicated that the Lawson-loaded SA/PVA nanofibrous mats have a great potential as a controlled release system wound dressing for healing improvement.

Keywords: Controlled - Release , Wound Dressing, Sodium Alginate , Lawson, Electrospinning

Nanoantibacterial Dressing in the Treatment of Diabetic Foot A Protocol for Systematic Review and Meta-analysis

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Background and Purpose: At present, there are many dressings used in the treatment of the diabetic foot. Among them, nanoantibacterial dressing are widely used, but the conclusion has not yet been formed. The purpose of this study is to search for relevant studies on the treatment of DF with nanoantibacterial dressing through evidence-based medicine methods and to draw conclusions with higher levels of evidence to provide a basis for the clinical treatment of DF.

Methods: Computer search of databases such as CNKI, SinoMed, VIP, Wanfang, PubMed, ISI, Scopus, Embase, and Cochrane Library. Use corresponding search formulas according to different database requirements. In order to avoid omissions, search scope for including subject words, keywords, or full text. The search time is from the establishment of the database to November 2, 2021. Search terms are: “diabetic foot,” “diabetic feet,” “diabetic foot ulcer,” “foot ulcer,” “Ag,” “nanoantibacterial dressing,” “Randomized controlled trial,” “RCT,” Two researchers will independently select studies, collect data, and assess

the methodology quality by the Cochrane risk of bias tool. The meta-analysis will be completed by RevMan 5.3 software.

Results: This systematic review will provide an assessment of the current state of DF, aiming to assess the efficacy of nanoantibacterial dressing for patients with DF. When compared to other antibacterial dressings, nanosilver has remarkable characteristics and advantages when treating diabetic foot, including broad-spectrum effect, wide and safe application, and long post-treatment action time. Empirical studies have shown that nanometer silver reduces pain, as well as the probability of time and infection, in diabetic foot patients. Nano-silver dressings are a novel form of long-spectrum, safe, antibacterial dressing. It plays a significant role in the prevention and treatment of diabetes. In addition to protecting the wound, facilitating better drainage, and improving safe broad-spectrum anti-infection role, related studies show that its application in the treatment of diabetic foot holds significant advantages, particularly several comparative experiments with different dressings have shown that nanoantibacterial dressing effectively improve the cure rate, the safety of diabetic foot patients, and alleviates pain to a certain level.

Conclusion: Nano-silver has been widely used in surgery, gynecology, dermatology, stomatology, medical devices, medical textile protective articles, and contraception. The application of nano-silver in treating diabetic foot is also becoming more popular in clinical settings. This systematic review will provide a credible evidence-based for the clinical treatment of DF with nanoantibacterial dressing.

Keywords: nanoantibacterial dressing, diabetic foot, systematic review, meta-analysis

Transparent pH - responsive Eudragit Nanofibrous Layers for Wound Healing

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Background: In recent years, development of smart dressings composed of stimuli-responsive polymers have received significant attention in wound treatment. Additional advantages such as transparency and ability of controlled drug release increase the utility value of dressings, in particular concerning patient comfort and ease of application. Eudragit is a copolymer of methyl acrylate commercialized with different acidic or alkaline end groups, which allow for a pH-dependent release of the active ingredient. Eudragit polymers are variously used in pharmaceutical excipient and drug delivery due to their desired properties in biological environment. Due to these mentioned benefits, we created an Eudragit L100 nanofibrous by electrospinning and transformed it into a transparent wound dressing by coating with a Eudragit RS100 resin. This transparent pH-sensitive membrane may provide a novel concept in the design of on-demand smart wound dressings.

Methods: Eudragit L100 with dissolution above pH 6 is selected as a suitable polymer for the production of nanofibrous dressing and was electrospun with concentrations of 15% (w/v) in ethanol/dimethylformamide solvent. To produce a transparent layer, nanofibers were impregnated with a resin containing Eudragit RS100 and polyethylene glycol 400 by drop-casting. Finally, physical properties of transparent layers such as surface morphology, light transmission and flexibility were investigated.

Results: Due to the proximity of refractive indexes of nanofiber polymer and resin polymers, transparent nanofibrous layer with maximum visible light transmission (57.36%) and minimum flexural length (1cm -maximum flexibility) obtained. Increasing the weight of nanofiber at given area from 21.33 to 64 g/m² reduced the light transmission to 8%. Scanning electron microscopy (SEM) images also confirmed the presence of nanofibers in the transparent layer.

Conclusion: According to the results, it is suggested that Eudragit nanofibrous membranes can be applied as a transparent wound dressing to enhance the controllability of drug release in infected wounds.

Keywords: Eudragit L100 nanofibers, transparent wound dressing, transparent nanofibrous layer, pH-sensitive wound dressing

Ciprofloxacin Hydrogels to Control of Bacterial Wound Infection

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Background and Aims.: Skin ulcers are one of the most common tissue injuries that can occur for a variety of reasons. Today, the treatment and repair of infectious wounds caused by bacteria is difficult. Therefore, the production of natural polymer hydrogels containing antibiotics can be a desirable solution for the treatment of these wounds. The aim of this study was to evaluate the antimicrobial effect and repair of ciprofloxacin-containing hydrogel on infectious wounds caused by *Pseudomonas aeruginosa*.

Materials and Methods: First, hydrogel was synthesized from natural polymers including alginate and carboxymethyl cellulose and then a certain amount of prepared ciprofloxacin solution was added to the hydrogel. To form the desired hydrogel, different concentrations of calcium chloride were used for crosslinking and the final hydrogel was obtained as a topical gel. The antimicrobial effect of hydrogel in vitro was evaluated by agar well diffusion test and in vivo against infectious wounds caused by *Pseudomonas aeruginosa* in mice.

Results: Based on the observations, the physical properties and the rate of absorption and release of antibiotics from the hydrogel were appropriate and its antibacterial effect was confirmed by the presence of a bacterial growth inhibition zone around the well containing the hydrogel in culture. Even for this purpose, in terms of formation and size of the growth inhibitory zone, it was compared with ciprofloxacin eye drops available in the market and a better result was obtained from the hydrogel. The wound sampling

results of hydrogel-treated mice showed the removal of *Pseudomonas aeruginosa* within 3 days and complete wound healing within 14 days, which is very significant.

Conclusion: In this study, bacterial elimination, wound healing and reduce inflammation in the hydrogel-treated group compared with the control group showed a suitable effect of ciprofloxacin-containing hydrogel on the wounds of mice infected with *Pseudomonas aeruginosa*. Also, the synthesized hydrogel has properties such as rapid absorption and proper release of the drug. Ciprofloxacin-containing hydrogel can be a good option for topical wound healing by removing bacteria and uncomplicated healing.

Keywords: Skin ulcers, Hydrogel, Ciprofloxacin, *Pseudomonas aeruginosa*

Development of Poly (Caprolactone) / Gelatin Blend Nanofibrous Scaffold Reinforced with Hydrolyzed Walnut Shell Nanoparticles & Investigation Resultant Composite Webs Properties

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Recently, lignocellulosic biomaterial has caught scientists' attention due to inherent biocompatibility in field of tissue regeneration. The aim of the present study was production of blend nanofibrous poly (ϵ - caprolactone) (PCL) - gelatin (Gel) / hydrolyzed walnut shells (WS) scaffolds via a single nozzle electrospinning process. WS nanoparticles characterized with FTIR, ZPA, and AFM analyses. WS incorporated into PCL-Gel nanofibers with varying percentage of (1, 2, 5, 8 wt%). The results showed that PCL-Gel/WS nanofibers possess coarse morphology due to the presence of WS nanopowders. The mean nanofiber diameter in blend (50:50) group increased from 349 nm to 562 nm with addition of WS. Elastic modulus was the highest for PCL-Gel (50:50)/2%WS nanofibers, so that increasing up to approximately 2.6

times compared with PCL-Gel (50:50) nanofibers. PCL - Gel (50:50) / 2%WS scaffolds not only provide a suitable biological environment for cell attachment, growth, and migration but also don't have any toxicity for mesenchymal stem cells (MSCs). Therefore, WS as blended bio-reinforcement material in PCL-Gel polymer system was applied in biomedical application.

Keywords: Electrospun nanofiber, Lignocellulosic - derived nanoparticles, Poly (ϵ -caprolactone) - Gelatin blend, Walnut shells

Fabrication of Multifunctional Chitosan Based Gel to Promote Wound Healing

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Burns are one of the most prevalent and harmful types of trauma. Patients with critical thermal harm need immediate specialized care to minimize morbidity and mortality. This study aimed to assess the curing possibility of chitosan / guar gum / Aloe Vera hydrogel on the curing of full-thickness burn wounds in the Wistar albino model. Two full-thickness burn wounds were formed on the dorsum of each rat under general anesthesia. Burn wounds were cured with chitosan gel; chitosan / guar gum hydrogel; chitosan / Aloe Vera hydrogel; chitosan / guar gum / Aloe Vera hydrogel, respectively. Healing was investigated based on the percentage of wound shrinkage, and surface area as well as histopathological and histomorphological observations. A significant decrease in the wound area and the epithelial gap were noticed in all groups especially the wounds treated with chitosan / guar gum. Maximum angiogenesis was observed in the chitosan / Aloe Vera treated group. Chitosan / guar gum / Aloe Vera treated wounds demonstrated an enhancement in the thickness and integrity of collagen fibers and the highest score among fibroblast cells accumulation. Furthermore, the inflammatory cellular response and hyperemia were significantly higher in the control group when compared with those of other chitosan-

based groups. Chitosan / guar gum / Aloe Vera hydrogel has a curing possibility and has presented the best healing result compared to other treatments for the restoration of full-thickness skin burn wounds in rats.

Keywords: Chitosan; Guar gum, Aloe Vera, Burn wound healing, Natural polymers

Fabrication and Characterization of Bacterial Cellulose / Gelatin Hydrogel as a Potential Candidate for Wound Healing

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Background: Bacterial cellulose (BC) is a natural polymer consisting of D-anhydro glucose rings linked by β 1, 4 - glycosidic bonds with a three - dimensional (3D) nano - fibrous porous network and excellent physico - chemical properties. However, BC has little antioxidant capacity and biological activity that limits its bio-related applications. Hence, different in situ and ex situ modifications are widely applied to incorporate other polymers into the structure of BC hydrogel. Here, we introduced a novel culture system to synthesize a BC/gelatin hydrogel as a feasible and inexpensive candidate for wound healing.

Materials and Method: BC/gelatin hydrogel was successfully synthesized by adding 0.5 wt/v% gelatin into the BC producing culture medium containing D-glucose (100g/L-1), yeast extract (10g/L-1), peptone (5g/L-1) and CaCO₃ (20g/L-1). Physico-chemical features of hydrogels were investigated by scanning electron microscopy (SEM) and ATR-FTIR spectroscopy. Biodegradation of gels was also assessed by a hydrolytic method based on measurement of weight/pH changes over 20 days under simulated physiological condition.

Result: SEM micrographs showed porous and interconnected structure of BC/gelatin composite

hydrogel. The ATR-FTIR spectroscopy demonstrated a characteristic peak around 1530cm⁻¹ correlated to amide II bonds formed between -COOH group of BC and -NH₂ group of gelatin. For both BC and BC/gelatin groups, no pH changes were observed over the physiological range, although highest degradation rate belongs to BC/gelatin hydrogel.

Conclusion: BC/gelatin hydrogel with porous structure and gradual biodegradability can provide suitable gas/liquid exchange, cell attachment, migration and proliferation especially for tissue regeneration and wound healing applications.

Keywords: Bacterial cellulose, Gelatin, Hydrogel, Wound dressing

Exercise and Wound Healing

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For patients with diabetic foot ulcers, offloading is one crucial aspect of treatment and aims to redistribute pressure away from the ulcer site. In addition to offloading strategies, patients are often advised to reduce their activity levels. Consequently, patients may avoid exercise altogether. However, it has been suggested that exercise induces an increase in vasodilation and tissue blood flow, which may potentially facilitate ulcer healing. The aim of this systematic review was to determine whether exercise improves healing of diabetic foot ulcers.

Review: We conducted a systematic search of MEDLINE, CINAHL and EMBASE between July 6, 2009 and July 6, 2019 using the key terms and subject headings diabetes, diabetic foot, physical activity, exercise, resistance training and wound healing. Randomised controlled trials were included in this review.

Three randomised controlled trials (139 participants) were included in this systematic review. All studies incorporated a form of non-weight bearing exercise as the intervention over a 12-week period. One study conducted the intervention in a supervised setting, while two studies conducted the intervention in an unsupervised setting. Two studies found greater

improvement in percentage wound size reduction in the intervention group compared with the control group, with one of these studies achieving statistically significant findings ($p < 0.05$). The results of the third study demonstrated statistically significant findings for total wound size reduction ($p < 0.05$), however results were analysed within each treatment group and not between groups.

Conclusion: This systematic review found there is insufficient evidence to conclusively support non-weight bearing exercise as an intervention to improve healing of diabetic foot ulcers. Regardless, the results demonstrate some degree of wound size reduction and there were no negative consequences of the intervention for the participants. Given the potential benefits of exercise on patient health and wellbeing, non-weight bearing exercise should be encouraged as part of the management plan for treatment of diabetic foot ulcers. Further research is required to better understand the relationship between exercise and healing of diabetic foot ulcers.

Keywords: Diabetic foot ulcer, Exercise, Physical therapy, Wound healing

Biomimetic Approaches in Prevention and Treatment of Demineralized Enamel

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Biomimetic remineralization is an alternative restorative technique that duplicates the natural process of enamel mineralization under physiological condition. Development of biomaterials with chemical composition, simulating natural enamel biomineralization have been recently introduced in the field of dental biomaterials.

The purpose of the present study is to assess the in vitro efficacy of a biomimetic nano-hydroxyapatite remineralizing composite in demineralized enamel surface and its effect on enamel microhardness. Enamel surface of 50 sound extracted human teeth

were demineralized, and subsequently, remineralizing composite was applied for 1 months.

SEM and Vickers microhardness tests were performed before demineralization and after demineralization and application of nHA composite. All data were submitted to statistical analysis.

The application of remineralizing composite induced a significant in vitro reduction of demineralized areas after the first week of application. Remineralized enamel showed significantly higher microhardness values than demineralized enamel and lower values than intact enamel.

This laboratory study reported success in the biomimetic mineralization of enamel.

Keywords: Enamel, Demineralized, Remineralized, Hydroxyapatite, Biomimetic

Evaluation of the Effect of Vitamin D3 Supplementation in Doses of 1000 and 3000 IU / Day on Hyperglycemic Control, Wound Healing, Wound Infection and Sepsis Incidence, and Length of Stay in Hospital in Burn Patients

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Introduction: Due to burn injury, damaged skin may not be able to synthesize vitamin D in the presence of sunlight, so patients who are deficient in Vitamin D at the time of admission are expected to have a variety of recovery problems. This study tested the hypothesis that vitamin D3 supplementation in doses of 1000 and 3000 IU/day improves hyperglycemia control, wound healing, scar formation, wound infection and sepsis incidence and length of stay in burn patients.

Materials and Methods: A total of 54 patients (35 men and 19 women, mean age: 35.17 and mean TBSA:

31.56) participated in a randomized controlled trial. 18 patients were randomly assigned to be in group C (control), 18 patients in group D1 (received 1000IU/day vitamin D3) and 18 patients in group D2 (received a 3000IU/day vitamin D3).

Results: Significant difference was observed one week after admission between group C and D1 (p-value = 0.02) and group C and D2 (p-value = 0.003) also two weeks after admission (p-value = 0.003) between group C and D1 (p-value = 0.04) and group C and D2 (p-value = 0.003). Three months after discharge, a significant difference was observed in the thickness (p-value = 0.03) and total score of the Vancouver scar scale (p-value = 0.03) Also, There was a significant difference between insulin requirements (p-value = 0.006) and the number of units of insulin required (p-value = 0.01) between group C and both of group D1 and D2.

Conclusion: supplementation with vitamin D3 in doses of 1000 and 3000 IU/day improved wound healing and decreased thickness of forming scar and exogenous insulin.

Keywords: Burn patients, Vitamin D supplementation, Wound healing, Wound infection, Scar formation

Non-thermal CO₂ Laser Therapy (NTCLT): A Novel Approach for Pain Management of Chemotherapy - induced Oral Mucositis: the Final Result

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Introduction: NTCLT (Non-Thermal CO₂ Laser Therapy) is a novel photobiomodulative (Low level laser therapy) approach used for immediate and significant pain reduction of some oral lesions with no visible thermal complications. This before-after clinical trial was designed to evaluate the pain relieving effects of NTCLT on chemotherapy- induced

oral mucositis (COM).

Study Design: The patients with COM (WHO grade ≤ 3) were included in the trial according to inclusion and exclusion criteria. Before irradiation, a thick layer of transparent, non-anesthetic gel with high water content was placed on the lesion. Then the lesions were irradiated with CO₂ laser (power: 1W, continuous mode, scanning rapidly over the lesions with circular motion of hand piece) through the gel layer. The patients reported their pain on VAS before and immediately after NTCLT and up to 7 days post operatively.

Results: The pain severity declined immediately and significantly after NTCLT ($p < 0.001$). The procedure itself was pain free and no kind of anesthesia was required. There were no visible thermal complications after NTCLT. None of the patients reported warmth sensation in their lesions during NTCLT.

Conclusion: The results of this before-after clinical trial suggest that NTCLT could be used to reduce pain of COM lesions immediately and significantly with no visible thermal adverse effects.

Keywords: chemotherapy- induced oral mucositis (COM), pain relief, Non-Thermal CO₂ Laser Therapy (NTCLT), photobiomodulation, low-level laser therapy

Lived Experiences of Caregivers of the Elderly with Burn Wounds: A Qualitative Study

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Background and Purpose: Caring for the elderly with burns is a difficult and unique path that exposes the caregiver to a range of different experiences. The aim of this study was to phenomenological analyze the lived experiences of caregivers of the elderly with burns over 50%.

Methods: This study was performed qualitatively using the tradition of descriptive phenomenology. Among all the primary caregivers of the elderly who

have experienced burns after the age of 60 and according to the treating physicians were in the third degree of burns using purposive sampling method based on the principle of saturation, 10 people participated. In the research process, they were selected and interviewed. All interviews were recorded and then handwritten and finally analyzed using the Colaizzi (1987) method.

Results: 10 semi-structured interviews were conducted and the analysis of the interview data resulted in the identification and classification of 8 sub-themes (astonishment, denial, distress, isolation, annoyance, despair, surrender, liberation, stability) and three main themes. (lack of self-esteem, self-discovery and stress relief) In the context of lived experiences of elderly caregivers with burns over 50%.

Conclusion: Elderly caregivers with a high percentage of burns face difficult emotional experiences and unique situations that can have a significant negative impact on the caregiver's physical and mental health and the patient care process. Understanding the life experience of this important group of caregivers will help specialist wound management teams to be properly informed to guide and support caregivers and to accompany caregivers to clarify patient needs and provide higher quality services.

Keywords: Lived experiences, caregivers, elderly, burn wounds, qualitative study

Wound Healing Effect of Hydroalcoholic Extract of Linum usitatissimum in Adult Rats

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Introduction: Researches to find a solution for wound healing have been continued from past to present. In this experimental study, the wound healing effects of hydroalcoholic extract of Linum usitatissimum were assessed on skin wounds in rats.

Materials & Methods: In this study, 80 male Wistar

rats were randomly divided into 5 groups. The rats were classified into the sham group, control group, hydroalcoholic extract of *Linum usitatissimum*-treated group (500 mg/kg), hydroalcoholic extract of *Linum usitatissimum*-treated group (200 mg/kg) and 0.01 Phenytoin-treated group treated for 22 days. The wound was developed in the back of the neck skin in the form of 1 cm diameter circular using the biopsy punch in three layers of the skin (dermis, epidermis and hypodermis). The skin samples were taken on the 3rd, 7th, 14th, and 22nd days after treatment for light microscopy. The data were analyzed through Kruskal-Wallis and Friedman tests (for histopathology analysis) using the SPSS v. 22 software.

Results: Macroscopical evaluations and measurement of wound size showed increased wound healing process in the treated groups. Complete improvement was obtained on the 14th day, and even the wound site was not observed on the 22nd day. However, the wound site was observed on the 22nd day in the control group. Moreover, comparison of the percentage of wound healing between the treated and control groups on the 3rd, 7th, 14th, and 22nd days showed significant differences ($p < 0.05$). Comparison of the H&E stained sections in the studied groups showed that wound healing was effective in the treated groups compared with the control group.

Conclusion: The results of the study showed that hydroalcoholic extract of *Linum usitatissimum* had beneficial effects on wound improvement and increased the rate of wound healing.

Keywords: hydroalcoholic extract, *Linum usitatissimum*, wound healing, skin wound

Evaluation of the Effects of Nitric Oxide on the Burn Healing in Rats

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Material and Methods: Adult male rats ($n=60$) with weight range of 250 ± 20 gr were used. After induction

of general anesthesia, a determined area of the skin of the back region was exposed to boiling water for 8s in order to producing the wet burns. After the burns made, the animals were grouped randomly in the following 6 groups. Control group, which received for 7 days after burns 100mg / kg normal saline intraperitoneally (IP). Experimental groups 1 and 2 received IP, L-Arginine 100 mg/kg and L-NAME 10mg/kg, respectively, for 7 days after burning. Abovementioned groups received the drug at first, third and fifth days after burning. The rest three groups (experimental groups 4,5 and 6), were as above three groups (Control, Experimental 1 and 2), but the test period in the second three groups lasted for 15 days and they received the drug at the first, third, fifth, seventh, ninth, eleventh and thirteenth days. The rats of groups 1-3 at the seventh day and the animals of the rest groups (4-6) were euthanized at the fifteenth day by ether inhalation. The skin samples were prepared from burned and the intact surrounding tissues. The samples were smeared by H&E and trichrome Mason.

Finding and Results: Statistical analyses revealed that the groups received L – Arginine had elevated angiogenesis, and this difference was statistically significant ($P < 0/001$). But the difference of the wound healing percentage in different days between groups were not statistically significant. The collagen deposition rate was also enhanced in L–Arginine receiving groups, in comparison to the others. The inflammation extent in the L – Arginine receiving groups was less than other groups, but there was no significant difference between study groups in epiderm production rate.

Conclusion: The results showed that NO is effective on some of the wound healing indices. So, through induction of its production in the burns, the extension and progression of the burn to the deeper sites and the occurrence of infection may be prohibited. The main reason of this healing effect may be through facilitating the perfusion to the burn bed.

Key Words: Burns, Rat, Nitric Oxide, L - Arginine, L-NAME.

Crossing Kingdoms: Herbal Derived Natural Cellulosic Scaffolds for Human Skin Tissue Regeneration

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Nonhealing wound, scars from surgical incisions, and burns have a significant impact on healthcare costs in addition to the negative effect on the patients' quality of life. Making a compatible wound dressing capable of providing a suitable microenvironment to promote the dynamic and complex processes of healing, can crack the aforementioned obstacles. In spite of developing novel wound-care therapeutic and tissue engineering approaches, efficient production of a safe and feasible wound dressing has low commercial reality yet due to various flaws and defects such as low biocompatibility, toxicity, and high cost. Natural-based wound dressings, particularly bacterial and herbal-derived cellulosic scaffolds, have been suggested for tissue regeneration owing to their fascinating characteristics. Their antibacterial capability and desirable mechanical and geometrical properties including porosity, tensile, hydrophobicity for use as ECM can mimic the niche of the skin structures to regenerate after injury. In this study, we examined various herbal-derived 3D scaffolds as wound dressings after decellularization and surface modifications using diverse methods. Amongst analyzed ECMs, decellularized apple skin exhibited vigorous mechanical properties and sufficient resemblance to skin microenvironment in order to be used for skin and stem cell culture with fewer antibiotics. Altogether, cellulosic herbal-derived scaffolds have a great potential to be used as a wound dressing.

Keywords: Wound dressing, herbal-derived scaffolds, skin regeneration, cell niche

TCM & Wound Management

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- TCM has been used for thousands of years for chronic wound care.
- Herbal therapy, the major branch of TCM, is used both internally and externally for wound treatment; supplementary therapies may include:
 - Acupuncture technique in which practitioners stimulate specific points (700 main points) on the body. Moxibustion (a heat therapy utilizing mug wort herb burning on the skin)
 - Cupping (a therapy utilizing suction on skin through cups)
 - There are articles that show its effect in reducing pain and promoting wound healing of chronic wound
 - TCM is a type of Holistic medicine and use as an integrative medicine method besides or alone in treatment of skin disorder. The main function is Balancing vital energy of Qi
 - Qi flow in the channel in the body, space between muscle and skin
 - Qi function: warming, moistening, nourishing, promoting normal function of the organs.
 - In Wound we have problem in external and internal part of body
 - In TCM treat energetic imbalance and make overall well being. Raise the level of Endorphins in the brain, regulate serotonin
 - Relax and decrease blood pressure, increase circulation
 - Decrease anxiety and Fatigue. Psychological and social factors, Immune system dysfunction, imbalance of TH1 and TH2 are effective in skin disorders and even wound
 - Acupuncture has ability to balance th1, th2. Cupping: could regulate Th1 and Th2 cytokines at protein and mRNA levels in splenic T cells (2). Herbal treatment has many effects on wound care such as:
 - Anti inflammatory, anti bacterial, anti fungal, anti viral
 - Angiogenesis
 - Anti oxidant
 - Anti cancer

- Neuroprotective
- Hepatoprotective
- Anti atherosclerotic and anesthetic

Common Ulcerations of the Oral Cavity (Any Mouth Sore is not Aphthous Ulcer)

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Defined as a “circumscribed, craterlike lesion of the skin or mucous membrane resulting from necrosis that accompanies some inflammatory, infectious or malignant processes,”¹ ulcers are a common finding in dental practice. Ulcerations of the oral cavity are the third most common reason for referral to an oral medicine or oral pathology specialist. The etiology of oral ulceration is vast and includes idiopathic, traumatic, viral, immune-mediated and neoplastic causes. There have been reported cases of malignant ulcerations being inappropriately diagnosed as reactive or idiopathic lesions — rather than neoplastic lesions — and delays in accurate diagnosis can lead to significant negative outcomes.² As such, it is imperative for oral health professionals to successfully differentiate and triage oral ulcers in a timely manner. This article will examine some of the more common etiologies of oral ulcerations that routinely present in dental practice.

Keywords: oral ulcer malignancy aphthous stomatitis

Efficient Scar Prevention by Using Menstrual Blood Stem Cells in Comparison to Fibroblast / Keratinocyte in Diabetic Mice Model

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Introduction: Attainment of lessened scarring during wound repair remains a major clinical challenge. In this study,

we comparatively evaluated the efficiency of menstrual blood stem cells and fibroblast/keratinocyte seeded on the fabricated scaffold (composed of human amniotic membrane and silk fibroin) to improve wound healing and prevention scar formation in a full-thickness model.

Methods & Methods: The diabetic mice were divided into five groups including no treatment group, amniotic membrane group, bilayer scaffold group, fibroblast/keratinocyte-seeded bilayer scaffold group, and MenSCs-seeded bilayer scaffold group. The healing of full-thickness excisional wounds in each group was evaluated at 3, 7, and 14 days after treatment.

Results: Histopathological evaluations showed that MenSCs-seeded bilayer nanofibrous scaffold promoted regeneration more than other groups. The mean dermal thickness index (DTI) of bSC+MenSCs group at three time points was significantly higher than the other groups. At day 14, the mean DTI of bSC+MenSCs group showed a significant reduction toward near optimal level. However, the dermal thickness in other groups was lower than native adjacent dermis. The mean epidermal thickness index (ETI) of bSC+MenSCs group at day 3 was significantly higher than other experimented groups. Interestingly, a significant reduction of epidermal thickness to the optimal level was observed in bSC+MenSCs group from day 7 to 14 and at day 14, the epidermal thickness of this group was near to the thickness of adjacent epidermis. Masson's trichrome staining displayed that in all groups the deposition of collagen fibers increased over time, however, the most collagen deposition in all time points belonged to bSC+MenSCs group. Immunofluorescence staining depicted the expression of type III collagen significantly increased during day 3 to day 14. However, bSC+MenSCs group demonstrated an upward trend during days 3 to 7 and a downward trend from day 7 to 14.

Discussion: The dramatic effects of MenSCs as a promising adult stem cell population sound to promoting wound regeneration and significantly decrease the scarring area of the wounds.

Keywords: Diabetic Wound, Healing, Scar formation, Menstrual Blood Stem Cells

A Review on Terahertz Applications for Wound and Diabetic Foot Screening

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In the last few decades advance of diabetes treatment, still diabetic foot problems, wounds and ulcerations, continue to be a critical burden for patients and the global health care systems. For monitoring wound healing, it is vital to apply for accurate wound measurement tools, in which be able to detect small wound size alterations. The terahertz radiation (T-ray) was discovered to cover the gap of the frequency range between the mid-infrared (mid-IR) and the microwave in the electromagnetic spectrum. THz radiation as safe radiation is increasingly being used in medical, sensing, communication applications since its generation and detection technology appeared. Due to its non-ionizing characteristic, it is generally considered to be harmless, and safe to the body tissues. Based on the mentioned characteristics, there has been an increasing interest in terahertz imaging and spectroscopy for biomedical applications. The recent development of THz technology has stimulated interest in studying biological effects associated with this frequency range and its special applications in medical diagnosis as valuable types of basic and applied research areas. Here we aim to review various fundamentals related to THz radiation, and the physical aspects including its interaction mechanisms with skin tissue, generation, detection and specifications, Terahertz imaging and spectroscopy, and finally THz application in wound and repair monitoring and diabetic foot screening.

Keywords: Terahertz radiation, wound, diabetic foot, skin

New Imaging Technologies in Skin Cancer

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Light diagnostic tools are increasingly being developed in the world. This development has been far greater

in the presence of dermatology and the diagnosis of various skin lesions than skin cancers. The use of conventional photography and pathology photographs are the simplest light-based diagnostic tools. With the advent of dermoscopy and its development With the advent of dermoscopy and its advances, a further step was taken to improve these tools. In recent years, more advanced instruments such as Multiphoton microscopes, Confocal microscopes, Multispectral imaging, Optical Coherence Tomography and Optoacoustic imaging are advanced tools in the diagnosis of skin cancerous lesions, hoping to be an alternative to biopsy and more accurate diagnoses in the future.

Poster Presentations

Bioactive Glasses for Wound Healing

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Abstract: Wound healing is a complex multi-stage biological process that is associated with many problems in some patients and has imposed many costs on the health care system. In the meantime, due to the polymeric nature of skin tissue, the use of polymeric biomaterials for skin regeneration and wound healing has received more attention. However, research in recent years has shown that ceramic biomaterials, especially bioactive glass, have had significant effects on wound healing. Bioactive glass and doped ions in them can improve the acceleration of epithelialization. They also improve angiogenesis and on the other hand, their antibacterial properties make bioactive glass a very suitable option for applying them along with polymers and the formation of advanced polymer composites for wound healing.

Keywords: bioactive glasses, wound healing, skin, bioceramics, biomaterials

Small molecules in Wound Healing: Opportunities and Challenges

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Wound healing as a dynamic process exploits specific signaling pathways that prepared novel targets for preclinical and clinical studies. Small molecules modulate signaling pathways related to tissue regeneration, since these chemical substances offer innovative therapies for wound repair. Small-molecule therapy needs less safety consideration in terms of sterility, stability and regulations compared with cell or protein therapy. Here, We searched profoundly

Google Scholar, Pubmed and Web of Science to review the impact of small molecules on the wound healing via critical signaling pathways. The literature review suggested that manipulation of key signaling pathways by small molecules may improve the repair of wounds especially chronic and diabetic ulcers and inhibit scar formation. Indeed, small molecules have been demonstrated to play critical roles in the stimulation of angiogenesis, recruiting stem cells, activation of somatic cells, reduction of inflammation and remodeling the extracellular matrix. On the other hand, the combination of small molecules with tissue-engineered materials strongly enhances the therapeutic potential of this approach.

Keywords: Small molecules, Wound healing, Signaling pathway, Chemical substance

Decellularized Plants as Perfusable Tissue Engineering Scaffolds

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The demand for transplantable organs and tissues greatly outweighs their supply. The development of tissue grafts in the past decade has increased the number of therapies available to these individuals. There are still obstacles in the way of their use in clinical settings. The lack of a working circulatory network is one of the main obstacles to the clinical application of tissue-engineered treatments at this time. There is an oxygen diffusion barrier of about 100 to 200 um inside tissues that cannot be broken, limiting the number of grafts that can be created while the patient is still alive. Pro-angiogenic scaffolds have shown minimal effectiveness in reconstructing natural vasculature,

even when laden with pro-angiogenic compounds.

Microvasculature cannot be efficiently fabricated using current biofabrication technologies, such as 3D printing. Nowadays, the focus is on bio-inspired strategies that make use of perfusion-based decellularization procedures rather than aiming to build a vascular network. Decellularization removes cells from a tissue or organ while leaving the circulatory system intact, leaving an acellular scaffold made of an extracellular matrix. This matrix's makeup varies based on the tissue or organ it came from.

Decellularized transplants are nonimmunogenic while maintaining gross organ architecture. Decellularized tissues and organs may be recellularized using a patient's own cells. Decellularization characteristics vary amongst individuals due to confounding factors such as age, organismal or tissue disease, and decellularization features. The protein content of decellularized tissues varies greatly across people, according to mass spectrometry.

Additionally, decellularized mammalian tissues are in low supply and, when accessible, are prohibitively costly. Additionally, much additional study must be undertaken before fully decellularized organs may be deemed a therapeutically viable alternative. The availability of decellularized tissue would improve chances by increasing the number of viable grafts at a lower cost.

Physical and intellectual restriction of basic study in distinct organisms inside their respective biological kingdoms limits most modern bioengineering endeavors. This fundamental obstacle may be solved by incorporating contributions from many kingdoms inside the same bioengineered platform. The vascular network topologies of plants and animals are very similar, despite their fundamentally different delivery systems. Murray's Rule defines the human circulatory system's tapering, branching network design. Plant tissue structures, like human tissue structures, have a variety of mechanical properties. Plant cell walls include polysaccharides such as cellulose, pectin, and hemicellulose. Cellulose is a well-studied biomaterial found in plant cell walls. This biocompatible material promotes wound healing. Also, decellularized apple

slice scaffolds displayed mammalian cell connectivity and proliferation, and were biocompatible when implanted subcutaneously *in vivo*. Pectin and hemicellulose have also been investigated as bone tissue engineering and wound healing biomaterials, respectively. The inherent similarities and apparent biocompatibility of plant ECM led us to examine whether plants and their native vasculatures may serve as perfusable scaffolds for creating human tissue. Decellularization procedures were used on a variety of plant species and tissues to develop acellular, pre-vascularized scaffolds for tissue engineering. Numerous plant species' profusion and quick development also offer a less expensive, more abundant, and sustainable scaffold material.

The purpose of this study is to review the new method of decellularization of plants and its use as a tissue engineering scaffold for many therapeutic purposes.

Keywords: Plant decellularization, Perfusable scaffolds, Biocompatible material, Cellulose

Pathophysiology of Pressure Ulcers in Patients Undergoing Coronary Bypass Surgery: A Review Study

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Acute pressure wounds and bedsore are one of the most important issues in public health and one of the national indicators of patient safety and quality of care. Pressure ulcer as one of the complications of hospitalization reduces the level of health and imposes heavy hospital costs on the patient and wastes the time of medical staff. It affects more than one million people in hospitals each year, and about 7 to 8 percent die from its complications.

This study reviews the research on pressure ulcers in patients who have undergone coronary artery bypass graft surgery. SID, MEDLINE,

PubMed, OVID and Scopus databases were used for this research during the years 2010 to 2021.

According to research, the main causes of stress in patients after coronary artery bypass graft surgery include stretching, friction, nutrition, anemia, change, obesity or excessive weight loss, and peripheral blood disorders. The results also showed the most important way, including: identifying people at risk using pre-surgery evaluation criteria, observing the skin holding, changing the patient's condition every two hours, and also using assistive devices to increase pressure such as air and water mattresses under pressure areas.

Therefore, it can be prevented with primary hard wound prevention of pressure followed by postoperative bypass surgery.

Keywords: Pressure Wound, Bedsore, Surgery, Coronary Artery Bypass, Physiology, Prevention

The Effect of *Elaeagnus Angustifolia* L Fruit Extract on Making Skin Collagen Precursors and Wound Healing: A Review Study

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Herbal medicines have recently taken a special place in medical treatment and research. the treatment method that is commonly used to wound repair these lesions is not effective. The plant extracts have shown to have an anti-oxidant, antimicrobial, antimutagenic, and some other therapeutic properties which can contain preventative effect in many serious diseases. Elm (*Elaeagnus Angustifolia* L.) from a variety of traditional drug programs to its new roles as active antioxidants, anti-inflammatory, anti-mutant, and analgesic, as well as in wound healing, fruit extract in the wound area, the content of hydroxyproline, an important factor in collagen production, increased in

the tissue. aqueous extract of *Elaeagnus angustifolia* accelerates cutaneous wound healing, and its effect may be due to the increased re-epithelialization and collagen deposition in wound and so it can be considered as a therapeutic agent for wound healing. The use of fruit powder and extract of *E. angustifolia* L. have shown to be effective in alleviating pain in patients with rheumatoid arthritis and also in reducing the healing time of wounds in injured person.

This study investigates the effect of elm extract on skin wound healing. SID, MEDLINE, PubMed, OVID and Scopus databases were used for this research from 2010 to 2021.

the extracts of Russian olive are known as a wound healing accelerator. If treatment of inflammation and proliferation is considered as the main steps of wound treatment, Russian olive fruit extracts can help in wound closure. It can increase histological scores (epidermis regeneration, collagen deposition and proliferation).

Keywords: Hydroxyproline, *Elaeagnus angustifolia* L, Herbal Medicines , Wound Repair

Exosomes Derived from Human Adipose Mesenchymal Stem Cells Accelerates Cutaneous Wound Healing

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Wound healing is a dynamic and attentively orchestrated procedures including, cytokines, blood cells, parenchymal cells (i.e., fibroblasts), and extracellular matrix reorganization. In the physical wound, this interactive procedure conclusively reforms cutaneous and epidermal functional completeness in a sequential and properly procedure

Prolonged curing and scar organization are two significant problems in the therapy of smooth and soft

contexture damage. Stem cells (SCs) act a significant task in tissue regeneration, and new studies have proposed that exosomes secreted via stem cells can chip in to paracrine marking and signaling. Stem cell extracellular vehicles (EVs) have been comprehensively studied due to their distinguished therapeutic potential. EVs from distinct kinds of stem cell can cure vascularization in addition help in the behavior and treatment of cancer and neurodegenerative illnesses. The skin is an intricate member that is sensitive to different kinds of damage. A complete research illustrate that Exosoms used anti-inflammatory results via preventing the secretion of pro-inflammatory enzymes and cytokines. As well as, they accelerated the wound-curing procedures via inducing endothelial cell reproduction and immigration to modify Angiogenesis and re-epithelialization in wound healing.

Strategies planned to restore epithelial tissues' completeness via stem cell EVs have display promising outcomes. Various populations of stem cell EVs are talented to examination inflammation, accelerate skin cell migration and proliferation, examination wound scarring, modify angiogenesis, and rather improve symptoms of skin aging. However, extensive- size construction of such stem cell EVs for human therapy is yet a challenge. This review focuses on recent studies that explore the potential of stem cell EVs in skin wound healing and skin rejuvenation, as well as challenges of their use in therapy.

Keywords: Diabetes Diabetic foot syndrome. Effective factors in diabetic foot ulcers

P 14

Comparison of Skin Wound Healing Using Maggot and Extract Maggot *Lucilia Sericata*

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Introduction: Wound is present in both chronic and acute forms. Nowadays, wound management and treatment is one of the medical priorities. Any process

that can reduce the wound healing time can help reduce the patient's problems. With the advancement of medical science, in addition to the use of chemicals to treat wounds, attention has been focused on the use of biological materials, including plant and animal extracts. *Lucilia sericata* fly is from the family of Calliphoridae. The use of fly larvae returns to eliminate necrotic tissues and repair wounds to ancient times. Therefore, we decided to focus on repairing skin lesions using Maggot *Lucilia sericata*.

Methods: This study is a review study by reviewing articles from reputable scientific databases and websites including Google Scholar, Science Direct, PubMed, and Scopus with keyword «wound», «healing», «repair», «maggot therapy» and «larvae» during the year 2000 to 2019 completed.

Results: Different research results show that in addition to live larvae that can repair chronic wounds including diabetic wounds; larvae extract at a specific concentration can affect wound healing. Also, Maggot *Lucilia sericata* has a significant effect on the growth of fibroblast cells and skin ulcer repair.

Conclusion: As a result, the use of live larvae in Necrosis tissue removal has pain due to having a particular oral part, and also the presence of active larvae is not pleasant to the patient for psychological reasons, so the use of maggot extract at a specified concentration is more useful cause it will have different efficiency in different quantity level.

Keywords: Exosome- wound healing- Stem cells

Application of Cationic Nanopolymer for Anti - inflammatory and Wound Healing Effect on Mice

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Skin is the most significant barrier against microbial infections or inflammation and protects human organs from microorganisms. However, burns, wounds, surgical procedures, or other illnesses could destroy this protective

layer and its function. Hence, designing effective wound healers has always been a necessity. Nowadays, nanomedicine introduces various new treatments for wounds by amazing features of some nanoparticles, nanocomposites, and nanopolymers.

Method: Herein, a novel nanopolymer with cationic copolymers was designed and successfully synthesized by a polymerization reaction with a cross-linker including disulfide bonds and a diamine heterocyclic ring. The nanopolymer was characterized by SEM and DLS for evaluating its shape and size. For in vivo studies a tick burn wound applies on 12 male mice and infected by *S.aureus* and *P.aeruginosa*. Then, the anti-inflammatory and wound healing efficacy was evaluated.

Result: Nanopolymer successfully synthesizes and the SEM result showed a uniform structure. Furthermore, its diameter was calculated by DLS showed 44.3 nm with narrow distribution. The nanopolymer showed a great effect on enhancing the healing process and decreasing the healing time in contrast to control groups. Furthermore, the result of analysis in mice's blood showed a meaningful decrease in the inflammatory response specifically in IL6 and 1.

Conclusion: The total results showed our nanopolymer has not only the wound healing effect but also anti-inflammatory efficacy and could be a potential treatment for further burn wounds and skin infections. Finally, as advantages, synthesizing this nanopolymer has economical preferences for using as a wound healer for both producer and patients because of easy procedure, easily scaled up, operator friendliness, provided satisfactory yields of the nanopolymer, and no need for an inert atmosphere.

Keywords: Wound healing, Anti-inflammatory, Bacterial infection

Various Applications of Platelet - rich Plasma in Increasing Surgical Wound Healing as a Biomimetic Approach

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Platelet-rich plasma (PRP) obtained by centrifugation of whole blood is known as an autologous product that contains high concentrations of platelets in the plasma. Autologous PRP gel due to the release of multiple growth factors and cytokines, including platelet-derived growth factor (PDGF), vascular endothelial growth factor (VEGF), basal fibroblast growth factor (bFGF), transforming growth factor- β (TGF- β), and insulin-like growth factor-1 (IGF-1) plays an important role in promoting tissue repair and regeneration. In addition, PRP has shown promising experimental and clinical effects in wound healing, especially in chronic wounds, due to its low immunogenicity and high angiogenesis. Several studies have been published on the evaluation of PRP gels in the process of healing various wounds. As the field of surgery progresses, new therapies are needed to help treat more complex patients. With countless musculoskeletal, gastrointestinal, and urological surgeries performed annually, surgical wound healing remains of paramount importance to the surgeon and patient. Platelet concentrate has emerged as an adjunct therapy to help heal surgical wounds and injuries. Therefore, in this review article, we will discuss the restorative properties of platelet-rich plasma in surgical wounds and its various applications in surgery.

Keywords: Platelet-rich plasma, Wound, Healing, surgical, angiogenesis

Effective Nanosilver-based Nanogel Dressings as Bioactive Antimicrobial Surfaces for Enhancing the Wound Healing Process

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Wound bleeding or wound infections are two important challenges during critical events such as accidents or trauma where effective hemostasis and wound healing

strategies have emerged as crucial initiatives in this term. traditional treatments depending on bandages and gauze however could limit active bleeding, but they have significant drawbacks, including nonbiodegradability, susceptibility to infection, secondary tissue injury, and lack of efficacy in wound healing. Nanogels with excellent performance have attracted a great deal of attention because of their advantages of high porosity, good biocompatibility, appropriate physicochemical characteristics, and the advantageous for wound healing. In recent years, biomedical engineering of nanogels has emerged as a promising field to produce bioactive materials with novel properties for application in healthcare system. Recently nanosilver has gotten a lot of interest because of its broad antibacterial function. However one of the most critical challenges in biomedical application of nanosilver is the limited binding capacity with other biomaterials, which allows to leach out and cause toxicity in the surrounding tissue. applying nanosilver in a nanogel confinement makes an opportunity for development of functional bioactive nanoparticles to bound with other biomaterial. For this reason the application of biotechnology in association with nanotechnology, is necessitate. in present study nanosilver-entrapped nanogel substances with different functionality were produced and the antimicrobial properties against different pathogens were evaluated for medical applications.

Keywords: Nanosilver, Nanogel, Wound, Infection

Electrospun Polyhydroxyurethane - Graft - Poly (ϵ - Caprolactone) Containing Quaternary Ammonium Moieties as Antibacterial Material Suitable for Skin Wound Healing

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Background. Wound dressings composed of electrospun fibers resemble functions of the extracellular matrix which can enhance restoration, proliferation, and migration of epithelial cells towards the wound

sites and facilitate the healing process. The chemical structure of electrospun fibers has a direct effect on the bioactivity of corresponding modules. In the present work, CO₂ gas and soybean oil as inexpensive, accessible, and renewable resources was utilized for the preparation of non-isocyanate polyurethanes (NIPU). To improve the mechanical properties and the spinning ability of NIPU, the extra hydroxyl groups generated in the backbone of NIPU was used as initiator for ring-opening polymerization of caprolactone led to the formation of NIPU-graft-poly(ϵ -caprolactone). Electrospun nonwoven mats obtained from this material was evaluated for application as a wound dressing.

Method. NIPU with quaternary ammonium salts was prepared from the reaction of carbonated soybean oil and N,N'-dimethylethylenediamine followed by treatment with iodomethane. NIPU-graft-poly(ϵ -caprolactone) prepared by ring-opening polymerization was subjected to electrospinning process under optimum condition, using HFIP as solvent. Subsequently it was loaded with curcumin via an ion-exchange procedure.

Results and Conclusion. The Electrospun dressings showed good cytocompatibility as evaluated by the high viability of fibroblast cells cultured on dressings. They showed high tensile strength up to 7 MPa. They had tunable equilibrium water absorption, and water vapor transmission rate up to 400% and 2.5–15.1 g 10cm⁻² day⁻¹, respectively. These mats show moderate to good antibacterial activity against gram-positive and gram-negative bacteria. Additionally, curcumin-loaded samples showed high antioxidant activity as determined by the DPPH assay.

Keywords: wound dressing, electrospun, non - isocyanate - polyurethane, antibacterial, antioxidant

Evaluation of the Economic Burden of Health in Patients with Chronic Wounds

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Non-communicable diseases are responsible for the deaths of more than 35 million people each year or nearly two-thirds of all deaths worldwide. More than 80% of deaths from these diseases occur in low- and middle-income countries and are an important obstacle to the development of countries. Chronic wounds are among these diseases. In cases where the wound does not heal within 3 months, it is called chronic wound. Unlike acute ulcers, chronic wounds have a specific microenvironment. Ischemia, hypoxia and infection are the main features of chronic wounds. Diabetic foot ulcers, bed sores, ischemic and vascular wounds are examples of chronic ulcers. Common causes of this issue include obesity, smoking, malnutrition, aging, vitamin and mineral deficiencies, malignancies, treatments such as chemotherapy and radiation therapy as well as the use of immunosuppressive drugs. It is steroidal and anticoagulant. However, wounds can become chronic without these causes. It may be delayed due to causes such as poor blood flow, excessive skin irritation or the presence of a foreign body, and infection. In general, in families with a person with a chronic illness, health costs increase dramatically. In addition, these patient and their families are exposed to more unhealthy costs. The purpose of this review article is to show the effects of chronic wounds regardless of their cause on health and labor costs, challenges and control and prevention strategies.

Keywords: Economics, Cost, Healthcare, Chronic Wounds, Non-Communicable Disease, Prevalence

Comparison of the Effect of Vaginal Cream with Combination of Honey, Olive, Propolis (Nika) Accompanied by Antibiotic Treatment on the Improvement Of cervicitis Symptoms in Women of Reproductive Age

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Patients with cervicitis were improved after treatment in 69.7% of the subjects in the intervention

group; this was 45.5% in the control group. Therefore, the probability of response to treatment in the group receiving Nika vaginal cream was 53% higher than that in the control group and this difference was also statistically significant. Also, the Risk Difference value was equal to 0.24, which was also statistically significant. Multivariate logistics was used to compare the symptoms associated with cervicitis. The results showed that the chance of symptoms (foul smelling discharge, itching, dysuria, frequency, spotting, acute pelvic pain) in the post intervention phase was reduced in the intervention group compared to the control group. However, this decrease was only statistically significant in the case of dyspareunia and frequency, so that in the post intervention phase, subjects in the intervention group reported 76% less dyspepsia than the subjects in the control group ($p = 0.03$). This was 84% for frequency ($p = 0.05$) Nika vaginal cream can be effective for the treatment of cervices in relieving symptoms, especially dyspepsia and frequency, and we recommend to use it for the treatment of cervices.

Keywords: candidiasis, honey, Iran, olea, propolis, vulvovaginal

The Role of Implant Properties on Macrophage Polarization (Focusing on Physical and Mechanical Properties)

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Various techniques provide several chances for the biomaterial design and fabrication. Scaffolds functionality relies on the manufacturing technique, material, the geometry, inner architecture, and the surface properties of structure. These properties also could affect macrophage behavior around the implant and lead to unresolved inflammation, frustrated phagocytosis, and macrophage fusion to form foreign body giant cells. Success or failure of an implant determine by macrophage response through their polarization (towards pro-inflammatory (M1) and anti-inflammatory or reparative (M2) states). Macrophage

polarization and morphology could be affected by different properties such as mechanical property such as stiffness and cyclic strain and physical properties including the morphology of pores (squared or triangular pores), the angle formed between struts, and fiber diameters. Rounded multinucleated giant cells observed in the presence of orthogonal scaffolds while elongated macrophages were because of diagonal ones. Certain cyclic strain of poly-ε-caprolactone modulates macrophages into M2 polarization and lead to early synthesis of extracellular matrix components. Also, increased pore size and fiber diameter of electrospun structures leads to macrophage M2 polarization. The plasma electrolytic oxidation (PEO) treatment of Additive manufactured porous titanium implants highly induces pro-repair macrophage phenotype. In other words, the immunomodulatory effects of the AM porous titanium could increase by PEO treatment. Also, silver nanoparticles may be beneficial for preventing implant-associated infections. These reports together highlight and emphasize the importance of understanding the macrophage response to several properties of scaffolds and implants to encourage positive remodeling outcomes after implantation of different biomaterials.

Keywords: Implant, Macrophage Polarization, Scaffold

Preparation and Characterization of Lawson - loaded Poly (Vinyl Alcohol) / Sodium Alginate Electrospun Nanofibers

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This research work is focused on the preparation of poly (vinyl alcohol) (PVA)/ sodium alginate containing the Lawson from henna extract as an ancient natural wound-healing agent and it has various bioactivities. In order to improve the water resistant ability for potential biomedical applications, the PVA-SA nanofibrous mats were cross-linked with citric acid (CA) addition heating treatments (150 °C for 3 min). SEM images showed

the smoothness without any beads of nanofibers. The chemical composition of the nanofibrous mats were characterized via Fourier transform infrared spectroscopy (FTIR) and X-ray powder diffraction (XRD), demonstrating the Lawson was successfully introduced to nanofibers. Disintegration time measurement testified the hydrophilicity change of the nanofibers which decreased with an increase the Lawson content of the nanofibrous mats. The tensile strength and strain at break decreased with an increase in the Lawson content. These results demonstrate that electrospun PVA/Sa nanofibers containing the Lawson have high potential as bioactive wound-dressing material.

Keywords: wound dressing, Henna, Electrospinning, sodium alginate, cross-linked

Autologous Platelet Gel as Biological Tool in Soft Tissue Regeneration

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Background: natural biological phenomenon is capable to Repair tissue loss or injury. Autologous platelet gel (APGel) is a modern surgery approach with a low invasiveness and a high rate of clinical healing that facilitates the regeneration of tissues. The main goal of the study is to introduce an alternative technique in regenerative surgery.

Methods: For this narrative review, a literature search was conducted using PubMed and Research gate. A combination of the following text words was used: PRP”, Platelet-rich growth factor, wound healing and tissue regeneration.

Results: The special texture of the APGel can promote and accelerate the healing process. Investigations have generally agreed that PRGF can promote and accelerate the healing process and regeneration of soft tissue and optimizes swelling and inflammation rate.

Conclusions: biological of features APGel shows clearly high quality clinical outcomes in improvement of the healing processes of the soft tissues.

Keywords: Autologous platelet gel, soft tissue, regeneration, natural biological

Treatment of Diabetic Foot Ulcer with propolis and Olive Oil

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Background: Diabetic foot ulcers are one of the main health problems in diabetic patients. This study investigated whether topical administration of propolis could improve the impaired wound healing in patients with diabetic foot ulcers. Methods: In this randomized controlled trial, 48 patients took part. Patients were randomly assigned to 4 groups. In the propolis group, the wound was dressed using gauzes with propolis (1g) daily for 1 month. In the olive oil group, the wound was dressed using gauzes with olive oil (4 mL) daily for 1 month. In the propolis + olive oil group the wound was dressed using gauzes with olive oil (4 mL) + propolis (1g) daily for 1 month. Patients in the control group received usual dressing. Wounds were assessed before and after intervention using the Wagner scoring system and the checklist of diabetic foot healing. Results: Mean scores of tissue around the wound, wound grade, wound drainage, and wound healing were similar before intervention in all four groups. After intervention, mean score of tissue around the wound, wound grade, wound drainage, and wound healing were significantly higher in patients in the propolis + olive oil groups compared to patients in the other groups. Conclusions: Propolis can improve the impaired healing of diabetic wounds. Therefore, the use of propolis may be extended to the clinical setting and prove an effective promoter of wound healing in patients with diabetes.

Keywords: propolis, olive oil, diabetic foot ulcer

The Pressure Ulcer Treatment with Rosemary Extract Compounds and Olive Oil

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Background: Pressure ulcers is a main challenging issue in patient's well-being. Based on the evidence, rosemary extract compounds and olive oil can affect wound healing. The aim of this study was to determine the effect of rosemary ointment combined with olive oil on pressure ulcer healing in long-term hospitalized patients. Methods: In this doubled-blind randomized clinical trial, 60 patients were selected purposefully and assigned to 3 groups by stratified randomization method. In the one group, rosemary ointment was applied once a day for seven days. The second group received rosemary ointment + olive oil once a day for seven days and the control group received routine care. Data were collected using the Pressure Ulcer Scale for Healing (PUSH) before the intervention and on the third and seventh days after the intervention. Results: The mean scores of PUSH decreased significantly in the group that received rosemary ointment + olive oil while remained unchanged in the other groups ($P \leq 0.05$) one week after the intervention. The effect of time and interaction effect was also significant ($P = 0.001$). Comparison of the ratio of complete ulcer healing in the 3 groups showed a significant difference between the two groups ($P \leq 0.05$). Conclusion: Combination rosemary ointment with olive oil facilitated healing and prevented the progression of grade I pressure ulcers in the Intensive Care Unit. Therefore, the use of this combination, as a low-risk, uncomplicated, available, and inexpensive intervention, is recommended in these patients.

Keywords: rosemary ointment, olive oil, pressure ulcer

Therapeutic Effects of Exosomes on Inflammatory Phase of Wound Healing

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Wound-healing is a complex and important biological process cooperating physicochemical and cellular factors. There are many studies on wound-healing and an important part of these studies is related to the

effect of exosomes on wound-healing. Exosomes are originated from endosomal vesicles of parental cells into the extracellular environment, containing various lipids, proteins, mRNAs, LncRNAs, miRNAs, CircRNA to regulate the activity of receiver cells and have main role in tissue regeneration as they can effect on tissue responses to injury. Now a day, cell-therapy is used in medicine with a lot of limitations, and exosomes are popular to overcome the limitations. Exosome-therapy is probably effective candidate due to ease of restoration and transportation. Existing literature shoes the potency of MSC-EVs (MSC-Derived Exosomes) on accelerating wound-healing at different phases even improving scar. Exosomes derived from BM-MSCs that carry miR-223 can enhance wound-healing in mice and induce M2 macrophage polarization by decreasing TNF- α and increasing IL-10 in the inflammatory phase. Exosomes derived from Human umbilical cord (UC)-MSCs that carry let-7b can accelerate diabetic cutaneous wound-healing in rats and induce M2 macrophage polarization also inhibit TLR4 signaling pathway due to decrease in iNOS, TLR4, p-p65 and increase in ARG1 and p-AKT in the inflammatory phase. Furthermore, UC-MSCs-exosomes containing miR-181c can decrease TNF- α , IL-1 β and increase IL-10 therefore reducing burn-induced inflammation in rats, reducing neutrophil and macrophage infiltration, and inhibit TLR4 signaling pathway. Now a day, exosome therapy is a novel therapeutic model as a replacement for cell-therapy by decreasing side effects of current methods.

Keywords: Exosome, wound-healing, macrophage, umbilical cord

Preparation and Evaluation of Antibacterial Non - isocyanate - polyurethane - gelatin Wound Dressing Containing Silver Nanoparticles

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Background. Wound dressing is expected to provide optimum condition over damaged skin tissue to stimulate the wound healing process. Polyurethanes

(PUs) are basic constituents of many commercial wound dressings. However, the use of isocyanate monomer with high toxicity during the synthesis of conventional PUs causes severe health and environmental issues. Recently, non-isocyanate pathways have been proposed for the preparation of PUs, especially for medical applications. In continuation of our ongoing researches regarding the development of NIPUs as building-block of wound dressings, the preparation of novel NIPUs appropriate for the protection of moderate exuding wounds is reported here. The developed NIPUs were also armored with silver nanoparticles to protect wounded tissue against pathogenic bacterial invasion.

Method. NIPU polymers were prepared from the reaction of cyclic carbonate-terminated PEG with triethylenetetramine. The NIPUs with secondary amines embedded into their backbone were further reacted with PEG diglycidyl ether as the crosslinking agent. To tune the biocompatibility of NIPU, gelatin at different weight percent was admixed with NIPU before crosslinking reaction. The Ag nanoparticles were simply impregnated into the bulk of the dressings via in-situ reduction of Ag⁺ ions with free secondary amines available in the backbone of either NIPU or gelatin.

Results and Conclusion. The dressings showed high cytocompatibility (about 95% cell viability) and high antibacterial activity against a variety of bacteria. They exhibited a tensile strength of 2.1 – 10.9 MPa and 110 – 196 KPa at dry and hydrated states. Equilibrium water absorption and water vapor transmission rate of up to 300% and 1.22–1.51 g 10 cm² day⁻¹ were recorded for dressings.

Keywords: wound dressing; non-isocyanate-polyurethanes, silver nanoparticles, gelatin

Treatment of Axillary Pressure Ulcer in a Patient with Covid 19 with Advanced Wound Dressing (Case Report)

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Covid 19 disease is a pandemic in the world that has

been receiving global attention since March 2020, and due to the high prevalence of this disease and its rapid spread, the identification of various manifestations, including skin manifestations, is of great importance.

In this study, the patient was a 57-year-old man with Covid 19 who developed an axillary ulcer for unknown reasons. The wound grade was unstageable. Finally, the patient's wound healed 45 days after advanced wound dressing.

Keywords: wound, covid19, dressing

Treatment of Diabetic Foot Ulcer Using Advanced Wound Dressing (Case Report)

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[In reply to Venus]

Background: Diabetes mellitus is a chronic disease with a high mortality rate that brings a lot of economic burden to the health system of any country, so it is one of the health problems. Foot problems are very common in people with diabetes that require long hospitalization. Term in the hospital and even amputation.

Case presentation: A 63-year-old woman has a diabetic foot ulcer in which her big toe was amputated in the operating room and the patient's foot ulcer was treated with an advanced wound dressing. The wound healed after two weeks.

Keywords: wound, dressing, diabetic foot ulcer

Fabrication and Evaluation of PCL / PVP Electrospinning Nanofibers Incorporating Henna for Wound Dressing Applications

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One of the pressing challenges around the world is wound care management. Nanotechnology has known as a suitable platform for the management of treating acute and chronic wounds. Henna plant has unique properties and has been used in the past as a medicinal plant with antibacterial properties. The purpose of this study is to investigate the properties of poly (ϵ -caprolactone)/poly (vinyl-pyrrolidone) nanofibrous mat containing a plant extract of Lawsonia inermis (Henna) leaves produced via double-nozzle electrospinning to enhance proses of the wound healing. The morphology and physicochemical properties of the samples were characterized using scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), contact angle goniometer, swelling and biodegradability behavior in buffered saline phosphate solution. The mechanical properties of the fibers were also evaluated. The SEM images of lawsone-loaded nanofibers proved that Continuous, smooth, and bead-free nanofibers with an average diameter of 215 ± 15 nm have been prepared. According to the SEM results, with the addition of lawsone, a decrease in the diameter of the produced nanofibers was observed. Presence of lawsone in the electrospun fibers was approved by Fourier Transform Infrared spectroscopy. The results shows that samples containing lawsone have good stability; In addition, with increasing the percentage of lawsone in the structure of nanofibers, degradability and water absorption were increase which this samples could be an ideal dressing material for treatment of chronic wounds. Contact angle measurements showed that increasing lawsone ratio improved wettability of the nanofibrous mat significantly. Also, the result indicated that the presence of lawsone in nanofibers mats exerted a lowering effect on mechanical properties. Therefore, our results show the ability of henna extract-loaded PVP/PCL nanofibrous mats as a good potential wound dressing materials.

Keywords: Wound dressing, Tissue engineering, Henna, Polycaprolactone, Polyvinylpyrrolidone, electrospinning

Evaluation of Risk Factors in Patients With Diabetic Foot Ulcers Referred to Shohada Educational and Medical Center of Ghaen

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Introduction: Diabetes is the most common endocrine disease and can lead to dysfunction of the kidneys, eyes, heart, arteries and nervous systems. Diabetes is the the main reason of diabetic foot ulcers and lower limb amputation which in turn reduces the quality of patients life. This study was done to evaluate the risk factors Leading to diabetic foot ulcers.

Methods: This case-control study was performed on 58 diabetic patients with diabetic foot ulcer (case group) and 110 diabetic patients without diabetic foot ulcer (control group), referred to shohada Educational and Medical Center of ghaen during 2019 and 2020. Patients information was collected using a researcher-made checklist. data were analyzed after entering SPSS software version 16.

Results: The mean age of patients in case group was 60.2 and in control group was 49 years old. In the case group, 68.96% were men, 31.04% were women, and in the control group, 55.45% were men and 44.55% were women. The average diabetic duration was 19.27 years in case group and 12.34 years in control group. 72.41% in case group and 76.36% in control group used oral drugs and the rest of the subjects in two groups used insulin to control blood sugar. 94.82% in case group and 82.72% in control group had a history of previous hospitalization due to complications of diabetes. 36.2% of the subjects in the case group and 32.72% in the control group had a history of smoking. 37.93% of the subjects in the case group and 37.27% in the control group had a family history of diabetes. There was a statistically significant difference between two groups in terms of age, sex and diabetic duration ($P < 0/05$) and in other cases this difference was not significant.

Conclusion: In men, with increasing in age and

diabetic duration, increases the risk of diabetic foot ulcers. Therefore, it is necessary for these people to be given more care and training in this field.

Keywords: Diabetes, Diabetic foot ulcer, Amputation

Pressure Ulcers; Risk Factors and Treatment

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One of the most common problems in health care is pressure ulcer. This complication is caused by decreased soft tissue blood flow following compression of the tissue between two hard surfaces, such as the bone surface from the inside and the surface of the bed or chair from the outside, and the necrotic cells themselves destroy adjacent cells. This complication affects the quality of life of patients and if not treated properly, can cause irreparable problems for the patient. Pressure ulcers increase the cost of health care and are known as the third most costly disorder after cancer and cardiovascular disease. The disease affects three million adults in the United States and is a major burden on the health care system. Pressure ulcers or injuries are seen predominantly in patients who belong to geriatric group, severely malnourished, paraplegic or neuropathic population. It can also be seen as a consequence of prominent implants/medical devices causing skin pressure. The condition becomes more complex and challenging to manage when it is associated with other comorbidities such as diabetes, infection, immunosuppression and poor tissue perfusion. One of the important points of pressure ulcers management is in obese patients . several studies have shown that obesity is associated with an increased risk of pressure ulcer. Increased duration of surgery and postoperative urinary tract infections are also two important risk factors for pressure ulcer. The most important stages are stage three and stage four pressure ulcers which generally require multiple surgeries including debridements, washouts and

wound closures. There are different surgical techniques described in the literature including myocutaneous flaps, perforator flaps and muscular flaps to provide adequate tissue cover and to achieve satisfactory healing of the ulcers. The possible common post-operative complications include infection, seroma formation, necrosis of the flaps, hematoma formation with subsequent infection and wound dehiscence. Along with surgical techniques, there are other measures such as the use of vacuum-assisted drainage, nutritional supplements and a variety of dressings which are in use and can play a role in achieving the aim of healing the ulcers depending on their stages and accompanying comorbidities of the patients. Dressings include the use of advanced nano-dressings, negative-pressure dressings, intelligent dressings with advanced sensors, oscillating magnetic fields, electrical excitation, ultrasound and infrared light, the use of biofilms and topical antimicrobials such as silver. Honey and polyhexamethylene bioguanide, herbal medicines; Platelet growth factors, omega-3 oils can help accelerate the healing of pressure ulcers. The overall positive outcome of managing such wounds depends on a number of factors, and therefore requires a multidisciplinary approach to address nutrition, patient's immune system, well-equipped nursing care and training, and indeed an appropriate approach.

Keywords: pressure ulcer, dressing, risk factor

Management of Some Post Surgery Dehiscence Wounds

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BACKGROUND : The process of management in a dehiscence abdominal wound can be challenging, Also there was many deep undermines that made it harder. This paper describes management of the current wound and wound healing process.

INTRODUCTION: Surgical wounds usually heal normally ,however,these wounds are sometimes complicated by impaired healing and dehiscence

due to intrinsic and extrinsic risk factors. Deposition of collagen early in the healing process is crucial for successful wound closure; any failure of this process increases the risk for wound dehiscence, which most commonly occurs during post-op days 5 to 8. Management of a large abdominal dehiscence wound is difficult, specially when it complicated with multiple undermines. The prime goal is to manage the undermines, wound contraction and develop life quality by controlling the exudate and comfortable dressing. The following case study describes how we managed this patient with multiple surgical procedures, following post-surgical infection and dehiscence wound.

CASE REPORT: A 40-year-old woman was under two plastic surgery, abdominoplasty and mammoplasty in July 2021. ,However, on the 4th postoperative day the patient developed a deep dehiscence wound, for which she recived surgical debridement in operation room and application of some tension sutures. Then she stayed in hospital for 15 days and IV antibiotic therapy was started. Then patient was referred to kia wound clinic, as wound nurse clinicians for wound consultation. On the 20th postoperative day we started managing the wound by the following plan.

METHOD: abdominoplasty wound: Initially, Sharp debridement was performed serially for the abdominoplasty wound. After the end of the debridement, Ag hydrofiber (exofiber ®) was used for the abdominoplasty wound tunnel to fill the gap. Any empty space in the wound can create the conditions for bacteria to grow, but it can also increase the load of infection. The edges of the wound were protected by a combination ointment of Vaseline and 25% zinc oxide by IROX® cream. Due to the high exodate of the wound, super absorbent dressing(Zetovit E ®) was used to prevent maceration wound margins. The dressings were changed every 48 hours (for 3 sessions). Exofiber® was still used in the tunnel and honey dressing(405 Medi Honey® ointment) along with silver contact layer dressing (Atruman ag®) was used for other dehiscence wounds. The dressings were changed every 4 days (for 3 sessions) to achieve epithelialized tissue, ultrazil ® was used,which utilized the time and energy required for the wound

healing process. (Increasing the time to change the dressing from 4 days to 7 days) In The seventh session the tunnel was closed. The final wound healing period lasted 38 days Mamoplasty wound: first, Sharp debridement was performed for the mamoplasty wound in 1 session. After the end of the debridement and remove sloughy tissue ,applied silver contact layer dressing (Atruman ag®) for antimicrobial effect and Conversion grunolation tissue to epitelezation. The edges of the wound were protected by a combination ointment of Vaseline and 25% zinc oxide by IROX® cream. Due to the offload management of the wound,foam dressing(Reno foam ®) was used. The dressings were changed every 72hours (for2sessions). the final wound healing period lasted 9 days.

CONCLUSION: Dressings with antimicrobial action should be used to treat infection caused by postoperative wounds such as dehiscence wounds. Using hydrofiber dressings to cover the undermine points and absorb secretions closes the tunnel in the abdominoplasty dehiscence wound, and due to the silver in exofiber we used in this case reduced infection load. Also, the use of honey and silver based dressings such as (405 Medi Honey® ointment) and (Atruman ag®) is very effective in reducing the microbial burden.

Keywords: abdominal wound, dehiscence wound, wound infection

Assessment of the Exosome's Role on the Repairing of Spinal Cord Injuries

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Spinal cord injury is a serious clinical problem that affects the patient's quality of life and causes temporary or permanent changes in the movement and senses and automatic function of the spinal cord. Spinal cord injury has various causes, including: accidents, falls from heights, sports injuries, tumors in areas close to the spinal cord, etc. In the pathophysiology of spinal cord injury, there are two stages of primary damage and secondary damage. Primary damage is

limited to the area of mechanical damage; secondary damage is mediated by various processes including inflammation, immune response, apoptosis, free radical cell death, and excitatory toxicity of glutamate. So far, no definitive and approved drug has been identified for the repair of spinal cord injuries, and corticosteroid drugs are used to reduce inflammation caused by injury. But research in recent years has emphasized the use of natural nanoparticles, including exosomes. Exosomes are small in size and therefore have the ability to cross membranes as well as the blood-brain barrier and protect the breakdown of encapsulated materials, thus transfer potential. They have various compounds including drugs into the cell. Exosomes do not stimulate the immune system and are also engineered as drug delivery and have been shown to play a role in angiogenesis and inflammation. Exosomes have the ability to penetrate into axons and are effective in repairing peripheral nerves and healing the affected area. Therefore, it seems to be effective in repairing spinal cord injury.

Keywords: Spinal cord injury, Nanoparticle, Exosome, Drug delivery

Role of miRNAs from MSC-derived in Skin Wound Healing: A Meta-transcriptomics Analysis

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Wound healing is a complicated process that consists of different overlapping phases. Chronic or impaired wounds are a major concern for global healthcare and impose a heavy financial burden on patients and local public health services. Currently, a growing body of evidence showed that extracellular vesicles (EVs) derived from mesenchymal stem cells (MSCs) have the positive effects on cutaneous wound healing, though there is a significant unmet need in the mechanism of EVs wound healing therapeutic role that requires further research. The purpose

of the research is to gain a better insight into EVs repairing effects.

miRNA data sets were achieved by searching in PubMed, GEO, and EVmiRNA databases until July 2021. The studies containing high throughput miRNA dataset which applied well-characterized MSC and their EVs based on ISCT and ISEV guidelines, were selected for further analysis. After updating miRNA names using miRNAme converter, the common miRNA was determined using Venny 2.1.0 software. To analyze the signaling networks and find significant molecular pathways, the miRSystem server was used.

According to the Venn diagram, only a small portion of miRNAs are common. These shared common proteins were associated with different signaling pathways such as TGF- β and PI3K, as well as several other pathways related to skin repair including VEGF, and insulin signaling pathway supporting that EVs from MSC was expected to positively impact on cutaneous healing.

The findings confirmed that EVs from MSCs play a key role in different overlapped phases of wound healing and could pave the way for understanding a more detailed mechanisms of therapeutic effect of EVs.

Keywords: Mesenchymal Stem Cell, Extracellular Vesicle, RNA Profiling, Wound Healing

Effect of Carboxytherapy on Tissue and Wound Healing

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Background: In recent decades, efforts have been made to identify materials and management techniques that can heal wounds. Tissue hypoxia is common in normal wounds. Collagen, angiogenesis,

re-treatment, and leukocyte activity. This is one of the main uses of medical problems that are available everywhere. The treatment of carbon dioxide is not easily accessible. It affects the blood and is used as part of treatment for skin lesions, including wounds with hypoxia. In carboxytherapy, carbon dioxide gas is used by the following injection. In this method, after the injection, a large amount of this gas reacts with the water in the tissue and blood and becomes an acidic substance called sodium bicarbonate, the body to compensate this mode Increases blood flow to the tissue, thus helping the tissue to regenerate and repair the tissue. Carboxytherapy has benefits in the body, including repair, tissue regeneration, rejuvenation, removal of dark circles under the eyes, wound healing. Topical contraindications, reduction of wrinkles, wound healing, and Subcutaneous injection of carbon dioxide play a role in the management of dark circles. As the blood flow improves, better oxygen reaches the eye, which leads to collagen synthesis and cell proliferation, which is ultimately appropriate for the course. Treatment sees a significant reduction in these rings. At the injection site, carbon dioxide gas causes small blood vessels to form and increases blood circulation, which leads to the production of collagen and elastin cells and fibers, thereby rejuvenating the skin.

Methods: This study aims to assess, through a systematic literature review, the Importance of carboxytherapy in wound healing and its application in skin rejuvenation. For this purpose, we conducted an electronic search in all databases for published papers over the past 5 years.

Results: Carboxytherapy for scarring is a non-asthmatic treatment that involves injecting a solution of carbon dioxide under the skin. It is possible to strengthen cells and treat skin problems, which improves skin elasticity and blood circulation and reduces lines and wrinkles.

Discussion: treatment with carbon dioxide is possible safely and in the treatment of hypoxia, it is a tissue treatment, and therefore it is used as a therapeutic method for skin treatment.

Keywords: Vicryl plus, suture, bladder, inflammation

Polyhydroxyurethane - siloxane Containing Quaternary Ammonium Moieties Surface Modified by Gelatin as Wound Dressing for Low Exuding Wound

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Background: Polyurethanes (PUs) derived from renewable resource-based raw materials with tunable chemical and biological properties are very good candidates for the preparation of high-performance wound dressings. They are usually prepared via classical procedure using isocyanate monomers which their handling can cause severe health concerns. Therefore, avoiding isocyanate and preparation of PUs through non-isocyanate routes are attracted many interests nowadays. In this work, soybean oil and gelatin were selected as renewable and inexpensive resources for the synthesis of PUs via the non-isocyanate route. To improve the mechanical performance of the resulting non-isocyanate PUs (NIPUs), alkoxy silane groups were chemically anchored to the precursors' backbone which upon sol-gel reaction led to the formation of cross-linked siloxane domains. To have antibacterial activities for the prepared dressings and meanwhile, do not scarify their biocompatibility, the dressings were modified by quaternary ammonium groups and gelatin, respectively.

Method: NIPU derived from carbonated soybean oil containing tertiary amines was prepared and functionalized with quaternary ammonium groups via reaction with (3-chloropropyl)trimethoxysilane (Si-NIPU). The sol-gel hydrolysis-condensation of intermediate Si-NIPU with tetraethoxysilane and 3-glycidyloxypropyltrimethoxysilane lead to the preparation of the dressing membrane which was further modified with gelatin through the reaction of embedded epoxy rings.

Results and Conclusion: Prepared dressings

showed; excellent cytocompatibility and antibacterial performance and tensile strength of 2.6 MPa. The dressing with tethered gelatin moieties showed higher equilibrium water absorption up to 60% and water vapor transmission rate in the range of 900-1000 g.m⁻².day⁻¹. Furthermore, the low hemolysis rate and prolonged clot formation on gelatin-modified dressings confirmed their superb hemocompatibility. The results confirmed appropriate functions of optimized dressing for coverage of low exuding wounds.

Keywords: Non, isocyanate, polyurethane, wound dressing, sol - gel reaction, soybean oil, antibacterial

Improving Chronic Diabetic Wound Ulcers by Applying Chitosan Platformed PRP

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Treatment of chronic non-healing wounds especially diabetic wounds is a great challenge in medicine that impose financial burdens on health care system. Lack of sufficient vasculature for effective nutrients or immune cells transport play important role in delay wound healing. For this reason, increasing angiogenesis and effective reperfusion is a critical step in healing of the chronic diabetic wounds. Platelet is one of the blood cells that contain many dense vesicles of growth factors in their cytoplasm. PRP contains a plasma with concentrated platelets and variety of growth factors that could potentially be used as a bioactive medication. In this way, platelet-rich plasma (PRP) is being considered as a potential therapeutic option. In recent years, Chitosan has gotten a lot of interest lately because of its capability for drug delivery and antibacterial properties. It is possible to utilize chitosan with a DDA greater than 75%, which promotes the release of platelet factor 4 into the plasma. To preserve GFS in PRPs, as well as to

execute angiogenesis and treat diabetic wounds, a self-healing injectable hydrogel containing a combination of chitosan, silk fibrin, and PRP (CBPGCTS-SF @ PRP) can be employed.

Keywords: Chitosan, Diabetic, Wounds, PRP

Antibacterial and Antibiofilm Activities of *Lucilia Sericata* Secretions / Extractions Against Wound Pathogens

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Background: Wound infection is an ongoing problem and may result in prolonged hospital stay of patients and increased healthcare costs. Since Infected wounds with antibiotic resistant bacteria are responsible for significant human morbidity and mortality worldwide, it calls for introducing new alternative antimicrobial agents. The present study investigated antibacterial and antibiofilm activities of secretions/ extractions of *Lucilia sericata* larvae against wound pathogens.

Methods: we prepared several secretions/ extractions of *Lucilia sericata* using live and dried larvae with some different solvents such as phosphate buffer saline (PBS), ethanol, and mixture of methanol, distilled water, and acetic acid. The antibacterial activities of these secretions/ extractions were compared by ditch-plate and colony count techniques against *Staphylococcus aureus* and *E. coli* isolates from wound samples. In all cases, solvents were individually tested as controls. Antibiofilm assay of the selected secretion/ extraction was carried out using microtiter plate method.

Results: Only dried larvae with mixture of solvents (methanol: distilled water: acetic acid) showed significant antibacterial activities using ditch-plate (the inhibition zone of 16 mm and 13 mm against *S. aureus* and *E. coli* isolates

respectively) and colony count techniques (6 log reduction in the presence of prepared extraction after only 2 hours). Percentage reduction of biofilm formation in the presence of prepared extraction are 100% and 90% for *E. coli* and *S. aureus* isolates respectively.

Conclusion: One of the prepared larval extractions showed significant antibacterial and antibiofilm activities against wound pathogens and suggest new promise in treatment of wound infections. More investigations are needed for determination of MIC and MBC of this larval extraction.

Keywords: Antibacterial agents, Biofilms, Larvae, Wound infection

Application of Photosensitizer Compounds in Tissue and Wound Healing

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Background: Wounds are physical injuries that lead to the opening or tearing of the skin and can cause physical and functional disorders. Wound healing is a dynamic and natural biological process in the body that includes four planned stages and overlaps with homeostasis, inflammation, proliferation, and remodeling. Due to the importance of wound healing and the fact that not treating open wounds may lead to local infection and eventually cancer, various studies have been performed on wound healing. There are various methods that have been shown to accelerate the wound healing process. Photodynamic therapy is the activation of the photosensitizing compound by visible light to produce samples of cytotoxic oxygen and free radicals that selectively affect target cells. Photodynamic therapy is less invasive than surgery. It has a short treatment duration. It is used exactly on the target tissue. Infection of wounds may also Cause prolonged healing time, due to «paralysis» of epithelial cell repair mechanisms. The signification of wound disinfection by a non-invasive and topical strategy such as photodynamic

therapy with limited damage to the host tissue has been well documented in studies. The bactericidal effect of photodynamic therapy reduces bacterial loading on the wound surface and aids the healing process. The antibacterial route of photodynamic therapy differs from that of traditional antibiotics; So, this treatment can have applications in drug-resistant strains and does not induce new drug resistance. This method also reduces the number of bacterial toxins.

Methods: This study aims to assess, through a systematic literature review, the Importance of photosensitizing compounds in wound healing. For this purpose, we conducted an electronic search in medical sciences include PubMed, Science Direct, Google Scholar, Elsevier, and Scopus over the past 5 years.

Results: Photodynamic therapy (PDT) is a hopeful treatment for the eradication of germs and has been clinically studied for the treatment of several infectious skin diseases such as acne and viral warts. In addition, several studies have approved the efficacy of PDT in the treatment of bacterial infections and their biofilms. The effectiveness and safety of photodynamic therapy with isotretinoin in the treatment of moderate to severe acne wounds is effective on wound healing.

5-linolenic acid (ALA-PDT) and isotretinoin-based photodynamics were examined on patients' wounds, and all patients tested showed complete clearance of skin lesions. This is a non-invasive and safe, low-recurrence method for the treatment of PCAS lesions.

Discussion: Photodynamic therapy (PDT) is considered a promising new treatment method for the extermination of microbes and has been clinically approved for the treatment of several infectious skin diseases and wounds.

Keywords: photosensitizer, wound healing, photodynamic therapy

Spirulina Platensis Microalga in Wound Healing and Scar Management

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Wounds are largely unrecognized tissue injuries that affect billions of persons worldwide, especially in developing countries. Wound healing is the body's response to this damage and includes a series of physiological, cellular, and molecular events that occur to restore the integrity and strength of injured tissue. *Spirulina platensis* blue-green microalga with antioxidants, anti-microbial and anti-inflammatory properties and other well-renowned nutraceutical agents able to accelerate wound healing. *Spirulina platensis* induces the expression of cyclin E, cyclin D1, cyclin-dependent kinases -2, -4, -6, and inhibits the activity of cyclin-dependent kinase inhibitors, p27, and p21 molecules to enter the damaged cells into the proliferative phase through triggering PI3K/ Akt signaling cascades. It also upregulates the expression of angiogenic genes such as bFGF and VEGF by stimulating the TGF- β 1 pathway, enhancing angiogenesis and tissue repair. Besides, it demonstrated that the blue-green microalga elevates the expression level of collagen and α -smooth muscle actin in injured tissue and improve scar management. *Spirulina platensis* rises the activity of superoxide dismutase and catalase enzymes and reduces malondialdehyde expression levels, thereby counteracting the destructive free radicals. It is also said that the microalga has photochemoprotective effects and can keep the tissue from radiation. All the characteristics make *Spirulina platensis* super skincare and highlight its biomedical application in various wound healing and scar management.

Keywords: *Spirulina platensis* microalga, wound healing, scar management

Spirulina Platensis Gastroprotective Property in Gastric Ulcer Patients

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Gastric ulcer is one of the most common gastrointestinal diseases with a risk of 5 to 10%. the

most important causes of gastric ulcers are *Helicobacter pylori* infection, aspirin, and NSAIDs consumption, etiologically. Some studies indicate that *Spirulina platensis*, a green-blue microalga, has gastroprotective activity. *Spirulina platensis* contains phycocyanin, which due to its antioxidant and anti-inflammatory properties can improve gastric ulcers caused by *Helicobacter pylori*, aspirin, NSAIDs, and a wide range of compounds such as acetic acid, chloroform, methanol, and ethanol. Various mechanisms have been proposed for the *Spirulina platensis* function in the disease: 1) increasing hexosamine production levels in the stomach, 2) inducing gastric barrier strength and thickness by blocking ATPase, K⁺ and H⁺ pumps or physically, 3) enhancing Ca⁺ influx intervention and membrane stabilization, 4) Elimination of oxygen free radical production in the gastric environment. In addition to phycocyanin, *Spirulina platensis* contains tannins and flavonoids that have gastroprotective effects. The microalga also limits the *Helicobacter pylori* attachment and colonization and reduces the number of it in the stomach. It has been reported that the use of this microalga in gastric ulcers patients strengthens the mucosal and systemic immune system, reduces the catalase and superoxide dismutase enzymes activity, inhibits lipid peroxidation, enhances the population of beneficial bacteria such as *Bifidobacterium*, and accelerates gastric ulcer healing. Therefore, the adding of *Spirulina platensis* in certain amounts in the gastric ulcer patient's meals or high-risk individual's meals can improve their disease and lifestyle.

Keywords: *Spirulina platensis*, gastric ulcer, gastroprotective, phycocyanin

Biological Effects of Concentrated Growth Factor in Tissue Regeneration

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Introduction: Tissue engineering and regenerative medicine requiring stem cells, scaffolds and growth factors are developing rapidly. New strategic approaches

to growth factors delivery are established with the pivotal role of growth factors in cell recruitment, proliferation, differentiation, and tissue repair. Platelet extracts are known as a source of different growth factors such as platelet-derived growth factor, beta-modifying growth factor, insulin-like growth factor, etc. Platelet-derived growth factors stimulate angiogenesis, proliferation, osteoblastic differentiation, and mesenchymal cell division, as well as facilitate the proliferation and synthesis of collagen in fibroblasts. In recent years, applications (utilization) of autogenous growth factors prepared from centrifugation of whole blood increased in wound healing and tissue regeneration. For this reason, the use of the patient's own blood-derived platelet-derived growth factors have recently been considered for clinical applications. Platelet-rich plasma (PRP) and plasma rich in growth factors (PRFG), are the first and platelet-rich fibrin (PRF) and concentrated growth factor (CGF), are the second generation of platelet concentrates. PRF and CGF are self-clotted, and set by one-step centrifugation. These platelet concentrates can be used alone or in combination with other biomaterials for soft tissue healing or bone formation. The CGF technique predicts the use of whole blood phases separately. This concentrated growth factor not only acts as an autogenous source of growth factors and membranes but also does not have the anticoagulated agents, leads to having no risk of cross-contamination with this product. Using these products as connective tissue grafts reduces pain, inflammation and bleeding and speeds up soft tissue repair. Our objective was to review the biological effects of CGFs.

Method and materials: This study investigates the biological outcome of CGF, a new platelet-derivative, used for tissue regeneration. A review of the literature search in PubMed and SCOPUS was carried out using keywords: "concentrated growth factor" (OR "CGF"), AND "stem cells", AND "cells" OR "cell proliferation", AND "repair" OR "revitalization", AND "tissue" OR "bone" The search was limited to the articles published over the last 10 years in English language.

Result: The studies have applied CGF as fresh solid form, freeze-dried, membrane, extract, or exudate. As a result, most studies demonstrate the positive effects of CGF in a dose-dependent manner under certain concentrations.

Studies comparing CGF with other platelet concentrates, report lower efficiency, no statistically significant differences, or better results for CGF.

Conclusion: Overview of articles, reveals the beneficial effects of CGF as a natural scaffold and reservoir of growth factors in regenerative medicine.

Keywords: concentrated growth factor, stem cells, cell proliferation, repair, revitalization, tissue, bone

Organoid Technology and Applications in Wound Healing

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For several years two-dimensional cell culture and animal modeling are the only option for researchers to investigate the cellular and molecular changes, disease studies and treatment approaches. Nowadays, Three-dimensional cell culture technologies are emerged to mimic in vivo main characteristics in the lab. Organoid technology as a novel 3D culture may fill the gap between 2D cell culture and animal models. Organoids are tissue miniatures that contain the precise cell populations, architecture and function of an original organ. It is suggested that organoids may be applied for developmental studies, disease modeling, drug screening and probably organ transplantation. Wound healing is a multistep process including inflammation, re-epithelialization, angiogenesis, and possibly scar formation. Fabrication of organoids has been used for investigations in keloid scar disease and gastrointestinal wound healing. On the other side, although current skin substitutes are lack of critical skin appendages, this technology could prepare skin organoids from stem cells that contain typical cell types, hair and sweat glands.

Keywords: Wound healing, organoid, Scar, disease modeling, skin substitutes

Enzymes role in wound healing: at a glance

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The aim of this review is to focus on the wound healing well-tuned process by cooperative of various functions such as hemostasis, inflammatory-related events, cell proliferation, and tissue remodeling. Proteolytic enzymes, matrix metalloproteinases (MMPs), and their inhibitors (TIMPs) are presented a key role during remodeling processes. Treatment of ulcers was reported using subtilains ointment containing serine, cysteine and aspartate proteases, and MMPs due to their enzymatic debridement effect. Bacillus-synthesized proteolytic enzymes could positively influence tissue regeneration due to their thrombolytic effect, inhibition of scar formation, and lysis of necrotic tissues. Wound healing and antimicrobial properties (by enzymes, bacteriocins) of biocomposite bacterial cellulose (BC) gel-film and B.subtilis (BS) were determined against wound infections such as Staphylococcus aureus, Pseudomonas aeruginosa. Incorporation of BS-proteases into BC matrix help to gradually release enzymes and faster wound healing. Also, the potential burn wound repairing of Bromelain (Ananas proteolytic enzymes), as a natural debriding agent, was reported when administered as chitosan-bromelain nanofibers. The reactive oxygen species (ROS) that are produced by NADPH oxidases are involved in wound angiogenesis and wound closure by regulating the re-epithelialization processes. The wound-ROS level is affected by up-regulation of ROS scavenging enzymes (superoxide dismutases, peroxidases, peroxiredoxins) and depletion of antioxidants (vitamin E, glutathione). Hence, preserving the ROS balance at generation and scavenging level is important to efficient wound healing especially in diabetic wounds. Overall,

these results suggest the promising application of proteolytic enzymes as effective wound therapeutic factors in a short time. Keywords: Wound healing, organoid, Scar, disease modeling, skin substitutes

Keywords: Biocomposite, Proteolytic enzymes, Tissue remodeling, Wound healing

