

# Lasers in Medicine

Official Journal of Iranian Center for Medical Laser (ICML)  
Academic Center for Education, Culture and Research (ACECR)

---

Chairman Manager

**Seyed Mehdi Tabaie, M.D**

Associate Professor of Dermatology, Academic Center for Education, Culture and Research  
mtaba@jdtums.ir

---

Editor in Chief

**Parvin Mansori, M.D**

Professor of Dermatology, Tehran University of Medical Sciences, Tehran, Iran  
mansori\_p@sina.tums.ac.ir

---

Executive Editor

**Siamak Bashardoust Tajali, Ph.D, PT.**

Assistant Professor, Department of Physiotherapy, Tehran University of Medical science, Tehran, Iran  
Medical Laser Research Center, ACECR, Tehran, Iran  
s\_bashardoust@sina.tums.ac.ir

---

Editorial Boards

- Mohammad Akbari, Ph.D, PT.** Professor, Department of Physiotherapy, Iran University of Medical science, Tehran, Iran  
**Ahmad Amjadi, Ph.D** Associate Professor, Department of Physics, Sharif University, Tehran, Iran  
**Shahnaz Aram, M.D** Associate Professor, Department of Obstetrics Gynecology, Esfahan University of Medical Sciences, Esfahan, Iran  
**Ali Asilian M.D** Professor, Department of Dermatology, Esfahan University of Medical Sciences, Esfahan, Iran  
**Leila Ataie Fashtami, M.D** Assistant Professor, Department of Dermatology, Medical Laser Research Center, Acecr, Tehran, Iran  
**Behrouz Attar Bashi, Ph.D, PT.** Assistant Professor, Department of Physiotherapy, Tehran University of Medical science, Tehran, Iran  
**Siamak Bashardoust Tajali, Ph.D, PT.** Assistant Professor, Department of Physiotherapy, Tehran University of Medical science, Tehran, Iran  
**Yahya Doulati, M.D, Ph.D** Professor, Department of Dermatology, Center for Research and Training in Skin Diseases and Leprosy, Tehran, Iran  
**Alireza Ebrahimzadeh, M.D** Professor, Department of Orthopedic Surgery, Esfahan University of Medical Sciences, Esfahan, Iran  
**Gholamreza Esmaeeli Djavid, M.D** Research fellow, Department of Medical Laser Research Center, Acecr, Tehran, Iran  
**Mohsen Fateh, M.D, MPH** Research fellow, Department of Medical Laser Research Center, Acecr, Tehran, Iran  
**Seyed Mostafa Fatemi, DDS** Research fellow, Department of Medical Laser Research Center, Acecr, Tehran, Iran  
**Mohammad Farhadi, M.D** Professor, Department of Otolaryngology, Iran University of Medical Sciences, Tehran, Iran  
**Alireza Firooz, M.D** Professor, Department of Dermatology, Center for Research and Training in Skin Diseases and Leprosy, Tehran, Iran  
**Khalil Ghasemi Falavarjani, M.D** Associate Professor, Department of Ophthalmology, Tehran University of Medical Sciences, Tehran, Iran  
**Seyed Hasan Hashemi, M.D** Professor, Department of Ophthalmology, Tehran University of Medical Sciences, Tehran, Iran  
**Ahmad Kaviani, M.D** Professor, Department of Surgery, Tehran University of Medical Sciences, Tehran, Iran  
**Keyvan Majidzadeh, M.D, MPH** Associate Professor, Department of Biotechnology, Academic Center for Education, Culture and Research (ACECR) Tehran, Iran  
**Reza Malek, M.D, FRCS(C), FACS** Professor, Department of Urology, Mayo Clinic, Minnesota, USA  
**Ramin Mehrdad, M.D** Associate Professor, Department of Occupational Medicine, Tehran University of Medical Sciences, Tehran, Iran  
**Maziar Mir, DDS** Professor, Department of Dentistry, University of Aachen, Germany  
**M. Hossein Miran Baygi, Ph.D** Associate Professor, Department of Biomedical Engineering, Tarbiat Modarres University, Tehran, Iran  
**Seyed Mahdi Mir Mohammadi, DDS** Dentist, Academic Center for Education, Culture and Research, Tehran University of Medical Sciences Branch  
**Hamid Mir Zadeh, Ph.D** Professor, Department of Polymer Engineering, Amirkabir University of Technology, Tehran, Iran  
**Ezzeddin Mohajerani, Ph.D** Professor, Department of Photonic, Laser Research Institute, Shahid Beheshti University, Tehran, Iran  
**Hamideh Moravej, M.D** Associate Professor, Department of Dermatology, Shahid Beheshti University of Medical Sciences, Tehran, Iran  
**S. Mohammad Javad Mortazavi, M.D** Assistant Professor, Department of Orthopedic Surgery, Tehran University of Medical Sciences, Tehran, Iran  
**Nima Ostovari, M.D** Assistant Professor, Department of Dermatology, Skin Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran  
**Fatemeh Ramezanzadeh, M.D** Professor, Department of Obstetrics Gynecology, Tehran University of Medical Sciences, Tehran, Iran  
**Hoshang Saberi, M.D** Assistant Professor, Department of Neurosurgery, Tehran University of Medical Sciences, Tehran, Iran  
**Rahmatollah Salmanpour, MD** Professor, Department of Dermatology, Shiraz University of Medical Sciences, Shiraz, Iran  
**Javad Sarraf Zadeh, Ph.D, PT.** Associate Professor, Department of Physiotherapy, Iran University of Medical science, Tehran, Iran  
**Seyed Mehdi Tabaie, M.D** Associate Professor, Department of Dermatology, Medical Laser Research Center, Acecr, Tehran, Iran  
**Nasrin Zand, M.D** Assistant Professor, Department of Dermatology, Medical Laser Research Center, Acecr, Tehran, Iran

---

Graphic

**Hamid Malekian**

---

Laser in Medicine is a peer-reviewed open access medical journal. It was established the leading national publication in the expanding field of the Medical application of Lasers and Lights. It provides a forum of papers on technical, experimental and clinical aspects of the medical Lasers applications. Furthermore, the journal publishes the articles on Lasers, Light delivery systems, sensor to monitor Laser effects, basic Laser-tissue interactions and modeling of Laser-tissue interactions. All other authors are cordially invited to submit their relevant studies on Lasers or any other light tissue interactions to the journals of the Lasers in Medicine. The journal of Lasers in Medicine provides an online platform for the high quality academic manuscripts, making the JLM an important academic journal in the field of Lasers and Light therapies.

---

Room No, 101 Tehran University of Medical Sciences, Tehran, Iran

Tel: +982188991163

Fax: +982166494649

website: www.icml.ir

**ACECR**  
Advanced Center for Education, Culture and Research  
TAMM Organization



January  
11 - 13

**2023**

**9<sup>th</sup> WTR**

Ninth International Wound and Tissue Repair Congress

AbuRayhan Biruni Hall, Tehran, Iran

# Wounds Over Time

Wounds and Scar in:

- Mental Health
- Personalized Medicine
- Prognostic and Diagnostic Tools
- Pregnancy
- Pediatric
- Cancers
- Genetics
- Nursing

submission deadline: Nov. 18, 2022



In Medicine  
**Lasers**



[www.wtrc.ir](http://www.wtrc.ir)

02166462915

09054642322

# **Lasers in Medicine**

Vol 19. Supplement 7, Winter 2023

## **Contents**

<b>Messages of Congress President</b> .....	<b>1</b>
Masoud Habibi, Seyed Mehdi Tabaie, Parvin Mansouri, Mansour Jamali Zavareh, Mohsen Fateh	
<b>Congress Organization</b> .....	<b>6</b>
<b>Congress Scientific Program</b> .....	<b>8</b>
<b>Oral Presentations</b> .....	<b>18</b>
<b>Poster Presentations</b> .....	<b>49</b>



**Masoud Habibi MD**

President

**Dear researchers and companions**

It is a great pleasure that, by the grace of God, we have been able to hold the ninth International Congress on Wound and Tissue repair for the ninth consecutive year. Wound and Tissue Repair 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 3 days from 11 to 13 January 2023 in Aburayhan Biruni Hall affiliated to Shahid Beheshti University. 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 Over Time" 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 9th WTRC-2023**



**Dr. Seyed Mehdi Tabie**

Chairman

### **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 9th WTRC-2023**

Tehran, Iran



**Dr. Mansour Jamali Zavareh**  
Scientific Chair in Basic Sciences

**Dear Researchers and Colleagues**

It's my pleasure to host the 9th International of wound and tissue repair congress. This congress aims to upgrade the application of novel technology in wound healing and tissue repair. It is hoped that the scientific achievements of basic research with the knowledge and experience of professors and students could promote scientific excellence and develop wound care methods. our congress team is honored to host scientists of various research fields in both the basic sciences and clinical scientists. in basic sciences, we have various fields such as new technology in wound management, Molecular cell research, cell therapy, regenerative medicine, and light and physics. The Congress has developed day by day and becomes more active and flourishing, and since two years of the virtual corona period have passed, the congress will be held in person this year. I would like to cordially invite you all to the upcoming congress.

**Professor Mansour Djamali Zavarehei**



**Parvin Mansouri MD**  
Scientific Chair in Clinical Sciences

**Dear respected colleagues and participants of WTRC 2023**

Knowledge about the importance of wounds and its complications during the time has attracted the attention of scientists and experts in various fields, and the result is holding of various congresses on wounds and tissue repair in the world, including the Wound and Tissue Repair congress of Yara institute of ACECER, which is our proud to hold the 9th national and the 4th international WTRC congress.

This year, the congress will be hold internationally with the motto of “Wound in time” and with the themes of “Mental health, Personalized medicine, New prognostic and diagnostic tools, Pregnancy, Pediatric, Cancers, Genetics, and Nursing”.

After the tome of passing from the Covid 19 pandemic conditions, this congress is hold again as Attendance program from 11-13 January 2023 in Tehran with the brilliant invited lectures of various national and international specialized groups. The presence of respected attendees in this congress will cause our pleasure and proud.

**Parvin Mansouri MD**  
**Scientific President in the clinical sciences section, WTRC 2023**  
**AbūRayḥān Hall, Shahid Beheshti University, Tehran, Iran**



**Mohsen Fateh MD, MPH**

Executive Chair

Wound healing and tissue repair is one of the serious issues in the health and therapeutic fields. Delay in a wound or tissue damage healing, impose lots of cost for the healthcare community and people economy.

This heavy burden, affects not only on the patients, but also on their family, community and organizations responsible in providing health services.

Due to the changing lifestyle of community, population increased rate and changing the pattern of diseases, problems related to chronic ulcers shows a growing trend. Accordingly, YARA institute as a leading institution in the field of planning and developing strategies on promoting health of community and ACECR's Medical Laser Research Center have held the annual congresses of WTR (Wound and Tissue Repair) with the goal of creating a good opportunity for cooperation of interested people in the wound healing and tissue repair field and also to present the latest achievements in this field. The upcoming congress is 9<sup>th</sup> international congress will be held at 11-13 January 2023 in Aburayhan Biruni international conference hall, Shahid Beheshti University, Tehran, Iran.

The target groups of the congress are clinical and basic science specialists, students of medical, paramedical, Nursing and Basic Sciences who are interested in the field of treatment of tissue damage.

Beside the scientific lectures, it will be established various scientific and commercial sections including poster presentation, some workshops, pavilions of publishers, organizations, manufacturers and Medical Equipment exhibition.

We hope your participation enrich the congress.

**Dr. Mohsen Fateh**



**9<sup>th</sup> WTR Congress Chairs****Masoud Habibi, *President*****Seyed Mehdi Tabaie, *Chairman*****Mansour Jamali Zavareh, *Scientific Chair in Basic Sciences*****Parvin Mansouri, *Scientific Chair in Clinical Sciences*****Moshen Fateh, *Executive Chair*****9<sup>th</sup> WTR Congress Scientific Board Committee**

<b>Dr. Naser Aghdami</b>	<b>Dr. Seyed Saeid Hashemi Natanzi</b>	<b>Dr. Mohammad Nazari</b>
<b>Mahdi Akbarzade Amirdehi</b>	<b>Dr. Farshad Hashemian</b>	<b>Dr. Najme Nazeri</b>
<b>Dr. Abbas Akhavan Sepahi</b>	<b>Farhad Hedayat</b>	<b>Dr. Mohammad Ali</b>
<b>Dr. Hesamuddin Allameh</b>	<b>Dr. Banfsheh Heidari</b>	<b>Nilforoushzadeh</b>
<b>Dr. Mahdieh Arian</b>	<b>Dr. Koroush Jafarian</b>	<b>Saeid Pasban Noghabi</b>
<b>Dr. Leila Ataie Fahshtami</b>	<b>Dr. Mansour Jamali Zavareh</b>	<b>Dr. Ali PorMohammad</b>
<b>Dr. Mohammad Ali Bahar</b>	<b>Dr. Hoda Keshmiri Neghab</b>	<b>Dr. Majid Pornoor</b>
<b>Dr. Alireza Bahrami</b>	<b>Dr. Mohsen Keshvarz Tork</b>	<b>Dr. Zahra Pourmohammadi</b>
<b>Dr. Kamran Baliqi</b>	<b>Dr. Farahnaz Khalighi-Sigaroodi</b>	<b>Dr. Mohammad Pooya</b>
<b>Dr. Salman Baraste</b>	<b>Dr. Mehdi Khoobi</b>	<b>Dr. Hassan Rasooli</b>
<b>Dr. Siamak Bashardoust Tajali</b>	<b>Dr. Khatereh Khorsandi</b>	<b>Dr. Homan Riazi</b>
<b>Dr. Nosratollah Boddouhi</b>	<b>Dr. Alireza Khosravi</b>	<b>Dr. Zahra Safaei Naraghi</b>
<b>Dr. Mostafa Dahmardehei</b>	<b>Dr. Amir Lalegani</b>	<b>Hamed Savadkouhi</b>
<b>Dr. Elya Damavandi</b>	<b>Dr. Bagher Larijani</b>	<b>Dr. Maryam Sedaghat</b>
<b>Dr. Mohsen Davarpanah</b>	<b>Mohaddeseh Larypoor</b>	<b>Dr. Farhad Seif</b>
<b>Dr. Ahmad Reza Dehpour</b>	<b>Dr. Aziz Maleki</b>	<b>Dr. Naisana Seyedasli</b>
<b>Dr. Gholamreza Esmaili Djavid</b>	<b>Dr. Parvin Mansouri</b>	<b>Dr. Atefeh shahbazi</b>
<b>Dr. Mohsen Fateh</b>	<b>Dr. Seyed Mehdi Tabaie</b>	<b>Dr. Mohsen Shahrousvand</b>
<b>Dr. Haleh Fateh</b>	<b>Dr. Hamid Mirzadeh</b>	<b>Dr. Afshan Shirkavand</b>
<b>Dr. Alireza Feizkhah</b>	<b>Dr. Mohhammad Reza Mobayen</b>	<b>Dr. Mohammad Hassan Soheilifar</b>
<b>Dr. Reza FekrAzad</b>	<b>Dr. Abdolreza Mohammadi</b>	<b>Dr. Manijeh Soleimanifar</b>
<b>Dr. Alireza Firooz</b>	<b>Dr. Niayesh Mohebbi</b>	<b>Dr. Ehsan Taghiabadi</b>
<b>Dr. Aziz Ghahary</b>	<b>Dr. Hamideh Moravej</b>	<b>Dr. Hossein Yari</b>
<b>Dr. Hosein Ghanaati</b>	<b>Dr. Nabi Motallebi</b>	<b>Dr. Nasrin Zand</b>
<b>Dr. Masoud Habibi</b>	<b>Dr. Mina Sadat Naderi</b>	<b>Dr. Kavosh Zand Salimi</b>
<b>Dr. Shahpar Haghghat</b>	<b>Dr. Abbas Ali Nasehi</b>	

### 9th WTR Congress Executive Committee

**Executive Manager:** Seyed Javad Emamizadeh

**Executive Coordinator:** Bahareh Kashani Movahhed

**Scientific Office:** Vahideh Alinaghi, Mahdi Akbarzadeh Amirdehi, Dr. Siamak Bashardoost Tajali, Hamid Malekian, Dr. Abdolreza Mohammadi, Salah Moradi, Dr. Mina Sadat Naderi, Najme Nazeri, Dr. Kavosh Zand Salimi, Dr. Farhad seif, Dr. Afshan Shirkavand, Dr. Mohamad Hasan Sohelifar, Dr. Mehrangiz Totonchi

**Executive Office:** Shirin Aghahi, Marjan Derakhshandeh, Sohrab Ekhtiyari, Mahtab Firoozi, Maryam Goldust, Erfan Haeri, Zahra Jalili, Fedora khatibi Shahidi, Amin Latifi

**Other Colleagues:** Zahra Bozorgkhoo, Omid Dejbraz, Atieh Goodarzi, Kiavash Hafezi, Seyed Ahmad Hasheminia, Mohammad Keshavarz, Mohammad Taghi Mohammadi, Ebrahim Mohammadnia, Masoumeh Nabiloo, Hamed Sanati, Khadijeh Saveie, Ali Shamlou, Mohammad Shamshiri, Hamideh Shokri

**Wednesday, January 11<sup>th</sup> 2023**

Opening Session	8:30 - 10:00
-----------------	--------------

Break	10:00 - 10:30
-------	---------------

Panel 1	<b>Wound Management in the Future</b>
---------	---------------------------------------

Chairpersons	Dr. Mansour Jamali Zavareh, Dr. Bagher Larijani Dr. Hesamuddin Allameh, Dr. Hamideh Moravej, Nosratollah Boddouhi
--------------	---

Bagher Larijani	The Future of Medicine	10:30 - 10:50
Mohammad Pooya	Personalized Medicine and Wound Care; Definition, Approaches, and Obstacles	10:50 - 11:05
Nabi Motalebi	Technological Innovation in Wound and Tissue Care	11:05 - 11:20
Haleh Fateh	Application of Artificial Intelligence Methodologies to Chronic Wound Care and Management	11:20 - 11:35

Panel 2	<b>Vascular Wounds</b>
---------	------------------------

Chairpersons	Dr. Shahpar Haghghat, Dr. Mohammad Nazari Dr. Abdoreza Mohamadi
--------------	---

Homan Riazi	Sclerotherapie for Treatment and Management of Venous Wounds	11:35 - 11:50
Mohammad Nazari	Interventional Management of Lower Extremities Varicose Veins	11:50 - 12:05
Shahpar Haghghat	Phlebo Lymphedema in Lower Extremity	12:05 - 12:20

Panel 3	<b>Phytomedicine</b>
---------	----------------------

Chairpersons	Dr.Mohammad Hassan Soheilifar, Dr. Farahnaz Khalighi-Sigaroodi
--------------	--

Farahnaz Khalighi Sigaroodi	Medicinal Plants and Herbal Medicines in Wound Healing	12:20 - 12:35
-----------------------------	--	---------------

Mona Gorji	Naringenin Improves the Healing Process of Burned Skin Damage in Rats	12:35 - 12:45
Mohammad Mehdi Attarpour Yazdi	Antibacterial Activity of <i>Curcuma Amada</i> Ethanolic Extract Against <i>Acinetobacter</i> Isolated from Burn Wound Infection	12:45 - 12:55
Ali Asadi Zeidabadi	Comparison of Antidermatophytic and Wound Healing Activity of <i>Prosopis Farcta</i> , <i>Chenopodium Album</i> and <i>Apium Nodiflorum</i> Extracts	12:55 - 13:05

Pray and Lunch	13:05 - 14:00
----------------	---------------

Panel 4	Nursing Care in Wound I
---------	-------------------------

Chairpersons	Mahdi Akbarzadeh Amirdehi, Mahdieh Aryan, Saeid Paseban Noghabi
--------------	---

Mahdi Akbarzadeh Amirdehi	Prevention and Management of Pressure Injury with Latest Guidelines (NPUAP / EPUAP / PPIA / PIP)	14:00 - 14:15
Hamed Savadkouhi	Wound Cleansing and Dressing Selection	14:15 - 14:30
Mahdieh Arian	Assessment and Management of Patient with Lower Extremity Ulcer	14:30 - 14:45
Saeid Paseban Noghabi	Wound care Necrotizing Fasciitis	14:45 - 15:00
Salman Baraste	Palliative Wound Care	15:00 - 15:15

Break	15:15 - 15:35
-------	---------------

Panel 5	Nursing Care in Wound II
---------	--------------------------

Chairpersons	Mahdi Akbarzadeh Amirdehi, Mahdieh Aryan, Saeid Paseban Noghabi
--------------	---

Yaser Hamidi	The Effect of an Interactive Follow-up Program on Ostomy Adjustment of Inpatients After their Discharge from Surgical Wards of the Hospitals Affiliated to Isfahan University of Medical Sciences	15:35 - 15:45
Mohammadreza Yousefi	Designing a Measurement Scale the Risk of Diabetic Foot Ulcers in Diabetic Patients	15:45 - 15:55
Firuzeh Hatamirad	Evaluation of Knowledge and Skill and Attitude of Nurses in Surgical Departments in Pressure Ulcer Management	15:55 - 16:05

Amirhossein Tondro	Evaluation of the Effectiveness of Maggot Therapy and Debridement on the Healing of Infected Ulcers	16:05 - 16:15
Somayeh Molaee	Nurses' Experience of Pain Management in Wounds	16:15 - 16:25

### Poster Presentation

Maedeh Mohaghegh	An Insight into Biopolymers and Treatment Strategies for Wound Healing
Amirhossein Tondro	Evaluation the Effect of Using Virtual Reality Technology on Anxiety Before Burn Dressing Operation in Children
Kimia Roozbeh	Evaluation of a Wound Dressing Composed of Human Foreskin Fibroblast on a Bovine Collagen Sheet
Amirhossein Tondro	Frequency of Burns and its Causes in Kermanshah, Iran
Naimeh Mahheidari	Role of Silicate-based Bioceramics in Angiogenesis and Accelerating the Chronic Wound Healing Process
Amirhossein Tondro	Investigating the Prevalence of Pressure Ulcers and the Factors Affecting them in Covid 19 Patients Admitted to the ICU
Donya Safari	A New Development in Wound Infection Diagnosis: The Use of Electronic Nose for Differential Detection of Volatile Organic Compounds in Wounds
Nasib Babaei	A Review on the Challenges of Patients with Chronic Wounds
Arash Mahvashi	Copper(II)-chitosan Complexes as Antibiotic-free Antibacterial Agent on Wounds
Fatemeh Mehrabi	The Effect of Aloe Vera on Wound Healing After Surgery: A Systematic Review
Naimeh Mahheidari	Li-doped Bioactive Materials; Promising Biomaterials for Skin Tissue Engineering and Wound Healing
Sajjad Seyedi Saravi	New Nanotechnologies for the Treatment and Repair of Skin Burns Infections
Zahra Mohammadi	Skin Substitutes; A New Approach to Wound and Burn Treatment Based on Tissue Engineering
Mohammad Amin Mojaradi	Intelligent Nanoparticle-Based Dressings for Bacterial Wound Infections
Mahsa Delyanee	Allograft Acellular Dermal Matrix as a Potential Substitute for Wound Healing Application
Kimia Rezaie Moghadam	A Review on the Use of Silver Nanoparticles in the Production of Wound Dressings with the Aim of Healing and Disinfecting Wounds
Zahra Mohammadi	Piezoelectric Wound Dressings Modified with Bioceramic Nanoparticles
Azizeh Rahmani Del Bakhshayesh	Recent Advances in the Application of Herbal Nanomaterials as Biological Materials Derived from Nature in Wound Healing

Simin Nazarnezhad	3D Bilayer Skin Bioconstruct for Scarless Healing of 3rd Degree Burns in Rats
Muhammad Maleki	The Effect of Using the Combination of Dressings Containing AgNPs and PHMB in Wound Healing
Amir hossein Abidi	Comparison of the Effect of Biopolymer Complex Dressing ALGIPAD (Chitosan, Calcium Alginate and Cellulosic Fibers) with Alginate Dressing in the Management of Diabetic Wounds
Sajjad Khan Einipour	Preparation and Evaluation of Antibacterial Wound Dressing Based on Vancomycin-loaded Silk/Dialdehyde Starch Nanoparticles
Bahareh Mohammadi	Comparative Study of 2-octyl Cyanoacrylate and Hyaluronic Acid Effects on Trypsin Protein Using Molecular Docking Method in Wound Healing Process.
Freshteh Sarafrazi	Exosomes and it's Role in Wound Healing

Thursday, January 12<sup>th</sup> 2023

Panel 1      ATMP: Advanced Therapy Medicinal Procedure in Wound Management

Chairpersons      Dr. Nasrin Zand, Dr. Mohammad Ali Bahar Dr. Hassan Rassouli  
Dr. Hamid Mirzadeh, Dr. Hoda Keshmiri Neghab

Mohsen Keshavarz	Future Studies and New Wound Technologies	8:30 - 8:45
Mohsen Shahrousvand	The Role of Polymers and Biomaterials in Regenerative Medicine	8:45 - 9:00
Aziz Maleki	Multifunctional Photoactive Nanoparticles and Hydrogel for Wound Healing Acceleration	9:00 - 9:15
Hassan Rassouli	Recombinant Proteins Use in Wound Healing	9:15 - 9:30
Ali Por Mohammad	Novel Antimicrobials for Wound Infection Control	9:30 - 9:45
Farhad Hedayat	New Technologies in Wound Care Management	9:45 - 10:00

Break

10:00 - 10:30

Panel 2      Burns

Chairpersons      Dr. Mostafa Dahmardehei, Dr. Mohhamad Reza Mobayen  
Dr. Abbas Ali Nasehi, Dr. Seyed Mehdi Tabaie

Mostafa Dahmardehei	Skin Substitutes in Burns: my Experience	10:30 - 10:45
Mohammad Reza Mobayen	Burn and Challenges Ahead with a Knowledge-based Perspective	10:45 - 11:00
Zahra Pour Mohammadi	Cell Therapy and Regenerative Medicine of Burn Wounds	11:00 - 11:15
Alireza Feizkhah	Application of Intraoperative 3D Bioprinter Technologies in Burn Surgeries	11:15 - 11:30
Abbas Ali Nasehi	Mental Health in Burn	11:30 - 11:45
Fatemeh Amini	An Observational Study on Dermatologists Perceptions on Suicide in Dermatological Practice: A Study of Iranian Attitudes and Prevalence Estimations	11:45 - 11:55
Qazal Ghaderi	Pain Management in Burned Adults: an Integrative Review	11:55 - 12:05
Zahra Shahravi	Novel Pentoxifylline-loaded Gel-nanofibers for Burn Wound Healing	12:05 - 12:15

## Panel 3

## Pharmacology and Lifestyle

## Chairpersons

Dr. Farshad Hashemian, Dr. Niayesh Mohebbi, Dr. Ahmad Reza Dehpour, Dr. Hossein Yari

Nazanin Nasiri	Drug Delivery in Dermatology in Wound Healing: What's New	12:15 - 12:30
Korosh Jafarian	Nutrition in Wound Healing	12:30 - 12:45
Niayesh Mohebbi	Pharmacology Consideration of Wound Healing in Special Groups	12:45 - 13:00
Mehdi Khoobi	Carnosine as a Promising Dipeptide in Wound Healing	13:00 - 13:15
Hossein Yari	Physical Medicine Interventions in Management of Diabetic Foot Ulcers	13:15 - 13:30

Pray and Lunch

13:30 - 14:30

## Panel 4

## Stem Cell and Wound

## Chairpersons

Dr. Naser Aghdami, Dr. Masoud Habibi  
Dr. Mohammad Ali Nilforoushzadeh, Dr. Atefeh Shahbazi

Naser Aghdami	Cell Therapy in Diabetic Wounds	14:30 - 14:50
Ehsan Taghiabadi	Exosome Derived from Stem Cell: A New Promising Option for Wound Healing	14:50 - 15:05
Naisana Seyedasli	The Role of Extracellular Matrix as a Directive Cue in Cellular Behavior and Treatment Response	15:05 - 15:20
Amirreza Asadi	The Investigation of Viability and Proliferation Potential of Mesenchymal Stem Cells Entrapped in Chitosan Hydrogel	15:20 - 15:30
Milad Ghasemi	Macroscopic Assessment of Burn Wound Healing following Umbilical Cord Mesenchymal Stem Cells transplantation	15:30 - 15:40
Majid Golkar	Clinical Application of Growth Factors in Wound Healing	15:40 - 15:50
Hosna Basiri	The Significance of Identifying the Crucial Genes in Expanding the Most Recent Therapy by Using Mature Cells and Stem Cells for Wound Healing	15:50 - 16:00
Fatemeh Makalani	Cell-based Therapy for Epidermolysis Bullosa	16:00 - 16:10

### Poster Presentation

Mohaddeseh Zeinali Ali Abadi	Effects of Microchimeric Fetal Cells on Wound Healing
Abdollah Abolfathi	A Case Report of Pressure Ulcer Healing Using 2 g of Sucralfate Daily
Amene Nikgoftar Fathi	Effect of Hydroalcoholic Extract of Trigonella Foenum Graecum Leaves on Mast Cell Numbers and Degranulation in Diabetic Rat Wound Healing
Mahla sadat Izadi	Effect of Ozone Therapy on Wounds
Reihane khorasanian	The Effect of Lavender on Wounds Healing
Zhila Saneipour	An Analysis on Application of Nursing Informatics in Wounds Repair in Tehran: A Survey
Ali Torkamandi	Effect of Silybum Marianum Plant Extract (Silymarin) on Wound Healing
Mobina Imandust	Examining the Knowledge, Attitude and Performance Quality of Nurses in the Prevention of Pressure Ulcers; A Systematic Review
Mahdiyeh Bakhtiyari-Ramezani	Investigating the Non-destructive Effects of Cold Atmospheric Plasma on the Induced Wound in Healthy Mice
Fateme Khodaparast	The Role of Microbiota in Nonhealing Diabetic Wounds
Samin Khosravi	Immunotherapy: A Promised Approach for the Treatment of Cutaneous Metastatic Melanoma
Pooriya Teimoori	Evaluation the Effect of Honey Bee Venom on Dermal Fibroblast Cells



Maryam Alahdadian	Investigating the Effects of Herbal Medicines in Episiotomy Wound Healing
Armin Nazemi Zadeh	Production of Recombinant Trypsin as a Potential Tool for Wound Debridement
Soraya Babaie	The Role of Fetal Cells in Maternal Wound Healing
Maedeh Nasirifar	Preventive Nursing Care in Pressure Ulcers in 2022
Fatemeh Amini	Immune Checkpoint Inhibitors that Cause Adverse Cutaneous Side Effects: Etiology, Management, and Monitoring
Parisa Arzani	Virtual Reality Systems (VR) for Post Burn Rehabilitation
Seyede Atefe Hosseini	Reinforcing of Decellularized Human Amniotic Membrane Laminates for Skin Transplantation
Hajar Sadeghi	Barriers and Facilitators of Nurses Competence in Chronic Wound Care in the Elderly: A Focus Group Study
Farzaneh Chehelcheraghi	Coactivity of Mast Cells and Stem Cells on Angiogenesis and Antioxidants Potentials at Inflammation, Proliferation, and Tissue Remodeling Phases of Wound
Hajar Sadeghi	Objectives, Curriculum and Content of Effective Wound Care Training in Iranian Nurses: a Delphi Study
Amir Nouri	Treatment of Oral and Dental Diseases Through Herbal Medicine
Delaram Kashani Javid	Effect of Ortokin on Tissue Healing
Mohaddeseh Larypoor	Investigating the Expression Levels of cdr1 and mdr1 Genes in the Stages of Biofilm Formation by Candidate Species Isolated from Sick and Normal People.
Dorsa Tavakoli	The Role of Mesenchymal Stem Cells (MSC) in Wound Healing
Vahid Mohammad zadeh Amir	From the mesenchymal stem cells to cardiomyocytes and heart To heal critical wounds

Friday, January 13<sup>th</sup> 2023

Panel 1

Dermatology

Parvin Mansouri	Best Practice in Wound Management: Challenge Wounds in Dermatology	8:30 - 10:00
Kamran Baliqi		
Leila Ataie Fahshtami		
Nasrin Zand		
Alireza Firooz		
Zahra Safaei Naraghi		

Break	10:00 - 10:25
-------	---------------

Panel 2	Light and Physics
---------	-------------------

Chairpersons	Dr. Siamak Bashardoust Tajali, Dr. Reza FekrAzad Dr. Afshan Shirkavand Dr. Leila Ataie Fahshtami, Dr. Mina Sadat Naderi
--------------	--

Reza Fekr Azad	Photo Biomodulation Management of Chemotherapy Side Effect in Cancer Patients: Walt Consensus Record	10:25 - 10:45
Seyed Mehdi Tabaie	Systemic Photodynamic Therapy in Nodular BCC	10:45 - 11:00
Mina Sadat Naderi	Photodynamic Therapy of Vit A&D in BCC Skin Cancer, In Vitro Study	11:00 - 11:15
Afshan Shirkavand	Application of Polarized Light in Tissue Healing	11:15 - 11:30
Yeganeh Tavousi	Highly Effective Inhibition of Pseudomonas Aeruginosa Biofilm Formation by Sublethal Methylene Blue-photodynamic Inactivation Augmented by Graphene Oxide Quantum Dot	11:30 - 11:40

Panel 3	Microbiology
---------	--------------

Chairpersons	Dr. Mohsen fateh, Dr. Abbas Akhavan Sepahi, Dr. Alireza Khosravi, Dr. Seyed Davar Siadat
--------------	--

Alireza Khosravi	Mycobiome in Wound Healing	11:40 - 11:55
Abbas Akhavan Sepahi	Microbial Biopolymers and their Applications in Medical Biotechnology	11:55 - 12:10
Mohaddeseh Larypoor	The Use of Fungi in Wound Healing	12:10 - 12:25
Zahraa Neamah Abass	Effect of Zinc Oxide Nanoparticles on Biofilm Expression in Mmethicillin-resistant Staphylococcus Aureus Isolated from Burn Wound Infection	12:25 - 12:40
Saeide Karami	Investigating the Effect of Aloe Vera Juice on Infected Wounds in Male Wistar Rats	12:40 - 12:50
Soheil Taherpouran	Chitosan and Nano Silver Suspension in Wound Healing of Oral Candidiasis in Piglet Infected	12:50 - 13:00

Break	13:00 - 13:30
-------	---------------

Panel 4	New Dressings	
Chairpersons	Dr. Parvin Mansouri, Dr. Kavosh Zand Salimi, Dr. Banfsheh Heidari, Dr. Mehrangiz Totonchi	
Atefeh Shahbazi	Biologic Dressings	13:30 - 13:45
Kavosh Zand Salimi	Regulatory Considerations to Develop Innovative Wound Dressings	13:45 - 14:00
Elnaz Shaabani	Induction of Hypoxia by LBL AuNps-siRNA in Nanofiber Substrate to Investigate the Expression of Angiogenesis Factors and Acceleration of Diabetic Wound Healing	14:00 - 14:15
Fateme Akar	Evaluation of Mesenchymal Stem Cells Encapsulated in Alginate Hydrogel for Wound Healing Products Applications	14:15 - 14:25
Peyvand Parhizkar Roudsari	Wound Healing with Acellular Amniotic Membrane Incorporating Placenta Mesenchymal Stem Cells; A Novel Dressing for Diabetic Foot Ulcers	14:25 - 14:35
Faezeh Ghasemi	Fabrication and Evaluation of Fibrin Biological Scaffolds from Plasma-derived Products with Synthetic Teriparatide Peptide	14:35 - 14:45
Amir Mohammad Chekeni	Development of a Commercially Scalable Placental Aqueous Extract Based Liquid Bandage (Film Forming Spray) for Burn and Wound Healing	14:45 - 14:55

## Workshops Program

Date		Title	Instructor	Time	Organizer
1	12 <sup>th</sup> Jan.	کنترل بهینه اگزودا روشی برای ترمیم مؤثر	Pante`a Sokhanvar Mehdi Khaleghi Nia	10:00	IRAN PHARMIS Co.
2	12 <sup>th</sup> Jan.	Wounds Light Therapy	Dr. Mehdi Akbarzadeh	11:00	Mehregan Tejarat Karmania Co.
3	12 <sup>th</sup> Jan.	از بین بردن موانع بهبود زخم	Maryam Mahzadeh	12:00	Ebtekar Tose`e Darman Co.
4	12 <sup>th</sup> Jan.	Time to Decide what dressing is what situation	Dr. Majid Ziabakhsh Daylami Ali Sanjari	14:00	Treetta Co.
5	12 <sup>th</sup> Jan.	Cell Therapy	Dr. Zohreh Saltanatpour	15:00 17:00	YARA Institute
6	After Congress	Hands-on Training on Cell Culture	Dr. Mohammad Hasan Soheilifar Dr. Hoda Keshmiri Neghab		YARA Institute
7	After Congress	Biofilm and Wounds	Dr. Mohammad Pooya		YARA Institute

# Oral Presentations

## Personalized Medicine and Wound Care: Definition, Approaches, and Obstacles

**Mohammad Pooya**

*MD, PhD, Molecular Biology Department, Pasteur Institute of Iran*

The aim of the personalized medicine is to match the right treatment to the right patient, or to design the treatment for a patient according to genotype as well as other individual characteristics. However, personalized medicine can include development of genomics-based medicine, predisposition testing, preventive medicine, and combination of diagnostics with therapeutics and monitoring of therapy.

Modern medicine demands that decisions be based on real information, preferably derived from methods that are measurable and reproducible. Relative to wound care, such diagnostics are available for blood flow, systemic diseases, nutritional status and even pressure damage.

The most important applications of personalized medicine in wound care are the implementation of remotely controlled diagnostic tools to monitor wound progression, the design of patient-specific wound dressings to actively take part in the healing pathway, the exploitation of mathematical models to predict the release of therapeutic agents and maximize their effectiveness, the use of naturally-derived products for the promotion of wound repair, and the engineering of wound models to pre-clinically validate innovative and smart formulations.

However, yet there are several concerns about different approaches to personalized medicine. For instance, while it developed to exclude some constructed phenotypes such as race, ethnicity, gender or sex, there are some researchers and physicians who include them in their research or practice.

## Application of Artificial Intelligence Methodologies to Chronic Wound Care and Management

**Haleh Fateh\***

**Mojtaba Khayat Ajami**

*Lifestyle medicine Research Group, Academic Center for Education, Culture and Research (ACECR), Tehran, Iran*

As the number of hard-to-heal wound cases rises with the aging of the population and the spread of chronic diseases, healthcare professionals struggle to provide safe and effective care to all their patients simultaneously. Accurately predicting wound healing trajectories are difficult for wound care clinicians due to the complex and dynamic processes involved in wound healing. Wound care teams capture images of wounds during clinical visits generating big datasets over time.

We have witnessed rapid advancement in technology over the last few decades. With the advent of artificial intelligence (AI), newer avenues have opened for researchers. Electronic Medical Records, or EMRs, have recently been incorporated into the health care system. This has allowed ease of accessibility to patient information. The availability of massive amounts of clinical data and robust programming has increased healthcare professionals' interest in AI's potential role in the healthcare industry.

With increasing availabilities of massive data (wound images, wound-specific electronic health records, etc.) AI-based digital platforms will play a significant role in delivering data-driven care to people suffering from debilitating chronic wounds.

Developing novel AI systems can help clinicians diagnose, assess the effectiveness of therapy, and predict healing outcomes. Another significant development that emerged from the findings is AI-based remote consultation systems utilizing smartphones and tablets for data collection and connectivity. In addition to showing promising results in wound healing prediction, artificial intelligence might also become a

viable tool for wound assessment.

In this article, we will attempt to briefly review current literature discussing AI in critical care medicine and analyze its future utility based on prevailing evidence.

Keywords: Chronic Wound, Electronic Medical Records, Artificial intelligence, Remote Consultation Systems

## **Medicinal Plants and Herbal Medicines in Wound Healing**

**Farahnaz Khalighi-Sigaroodi**

*Medicinal Plants Research Center, Institute of Medicinal Plants, ACECR, Karaj, Iran*

In general, wounds can be classified based on the main cause of their creation as acute, closed, open, incised, tear or laceration, puncture, abrasive or superficial, penetration, gunshot and chronic wounds. Wound healing is one of the normal biological process in the human body. It is including four programmed phases: coagulation, inflammation, proliferation, and remodeling. For a wound to heal successfully, all these physiological processes must occur in the proper sequence and time frame. Wound treatment is done in different ways. These treatments can be local or systemic. Among these treatments, it can be mentioned the use of antibiotics, disinfectants, chemical debridements, vitamins, minerals, and a number of herbal products.

For many years, humans have used medicinal plants as a first-line treatment for inflammation, burns, ulcers, and surgical wounds. Various medicinal plants and their compounds have been properly investigated in the management and treatment of wounds. Plants contain a large number of natural bioactive compounds that help accelerate the wound healing process and tissue regeneration in the wound. Some examples of medicinal plants and their wound healing effects are mentioned in this study.

Topically applied acemannan, from Aloe vera, significantly reduce the time for wound closure. Centella asiatica promotes epithelialization and collagen deposition in a punch type wound. Curcumin derived from Curcuma longa root stimulates fibroblast proliferation, the development of granulation tissue and

the deposition of collagen in the healing of cutaneous wounds. Matricaria chamomilla cause the accretion of reepithelization and collagen in the dermis tissue, and also the absence of necrosis. Calendula officinalis is used for the treatment of a variety of skin conditions, such as wounds, burns, and dermatitis.

Overall, one of the best alternative treatments for wound healing is using medicinal plants and their derived products, which accelerate the healing process of wounds with different mechanisms.

## **Naringenin Improves the Healing Process of Burned Skin Damage in Rats**

**Mona Gorji**

*Skin research center shahid beheshti medical university*

Burn wounds is a complex and dynamic process that begins immediately after tissue injury and continues until the wound has healed and been remodeled. Applying the most effective methods of burn repair is an ongoing challenge in medicine. Recent investigations and animal studies demonstrate that Naringenin has Phenol compounds and flavonoids are documented to possess anti-inflammatory and antioxidant activities, and the flavonoid naringenin is proposed to have pharmacologically significant effects against including anti-ulcerogenic and wound healing effects. The present study was planned to evaluate the possible burn wound healing effect of narengenin in rats. Material and methods: In this experimental study, 40 male Wistar albino rats were examined in five groups of eight receiving silver sulfadiazine cream 1% (reference standard), eucerin (positive control), 5% and 10% ointments of naringenin (treatment groups) for 14 days. The negative control group received no treatment. Burn wounds were made on the dorsal part of the animals' necks. Wound contraction rate and histopathologic study of wound sites after sacrificing the rats were performed. Data were analyzed using SPSS software version 22. Results: On the 14<sup>th</sup> day, wound contraction rate (WCR) was significantly higher in rats treated with naringenin 10% extract

ointment compared with 5% extract, positive and negative control groups ( $P < 0.001$ ) and SSD ( $P=0.01$ ). Application of 10% extract ointment on burn wound sites showed complete healing and slight tissue inflammation and edema.

**Conclusion:** These results suggest that the naringenin could accelerate the wound healing process. Further study is required to identify the compounds responsible for its wound healing properties and to understand the mechanism of action.

## **Antibacterial Activity of Curcuma Amada Ethanolic Extract Against Acinetobacter Isolated from Burn Wound Infection**

**Mohammad Mehdi Attarpour Yazdi**

*Department of Microbiology, Faculty of Medicine, Shahed University, Tehran, Iran*

**Introduction & Aims:** Acinetobacter is an important pathogen and produce burn wound infections. Increasing of antibiotic usage for Acinetobacter infections, created antibiotic resistance and subsequently to produce new antibiotics. Medical herbs with anti microbial activity have always been important role in traditional medicine. The aims of this study was to determine the antibacterial activity of ethanolic extract of Curcuma amada rhizome against Acinetobacter isolated from burn wound infections and to compare with effects of selected antibiotics in vitro. **Methods:** This research is a descriptive analytic study. First, a sample of ethanolic extract of the plant rhizome was prepared by maceration method. Then its antibacterial activity against 93 isolates of Acinetobacter from 300 samples of different infection was evaluated by well diffusion and then agar serial dilution method. Also, the MIC (Minimum Inhibitory Concentration) of extract was determined. The effect of selected antibiotics was tested by disk diffusion method. **Results:** The frequency distribution tables, diagrams, Kay square, and T test were used to describe and analyze the data. The results demonstrated that the Curcuma amada rhizome ethanolic extract had been

effected against 54 of Acinetobacter isolated (58%). The MIC of the extract for this bacterium was 15.50 mg/ml, while they were often resistant to selected antibiotics (91.2% resistant to Imipenem and Amikacin). There was significant difference between the effects of plant and antibiotics on Acinetobacter ( $P < 0.05$ ). **Discussion & Conclusions:** This study demonstrates that an ethanolic extract of Curcuma amada is effective on Acinetobacter isolated from burn wound infection and its effect is even better than that of selective antibiotics. Further investigations will be necessary.

**Keywords:** Burn Wound Infection, Acinetobacter, Curcuma amada, Antibacterial Activity

## **Comparison of Antidermatophytic and Wound Healing Activity of Prosopis Farcta, Chenopodium Album and Apium Nodiflorum Extracts**

**Ali Asadi Zeidabadi<sup>1</sup>**

**Ensieh Lotfali<sup>2\*</sup>**

**Soheil Taherpouran<sup>1</sup>**

**Ebrahim Salimi-Sabour<sup>3</sup>**

*1. Student Research Committee, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran*

*2. Department of Medical Parasitology and Mycology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran*

*3. Department of Pharmacognosy and Traditional Pharmacy, Faculty of Pharmacy, Baqiyatallah University of Medical Sciences, Tehran, Iran*

**Introduction:** Wound healing is a complex procedure with cellular and extracellular factors and is a main challenge in the medical science. Dermato phytosis is a world wide fungal disease in animals and humans, caused by dermato phytesspecies (pathogenic keratinolytic fungi). Some findings suggest that some herbal extracts can progress wound healing through growth factors and its receptors. This study is aimed at examining the local effect of root extract of Prosopis farcta (P.farcta), Chenopodium album (Ch. apium), Apium nodiflorum (A.nodiflorum) extracts

on wound healing and its antidermatophytic effect. **Materials and Methods:** According to the CLSI-M38-A2, in-vitro drug susceptibility for aquatic extracts of *P.farcta*, *Ch.album*, *A.nodiflorum* and terbinafine were carried out against *Trichophyton mentagrophytes*. For in-vivo anti-dermatophytic activity, the nine male sprague rats were infected by *T. mentagrophytis*. The topical solutions (10%) was formulated by root extract of herbs. The terbinafin (positive control) and solutions were topically applied thrice daily for 15 days. The wound area was measured on day 0, 5, 10 and 15.

**Results:** The MIC value of terbinafine was  $\leq 0.25\mu\text{g}/\text{mL}$  against *T. mentagrophytis*. The MIC value of *P. farcta*, *Ch. album* and *A. nodiflorum* extracts were 0.5, 0.0125 and 0.5 respectively. The aquatic *Ch. album* extract showed the lowest MIC values on fungal activity (with  $0.0125\ \mu\text{g}/\text{mL}$ ). The wound area in *Ch. album* group was significantly (70%) reduced as compared to control group. The complete cure with aquatic root extract of *Ch. album* solution lasted for 15 days, compared to 21 days with terbinafine.

**Conclusion:** It seems that local administration *Ch. album* extracts probably accelerates wound healing. It is hopeful that *Ch. album* maybe an appropriate choice in traditional medicine and pharmacology.

**Keywords:** Wound healing, Antidermatophyte, Extracts

## **Prevention and Management of Pressure Injury with Latest Guidelines (NPUAP/EPUAP/PPPIA/PIP)**

**Mahdi Akbarzadeh Amirdehi**

*Head of Wound and Ostomy Clinic of Baqiyatallah Hospital & sadra wound ostomy and osteomyelitis care, specialized center Tehran, Iran*

*MsN ,ET nurse, EWICW(EWMA),IWCC(university of Toronto faculty of medicine)*

Wound healing as a biological process that is mainly crucial for the regeneration of injured tissues, requires persevering improvements in materials and methods utilization. Skin wounds are one of the major cases in several countries include Iran that cause expending

more than several million dollars annually for treatment process. In the current paper the recent newsworthy wound healing process managements for Prevention and management of pressure injury with latest guidelines (NPUAP/EPUAP/PPPIA/PIP) in cases include Neonatal, Pediatrics, Geriatric and Bariatric Population and Spinal cord-injured Patients were reported. The macroscopic evolution in the wound area and the histological characteristics of the skin samples were evaluated. The skin wounds of patients were evaluated macroscopically after different periods of time in terms of the formation of a scab and reduction in the wound area. The application of recent novel materials and methods usage modulated the cascade of biological events from extensive tissue injuries, reduced wound regression and inflammatory response, and increased fibroblast proliferation and early stimulation of the production and organization of collagen fibers. Besides meeting the functional goals of the reconstructed skin, the results obtained are important given the reduction in the total time of the wound healing process and the final appearance observed.

**Keywords:** Wound Care Management, Neonatal wounds, Pediatrics wounds, Geriatric wounds, Bariatric wounds, Spinal cord-injuries, latest guidelines

## **Wound Cleansing & Wound Irrigation**

**Hamed Savadkoohi**

*BSN, MSN, NSWOCC, RN*

*Master student of geriatric nursing , Shahid Beheshti University of Medical Sciences - WOC Specialist Nurse*

When is wound cleansing necessary and what solution should be used? Wound cleansing: Which solution, what technique?

Wound cleansing helps optimize the healing environment and decreases the potential for infection. Wound irrigation aims to reduce the microbial burden by removing tissue debris, metabolic waste, and tissue exudate.

Cleansing is a vital component of wound management. Most wounds should be cleansed initially and at each dressing change.

An ideal wound-cleansing solution would:

- Be non-cytotoxic



- Not induce an immune response
- Reduce the numbers of pathogenic bacteria
- Not induce bacterial resistance
- Be non-sensitizing
- Be easily accessible
- Be cost-effective
- Be stable with a long shelf life.

There is ongoing discussion, debate and further research required of what solutions, at what temperature, duration of exposure of the solution on the wound bed to be clinically effective for microbes, cytotoxicity, ease of use, access and cost economics.

First, enough solution needs to be used, with a recommendation of 50–100 ml per cm<sup>2</sup> of wound space as a minimum amount. A range of 4 to 15 PSI has been determined to be the safest and most effective range depending on the perceived need to clean.

Surfactants are commonly used in day-to-day life, such as in shampoos, to separate oils and styling products from the hair allowing them to be rinsed away, as well as in dish washing detergents to loosen food and greasy materials from dishes and pots. An international survey conducted of wound practitioners revealed that one of the primary considerations related to dressing changes was avoidance of pain and trauma to the patient. When a wound tissue temperature falls below 33°C, it has a negative impact on mitotic activity of the cells. Cold solutions may cause the wound bed temperature to drop below 37 degrees Celsius, which slows mitotic activity for up to four hours! Macrophages are also inhibited in such cold environments, and leukocyte activity reduces to zero.

## Evaluation and Management of Patients with Lower Extremity Ulcers

**Mahdieh Arian**

*Nursing and Midwifery Care Research Center,  
Faculty of Nursing and Midwifery, Mashhad  
University of Medical Sciences, Mashhad, Iran*

Introduction: Lower extremity ulcers are divided into two groups, leg ulcers, and foot ulcers, due to

differences in causes, pathogenesis, and treatment. Even with the best available care, 25-50% of leg ulcers and more than 30% of foot ulcers do not heal completely after 6 months of treatment. Approximately 70% of leg ulcers are caused by venous disease, and about 20% are caused by arterial insufficiency or mixed arteriovenous disease. Evaluation and differential diagnosis and providing a systematic approach based on available evidence are essential in the investigation and management of these wounds.

Objective: The present study aims to present a systematic approach to evaluating and managing patients with lower limb ulcers.

Methodology: This study is a narrative review by searching Pubmed, Scopus, WoS, UpToDate, and ScienceDirect databases with the keywords leg ulcers, foot ulcers, arterial ulcers, diabetic foot ulcers, and assessment and management in English and without limited time. A total of 15 high-quality studies were selected and data extracted.

Findings: The extracted systematic approach included: a pathophysiology review, comprehensive history, and physical examination, wound assessment and continuous documentation, biopsy, infection diagnosis, arterial and venous vascular assessment, and management of lower extremity wounds. Lower extremity ulcers based on pathophysiology-etiology are venous leg ulcers, diabetic foot ulcers, pressure ulcers, arterial ulcers, mixed arteriovenous ulcers, and atypical ulcers. For the differential diagnosis of these types of wounds, a comprehensive history and physical examination of the wound and its surrounding skin, identification of healing barriers, and examination of the patient's medical conditions such as diabetes mellitus, and peripheral arterial disease, and deep vein thrombosis that may point to the leading cause of the wound, and also, neurovascular evaluation is essential in order to identify neuropathy and arterial insufficiency. Continuous documentation of wound size and characteristics is important to monitor healing and treatment effectiveness. When ulcers do not heal as quickly as expected despite treatment, skin biopsy specimens should be obtained and bacterial cultures may be a useful diagnostic tool. Among all lower extremity wounds, diabetic foot ulcer is more prone to infection and early identification of their infection is very important. Severe necrotizing

infections are characterized by crepitus, blistering, and extensive necrosis and require immediate consultation with a vascular surgeon. In the case of deep and chronic wounds on the bones, osteomyelitis should be suspected. Signs and symptoms of local infection include local warmth, erythema, tenderness or pain, swelling, and purulent discharge. Systemic infection is detected by the presence of fever, chills, leukocytosis and erythema and expanding lymphangitis. Arterial and venous vascular assessment is very important to confirm the diagnosis and plan treatment options. General principles of lower extremity wound management include wound debridement, infection control, dressing application, local pressure reduction, and treatment of comorbidity conditions such as diabetes and peripheral arterial disease, lifestyle changes (such as smoking cessation and dietary modification), which should be developed to help manage comorbidity diseases.

**Conclusion:** Although accurate wound diagnosis may be easy in theory, it is not always the case in practice. Successful wound management requires good collaboration between competent doctors and nurses with a multidisciplinary approach. There is a need for reliable epidemiological research, using clear criteria to diagnose the types of lower extremity ulcers, with the aim of estimating the prevalence and incidence of these ulcers as well as their impact on health, economy and quality of life.

**Keywords:** leg venous ulcer, diabetic foot ulcer, pressure ulcer, arterial ulcer, mixed arteriovenous ulcer and atypical ulcer

## Wound Dressing in Fournier's Gangrene

**Saeid Pasban-Noghabi<sup>1</sup>**

**Mohsen Rohani<sup>2</sup>**

*1. Msc in Nursing education, Infection control supervisor, Wound manager nurse, Sina & Velayat hospital, Mashhad university of Medical Sciences, Mashhad, Iran.*

*2. Bsc in Operation room, Wound manager nurse, Taleghani hospital, Mashhad university of Medical Sciences, Mashhad, Iran*

Fournier's gangrene is a synergistic polymicrobial

necrotizing fasciitis of the perineum and genitalia. Incidence reported of 1/7,500 and accounting for only 1%–2% of urologic hospital admissions. The diagnosis of Fournier's gangrene is made on clinical grounds. It is usually preceded by prodromal symptoms such as fever, prostration, nausea and vomiting, perineal discomfort, and poor glucose control. In this article we describe the role of wound dressing on Fournier's Gangrene treatment. In this review article we research in SID, Pubmed, and Sciences direct index with key words Fournier's Gangrene, wound dressing, dressing. The main goals in the management of Fournier's gangrene are aggressive resuscitation of the patient, administration of broad-spectrum antibiotics, and debridement of infected and necrotic tissue. Debridement is paramount, and the aim should be to get the patient to the operating room as soon as possible. The base of wound care is prevented reinfection and promote natural healing and granulation. Dressing including Hydrogen peroxide, povidone iodine, sodium Hypochlorite. Simple sodium hypochlorite, Honey, acetic acid dressings and Negative pressure wound therapy. According the study Fournier's Gangrene have mortality range between 0 to 70% and management and healing needs surgical and nursing team whom that know about dressing. According the last study and experiences dressing can improve the survival rate.

**Key words:** Fournier's Gangrene, Wound dressing, Debridement.

## Wound Specialist Nurse in Palliative Care Units in Health System of Iran

**Salman Barasteh**

*Health Management Research Center, Nursing Faculty, Baqiyatallah University of Medical Sciences, Tehran, Iran*

Patients with advanced diseases may refer to hospice or palliative care units with uncontrolled symptoms. The symptoms of these patients are aggravated by the presence of an ulcer. Disturbing symptoms such as pain, odor, bleeding, and/or excessive exudate may interfere with patients' ability to spend quality

time with their loved ones. Although patients may present with ulcers of various causes, the most common ulcers in this population are pressure ulcers. However, the lack of nurses specializing in wound care and palliative care is a major challenge in the healing and management of wounds in patients with advanced diseases. The use of remote health technology and other technologies can be a way to solve this shortage. The use of these technologies provides access to a larger number of patients. It will also ensure that appropriate wound care plans are in place to achieve care goals. Although wound healing may not always be possible in this patient population, access to wound care and palliative care can improve the quality of life of patients and their caregivers.

### **The Effect of an Interactive Follow-up Program on Ostomy Adjustment of Inpatients After their Discharge from Surgical Wards of the Hospitals Affiliated to Isfahan University of Medical Sciences**

**Yaser Hamidi<sup>1</sup>**

**Mahin Moeini\*<sup>2</sup>**

**Hojatollah Yousefi<sup>2</sup>**

*1. master of nursing emem mosa kazem hospital of social security organization khozestan iran*

*2. Ulcer Repair Research Center, Nursing and Midwifery Care Research Center, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran*

**Purpose** Ostomy patients suffer from many physical and mental problems, which can be solved to a large extent with the help of education and follow-up programs. These follow-up scans be done in person or on the telephone by the nurses, or even, by sending a text message that is an easier way for the patients to adapt to their condition. This study aimed to investigate the effect of an interactive follow-up program on the adjustment of ostomy inpatients after being discharged. **Methods** This study is a clinical trial, conducted on 64 ostomy patients who were discharged from the surgical wards of the hospital affiliated to Isfahan University of Medical Sciences. Subjects in the experimental

group participated in a 6-week follow up program via text message. The information about the patients were collected by Olbrisch Ostomy Adjustment Scale. **Results** The obtained results have suggested that 34.4% of the patients in the experimental group and 28.1% of the patients in the control group were female. Before the intervention, comparing the mean score of ostomy adjustment and its dimensions in the two groups showed no significant difference ( $P>0.05$ ). However, a significant difference was observed between the two groups immediately after the intervention ( $P<0.05$ ) and 1 month after the intervention, except for dimension of negative acceptance ( $P>0.05$ ). **Conclusions** The findings of this study suggested that using SMS can be considered as a proper tool or method for following up the ostomy patients.

**Keywords:** Follow-up program, Ostomy adjustment, Surgical units, Hospitals

### **Designing a Measurement Scale the Risk of Diabetic Foot Ulcers in Diabetic Patients**

**Mohammadreza Yousefi<sup>1</sup>**

**Mohadeseh Shahrodi\*<sup>2</sup>**

*1. MSc of Nursing, Razavi Khorasan University of Medical Sciences, Alawi Vascular Surgery Hospital, Mashhad, Iran*

*2. Master of Special Care Nursing, Faculty of Azad Gonbad University*

**Introduction:** Diabetic foot ulcer is one of the most serious complications in diabetic patients. Investigating and identifying susceptible individuals can prevent disease progression, hospitalization and loss of a member. Patient review requires a reliable and reliable tool design. The aim of this study was to design a diabetic foot ulcer risk assessment tool in diabetic patients. **Method:** This study is a methodological study in two steps. Determine instrument expressions. 2. Determine the psychometric properties (validity and reliability) of the tool. In the first stage, phrases were designed using the concept of care and examination of diabetic foot, review of resources, use of existing tools, opinion of the professors of vascular surgery, orthopedic and internal

medicine, and interview with 10 patients with diabetic foot ulcers. In the second stage, the validity of the content, formal validity, criterion validity (concurrent criterion), construct validity (factor analysis), internal consistency (alpha cronbach) and stability (test-retest reliability) were investigated.

Result: The final questionnaire was designed according to the opinion of the professors, including 3 observation dimensions (4 items), touch (3 items) and review (6 items). The validity of the questionnaire was verified by 5 surgeons in the field of vascular surgery, pediatric orthopedic specialist and internist. The results of the tool reliability test showed that the Cronbach's alpha coefficient was 0.85 and the test-retest reliability coefficient was 0.86.

Conclusion: Diabetic foot ulcer risk assessment tool with a score of 0 to 38 at 4 degrees. Determining the position of diabetic patients in terms of susceptibility to wound inflammation was designed to be reliable and reliable. Using this tool can be a great help to prevent diabetic foot ulcers.

Keywords: Tool design, risk of diabetic foot ulcers, diabetic foot

## **Evaluation of Knowledge and Skill and Attitude of Nurses in Surgical Departments in Pressure Ulcer Management**

**Firuzeh Hatamirad\***

**Mahtab Eskini**

*Lorestan University of Medical Sciences, Lorestan, Khorramabad, Iran*

Introduction: After cancer and heart diseases, pressure ulcers are the most expensive treatment problems, the prevalence of which is increasing in the world and in Iran, and it is considered one of the indicators of the quality of health care. As one of the main members of the health team, nurses play an important role in preventing pressure ulcers in health care centers. The present study was carried out with the aim of determining the knowledge, skills and attitudes of the nurses of surgical

departments in the management of pressure ulcers.

Methods: The present study is a cross-sectional descriptive study in which the number of 114 nurses working in the surgical wards of the educational center of Shahada Ashair Khorramabad was selected by census method. In order to collect data, a pressure ulcer knowledge questionnaire and a three-part questionnaire were used including: demographic information, nurses' attitude in pressure ulcer prevention, and a checklist of surgical ward nurses' skills regarding the evaluation and management of pressure ulcers. Descriptive statistics and inferential statistics and Spearman and Pearson correlation coefficient were used to analyze the data.

Results: The average age of the research samples was 33 years, and in terms of gender, the highest frequency belonged to female nurses with an expert degree. The average work experience of the nurses was  $105.88 \pm 84.69$  months. The mean and standard deviation of scores related to the following areas: knowledge level  $9.66 \pm 2.30$ , skill  $10.46 \pm 2.57$  and attitude  $55.54 \pm 5.92$  were obtained. Based on the findings of the research, there was no statistically significant difference between the mean of the total scores of attitude, knowledge and skills with demographic characteristics, but in the study of the relationship between the training history in the field of wound management and the scores of the areas of knowledge and attitude of nurses, a statistically significant relationship was observed.

Conclusions: The results of the research showed that the nursing staff have a positive attitude and moderate knowledge and skills in the evaluation and management of pressure ulcers. Due to the fact that pressure ulcers are one of the events that threaten the safety of patients, it is suggested that proper educational planning be done to improve the knowledge and skills of health care workers, especially nurses, in the field of pressure ulcer prevention.

Keywords: Knowledge, skill, attitude, nurse, pressure ulcer

## **Evaluation of the Effectiveness of Maggot Therapy and Debridement on the Healing of Infected Ulcers**

**Mehrdad Derakhshan**

**Mohammad Javad Ranjbari**

**Amirhossein Tondro\***

*Student Research committee, Kermanshah University of Medical Sciences, Kermanshah, Iran*

**Background and purpose:** Infection is one of the main and dangerous complications of ulcer after surgery and diabetic foot and it is one of the main causes of limb amputation. Debridement of necrotic and infected tissues is very effective for ulcer preparation and ulcer healing process. One of the emerging techniques for debridement of infected tissue of wounds is the maggot therapy and with debridement of dead tissues and growth stimulation, it is very effective in reducing infection in the treatment process of these patients. The purpose of this research is to evaluation the clinical effectiveness of treating infected wounds with maggot therapy. **Method:** This study is a clinical trial on 20 patients with infected ulcer (15 patients with diabetic foot ulcers and 5 patients with infected wounds after surgery) in the general and infection unit of Biseton Hospital. *Lucilia sericata* larvae were applied to the wounds for 48-72 hours (depending on the type of wound and infection) until the necrotic tissue was cleared during this period, the evaluation of the performance of the maggot effect was examined by the researcher and the changes in the percentage of the wound surface area and growing microorganisms were recorded.

**Results:** The samples included 20 patients who were hospitalized for 1 to 2 weeks and treated with maggot 1 to 2 times per week on average, out of 15 diabetic foot ulcers, 12 of them were completely healed and debrided and 3 wounds reached the graft stage. 5. Infectious wounds caused by infection after surgery were completely healed, and the microorganism isolated from the wound was significantly decreased immediately after the first maggot therapy.

**Conclusion:** Although many methods are used in the treatment of infected wounds, the maggot therapy that is being used today is a simple and effective method in the treatment of infected wounds and its effect like biodebridement, asepsis, stimulating the growth and granulation of dead tissues, can help in the rapid healing of venous ulcers caused by diabetic foot ulcers and infections after surgery. **Keywords:** maggot therapy, diabetic wound, infection, surgical wound, debridement

## **Nurses' Experience of Pain Management in Wounds**

**Somayeh Molae\***

**Nahid Dehghan Nayeri**

**Arpi Manookiyan**

*Department of Medical Surgical, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, I.R.Iran*

**BACKGROUND AND OBJECTIVE:** Considering that the experience of nurses in pain management is significant in this regard, identification of their experiences can be the basis for dealing with the challenges. The present study was conducted to explain the experiences of nurses regarding pain management. **METHODS:** In this qualitative study, 14 nurses affiliated to the Tehran University of Medical Sciences participated through purposive sampling. The data were collected through individual, in - depth and semi -structured interviews and were simultaneously analyzed by conventional content analysis.

**FINDINGS:** Based on the data analysis, two themes of «challenges and barriers to pain management» and «right to patient -centered pain relief» were extracted. **CONCLUSION:** Based on the results of this study, fundamental values of nursing profession and paying attention to patients' individual needs and rights can be effective in managing the pain properly.

**Keywords:** Pain Management, Emergency Department, Qualitative Study, wound

## Future Emerging Technologies of Wound & Tissue Repair

**Mohsen Keshavarz**

*Member of the Faculty of Business Studies and Research Institute, Tehran, Iran*

Wound healing is a multifaceted biological process that requires the intricate collaboration of various cell types and their products in sequential steps. The wound-healing process is affected by numerous factors including humidity and oxygenation, infection, stress, increasing prevalence of acute and chronic wounds, and patient-related factors such as age, lifestyle, and health status. Wound healing is an important physiological process; when it fails, the quality of a patient's life becomes worst, especially in patients with chronic metabolic disorders. The clinical assessment and management of wounds remains challenging despite the development of various therapeutic regimens owing to its painstakingly long-term treatment requirement and complex wound healing mechanism. Various conventional approaches such as cell therapy, gene therapy, growth factor delivery, wound dressings, and skin grafts etc., are being utilized for promoting wound healing in different types of wounds. However, all these abovementioned therapies are not satisfactory for all wound types, therefore, there is an urgent demand for the development of competitive therapies. Therefore, there is a pertinent requirement to develop newer and innovative treatment modalities for multipart therapeutic regimens for chronic wounds. The cost of the management for chronic and nonhealing wounds is increasing which may affect the patient's quality of life. Hence, the search for new lead or drugs from natural sources is essential to reduce the cost of the treatment. In the traditional medicine system, numerous herbs are reported to have wound-healing properties and those plants are used in folk medicine to treat wounds. The plant and marine sources are extensively studied for their wound-healing activity (preclinical studies) and further clinical studies are required to explore the possible effect on humans. Recent developments in advanced wound care technology includes nanotherapeutics, stem cells therapy, bioengineered skin grafts, and 3D bioprinting-based strategies for improving therapeutic outcomes with a focus on skin

regeneration with minimal side effects.

The main objective of this review is to provide an updated overview of progress in therapeutic options in chronic wounds healing and management over the years using next generation innovative approaches especially in mental health domain. Herein, we have discussed various emerging and innovative technology for promoting quality wound healing such as nanotherapeutics, stem cells therapy, 3D bio-printed skin, extracellular matrix-based approaches, platelet-rich plasma-based approaches, and cold plasma treatment therapy have been discussed with their benefits and shortcomings.

Keywords: wound healing, emerging technologies, foresight, nanotherapeutics, 3D bioprinting

## The Role of Polymers and Biomaterials in Regenerative Medicine

**Mohsen Shahrousvandi**

*Caspian Faculty of Engineering, College of Engineering, University of Tehran, Rezvanshahr, Iran  
Burn and Regenerative Medicine Research Center, Guilan University of Medical Sciences, Rasht, Iran*

Polymers as macromolecules are one of the fundamental components of regenerative medicine. Polymers are divided into natural and synthetic categories, each of which has advantages and disadvantages. Natural polymers include collagen, gelatin, elastin, actin, keratin, albumin, chitosan, alginate, chitin, cellulose, silk, and hyaluronic acid. Many natural polymeric materials are more easily accepted by biological systems where they can be metabolically processed through established pathways. However, natural biomaterials have some disadvantages including possible immunogenicity, structural complexity, and inferior biomechanical properties. Due to their availability and controllable degradation rate, synthetic biomaterials are also considered to be potential candidates in tissue engineering and regenerative medicine. Compared to natural polymers, synthetic polymers can easily be tailored into any form suitable for tissue engineering applications.

In this research, first each of these categories are introduced and then their use in regenerative medicine is listed such as drug carriers, wound dressings, tissue engineering scaffolds, implants, bone cement. Use of advanced processing techniques and numerous synthetic organic routes still allows the modification of existing polymers to alter their properties suitable for tissue/organ repair and other biomedical applications. Appropriate biocompatibility and degradability could be achieved by combining different polymers by physical blending or chemical modifications. In recent years, the gap between biocompatibility and immunogenicity of polymers has narrowed as a result of various copolymerization processes. This chapter has demonstrated a clear outline of the various biomedical applications of natural and synthetic polymers with a prime focus on tissue and regenerative engineering.

Keywords: Polymers, Biomaterials, Regenerative medicine, Wound dressings

## **Multifunctional Photoactive Nanoparticles and Hydrogels for Wound Healing Acceleration**

**Aziz Maleki**

*Zanjan Pharmaceutical Nanotechnology Research Center (ZPNRC), Zanjan, Iran.*

*Department of Pharmaceutical Nanotechnology, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran*

Light is an attractive tool that has a profound impact on modern medicine. Particularly, light-based photothermal therapy (PTT) shows great application prospects in the prevention of wound infection and promoting wound healing. Nanoparticles and hydrogels have shown attractive advantages in the field of wound repair due to their excellent biochemical effects. Therefore, multifunctional photoresponsive nanoparticles or hydrogels that integrate the advantages of light with a special wavelength are increasingly used in biomedicine, particularly in the field of the wound healing process. Here, we first introduce photoactive nanostructures including transition metal sulfide/oxides nanomaterials, carbon, black-phosphorus, TiO<sub>2</sub>, ZnO, or small organic

molecule-based materials. Then we discuss how PTT and PTT-involved synergistic therapies can modulate the microenvironments of bacteria to inhibit infection. Finally, recent achievements in our research group using photothermally active nanoparticles and hydrogels with both therapeutic and tissue regeneration capabilities in wound management are presented.

## **Recombinant Proteins Use in Wound Healing**

**Hassan Rassouli<sup>1,\*</sup>**

**Fereshteh Sarafrazi<sup>1</sup>**

**Armin Nazemi Zadeh<sup>1</sup>**

**Mohsen Fateh<sup>2</sup>**

**Masoud Habibi<sup>1</sup>**

*1. Department of Photo Healing and Regeneration, Medical Laser Research Center, Yara Institute Academic Center for Education, Culture and Research (ACECR), Tehran, Iran*

*2. Lifestyle Medicine Department, Medical Laser Research Center, Academic Center for Education, Culture and Research (ACECR), Tehran, Iran*

Naturally every wound heals in a few days by expression and secretion of cytokines involved in healing process. In some cases of chronic wounds, cytokines expression and secretion stop or decrease because of known and unknown reasons. In contrast, in some cases enough amounts of cytokines secreted by immune system, but there are different types of proteases e.g., Matrix metalloproteinases (MMPs) that destroy the cytokines and Matrix proteins. Regarding these facts, using recombinant proteins (e.g., EGF, bFGF, PDGF, VEGF and ...) and/or proteinase inhibitors (trypsin inhibitor) could be one of the most recent approaches in wound management. Recombinant proteins could be produced and purified in large amounts and used in very defined concentration that could help wounds to be heal. Different wounds in different stages need various combination of cytokines. Then it is important to produce different cocktails of cytokines to examine which cocktail is better for any wound type. Recombinant proteinase inhibitors also could help to prevent degradation of cytokines expressed and secreted by immune system cells. This degradation prevention

is very vital for successful wounds healing process.  
Key Words: Recombinant protein, Cytokine, Matrix metalloproteinases, Proteinase inhibitor, wound

## **Burn and Challenges Ahead with a Knowledge-based Perspective**

**Mohammadreza Mobayen**

*Associate Professor of Guilan University of Medical Sciences-Burn and Regenerative Medicine Research Center, Guilan University of Medical Sciences, Rasht, Iran*

Burns have always been one of the most catastrophic injuries. More than 3000000 people lose their lives yearly due to burns and their results. Burn injury is the seventh major cause of disease burden injuries in Iran.

In this part, first, we will describe the pathology and physiology of different degrees of burns, then the ways to control burn wounds and prevent and improve scars, keloid, and skin discoloration.

We will also talk about upcoming innovations and achievements like the application of cell appendages for the management of burn wounds, The importance of considering biomedical properties in skin grafts, and the identification of the TGF-B1 expression pathway in improving burn wound healing.

## **Cell Therapy and Regenerative Medicine in the Field of Burn Wound Healing: Current Status and Future**

**Zahra Pourmohammadi**

*Burn and Regenerative Medicine Research center, Guilan University of Medical Sciences, Rasht, Iran*

Burn injuries affect approximately 11 million people each year, with 180000 fatalities. Burn injuries are a global health issue with high morbidity and mortality. Wound healing phases are highly synchronized processes that begin as a result of damage and restore the integrity of the injured tissues. Wound healing process reduces tissue damage and provides sufficient oxygen and

tissue perfusion, as well as proper nourishment and a humid wound healing environment to re-establish the essential status of exaggerated parts. Untreated wounds are more prone to pus formation, bacterial infection, and complications such as sepsis. Traditional and modern approaches to treating acute, open, and chronic injuries are in use; however, current wound care managements have met with challenges and have had minimal positive effects. Recent advancements in regenerative medicine for burn wound healing have included stem cells, stem cell-derived products such as exosomes, conditioned media, and cell appendages, all of which have shown promising results when compared to current treatment approaches. Hair follicle stem cells, embryonic stem cells, umbilical cord stem cells, and mesenchymal stem cells, such as adipose-derived mesenchymal stem cells, bone marrow-derived mesenchymal stem cells, and even stem cells harvested from discarded burn tissue, are all sources of stem cells used for treatment. The ability of stem cells to modulate the release of chemokines, cytokines, and growth factors required for wound healing contributes to their therapeutic potential for burn wound healing. Furthermore, it is increasingly being accepted that rather than post-engraftment differentiation and proliferation, the therapeutic effects of stem cells lie in the secretion of paracrine or signaling molecules. Proteomic analysis of mesenchymal stem cells shows the secretion of chemokines, cytokines and growth factors which promote migration, proliferation of fibroblasts, endothelial cells, and keratinocytes. It should be noted that, nowadays, researchers have turned to specific organelle therapy due to the beneficial therapeutic effects in the process of cell survival. Levoux et al. in 2022 describe a novel mechanism by which platelets enhance mesenchymal stem cells capacity for regeneration (MSCs). They found that respiratory capable organelle is released to MSCs by activated platelets, and this mechanism enhances the MSCs proangiogenic function by increasing cytosolic citrate levels and stimulating fatty acid synthesis. In this presentation, we intend to talk about cell therapy and regenerative medicine in the field of burn wound healing.



## **Intraoperative 3D Bio-Printing for Burn Surgery: Opportunities & Challenges**

**Alireza Feizkhah**

*Clinical Technologies Development Center, Guilan University of Medical Sciences, Rasht, Iran*

Burn injuries are a major cause of morbidity and mortality among burn patients worldwide. Severe skin burn injuries are challenging to treat due to various problems, including pain, infection, and scars.

When a burn damages the skin's extended surface, restoring the skin barrier is critical to avoid sepsis and severe fluid loss. The standard of therapy in this instance is early surgical excision and autologous skin grafting, which is not always practicable owing to a lack of healthy skin and other structural restrictions that enable epidermis restoration but not dermis reconstruction.

Three-dimensional (3D) printing refers to manufacturing techniques that use digital data to create a physical model. Biocompatible materials, cells, and supporting components may now be 3D printed into complex 3D functioning living tissues, thanks to recent advancements in this field of interest.

3D bioprinting has more complications than non-biological printing, such as material selection, cell types, growth and differentiation factors, and technological obstacles relating to the sensitivities of living cells and tissue construction.

Intraoperative bioprinting (IOB) or 3D bioprinting directly into wounded regions in a surgical environment is an efficient procedure in which defect information may be quickly acquired and subsequently repaired by bioprinting on a living subject like skin the biggest organ in the human body. Although we expect a promising future of IOB In Burn surgery, It must be acknowledged that we are at the beginning of this technology and the new path that comes with it for treatment. A typical process for bioprinting 3D tissues is Imaging the damaged tissue, Design approach, Material selection, cell selection, bioprinting, and application

So it can be noted that different items need to be considered in order to be used as an efficient technology in the operating room; Also features such as functional accuracy, simultaneous printing, proper print speed, infection control, access to different parts of the body and various items that should be considered for the treatment and control of burn complications. Considering all of these issues in a critical process can challenge the IOB.

Meanwhile, IOB has a wide range of benefits for providing high-quality burn injury wound treatment. This technology offers less use of autologous skin and consequently minor invasion; scaffolds based on damaged tissue morphology optimally cover the wound, creating a suitable environment for wound healing with proper placement, leading to fewer scars. In this context, We can also define the ability to define the reconstruction of the subcutaneous layers, which is one of the limitations of a routine graft.

it seems that IOB can be considered potentially promising for treating burns injury wounds. However, We are at the beginning of the evolution of this technology, and there are various items to consider to obtain the benefits of the IOB and overcome the limitations of routine operations. In this study, we have reviewed this topic.

## **An Observational Study on Dermatologists Perceptions on Suicide in Dermatological Practice: A Study of Iranian Attitudes and Prevalence Estimations**

**Fatemeh Amini**

*Medical Student, West China School of Medicine, Sichuan University, Chengdu, Sichuan, China*

Background: chronic illnesses are risk factors for suicide. From a third-person perspective, the goal of the current study would be to determine the prevalence of suicide-related behaviors in atopic dermatitis, psoriasis, or acne patients (namely, Iranian dermatologists).

**Methods:** A link to a survey designed exclusively for this study has been issued to 380 independent dermatologists in Iranian; 39 of them participated.

**Results:** More than five patients with atopic dermatitis, psoriasis, or acne committed suicide in 2018, according to three dermatologists. Seven doctors treated for one to ten patients with suicide thoughts. These results are suggestive for a low rate of suicidal ideations in Iranian dermatology ordinations. These patients had a higher risk of suicide, which has been recognized by the majority of dermatologists in the sample (79%) Furthermore, 54% of participants said it would not be challenging for them to identify suicidal thoughts. Patients who were in a suicide crisis were reportedly helped by being referred to a psychiatrist or having a chat about it. In the sample, most challenging about suicide was lack of time and lack of knowledge. Furthermore, dermatologists were enthusiastic about collaborating with mental health specialists and bringing innovative preventative methods into practice (e.g., suicide-related training programs). Results suggests that private specialists visited fewer patients but spent much more time with them than contract doctors. Nevertheless, these difficulties associated not seem to have an impact on the standard of care they provide. The degree to which doctors notify their patients that extra psychological therapies may be beneficial and investigate about their emotional condition was used to define the quality of the therapy. Positive effects on treatment quality were seen in patients who were female and had a background in psychology.

**Conclusions:** Dermatologists' underestimation of the problem and Iran's effective healthcare system are two possible explanations for the low incidence of reported depression and suicidal thoughts. The study has implications for improving dermatologists' and mental health experts' collaboration and addressing patient suicidality from a first-person perspective (i.e., the patients).

**Keywords:** Suicide prevention, Suicidality, Mental health, Psychodermatology, Skin disorders Dermatology

## **Pain Management in Burned Adults: An Integrative Review**

**Qazal Ghaderi**

*nurse, msn, thz med, sanandaj, iran*

**Introduction:** The development of more effective methods to relieve pain caused by burn injury is a major unmet medical need. Acute burn pain is not only a source of great suffering, but is also associated with debilitating chronic pain and stress-related disorders. The purpose of this study is to investigate ways to control pain in adult burn patients.

**Method:** The present study is an integrated review, in five stages of text search, text selection, data evaluation, data extraction and data classification.

Articles were searched in the databases of PubMed, Cochrane library using the keywords Pain, Nurs\*, Burn, considering the time limit of 2019-2022 in order to obtain the latest results. Finally, 8 articles were included in the study.

**result:** The effect of dhikr and worship, pregabalin, foot reflexology, guided imagery, encouraging activities of nurses, guided imagery, the effect of methoxyflurane and the lack of effect of having a distinct behavioral response of stimulation of the primary motor cortex on burn pain are among the findings of this study.

**Conclusion:** A review of clinical trials conducted in the world showed that most interventions to reduce burn pain were effective, but due to the small number of articles, it is not possible to comment on a specific method; Therefore, it seems that there is a need for researchers to reconsider and conduct more clinical trials to control burn pain.

**Keywords:** pain, nurse, burn

## Novel Pentoxifylline-loaded Gel-nanofibers for Burn Wound Healing

Zahra Shahravi<sup>1</sup>

Mohammad Amir Amirkhani<sup>1\*</sup>

Mehdi Mehdikhani<sup>2</sup>

Mahsa Mollapour Sisakht<sup>3</sup>

Shadi Farsaei<sup>4</sup>

*1. Skin and Stem Cell Research Centre, Tehran University of Medical Sciences, Tehran, Iran*

*2. Department of Biomedical Engineering, Faculty of Engineering, University of Isfahan, Isfahan, Iran*

*3. Stem Cell and Regenerative Medicine Center of Excellence, Tehran University of Medical Sciences, Tehran, Iran*

*4. Department of Clinical Pharmacy and Pharmacy Practice, School of Pharmacy, Isfahan University of Medical Sciences, Isfahan, Iran*

**Introduction:** Skin is a largest organ of body which protect body from different pathogen, regenerative medicine proposed new generation of smart wound dressing to accelerate wound healing and led to decrease significant burden on patients and healthcare systems. Here we describe assessment and characterization of novel nanofiber created by electrospinning machine from polyvinyl alcohol/gellan gum/polycaprolactone along with compound called pentoxifylline.

**Methods:** amount of polyvinyl alcohol/gellan gum nanofibers containing drug were optimized in different concentration, then cross-linked for long stability. Topography characteristics were investigated with SEM and AFM imaging. Biocompatibility, degradation, swelling, and drug released survived by MTT and Spectrophotometry. Besides, contact angle, mechanical properties, water absorption and FTIR was carried out.

**Results:** In this case study, results show that nanofiber is quite similar to extra cellular matrix and porous structure is suitable to traps the cells. Cross-linker importantly enhances the viscosity of linear gel by increasing the molecular simultaneously. Moreover, load of active agent is provided slow and continuous drug delivery. Swelling and contact angle test show gel-nanofibers moisturizes the surface of the dehydrated burn wound. Pentoxifylline delivery improves its

efficacy by controlling the rate, time and place of release of drugs in the body.

**Conclusion:** This study showed the ability of combination of polyvinyl alcohol/gellan gum/polycaprolactone in generation stable and well-defined wound dressing which is also contain compound to increase wound healing process. Further study on preclinical and clinical setting may show the ability of healing effect as long as prevent scar formation and/or infection.

**Keywords:** Nanofiber, Regenerative medicine, wound, Pentoxifylline

## Wound Care in Special Population

Niayesh Mohebbi

*Pharm. D, iBCPS. Department of clinical pharmacy, TUMS*

Clinicians are progressively understanding that, compared with adults, other special populations, such as pediatric patients require special consideration, protocols, guidelines, and standardized approaches to ulcer and wound prevention and management. Regarding prevention, it is important to bear in mind the specific population has more risk of ulcers. Clinical knowledge and practice have advanced since the first risk assessment instrument was developed. Risk assessment instrument factors and subscales can be helpful in this regard. It is imperative that instruments be regularly reviewed against the current science of PI development and validated by reporting reliability, sensitivity, specificity, and predictive values. These instruments are a means for common communication and practice among direct care providers to protect pediatric patients. Prevention strategies for optimal skin health is also recommended. Skin integrity, using moisturizer but avoiding excess moisture is critical cases, because skin is susceptible to injury not only from moisture, but also the chemicals found in moisture sources such as stool, urine, respiratory devices, and caustic gastrointestinal effluent. In general, breakdown, excoriation, dryness, erythema, skin moisture, skin type, skin condition, skin tolerance should be noted. Wound care practices are currently based on a combination of provider experience and preference as well as a small

number of published clinical guidelines based on expert opinion. This includes the choice of specific dressings or other wound care products for specific population particularly pediatric patients. Transparent films and hydrocolloids were favored at one point, especially in the younger pediatric populations. However, their increased propensity to cause skin stripping and/or moisture-associated skin damage has caused them to fall out of favor. Medical-grade honey has been used more recently because it is seen as a natural product and people respond positively to natural and gentle dressings that are effective and easy to use. Overall rigorous evidence-based criteria and clinical guidelines for wound management for these populations are required.

## **Carnosine as a Promising Dipeptide in Wound Healing**

**Mehdi Khoobi**

*Department of Radiopharmacy, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran  
Biomaterials Group, The Institute of Pharmaceutical Sciences (TIPS), Tehran University of Medical Sciences, Tehran, Iran*

Employment of the advanced and cost-effective biomaterials accelerating the healing and restoration of the tissue with the ability to mimic the features of the skin paves the way to reach an ideal wound dressing. Among different types of the natural biomaterials, peptides have attracted great attention due to their safety, biodegradability, relatively low-cost as well as low production complexity. They participate in wound healing process through multiple mechanisms including stimulation of the cytokine production, cell proliferation and migration, angiogenesis, immunomodulation, and anti-infection activities. Carnosine is a natural dipeptide mostly available in brain and muscles, discovered by Vladimir Gulevich in 1900. As an endogenous antioxidant, it is synthesized from  $\beta$ -alanine and L-histidine by carnosine synthetase and could be degraded by carnosine dipeptidases 1 and 2, decreasing its bioavailability and therapeutic efficacy. Carnosine derivatization or immobilization are two strategies improving its stability in

physiological media, while simultaneously enhancing or at least maintaining the positive effects of the conjugated part. Various biological activities have been so far reported for carnosine including antioxidant, anti-glycating, metal ion chelation, anti-aging, anti-inflammatory, and neuroprotective activities making this valuable dipeptide as a promising candidate in medical applications. It is also an interesting available biomaterial accelerating wound closure through quenching free radicals, promoting granulation, improving the tensile strength in the wound area, and stimulating epithelialization, and angiogenesis. Our findings revealed that silk fibroin or Carbopol gel containing carnosine-enriched bentonite (CEB) with acceptable rheological properties, favorable biocompatibility, acceptable swelling behavior, could improve the cell adhesion, and migration. Our studies also exhibited that the prepared dressings could better reduce inflammatory cells and improve epithelialization, as well as angiogenesis than the controls.

## **Exosome Derived from Stem Cell: A New Promising Option for Wound Healing**

**Ehsan Taghiabadi**

*Skin and Stem Cell Research Center, Tehran University of Medical Sciences, Tehran, Iran*

A wound occurs when the epidermis and dermis of the skin are damaged internally and externally. The traditional wound healing method is unsatisfactory, which will prolong the treatment time and increase the treatment cost, which brings economic and psychological burdens to patients. Therefore, there is an urgent need for a new method to accelerate wound healing. As a cell-free therapy, exosome derived from stem cell (EdSC) offers new possibilities for wound healing. EdSC is the smallest extracellular vesicle secreted by stem cells with diameters of 30–150 nm and a lipid bilayer structure. Previous studies have found that EdSC can participate in and promote almost all stages of wound healing, including regulating inflammatory cells; improving activation of fibroblasts, keratinocytes, and endothelial cells; and

adjusting the ratio of collagen I and III. EdSCs are small in size and efficient, low immune rejection, and have special physiological and biological functions, which have significant advantages for the treatment of wounds. The most difficult component of the research of exosomes is the inadequate number of exosomes meeting the application standards. In the near future, advances in the scaling-up technology for GMP compliant exosome manufacturing will enhance the applications of exosomes for wound healing.

Keywords: exosome, stem cell, wound healing, therapeutics, wound

## **The Investigation of Viability and Proliferation Potential of Mesenchymal Stem Cells Entrapped in Chitosan Hydrogel**

**Amirreza Asadi<sup>1</sup>**

**Halime Hasanzadeh<sup>2</sup>**

**Alireza Sadeghi - avalshahr<sup>3</sup>**

**Zahra Esmaeili<sup>4</sup>**

**Mahsa Haqbin<sup>5</sup>**

**Hamid Reza Bidkhor<sup>6</sup>**

**Majid Momeni Moghaddam<sup>\*7</sup>**

*1. M.Sc. student, Cell and Molecular Biology, Department of biology, Faculty of Sciences, Hakim Sabzevari University, Sabzevar, Iran / Stem Cell and Regenerative Medicine Research Group, Academic Center for Education, Culture and Research (ACECR)-Khorasan Razavi, Mashhad, Iran*

*2. Instructor (Ph.D candidate), Cell and Molecular Biology, Stem Cell and Regenerative Medicine Research Group, Academic Center for Education, Culture and Research (ACECR)-Khorasan Razavi, Mashhad, Iran*

*3. Instructor (Ph.D candidate), Biomaterial Engineering, Department of Materials Research, Iranian Academic Center for Education, Culture and Research (ACECR)-Khorasan Razavi, Mashhad, Iran*

*4. M.Sc, Cell and Molecular Biology, Stem Cell and Regenerative Medicine Research Group, Academic Center for Education, Culture and Research (ACECR)-Khorasan Razavi, Mashhad, Iran*

*5. M.Sc, Biomaterial Engineering, Department of Materials Research, Iranian Academic Center for Education, Culture and Research (ACECR)-Khorasan*

*Razavi, Mashhad, Iran*

*6. Assistant Professor (MD, Ph.D.), Cell and Molecular Biology, Stem Cell and Regenerative Medicine Research Group, Academic Center for Education, Culture and Research (ACECR)-Khorasan Razavi, Mashhad, Iran*

*7. Associate Professor, Cell and Molecular Biology, Department of biology, Faculty of Sciences, Hakim Sabzevari University, Sabzevar, Iran*

Introduction: Diabetic ulcer is classified as chronic ulcer due to hyperglycemic conditions, growth of bacteria and lack of blood supply, and unfortunately, today's treatment methods have not achieved the desired results. In this research, we used Adipose-Derived Mesenchymal Stromal/Stem Cells (AD-MSCs) to investigate the growth, proliferation and survival of these cells encapsulated chitosan hydrogel, due to their unique characteristics such as high accessibility with minimal invasion and no ethical restrictions and their immunomodulatory potential. One of the remarkable features of chitosan hydrogel is its intrinsic antimicrobial property, which causes microbial defense in the wound area. The innovation of this research in the synthesis of chitosan hydrogel is due to the presence of abundant water and the simulation of extracellular matrix space for these cells. By combining these cells with hydrogel, we examine the adhesion and functional properties of these cells.

Methods and Results: To isolate AD-MSCs, we washed the sample obtained from liposuction three times with PBS solution containing antibiotics, and then we used a fresh solution of collagenase supplemented with bovine serum albumin, and calcium chloride. In order to digest adipose tissues, they were added to the above solution. After incubation and centrifugation, the cell pellet was suspended in the DMEM culture medium (%10 fetal bovine serum) and transferred to the flask to be maintained in the incubator at 37. For the synthesis of chitosan hydrogel, we combined 3.33% chitosan solution with 0.5 M  $\beta$ -GP solution. In order to evaluate the adhesion and viability of the cells after 1, 3 and 5 days, we used 24-well plates to culture AD-MSCs in combination with chitosan hydrogel. At each time point, the survival and proliferation of cells were examined by the following tests: FDA/PI staining and evaluation by a fluorescent microscope were performed and the result showed 92% of survival. The

electron microscope. (FE-SEM) images also indicated the distribution of highly proliferated adhering cells.

Conclusion: This research shows that chitosan hydrogel provides optimal conditions for the growth, proliferation and survival of AD-MSCs in vitro and can be introduced as a suitable option as a biological dressing in wound healing.

Keywords: Wound healing, Chitosan hydrogel, AD-MSCs

## **Macroscopic Assessment of Burn Wound Healing Following Umbilical Cord Mesenchymal Stem Cells Transplantation**

**Milad Ghasemi<sup>1</sup>**

**Peyvand Parhizkar Roudsari<sup>2</sup>**

**Alireza Takzare<sup>3</sup>**

**Nasrin Takzare<sup>3\*</sup>**

*1. Tehran University of Medical Sciences, Tehran, Iran*

*2. Cell Therapy and Regenerative Medicine Research Center, Endocrinology and Metabolism Molecular-Cellular Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran*

*3. Department of Anatomy, School of Medicine, Tehran University of Medical Science, Tehran, Iran*

Burns are still one of the fundamental concerns of health care organizations due to their significant influences on patients' physical/mental status. Burns themselves can have some serious and life-threatening effects in the acute phase, and on the other side, improper or insufficient treatment can be associated with infections, skin discoloration, psychological distresses, cosmetic issues, and many other complications. Despite the discovery of a diversity of therapeutic tools in this regard, a lack of more efficient therapeutic tools with more capabilities and free of adverse effects can be noticed, which recalls researchers for novel approaches. So far, MSC-based therapies have proven their ability in regeneration processes to aid wound repair in all its different stages. The transplantation of umbilical cord mesenchymal stem cells (UCMSCs) can be one of the ideal candidates because of their advantages like their easier accessibility and safe use

besides their rich sources with higher proliferation/differentiation rates. Thus, we have evaluated the burn surface alterations in 24 Wistar rats in two groups of UCMSCs and the control group to find out if UCMSCs can hasten the repairing process. Considering ethical guidelines and under sterile conditions, wounds were created after anesthetic steps. Thereafter, on days 7, 10, 14, and 21 burn surface was evaluated using the related formula to achieve wound repair percentage. The results have shown the statically significant strength of UCMSCs to accelerate wound repair in all of the evaluation days using the one-way analysis of variance (ANOVA) test (P Value <0.05). On day 21, the healing percentage was near 100% in the UCMSCs group, whereas the control group showed approximately 65% that strongly emphasized on the successfulness of utilizing UCMSC for wound healing. Regarding the capabilities of UCMSCs in their nature and the remarkable potency of UCMSCs established by our study and several other similar works on animals, further clinical studies (in human beings in particular) and on larger scales seem to lead to satisfactory results. Also, histopathological features of burns could be included in future studies to indicate UCMSCs' effects on different wound healing properties.

Keywords: Wound Healing, Cord Blood Stem Cell Transplantation, Burns, Wounds and Injuries

## **Clinical Application of Growth Factors in Wound Healing**

**Majid Golkar\***

**Pezhman Fard-Esfahani**

*Associate Professor, Pasteur Institute of Iran, Tehran, Iran*

Growth factors are endogenous signaling molecules that regulate cellular responses for the wound healing processes of migration, proliferation, and differentiation. Wound healing is a complex process influenced by a variety of factors. At each healing stage, a different set of specific cytokines and growth factors must interact with their receptors, other growth factors, and extracellular matrix (ECM) components at their target sites. Several studies have

identified decreased levels of specific growth factors involved in the wound healing process through analysis of wound fluid. As such, growth factors have been proposed as therapeutic agents to promote wound repair. On the other hand, clinical application of growth factors might be hampered because of a short in vivo half-life due to their low stability, restricted absorption through the skin around wound lesions and elimination by proteinases present in wound exudate. Here, we review clinical efficacy of growth factors in wound healing, and elaborate new strategies to overcome above-mentioned limitations in clinical application of growth factor. Keywords: wound healing, growth factors, clinical application

## The Significance of Identifying the Crucial Genes in Expanding the Most Recent Therapy by Using Mature Cells and Stem Cells for Wound Healing

Hosna Basiri Kheradmand Tehrani<sup>1</sup>

Seyed Mehdi Tabaie<sup>2</sup>

Mina Sadat Naderi<sup>3\*</sup>

*1. Department of Cellular and Molecular Biology, Faculty of Biological Science, North Tehran Branch, Islamic Azad University, Tehran, Iran*

*2. Department of Medical Laser, Medical Laser Research Center, Yara Institute, Academic Center for Education Culture and Research ACECR, Tehran, Iran*

*3. Department of Biophysics, Faculty of Biological Sciences, North Tehran Branch, Islamic Azad University, Tehran, Iran.*

Introduction: The fundamental driver behind the development and investigation of treatment options is the significant proportion of people in statistical society who suffer from chronic wounds. One of the most recent techniques, gene therapy, has two components. the first is based on the permanent insertion of DNA, and the second is the temporary transformation and short-term expression of a gene product. We believe that a better understanding of how stem cells, especially MSCs and wound

healing interact will aid in preventing scarring and promoting reparative healing.

method: «Harmonizome»«Gene Ontology and GO Annotations» «AmiGO 2»«panther»«index» PubMed, and other publication resources, were used for searching the literature

Result: advantages of using stem cell technology include its simplicity, minimal immunogenicity, and its eventual function in the physiology of wound healing. In order to cure wound repair, 71 critical genes have been chosen. These genes are categorized into 5 major areas based on their performance, including molecular function, biological process, cellular components, protein class, and pathways. Investigating the functions of the genes led to the formation of groups that demonstrated the significance of many of those genes involvement in cellular processes, cellular anatomical entities, protein-containing complexes, transmembrane signal receptors, intercellular signal molecules, angiogenesis, and binding. This grouping enables us to comprehend that activating a particular gene result in a considerable rise in the products concentration, rendering it unable to maintain and promote all stages of wound healing.

Discussion: The next generation of tailored therapy for the treatment of chronic wounds is being developed using induced pluripotent stem cell technology (iPSC). The benefit of this approach is that we can address each specific stage of wound healing by understanding how the genes work to quicken the healing process. we can manage «epigenetic differentiation» and eventually produce the targeted differentiation and diversity of epigenetics by using specific marks like DNA methylation and histone modification. In particular, if they shared an embryonic origin with the target cell type, it is the primary secret to directly changing one type of somatic cell into another. we want to discuss the result of activating some genes in particular mature cells and stem cells and use them in these novel approaches by identifying the most crucial genes.

Keywords: chronic wounds, gene therapy, stem cells, somatic cell, crucial genes

## Cell - based Therapy for Epidermolysis Bullosa

**Fatemeh Makalani\*<sup>1</sup>**

**Azam Bozorgi<sup>2</sup>**

*1. Student Research Committee, Kermanshah University of Medical Sciences, Kermanshah, Iran*

*2. Department of Tissue Engineering, School of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran*

*3. Fertility and Infertility Research Center, Health Technology Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran*

**Introduction:** Epidermolysis bullosa (EB) is a heterogeneous group of rare hereditary blistering disorders with an incidence of 1.4–25.0 per million live births and a prevalence of 2.82–54.0 per million population. The most recent classification of EB includes four major classical forms, EB simplex (EBS), junctional EB (JEB), dystrophic EB (DEB), Kindler EB (KEB), and several other skin fragility disorders under its term of EB. Most forms of EB result from recessive or dominant mutations in genes encoding structural proteins at or near the dermal-epidermal junction (DEJ). Sixteen genes contribute to the classic EB genetic pathology, and an additional 24 genes add to the full list of candidate genes in the broader classification of EB. Clinically, some forms of EB such as localized EBS give only a few seasonal blisters that may be confined to the toes. In contrast, other forms of EB can produce more extensive blisters and often involve various mucous membranes and noncutaneous lesions such as muscles, gastrointestinal tract, lungs, and kidneys. This diversity of clinicopathology poses great challenges to optimizing patient management. To date, most treatments have focused on improving wound healing and treating patient symptoms such as itching and pain. However, there is no cure for EB and there is a significant unmet need to improve clinical care and quality of life for patients. In recent years, attempts have been made to develop gene, cell, and protein therapies aimed at correcting the underlying primary genetic pathology in various forms of EB. Cell-based therapies use primary cells, blood cells, stem cells, stromal cells, progenitor cells, or iPSCs alone or in combination with

preconditioning, fractionation, or genetic modification. **Materials and Methods:** This study aimed to explore the latest developments in cell-based therapies for EB. Therefore, Science Direct, PubMed, and Scopus databases were explored and related original articles and clinical trial studies were investigated with the keywords Epidermolysis bullosa, cell therapy, and wound healing.

**Results:** In EB, cell therapy, including keratinocytes, fibroblasts, bone marrow transplantation (BMT), stem/stromal cells (MSCs), and iPSCs, was evaluated in several trials. initial clinical trial. It includes autologous, allogeneic, or autologous donors.

**Keratinocytes:** According to the technical feasibility of human keratinocyte cultures in 1975, autologous keratinocytes from.

**Keywords:** Epidermolysis bullosa, cell therapy, and wound healing

## What is New in Epidermolysis Bullosa: Report of a Challenging Wound

**Parvin Mansouri\*<sup>1</sup>**

**Katalin Martits-Chalangari<sup>2</sup>**

**Reza Chalangari<sup>2</sup>**

*1. Medical Laser Research Centers, Academic Center of Education - Culture and Research, Tehran University of Medical Sciences, Tehran, Iran*

*2. Kassir Dermatology, Dallas, Texas, USA*

Epidermolysis Bullosa (EB) is a prototype of rare genetic disorder of mucocutaneous fragility after minimal trauma.

Blisters formation, skin peeling, erosions and ulceration occur in various body parts with significant morbidity.

Next Generation Sequencing (NGS) is the gold standard for diagnosis of EB. There is no definitive treatment and cure remains elusive. Four major subtypes depending upon the localization of the defective proteins in skin layers have been recognized.

There are novel experimental therapies including causal strategies that mainly focus on replacing or silencing genes and management of comorbidities including



blister, pruritus, wound healing, and correction of deformities. In this case, Losartan as an antifibrotic agent combined with PRP and hyperpolarized light improved wound healing in recessive dystrophic EB.

## Management of Radiation Dermatitis: An Overview

**Nasrin Zand**<sup>\*1</sup>

**Hoda Mahdavi**<sup>2</sup>

*1. Assistant Professor of Dermatology, Department of Medical Laser, Yara institute, Academic Center for Education, Culture and Research (ACECR), Tehran, Iran*

*2. Radiation oncology department, school of medicine, Iran University of Medical Sciences, Tehran, Iran*

Radiation dermatitis (RD) is a common complication of radiation therapy (RT); nearly 95% of patients undergoing radiotherapy will develop RD. Although RD may resolve over time, it can have a profound effect on patients' quality of life and lead to dose modifications. Acute radiation dermatitis manifests within 90 days after the induction of RT, while chronic radiation dermatitis develops beyond 90 days (months to years) of radiation. The risk factors associated with RD can be characterized as extrinsic, intrinsic or both. Extrinsic risk factors include cumulative dose, fractionation and technique of radiotherapy. The intrinsic factors include body site, age, sex, smoking habits, nutritional status, obesity, concurrent chemotherapy and targeted therapy, genetic risk factors (such as ataxia telangiectasia, Gorlin syndrome), connective tissue diseases (such as systemic lupus erythematosus, scleroderma), infectious disease (HIV), radiosensitizers (systemic therapies), etc.

Despite recent improvements in technology and the development of new treatments, there is no definitive therapeutic option for prophylaxis and treatment of RD. While many different therapeutic strategies are currently used for management of RD, there is a lack of consensus in this field. RD prophylaxis and treatment guidelines have remained largely unchanged over the past years. Due to great discordance among different guidelines' recommendations, further research is necessary to establish optimal treatments for RD prophylaxis and treatment.

## Systemic Photodynamic Therapy for Nodular BCC

**Seyed Mehdi Tabaie**<sup>1\*</sup>

**Parvin Mansuri**<sup>2</sup>

**Mina Sadat Naderi**<sup>3</sup>

*1. Associate Professor Department of Medical Laser, Medical Laser Research Center, Yara Institute, ACECR, Tehran, Iran*

*2. Professor of Dermatology, TUMS, Tehran, Iran*

*3. Assistance Professor of Biophysics, North Tehran Branch, Islamic Azad University, Tehran, Iran*

BCC is the most common human cancer.

Photodynamic therapy (PDT) is a therapeutic method for basal cell carcinoma (BCC).

This is our experienced case report about Systemic Photodynamic Therapy with Chlorine e6 as a Photosensitizer for BCC Treatment

A 78-year-old man was diagnosed with a 4-year history of nodular BCC on the nose area. The patient had under control and treatment for hypertension and type 2 diabetes. Chlorine e6 was injected intravenously at a dose of 0.08 mg/kg in 500cc normal saline within 20 minutes. After 3 hours of injection, Laser irradiation was performed with the wavelength of 665 nm, a dose of 150 j/cm<sup>2</sup>, the irradiance of 150 mW/cm<sup>2</sup>. His nodular BCC has been completely cured after 1 session of PDT with chlorin e6 without any side effects.

Systemic PDT with Chlorine e6 as a Photosensitizer has been safe and effective in the removal of BCC lesions due to the data achieved in a two-month follow-up

## Photodynamic Therapy of Vit A & D in BCC Skin Cancer: In Vitro Study

**Mina Sadat Naderi**<sup>1\*</sup>

**Seyed Mehdi Tabaie**<sup>2</sup>

*1. Department of Biophysics, Faculty of Biological Sciences, North Tehran Branch, Islamic Azad University, Tehran, Iran.*

*2. Department of Medical Laser, Medical Laser Research Center, Yara Institute, Academic Center for Education Culture and Research (ACECR), Tehran, Iran*

**Background:** Melanoma, the deadliest type of skin cancer in humans, is caused by mutations in melanocytes located in the basal layer of the epidermis. It accounts for 80% of skin cancer passing due to its metastatic capacity and resistance to chemotherapy treatment. There are different treatment methods for cancer. photodynamic therapy is a promising treatment method for all types of cancer. Photodynamic therapy is a minimally invasive treatment for diseases such as cancer. the advantage of this method is the use of non-ionizing radiation, which leads to minimal damage to DNA and surrounding tissues, so this method can improve the method by using different photosensitizers with different optical wavelengths according to the target tissue. We aimed to investigate the effect of photodynamic effect of Vit A & D in the melanoma A375 skin cancer cell line.

**Methods:** in this study, we used four different concentrations of vitamins A and D with a low-level laser ( $\lambda= 685$  nm, energy doses of 2 and 5 joules per square centimeter). the viability of cancer cells was evaluated via the MTT test and also apoptosis, and cellular ROS levels were performed via flow cytometry.

**Results:** The results of the MTT test showed that the photodynamic effect of 50  $\mu$ M of vitamin A and 35  $\mu$ M of vitamin D with low-level laser radiation with an energy dose of 5 joules per square centimeter were decreased significantly in A375 cells. Besides, the rate of apoptosis and ROS generation of these cancer cells were increased considerably under the mentioned condition in vitro.

**Conclusion:** Our work can be an effective step in improving cancer cell therapy. The more we deepen our understanding of low-level laser mechanism and vitamin A and vitamin D effects on cancer cells, the more possibility we have to achieve effective approaches in this case.

**Keywords:** Skin cancer, Photodynamic therapy, Vitamin A, Vitamin D

## **Applications of Polarized Light in Tissue Healing**

**Afshan Shirkavand**

*Assistant prof of Biophotonics, Medical Physics, Photodynamic therapy group, Medical Laser Research Center, YARA institute, ACECR, Tehran, Iran*

Polarized light is light waves in which the vibrations occur in a single plane. Polarization is produced by Reflection, scattering, and Passing through designed filters. Light lamps or LEDs or laser therapies are a newer entity, which utilize light of a single specific wavelength, typically characterized by color. The most common modalities: yellow, green and red. Phototherapy is characterized by its ability to induce photobiological processes in both cellular and subcellular levels. Many studies and researches have recommended the successful application of light therapy in the management of diabetic foot ulcer, acceleration of healing rate and recovery to overcome this serious problem.

Polarized light therapy (PLT) utilizes visible-spectrum polarized light for a number of clinical applications. The advantage of polarized light is that it is able to penetrate the skin to a depth of up to 5 cm, reaching deeper tissues involved in wound healing. PLT has been shown to accelerate the healing process for ulcers, surgical wounds and dermal burns as well as a small number of musculoskeletal injuries. PL varies from other types of light therapy in that it uses a considerably wider spectrum of wavelengths than LLLT or UV. Then, PLT devices are often less expensive and simple to operate. The aim of this presentation is to review some of the Applications of polarized light in tissue healing.

## **Highly Effective Inhibition of Pseudomonas Aeruginosa Biofilm Formation by Sublethal Methylene Blue-photodynamic Inactivation Augmented by Graphene Oxide Quantum Dot**

**Yeganeh Tavousi<sup>1</sup>**

**Esmail Darabpour<sup>2\*</sup>**

*1. Department of Biology, Faculty of Science, Shahid Chamran University of Ahvaz, Ahvaz, Iran*

*2. Department of Biology, Faculty of Science, Shahid Chamran University of Ahvaz, Ahvaz, Iran*

The pathogenesis of chronic Pseudomonas aeruginosa infections is mainly due to its capacity to form

biofilms. Antimicrobial photodynamic inactivation (APDI) is a promising novel strategy for targeting biofilm-related infections. Nanoplatfrom-based photosensitizer systems can improve the efficiency of APDI. The objective of this study was to evaluate whether graphene oxide quantum dots (GOQDs) could enhance the efficiency of sublethal methylene blue (MB)-induced PDI in preventing the formation of *P. aeruginosa* biofilm.

At first, methylene blue (MB) was immobilized on to the negatively-charged GOQDs. The planktonic cell growth of *P. aeruginosa* was exposed to lethal and sublethal PDI by using MB alone and MB-GOQD conjugate (at the same MB concentration) combined with a red laser (650 nm). Then, biofilm formation ability of *P. aeruginosa* strain exposed to sublethal PDI (sPDI) was evaluated using crystal violet (CV) assay and scanning electron microscopy (SEM).

Sublethal MB/GOQD-mediated PDI (at the final concentration of 25  $\mu$ M MB) significantly reduced biofilm formation up to >95% while sublethal MB-mediated PDI (at the final concentration of 25  $\mu$ M MB) slightly reduced biofilm formation. Electron scanning microscopy images confirmed the potent ability of GOQDs to augment inhibition of *P. aeruginosa* biofilm formation by sublethal MB-mediated PDI.

In summary, the results of this study demonstrated that sublethal APDI using hybrid GOQD-MB nano-photosensitizer is a promising approach to combat *P. aeruginosa* infections.

Keywords: antibiotic resistance, nanomedicine, photodynamic therapy

## **Microbial Biopolymers and Their Applications in Medical Biotechnology**

**Abbas Akhavan Sepahi**

*Department of Microbiology, Faculty of Biological Sciences, Islamic Azad University, North Tehran Branch, Tehran, Iran*

Biopolymers are a inharmonic, acquiescent group of

materials that can be synthesized or obtained from several biological compounds or their building blocks, such as sugars, amino acids, lipids, and nucleic acids, sourced from living organisms such as animals, plants, and microbes. Thus, they are broadly divided as carbohydrates or polysaccharides (e.g., glycogen, starch, and cellulose), proteins or polypeptides, nucleic acids or polynucleotides (e.g., DNA, RNA), lipids, and synthetically derived materials from resins, vegetable oils, and fats. Their unique properties like the possession of diverse functional groups and the ability to adopt precise 3D shapes and structures empower biopolymers to function as bioactive biomolecules capable of playing several biological roles. Biopolymers present some advantages such as a well-defined and more complex structure responsible for their biological activities, biodegradability, inexpensiveness, and renewability along with some distinctive features of smart biopolymers such as sensitivity to light intensity, pH, temperature, humidity, and electromagnetic fields. Microorganisms play a significant role in producing a great variety of biopolymers, ranging from viscous solutions to plastics, such as polysaccharides, polyesters, polyamides, and polyphosphates. The microbial biopolymers can be effectively produced from pure cultures, selective laboratory mutants, or genetically modified microorganisms. They are acquiring a significant place in a wide range of biomedical applications for use as medical, pharmaceutical and biotechnological materials, cosmetics, food additives, biosensors, absorbents, packaging materials, along with regular industrial applications such as industrial plastics, clothing fabrics, water treatment chemicals, data storage elements, and many more. In this chapter, we specifically reviewed the leading microbial biopolymers and their wide range of specific applications in the field of Medicine, Pharmacy, and Biotechnology.

## **Application of Fungi in Wound Healing**

**Mohaddeseh Larypoor**

*Assistant professor of Mycology, Faculty of Biological Sciences, Department of Microbiology and Biotechnology, Islamic Azad University, North Tehran Branch, Tehran, Iran*

The extracellular matrix (ECM) is the largest gel-like component of the skin and is produced by skin cells and is a key factor for filling skin lesions such as burns. ECM Contains different polysaccharides, water, and, collagen proteins. Natural skin has high elasticity and compressibility that the combined effect of two main groups of ECM constituent molecules that are secreted by fibroblasts and epidermal cells: Fibrous structural proteins such as collagens, elastin, fibronectin, and laminin, which give strength and elasticity to the ECM and proteoglycans such as dermatan sulfate and hyaluronic which usually consist of several glycosaminoglycan strands that branch from a protein core. Proteoglycans are large, water-absorbing molecules that create the shock state of ECM to protect cells. Primary and sometimes secondary metabolites isolated from yeast, yeastlike, saprophytes and mushrooms especially of cell wall polysaccharides, can effectively activate cells and solutions for wound healing. Metabolites of fungi cause the migration and proliferation of fibroblasts and keratinocytes, antibacterial and antifungal effects by producing the antibacterial effect of TGF- $\beta$  against *Staphylococcus aureus* and also by producing IL-1, they reduce wound inflammation. Nanofiber dressings prepared from fungal polysaccharides by electrospinning method, like chitosan, due to their bioactivity, high surface-to-volume ratio, biodegradability, three-dimensional and porous structure, maintain moisture in the injury site, prevent infection and increase oxygen supply, accelerate wound healing. Nanofibers allow fibroblast cells to adhere and grow by facilitating the exchange of moisture and oxygen and accelerating the wound-healing process. Fungi nanofibers have good potential for use as wound dressings. It is suggested that antimicrobial and skin-restoring drugs are mounted on nanofibers prepared from fungi and slowly released on the wound site.

**Keyword:** Fungi, wound healing, Inflammation, Chitosan, Yeast, Saprophyte

## **Effect of Zinc Oxide Nanoparticles on Biofilm Expression in Methicillin-resistant *Staphylococcus Aureus* Isolated from Burn Wound Infection**

**Zahraa Neamah Abbas**<sup>1,3\*</sup>

**Hanaa N. Abdullah**<sup>3</sup>

**Bijan Ranjbar**<sup>1,2</sup>

*1. Department of Nanobiotechnology, Faculty of Biological Sciences, Tarbiat Modares University, Tehran, Iran*

*2. Department of Biophysics, Faculty of Biological Sciences, Tarbiat Modares University, Tehran, Iran*

*3. College of Health and Medical Technology, Middle Technical University, Baghdad /Iraq*

**Introduction:** Methicillin-resistant One of the main nosocomial pathogens that causes a variety of diseases and the most common one is *Staphylococcus aureus* (MRSA) isolated from burn wound infection. Antibiotic resistance in bacteria has caused a wide range of medications to have treatment limitations. An intriguing area of nanotechnology nowadays is the production of zinc oxide nanoparticles. Zinc oxide nanoparticles have well-known antibacterial and inhibitive properties. Pathogenic bacteria's development of antibiotic resistance has become a significant health issue in recent years. The purpose of this study was to evaluate the effectiveness of zinc nanoparticles against methicillin-resistant *S. aureus* that produces biofilm. Biofilm production was detected by the tissue culture plate (TCP) method.

**Materials and methods:** Out of 20 MRSA isolates, 16 isolates produced strong biofilms, whereas the remaining four produced only moderate and weak biofilms. Strong and Weak methicillin-resistant *S. aureus* isolates that produce biofilms were subjected to antibacterial activity using zinc oxide nanoparticles. The nanoparticles showed remarkably strong activity against the isolates, leading researchers to believe that they may have interesting antibacterial properties selected bacterial strains were allowed to grow on the wells of a 96  $\mu$ l well plate. The containing (100  $\mu$ l of 99 Brain Heart Infusion (BHI) fluids and 1  $\mu$ l

glucose) and add after dissolution of zinc oxide nanoparticles. Incubation was carried out at 37 C for 24 h. Cultures were then aspirated and the wells were washed three times with phosphate-buffered saline, pH 7.2. The plates were then air dried overnight and stained with 0.1 % crystal violet.

Results: The optical density of the wells was measured through a reading of the absorbance at 630 nm using an ELISA reader. The ZnO NPs were tested for antimicrobial Activity by well-diffusion 2 method against strong and weak biofilm-producing MRSA. An optical density of ( $\leq 0.122$ ) for weak biofilm producers, and ( $\geq 0.440$ ) were chosen to distinguish strong biofilm producers. by using ZnO NPs nanoparticle's 11 isolates became weak in biofilm production and 5 isolates became strong in biofilm production.

Conclusion: The binding of ZnO NPs to bacterial cell walls may be due to the electrostatic force between the cation  $Zn^{+}$  and anionic groups on the bacterial cell wall. Subsequently, the binding of ZnO NPs on the bacterial membrane and cell wall causes a change in the membrane potential. For example, ZnO nanoparticles exert their antibacterial activity by membrane disruption and ROS Production. The antibacterial activity of ZnO NPs against MRSA was evaluated using the tissue culture plate (TCP) method. The strong, weak, and medium inhibition phases were measured Using an ELISA reader with ZnO nanoparticles with biological molecules, knowing that bacteria carry a positive charge, but antibiotic molecules contain the negative charge and many active groups of amino and hydroxyl groups, while metal oxides carry a positive charge, thus causing an attraction between bacteria and the surface the processor that leads to oxidation of the microbe and death.

The study showed that Staphylococcus aureus (MRSA) isolated from burn wound infection of hospitalized patients had a high degree of ability to form biofilms. Biofilm-producing in strains tend to exhibit antimicrobial resistance, multidrug resistance, and methicillin resistance. Zinc oxide nanoparticles have been used as a material capable of disposing of a biofilm that gives bacteria a high resistance potential.

Keywords: biofilm, multidrug resistant, methicillin-resistant Staphylococcus aureus

## Investigating the Effect of Aloe Vera Juice on Infected Wounds in Male Wistar Rats

**Mohsen Karami<sup>1</sup>**

**Saeedeh Karami<sup>2\*</sup>**

**Zohreh Jafari<sup>3\*</sup>**

*1. PhD Student, Department of Biology, Faculty of Basic Sciences, Arak Branch, Islamic Azad University, Arak, Iran*

*2. Bachelor's student of cellular and molecular biology, Faculty of Biological Sciences, North Tehran Branch, Islamic Azad University, Tehran, Iran*

*3. Assistant Professor, Department of Biology, Faculty of Basic Sciences, Arak Branch, Islamic Azad University, Arak, Iran*

Mankind has always sought to find a substance that can accelerate the healing of wounds, and to achieve this goal, he has tested various plant and chemical substances. Due to various reasons such as side effects and the high cost of producing chemical compounds, the attention of researchers has been drawn to plant materials. In this project, the effect of aloe vera-barbadensis Miller juice on infected wounds of Wistar rats with Staphylococcus aureus and Pseudomonas aeruginosa strains has been investigated. 50 mice were adapted for one week and divided into five groups of ten. Then, under the same conditions, a wound with an area of 1.69 cm<sup>2</sup> was created on the back of each neck. The standard bacteria strains of Staphylococcus aureus and Pseudomonas aeruginosa were inoculated on the wound of the group in question and became infected. Aloe vera sap was collected and made into a 3% ointment with Eucerin base ingredient. After the second day, the treatment of wounds with topical ointment was started and this process was repeated every day and the dimensions of the wounds were recorded. Staphylococcus aureus and Pseudomonas aeruginosa with aloe vera juice treatment progressed in parallel with tetracycline treatment, and the difference between the two was in the healing time of the wound; So that the wounds caused by Staphylococcus aureus and treated with tetracycline improved on the eighth day, and the wounds caused by Pseudomonas aeruginosa were completely closed on the ninth day. However, the wound was treated with aloe vera juice without infection and caused the wounds to close completely on the seventh day. According to the mentioned

observations, we conclude that aloe vera juice, in addition to its antibacterial properties, can also show positive effects in wound healing.

Keywords: skin, aloe vera, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, infectious wound

## **Chitosan and Nano Silver Suspension in Wound Healing of Oral Candidiasis in Piglet Infected**

**Soheil Taherpouran<sup>1</sup>**

**Ensieh Lotfali<sup>2</sup>**

**Ali Asadi Zeidabadi<sup>1</sup>**

*1. Student Research Committee, School of Medicine, ShahidBeheshti University of Medical Sciences, Tehran, Iran*

*2. Department of Medical Parasitology and Mycology, School of Medicine, ShahidBeheshti University of Medical Sciences, Tehran, Iran*

**Introduction:** Oral candidiasis (OC) is a common opportunistic fungal infection. The most common *Candida* species associated with oral candidiasis is *Candida albicans*. There are different types of clinical manifestations. The thrush (pseudomembranous candidiasis) is the most common form. Nystatin is the most widely used topical agent for the treatment of OC. Recently, studies indicated notable drug resistance which causes unsuccessful treatment procedures. So, new alternative replacement drugs are required to increase the effect of nystatin on resistant *Candida* isolates. Due to the biodegradable and nontoxic properties of chitosan particles, it may be a proper choice in clinical applications. The purpose of this study is to determine the activity of nanosilver suspension and chitosan against resistant *Candida albicans* in wound healing of oral candidiasis in piglet infected.

**Materials and Methods:** The eight male pigs were infected by *C. albicans* and were randomly divided into four groups of two animals each. The first group included piglets whose oral wounds were infected with nystatin-resistant *Candida albicans* (NRCA). In the second group, piglets with infected wounds were only dressed with chitosan (NRCA/CHIT). In the third group, piglets with infected wounds were dressed in chitosan and nano silver (NRCA/CHIT/NS). In the fourth group, the wounds were created with no infection.

**Results:** There were significant differences in comparisons of group III and other groups, particularly in terms of the presence of white spots on the tongue, throat, and other areas of the mouth. In microscopic tests with methylene blue staining, the number of *Candida* yeast and pseudohyphae decreased significantly ( $P < 0.05$ ).

**Conclusions:** According to the importance of nystatin resistance in OC, the treatment of the disease seems to require more complicated procedures. The final results of this study indicate that final comparisons between groups of infected piglets with different dressed antifungal particles determine that using chitosan as a particle to nystatin can decrease the effects of OC more significantly. Therefore, with considerable demonstrated effects associated with nystatin as a complex clinical choice, it is suggested to modify this material as an appropriate treatment for OC.

Keywords: Oral candidiasis, Chitosan, Nanosilver, Wound healing

## **Biological Dressing**

**Atefeh Shahbazi**

**Hoda Keshmiri Neghab**

**Banafsheh Heidari**

**Masoud Habibi\***

*Department of Photo Healing and Regeneration, Medical Laser Research Center, Yara Institute, ACECR, Tehran, Iran*

Skin is the largest organ in human also it has three different layers: including epidermis, dermis, and hypodermis, which intrinsically are self-renewable which have various functions. Cells located on the surface of the skin are continuously being replaced by new cells from inner layers with sloughing off the top layers. Scaling up this normal phenomenon is merely the healing process of the epithelial wound. Damage to the skin barrier initiates a complex healing process through the interactions of many cell types within various microenvironments. However, the basic principles of choosing a wound dressing remain the same. Choosing the correct dressing will lessen the time of healing, provide cost-effective care, and improve the patient's quality of life. This activity addresses materials, techniques, cost, ease of application, and health professional preference. Due to the different

types of wounds, as well as the advancement in medical technology, various products have been developed to repair different skin lesions. Our objective is to investigate the advancement in wound dressings from traditional to the current methods of treatment. The article presents the characteristics of an ideal wound dressing, the requirements for the appropriate selection of different types of wounds, and a detailed classification of wound dressings. Animal origin, herbal origin, and synthetic dressings are firstly introduced and reviewed. Then, nonmedicated dressings including alginate, hydrogel, and hydrocolloid dressings, as well as medicated dressings are discussed. Finally, the developmental prospectives of the new generations of wound dressings for future researches are presented. This activity also reviews the evaluation and treatment using various wound dressings and highlights the role of the interprofessional team in wound care.

Keywords: wound healing, biological dressing, non-biological dressing

## **Regulatory Considerations to Develop Innovative Wound Dressings**

**Kavosh Zand Salimi**

*PhD, Department of Photodynamic, Medical Laser Research Center, Yara Institute, ACECR, Tehran, Iran*

During the last two decades, different types of wound dressings have been introduced on the market to meet the ever-increasing demand for safe and efficient wound care products. However, innovative wound care products are essential to address rapidly growing needs for the management of chronic and non-healing wounds. Developing innovative products is a costly and time-consuming process and requires close collaboration between beneficiaries including academia, industry, investors, and regulators. In regulatory systems such as FDA, EU, and the Iranian food and drug organization (FDO), wound care products are considered as medical devices, drugs, biologics, or combination products. The regulators conduct pre-market evaluations and post-market surveillances of wound care products. Pre-market evaluations are performed in order to confirm the products'

safety and performance. Depending on the type and the risk class of a product, evaluations are carried out via different routes. Besides, approval requirements are not the same in different regulatory systems for a specific product. Inconsistencies in evaluation procedures and approval routes is a source of confusion in the product development procedure. In addition, lack of sufficient knowledge on regulatory requirements wastes time and imposes additional costs. To help advance product development for non-healing and chronic wounds, this study provides an overview of regulatory requirements and the evaluation process of innovative wound dressings.

## **Induction of Hypoxia by LBL AuNPs-siRNA in Nanofiber Substrate to Investigate the Expression of Angiogenesis Factors and Acceleration of Diabetic Wound Healing**

**Elnaz Shaabani**

*Department of Medical Nanotechnology, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran*

Diabetic foot ulcer is chronic nonhealing ulceration that increases the risk of amputation. Clinical evidence indicates that impaired wound healing in diabetic patients has multifactorial causes. One of the main pathological mechanisms is insufficient or delayed neovascularization. At the molecular level, the angiogenic process is regulated by hypoxia-inducible factor-1 (HIF-1), which mediates the cellular response to hypoxia and promotes pro-angiogenic gene transcription. HIF-1 activity is regulated by the oxoglutarate-dependent prolyl hydroxylase domain-2 (PHD-2) protein. Therefore, the stabilization of HIF-1 by downregulation of PHD-2 via small interfering RNA (siRNA) could stimulate the expression of hypoxia-inducible genes, in turn, stimulating angiogenesis and accelerating wound healing. To find an efficient and stable siRNA nanoformulation for silencing PHD-2, we used layer-by-layer (LbL) nanocarriers. We explored siRNA nanocarriers consisting of chitosan-coated

gold nanoparticles (AuNPs), onto which siRNA was electrostatically complexed and protected by another final layer of chitosan (AuNPs@CS) or poly L-arginine (AuNPs@PLA). Finally, the possibility of loading these nanoparticles into nanofibers was investigated by electrospinning method. Our results demonstrate that siRNA can be formulated into a tunable layer-by-layer platform around gold core particles, for which the outer layer can be conveniently modified, which allows tuning of cellular internalization and endosomal escape. Of the two different outer layers tested, it was found that AuNP@PLA not only has an outstanding stability over time as an siRNA carrier, but also proved to be highly effective for cytosolic release after endocytic uptake. In NIH-3T3 fibroblast cells, we found that siRNA-mediated downregulation of PHD-2 resulted in increased levels of VEGF and FGF-2 angiogenesis factors. Finally, the results obtained from loading nanocarriers inside nanofibers showed the possibility of electrospinning these nanocarriers while maintaining the function and protecting siRNA. These in vitro results could pave the way for a novel nanoparticle-based angiogenic siRNA therapy for improved healing of diabetic wounds.

Keywords: Diabetic wound, Hypoxia, Angiogenesis, Layer by layer gold nanoparticles, Gene therapy

## Evaluation of Mesenchymal Stem Cells Encapsulated in Alginate Hydrogel for Wound Healing Products Applications

**Fateme Akar<sup>1</sup>**

**Alireza Sadeghi-avalshahr<sup>2</sup>**

**Halimeh Hassanzadeh<sup>3</sup>**

**Mahsa Haghbin<sup>4</sup>**

**Zahra Esmaeili<sup>5</sup>**

**Jafar Vatandoost<sup>6\*</sup>**

**Hamid Reza Bidkhor<sup>7\*</sup>**

*1. M.Sc. student, Cell and Molecular Biology, Department of biology, Faculty of Sciences, Hakim Sabzevari University, Sabzevar, Iran*

*2. Instructor (Ph.D candidate), Biomaterial Engineering, Department of Materials Research, Iranian Academic Center for Education, Culture and*

*Research (ACECR)-Khorasan Razavi, Mashhad, Iran*

*3. Instructor (Ph.D candidate), Cell and Molecular Biology, Stem Cell and Regenerative Medicine Research Group, Academic Center for Education, Culture and Research (ACECR)-Khorasan Razavi, Mashhad, Iran*

*4. M.Sc, Biomaterial Engineering, Department of Materials Research, Iranian Academic Center for Education, Culture and Research (ACECR)-Khorasan Razavi, Mashhad, Iran*

*5. M.Sc, Cell and Molecular Biology, Stem Cell and Regenerative Medicine Research Group, Academic Center for Education, Culture and Research (ACECR)-Khorasan Razavi, Mashhad, Iran*

*6. Associate professor, Cell and Molecular Biology, department of biology, Faculty of Sciences, Hakim Sabzevari University, Sabzevar, Iran*

*7. Assistant Professor (MD, Ph.D.), Cell and Molecular Biology, Stem Cell and Regenerative Medicine Research Group, Academic Center for Education, Culture and Research (ACECR)-Khorasan Razavi, Mashhad, Iran*

Introduction: Diabetes mellitus can cause serious health issues and is one of the most important challenges in medical systems globally. Diabetic foot ulcer (DFU) affects more than 25% of patients and causes a chronic wound that can lead to amputation or death. Normal wound healing normally takes 4-6 weeks to heal, but diabetic wound healing frequently takes longer and is left untreated, which mostly results in infection and amputation. The mesenchymal stem cells prove to be a potential treatment for chronic wounds because they are able to increase capillary blood circulation, angiogenesis, migration to the damaged area, differentiating into different cells and regulating the immune system. Since cells alone do not have much survival, a three-dimensional matrix that has the same conditions as the extracellular matrix (ECM) is needed for proper cell efficiency. Among the different types of these matrices, we can mention hydrogel matrices. Sodium alginate hydrogel provides a good structural matrix to support the cells.

Materials and methods: In order to isolate mesenchymal stem cells from adipose tissue under liposuction, obtained adipose tissues were washed with PBS and digested with 1% collagenase solution. Following incubation and centrifugation, the pellet was resuspended in culture media and transferred to the cell culture flask and incubated at 37 °C. After passage



number 3, the cells were prepared to be encapsulated in alginate hydrogel scaffold. To synthesize the hydrogel, sodium alginate, calcium carbonate and Glucono delta-lactone were used. The cell viability was characterized by FDA/PI staining, MTT assay and scanning electron microscopy (SEM) on days 1, 3 and 5.

**Results:** The results of SEM showed that alginate hydrogel has a suitable porosity for entrapping mesenchymal stem cells. Also, the viability percentage of the cells inside the scaffold evaluated by FDA/PI staining on days 1, 3 and 5 was 94.5%, 98% and 99.5%, respectively. In accordance with previous results, the MTT assay also, indicated that the survival of cells inside the hydrogel has increased significantly.

**Conclusions:** Alginate hydrogel proves its function as a structure for Ad-MSCs maintenance and their remarkable proliferation. Therefore, this scaffold is suggested as an effective biological dressing to be applied in wound healing.

**Keywords:** wound healing, mesenchymal stem cells, alginate hydrogel

## **Wound Healing with Acellular Amniotic Membrane Incorporating Placenta Mesenchymal Stem Cells; A Novel Dressing for Diabetic Foot Ulcers**

**Akram Tayanloo-Beik<sup>1</sup>, Hamidreza Aghayan<sup>1</sup>, Peyvand Parhizkar Roudsari<sup>1</sup>, Ensieh Nasli-Esfahani<sup>2</sup>, Rafta Arjmand<sup>1</sup>, Babak Arjmand<sup>1\*</sup>**

*1. Cell Therapy and Regenerative Medicine Research Center, Endocrinology and Metabolism Molecular-Cellular Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran*

*2. Diabetes Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Islamic Republic of Iran*

Diabetic foot ulcers are prevalent and long-term complications of diabetes mellitus with significant health care influences and costs. These mentionable instances of chronic wounds can be accompanied by

other severe complications, including limb amputation and gangrene, infections, and even death in some severe cases. Financial, emotional, and cosmetic issues are also remarkable challenges following these chronic ulcers. All these complications can remarkably impact the quality of life of individuals. Thus, more attention should be paid to the discovery of novel treatments. Mesenchymal stem cells (MSCs) have been introduced as satisfactory therapeutic tools in recent years in the personalized medicine era. MSCs could be obtained from various sources regarding numerous researches. Herein, Placenta MSCs (PMSCs) as the rich MSCs sources have attracted great concern due to their advantages compared to others, such as their better accessibility and expansion and decreased immunogenic impacts. In this regard, the effectiveness of PMSC-based therapies in the treatment of different disorders and particularly for wound management has been established so far. On the other hand, the amniotic membrane (AM) itself can provide a graft with regenerative, immune regulatory, and healing functions with limited ethical concerns. Indeed, acellularized AM can offer an accessible natural scaffold that has become more popular in regenerative medicine. It provides a swelling and moisture-retention environment and contains different bioactive molecules, growth factors, and elastic properties (without the associated complications of synthetic scaffolds) for ideal wound healing. Many studies indicated that acellular AM loaded with MSC can even promote the regeneration process and acts as an efficient wound dressing. However, there is a requirement for more research works that focus on the influences of the PMSCs in a company with AM (as a scaffold) to be utilized as a wound dressing for diabetic ulcers. In this approach PMSCs should be manufactured after obtaining to be seeded on the prepared acellularized AM. Eventually, the topical use of the provided scaffold must be evaluated. Altogether, we have concluded from the results of many studies that PMSCs+AM graft can be considered a novel wound dressing that should be assessed more in further studies to cure diabetic wounds.

**Keywords:** Wound Healing, Mesenchymal Stem Cells, Diabetic Foot, Amniotic Membrane, Placenta, Diabetes Mellitus

## **Fabrication and Evaluation of Fibrin Biological Scaffolds from Plasma-derived Products with Synthetic Teriparatide Peptide**

**Faezeh Ghasemi**

*Blood Transfusion Research Center, High Institute for Research and Education in Transfusion Medicine, Next to Milad Tower, Tehran, Iran*

**Introduction:** Fibrin glue is one of the most important biological products that can be extracted from plasma-derived products such as fresh frozen plasma (FFP). This plasma product has known roles for medical applications. Teriparatide is a 34 amino acid synthetic peptide approved by the Food and Drug Administration for the treatment of osteoporosis. In the current study, we fabricated and evaluated the mechanical and biological properties of fibrin glue. However, we measured the releasing rate of Teriparatide in the fibrin scaffold and also the amount of viability of this scaffold (alone and with Teriparatide) for giving a better vantage point for diseases related to osteodeficits.

**Methods:** In this study, fibrinogen was extracted from FFP by using ethanol. Thrombin was precipitated by Ammonium Sulfate separation method and then the fibrin scaffold was fabricated by mixing of both fibrinogen and thrombin. Fibrinogen was characterized by FTIR and SDS-PAGE methods. Rheology, porosity, biodegradability, and sterility tests were performed to characterize the fibrin scaffold. In terms of morphology, Scanning Electron Imaging (SEM) was also taken from the scaffold. Moreover, the rate of Teriparatide release within the scaffold was also measured by the Spectroscopic method. Viability was assessed by taking advantage of MTT assay in 4 groups, including group 1) HFFF2 cells with fibrin scaffold, group 2) HFFF2 cells with fibrin scaffold containing Teriparatide peptide at the concentration of 50 µg/ml, group 3) HFFF2 cells with fibrin scaffold containing Teriparatide peptide at the concentration of 100 µg/ml, group 4) HFFF2 cells with fibrin scaffold containing Teriparatide at the concentration of 150 µg/ml.

**Results:** In this study, the gelation time of the fibrin scaffold was 4±0.2 seconds. The highest

infrared absorption for fibrinogen was at 1651-cm<sup>-1</sup> wavenumber. For the fibrinogen sample, 3 bands were observed in SDS-PAGE in 46, 52, and 66 KDa. The porosity of the scaffold was 91%. The elasticity, biodegradability, and sterility of the scaffold were confirmed. SEM images showed the morphology of the fibrin scaffold which was being porously networked. However, 61% of Teriparatide released after 54 hours. The viability of the scaffold in 4 groups was 94, 86, 71, and 57%, respectively.

**Conclusion:** Plasma-derived fibrin scaffold has suitable mechanical and biological characteristics for applying as a biological scaffold. Teriparatide has acceptable release in fib.

**Keywords:** Fibrin glue, Teriparatide, Viability

## **Development of a Commercially Scalable Placental Aqueous Extract Based Liquid Bandage (Film Forming Spray) for Burn and Wound Healing**

**Amir Mohammad Chekeni<sup>1</sup>**

**Mohd. Aamir Mirza<sup>\*2</sup>**

**Mahdi Darvishi<sup>3</sup>**

*1. School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran*

*2. Dept. of Pharmaceutics, School of pharmaceutical education and research, Jamia Hamdard, New Delhi, India*

*3. School of pharmaceutical education and research, Jamia Hamdard, New Delhi, India*

We have presented the hypothesis of creating a polymer film-forming spray product containing aqueous placenta extract. After spraying, it forms a transparent and bio-adhesive layer on the wound. The therapeutically active compounds are expected to be released in a sustained release manner. The thin layer dissolves in the wound. Dried powder of aqueous extract of placenta will be procured, analytical method will be developed and excipient compatibility studies will be carried out. As per the QTPP, the lab scale batches of film forming spray will be developed. Pilot scale or commercial scale batches will be charged

for stability studies and preclinical evaluation (skin irritation, Photo-toxicity, wound healing efficacy model and histopathological assessment) will be carried out. We have recently developed a similar film-forming product containing Povidone-Iodine (Application No. 202011026390). So, this technology is already known to us.

Keywords: placental aqueous, burn and wound healing, bandage, film-forming spray

# Poster Presentations

## **An Insight into Biopolymers and Treatment Strategies for Wound Healing**

**Mina sadat Naderi**<sup>1\*</sup>

**Alireza Aghaahmadi**<sup>2\*</sup>

**Maedeh Mohaghegh**<sup>3</sup>

*1. Assistant professor- biophysics - Azad university - north branch – Tehran*

*2. Student of biotechnology -central branch of Azad university – Tehran*

*3. Student of cell biology- Azad university - north branch - Tehran*

Wound healing is a multifactorial physiological process and a growing healthcare challenge affecting several million people worldwide. Chronic, non-healing wounds place a massive burden on healthcare systems and treatments remain difficult in clinical due to the complexity of the healing process. These chronic wounds especially diabetic wounds will ultimately lead to compromised mobility, so there is a demanding need for effective management and easy operative wound dressing. Biopolymers such as alginate, chitosan, collagen, hyaluronic acid, and silk fibroin are attracting constantly increasing interest as a class of materials with remarkable characteristics, such as biocompatibility, biodegradability, non-toxicity, as well as unique physicochemical properties. they provide a microenvironment favorable for the enhanced healing rate, and they have become promising candidates for various applications, including wound dressings, drug carriers, coating materials, tissue adhesion, etc. Recent research shows that further modification of biopolymers by novel techniques and tissue engineering offers development in their antibacterial activity, drug-releasing capability, immune-modulatory, and tissue regeneration. However, several challenges remain in developing an ideal biomaterial. The present article aims to review the type of biopolymers and potential biomaterials, highlighting advancements in naturally inspired wound dressings and drug delivery systems,

also emerging approaches, and engineered devices for advanced wound care are reported.

Keywords: biopolymers, wound healing, biomaterial, wound dressing

## **Evaluation the Effect of Using Virtual Reality Technology on Anxiety Before Burn Dressing Operation in Children**

**Mehrdad Derakhshan**

**Amirhossein Tondro**<sup>\*</sup>

*Student Research committe. kermanshah University of medical science. Kermanshah.Iran*

Introduction: Anxiety before dressing can have a significant positive correlation with the amount of pain, the amount of painkiller uses and the length of hospitalization. The present study was conducted with the aim of investigating the effect of using virtual reality technology on anxiety before dressing in children.

Methodology: The study design was a four-group Solomon intervention (two experimental groups and two control groups) and was a randomized controlled clinical trial, so that 40 volunteers and dressing candidates were randomly divided into two experimental and control groups. The level of preoperative anxiety was assessed using a checklist containing a standardized four-axis Yale preoperative anxiety scale questionnaire, each axis having 4 items.

The experimental groups received exposure to the dressing room through virtual reality technology for five minutes, and the control group did not receive the psychological intervention. Then the results were analyzed with Kruskal-Wallis-Voilcoxon non-parametric tests using spss-23 statistical software.

Findings: Kruskal-Wallis non-parametric test for two independent groups (experimental group with pre-test-post-test and control group with pre-test-post-test)

showed that there is a significant difference between the scores of the two groups regarding speaking (excitement and expression of emotions) ( $p > 0.05$ ) There is  $p = 0.017$ .

Conclusion: Exposure therapy using virtual reality technology, as well as distraction and immersion in virtual reality, reduces anxiety before dressing in children.

Keywords: anxiety before dressing, virtual reality technology, children, exposure therapy, burns

## Evaluation of a Wound Dressing Composed of Human Foreskin Fibroblast on a Bovine Collagen Sheet

Kimia Roozbeh<sup>1,2,3</sup>

Maryam Saber<sup>1</sup>, Nasrin Fallah<sup>1,3</sup>

Zahra Khalajasadi<sup>1,3</sup>

Seyedeh Maryam Zarghami<sup>1,2</sup>

Seyedeh Nafiseh Hassani<sup>1,3\*</sup>

*1. Department of Stem Cells and Developmental Biology, Cell Science Research Center, Royan Institute for Stem Cell Biology and Technology, ACECR, Tehran, Iran*

*2. Department of Developmental Biology, University of Science and Culture, ACECR, Tehran, Iran.*

*3. Advanced Therapy Medicinal Product Technology Development Center (ATMP-TDC), Cell Science Research Center, Royan Institute for Stem Cell Biology and Technology, ACECR, Tehran, Iran*

Background: By far, a variety of biomaterials have been developed and investigated in terms of their suitability for the full-thickness skin defects. Collagen as a key component of extracellular matrix with attributes such as biocompatibility, biodegradability, and various functional moieties for chemical modification have attracted much attention as wound-dressing. Collagen has a very poor immune response and doesn't produce unwanted side effects. Collagen dressing can decrease the wound liquid's pH, reducing the risk of secondary bacterial colonization. On the other hand, the structure of the collagen scaffold provided a suitable platform for the transferring of fibroblast cells and facilitates their migration into the injury zone and speeds up angiogenesis

in the wound area. The bovine collagen sheet (Suprasorb® C) is a protease-modulating dressing designed not only to promote a moist wound environment but also to support growth factors and inactivate proteases. This structure also improved the microcirculation and promoted angiogenesis and finally promote homeostasis in wound area. Fibroblasts have critical roles in supporting normal wound healing, involved in creating new extra cellular matrix and secreting various growth factors and cytokines that have a direct effect on epidermal proliferation and differentiation. With this background, the present study was designed to investigate the ability of Suprasorb C collagen sheet to develop a substrate for seeding, maintain and infiltration of human foreskin fibroblast (hFF) and its healing potential for full thickness skin wounds in wistar rats.

Materials and Method: In this study, hFF cells were supplied by the Royan Stem Cell Bank and cultured in appropriate environment. The collagen sheet (Suprasorb® C) was cut out in dimensions of  $0.2 \times 0.2 \text{ cm}^2$  and inserted into the wells of a 24-well plate. The cells were loaded at the density of 105 cells/well on the collagen sheet. The MTS assay was performed to analyze the viability and proliferation of the cells on the collagen sheet after one, two, and three days of incubation. For in vivo assessment, ten weeks wistar rats (250-300 gr) were used according to the approved animal protocols. Before the surgery, the rats were anesthetized by Isoflurane ventilator. After shaving the dorsal hair and disinfecting the skin, full-thickness skin with a diameter of 2 cm were created on the side of rats and fixed with a silicone ring to impede wound contraction.

Keywords: Human foreskin fibroblast, Collagen sheet, Full-thickness wound, Wound dressing.

## Frequency of Burns and its Causes in Kermanshah, Iran

Mehrdad Derakhshan

Amirhossein Tondro\*

*student Research committee. kermanshah University of medical science. Kermanshah.Iran*

Introduction: Burn is one of the public health

problems and one of the major causes of death in Iran, which causes many physical and psychological disabilities. The aim of this study was to investigate Frequency of burns and its causes in Kermanshah province.

**Methods:** This is a descriptive -analytical cross-sectional study. Data were obtained from the burn data record center of Kermanshah province. 490 patients were studied in this research. A designed checklist was used for data collection. Data analysis was performed using SPSS 22.

**Results:** The mean age of patients was 17.01 years. Most burns (28.6% of the patients) were caused by oil and gasoline. 65.5% of patients had 25% to 50% burning rate. Remedial measures taken for 44% (44.1%) of patients were debridement.

**Conclusion:** Since burn is more prevalent in childhood and adolescence, it is necessary to provide policy interventions and required trainings to this at-risk group to prevent burn incidence.

**Keywords:** Burn incidence, Burn etiology, Kermanshah

## **Role of Silicate-based Bioceramics in Angiogenesis and Accelerating the Chronic Wound Healing Process**

**Naimeh Mahheidari<sup>1</sup>**

**Majid Salehi<sup>2,3\*</sup>**

*1. Student Research Committee, Department of Tissue Engineering, School of Medicine, Shahroud University of Medical Sciences, Shahroud, Iran*

*2. Department of Tissue Engineering, School of Medicine, Shahroud University of Medical Sciences, Shahroud, Iran*

*3. Tissue Engineering and Stem Cells Research Center, Shahroud University of Medical Sciences, Shahroud, Iran*

Tissue engineering improves tissue healing and regeneration process using natural and synthetic materials. Although numerous treatments are developed for wound care management, prolonged and non-healing wounds require specific consideration. Chronic ulcer therapy still has remained a significant

healthcare challenge. Chronic ulcers occur when healing fails to proceed within the anticipated time for example as a result of impaired blood supply. Chronic wounds are commonly related to ischemia, diabetes mellitus, venous stasis disease, or pressure. Four overlap phases are involved in the wound healing process, including hemostasis, inflammation, proliferation, and remodeling. Neovascularization is a vital key to wound healing acceleration in the granulation and remodeling phases of tissue regeneration. Generally, neovascularization in adults is associated with both angiogenesis and vasculogenesis and is a critical factor for appropriate and accelerating wound healing during whole phases of tissue repair. The angiogenesis process requires growth and survival-promoting factors, proteolytic enzymes, several differentiated and progenitor cell types, and appropriate microenvironments. Promoting wound angiogenesis or revascularization can lead to substantial advances in wound healing promotion. Silicate-based bioceramics such as diopside have the potential to induce angiogenesis and improve blood vessel formations. Recognizing materials enhancing angiogenesis would not only further advance our understanding of the regulating wound repair mechanism but also provide new approaches to overcoming the healing of chronic wound problems in vivo.

**Keywords:** Bioceramic, Wound Healing, Chronic Wounds, vasculogenesis, Angiogenesis

## **Investigating the Prevalence of Pressure Ulcers and the Factors Affecting them in Covid-19 Patients Admitted to the ICU**

**Reza Shakeri**

**Zidan Yousefi**

**Amirhossein Tondro\***

*student Research committe. kermanshah University of medical science. Kermanshah.Iran*

Pressure ulcer is one of the basic and major problems in patients who are hospitalized for a long time, especially in special care units, and it is one of the problems

affecting the treatment process of Covid-19 patients, which imposes a lot of costs and complications on the patients and the health system.

materials and methods: In this retrospective analytical study, 130 patients with Covid-19 virus and acute respiratory complications were examined in a 2-year period in the intensive care unit, and the patients' pressure ulcers were evaluated using the Braden tool and a checklist (including age, gender, Hospitalization period, covid 19 diagnostic test, diet, intubation, ...) were investigated.

Findings Out of 130 covid- 19 patients hospitalized in the intensive care unit, 49 people (~%37) were diagnosed with pressure ulcers, and out of 49 people, 18 people with 1st degree wounds, 25 people had grade 2, 6 people had grade 3, which There were %38 women and %62 men, and factors such as diet, severe anxiety covid -19 pandemic, lack of movement, side effects of covid -19 drugs, and improper position have influenced the development of pressure ulcers, and patients with pressure ulcers compared to others Patients had a longer hospitalization period.

Conclusion: The prevalence of pressure ulcers in the intensive care unit after contracting the covid 19, which can be prevented, which can have many complications for the patient and prolong the hospitalization process. Continuous follow-up of patients and monitoring of general affairs and services and changing position every 2h and strengthening morale and reducing stress and anxiety of patients helps in reducing the rate and trend of pressure ulcers in patients.

Keywords: covid 19, pressure ulcer, intensive care unit

## **A New Development in Wound Infection Diagnosis: The Use of Electronic Nose for Differential Detection of Volatile Organic Compounds in Wounds**

**Donya Safari<sup>1\*</sup>**

**Reihaneh Seyedebrahimi<sup>2</sup>**

*1. Medical Student, Faculty of Medicine, Qom University of Medical Science, Qom, IRAN*

*2. Cellular and Molecular Research Center, Qom University of Medical Science, Qom, Iran*

Background: Wounds cause skin permeability, so any microorganisms contaminating in and around the wound – typically bacteria or fungi – can cause wound infection due to the imbalance in pathogen virulence and the host's immune response. Infectious wounds are an ever-growing global pandemic, with high mortality rates. Wound infection if not adequately managed causes scarring and cellulitis, and if it continues with secondary complications, it can cause loss of limb or life. For these reasons, timely diagnosis of wound infection is essential for all physicians involved in wound care. So, the present study reviewed the use of an electronic noses for the detection of volatile organic compounds in skin wounds to rapid diagnosis of infection wounds.

Method: Data were recognized by searches of PubMed, and Scopus and used from articles published in English between 2018 and 2022 using the search terms «electronic nose», «wound infection diagnosis», and «volatile organic compounds».

Result: The general way to diagnose wound infection is based on clinical symptoms such as pain, erythema, fever, etc. However, the diagnosis is prone to error and requires additional methods such as culture, which itself is an invasive method and unconventional, so, it is not considered a reliable and sufficient way. One of the new ways to detect infection wounds is the use of volatile organic compounds (VOCs). They are a diverse group of carbon-based molecules produced and released by humans and microorganisms. The fungi and bacteria commonly associated with chronic wounds, release VOCs. The diagnosis of these VOCs can allow the identification of bacterial and/or fungal microorganisms. Although various chemical sensors are capable of detecting VOCs, the use of medical electronic noses (eNose) can be effective in differentiating the types of infectious agents. eNose with 31 sensors, can detect wound infection through the analysis of the metabolic compounds of bacteria and fungi. But regrettably, the presence of obstacles such as the low concentration of volatile substances, the presence of interfering substances in the environment, and the decrease in the accuracy of eNose in clinical samples, prevent the proper use of this technology.

Conclusion: Due to the tendency to use less invasive and safer methods, eNose as a cost-effective method for differential diagnosis of infectious and non-infectious

wounds may be beneficial. However, the use of this method requires extensive.

Keywords: wound infection diagnosis, volatile organic compounds, medical electronic noses

## A Review on the Challenges of Patients with Chronic Wounds

Mojgan Lotfi<sup>1\*</sup>

Marzieh Avazeh<sup>2</sup>

Nasib Babaei<sup>2</sup>

*1. Associate Professor of Nursing, Department of Medical Surgical Nursing, Faculty of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran*

*2. PhD candidate in Nursing, Department of Medical Surgical Nursing, Faculty of Nursing and Midwifery, Tabriz University of Medical Sciences, Tabriz, Iran*

**Introduction:** Chronic wounds are those that do not progress through a normal, regular and timely healing. They are common and often mistreated. Management of patients with chronic wounds is a major part of the services that can be provided by health care providers, and any failure in this matter causes concern in this group. These patients themselves also face various challenges. Therefore, the purpose of this study is to review the challenges of patients with chronic wounds.

**Method:** In this review study, a comprehensive review of texts in databases including; SID, Magiran, Iranmedex, CINAHL, ProQuest, Ovid, PubMed, Scopus, Science Direct, using the keywords: wound, chronic wound, challenge, ulcer and caring problems were carried out from 5 September to 6 October 2022. Inclusion criteria included: publication of the article between 2012 and 2022, research articles related to challenges of patients with chronic wounds, published in Persian and English, and access to the full text of the articles. In the initial study review, duplicates were removed, then the entire study text selected by the two reviewers was independently evaluated using the Gifford tool.

**Results:** In the initial search of databases, 2319 studies were identified. After screening the titles and abstracts, 82 full texts were reviewed, of which 11 studies met the inclusion criteria. The need for accurate initial assessment

and frequent follow-up assessments of the wound status, furthermore the slow healing process and the need for complex treatment regimens pose many challenges to patients with chronic wounds. After reviewing articles; pain, concern regarding the effectiveness of the treatment, concern regarding the occurrence of complications, the negative impact of the wound on the quality of life, lack of access to a doctor or specialist wound therapist, traveling long distances to the hospital or doctor visit, cost and also the waste of patients' time were identified as the major challenges of these patients.

**Conclusion:** Due to the nature of chronic wounds, despite the progress made in this field, patients experience many challenges, and a large group of these challenges can be solved by providing remote care as a supplement. It is suggested that more studies be conducted in the field of its implementation and effectiveness.

Keywords: chronic wound, wound patients, challenge, review

## Copper (II)-chitosan Complexes as Antibiotic-free Antibacterial Agent on Wounds

Arash Mahvashi

*PhD in microbiology*

Bacterial resistance to antimicrobial agents, especially antibiotics, is a challenge that has been recently recognized and addressed by the authorities all over the world as an emerging threat to humanity. The excessive use of antibacterial agents is causing a high impact on environment and all existing life mainly human being health. There is a worldwide trend to explore new alternatives that control postharvest pathogenic diseases, giving priority to methods that reduce disease incidence and avoid negative and side effects on human health. The chitosan, a polycationic biopolymer, is currently receiving a great deal of attention. It became a valuable compound undoubtedly due to its appealing intrinsic physicochemical and biological properties, such as biocompatibility, biodegradability and bioactivity. The antimicrobial activity of chitosan is well known against a variety of bacteria and fungi due to its polycationic nature. However, the antimicrobial activity of chitosan is sensitive to many factors such as



molecular weight, pH, and water solubility. The chitosan, a polycationic biopolymer, is currently receiving a great deal of attention. It became a valuable compound undoubtedly due to its appealing intrinsic physicochemical and biological properties, such as biocompatibility, biodegradability and bioactivity. that low molecular weight chitosan exhibited strong bactericidal activities compared to chitosan with high molecular weight. The chitosan on the surface of the cell can form a polymer membrane, which prevents nutrients from entering the cell. Chitosan of lower molecular weight diffuses into the cell through pervasion. Since chitosan could adsorb the electronegative substance in the cell and flocculate them, it disturbs the normal physiological activities of the bacteria and kills them. It can be observed that the antibacterial activities of Chitosan-Cu (II) complexes are enhanced with increasing chelate ratios. Ideal-inhibiting effects could be obtained when the chelate ratios of complexes were about 1:1. More works are needed to confirm this conclusion. Since chitosan degradation can be caused by the coordinating bond, we attempt to synthesize and characterize the chitosan-Cu (II) complex, and then after study the coordinating bond effect on its antibacterial activity against *Salmonella enteritidis*. Seven chitosan-copper complexes with different copper contents were prepared and characterized by FT-IR, UV-vis, XRD and atomic absorption spectrophotometry.

Keywords: copper (II)-chitosan, antibiotic-free, antibacterial, wounds

## The Effect of Aloe Vera on Wound Healing After Surgery: A Systematic Review

Abdollah Abolfathi<sup>1</sup>

Yasaman Pourandish<sup>2</sup>

Mina Yaramtaghlou<sup>1</sup>

Parsa Ahmadi<sup>1</sup>

Fatemeh Mehrabi<sup>2\*</sup>

*1. MSc Student in Nursing, Student Research Committee, Arak University of Medical Sciences, Arak, Iran*

*2. Nursing Instructor, Department of Nursing, Faculty of Nursing and Midwifery, Arak University of Medical Sciences, Arak, Iran*

Background and purpose: Aloe vera is a herbaceous and perennial plant from the Liliaceae family. Many studies have been conducted on aloe vera and its topical use has been found to be useful in healing skin wounds. Based on this, we decided to conduct a systematic review of the effect of aloe vera on the healing of post-surgical wounds.

Search method: by checking SID database, Irandoc, Google scholar, PubMed, Medline, Scopus, Science Direct, using the keywords «aloe vera», «wound healing»; All clinical trial articles that used aloe vera gel, cream, and other products derived from aloe vera, had a control group with placebo or compared with other treatments, were included in the study. Electronic search was done without any time limit. To carry out this review article, the 2009 PRISMA checklist was used, and articles that were conducted on animal samples, duplicate articles, articles with unclear statistical results, incomplete articles, and all articles with less than 30 samples were removed.

Results: Finally, 16 clinical trials that met the inclusion criteria were examined. These studies have investigated the use of aloe vera in post-surgical wounds such as episiotomy, caesarean section, skin biopsy, hemorrhoidectomy, gynecological surgery laparotomy and graft site. In all these studies, the use of aloe vera gel and cream compared to other common treatments has reduced pain and discharge and reduced recovery time. In only one study, the aloe vera dressing group for shave skin biopsy did not differ from the combined dressing group in terms of recovery.

Conclusion: According to the results of this study, the use of aloe vera is recommended as an effective and low-cost treatment for the revival of traditional medicine and as a complementary treatment.

Keywords: Aloe vera, prevention, wound healing after surgery, systematic review

## Li-Doped Bioactive Materials; Promising Biomaterials for skin Tissue Engineering and Wound Healing

Naimeh Mahheidari<sup>1</sup>

Fatemeh Moradbeygi<sup>2,3</sup>

Ahmad Reza Farmani<sup>4,5,6\*</sup>

*1. Student Research Committee, Department of Tissue Engineering, School of Medicine, Shahroud University of Medical Sciences, Shahroud, Iran*

*2. Department of Pharmaceutical Biotechnology, School of Pharmacy, Shiraz University of Medical Sciences, Shiraz, Iran*

*3. Pharmaceutical Sciences Research Center, Shiraz University of Medical Sciences, Shiraz, Iran*

*4. Department of Tissue Engineering, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran*

*5. Department of Tissue Engineering, School of Advanced Technologies in Medicine, Fasa University of Medical Sciences, Fasa, Iran*

*6. Students' Scientific Research Center, Tehran University of Medical Sciences, Tehran, Iran*

Wound injuries require essential and appropriate wound care management to accelerate wound healing and achieve scar-less tissue regeneration. Lithium-ion is a trace element ion with significant therapeutic characteristics including antibacterial, anticancer, antiviral, and tissue regeneration effects. Li can facilitate angiogenesis, which is crucial in tissue repair, through upregulating expressions of VEGF. Moreover, lithium chloride acts as a trigger in Wnt, and WNT/ $\beta$ -catenin signaling activation, which is vital in controlling the size of the wounds. Also, it has been proven that lithium is highly effective in burn wound healing, in a dose-dependent manner. Also, Lithium's effectivity in healing is also investigated in diabetic ulcers and promoted wound healing in rat diabetes ulcers by inhibiting pigment epithelium-derived factor (PEDF). Furthermore, Li-ion demonstrated that has a considerable antibacterial effect against both gram-positive and gram-negative bacteria. Also, this ion has anti-inflammatory impact results from  $\text{INF-}\gamma$  synthesis inhibition and a significant reduction in TLR2 and TLR4 expressions, as well as increased expression of IL10 simultaneously. Incorporating of lithium into

the structure of biomaterials including hydrogels and bioceramics can be accomplished very conveniently. Subsequently, regarding the great advantages of lithium in wound healing, Li-incorporated biomaterials can create new horizons in wound healing.

Keywords: Lithium, Wound Healing, Antibacterial Activity, WNT,  $\beta$ -catenin, Angiogenesis.

## New Nanotechnologies for the Treatment and Repair of Skin Burns Infections

Sajjad Seyedi saravi<sup>1</sup>

Amirhosein Mohamadi<sup>2</sup>

Seyed Amin Fallah Mortezaejad<sup>3</sup>

Shahriar Abbasi<sup>4</sup>

Elaheh Oliyaei<sup>5\*</sup>

*1. Medical student, faculty of medicine, department of medicine, mazandaran university of medical science, Sari, Iran*

*2. Dentistry student, faculty of dentistry, department of medicine, tehran university of medical science, Tehran, Iran*

*3. Medical student, faculty of medicine, department of medicine, Guilan university of medical science, Rasht, Iran*

*4. Medical student, faculty of medicine, department of medicine, zanzan university of medical science, Zanzan, Iran*

*5. Bachelor student of radiology, faculty of paramedicine, department of medicine, bushehr university of medical science, Bushehr, Iran*

Introduction: Burns are typically described as skin wounds as a result of thermal / warmth publicity, electricity, chemical materials, radiation publicity and etc. The remaining healing aim is to save you and deal with infection. Some corporations, which includes sufferers with diabetic neuropathy, sufferers with intellectual disorders, and children, are greater liable to those injuries. The recovery of burn harm is an organic method which includes 4 overlapping phases, homeostasis segment, inflammatory segment, proliferation segment and reworking segment. Recently, the focal point in nanotechnology has been on biocompatible

pharmaceutical nanocarriers which includes nanoparticles (NPs), dendrimers, and polymer micellar structures for the control and remedy of wound recovery with smart biomaterials and theragnostic NPs.

**Method:** In the forthcoming systematic study, the required data were collected using keywords and citing valid databases such as: Scopus PubMed, Google Scholar and ProQuest. The statistical population of the study includes all studies conducted up to 2022 in the field of New Nanotechnologies for the Treatment and Repair of Skin Burns Infections. After reviewing the relevant findings and evaluating the data quality, a total of 22 articles were analyzed

**Results:** Dihydroquercetin formulated as a liposomal nanocomplex should enhance endogenous antioxidant hobby, lessen the necrotic location in burned skin, and subsequently result in higher recovery. Photothermal and photodynamic remedy for antimicrobial hobby and wound recovery, NPs can be activated via way of means of incident mild taking benefit of both photothermal or photodynamic remedy—primarily based totally mechanisms, and may kill microbial cells in wound web sites and enhance wound recovery. In one study, the interplay of the undoubtedly charged corporations of a dendrimer and the negatively charged corporations of the bacterial mobileular wall should lead disruption of the bacterial structure. In some other approach, silver-dendrimeric NSs have been determined to have synergistic outcomes in phrases of anti-inflammatory and antimicrobial hobby; dendrimers have been proven to be an excellent provider to decrease inflammation, even as disinfecting the wound and stimulate recovery

**Conclusion:** Burns pose a notably complicated trouble in clinical care, antimicrobial resistance growing in an extensive variety of microorganisms has created good sized issues for topical remedy of burned infections in current years.

**Keywords:** Nanotechnologies, Skin Burns, Burns Infections, Skin Burns Nanotechnologies, Skin

transplantation

## **Skin Substitutes; A New Approach to Wound and Burn Treatment Based on Tissue Engineeringe**

**Mohammad Hassan Yazdanfar<sup>1</sup>**

**Zahra Mohammadi<sup>\*2</sup>**

**Abdorrezza Sheikh–Mehdi Mesgar<sup>1</sup>**

*1. MSc Students, Bioceramics and Implants Laboratory, Faculty of New Sciences and Technologies, University of Tehran, Tehran, Iran*

*2. Lecturer, Bioceramics and Implants Laboratory, Faculty of New Sciences and Technologies, University of Tehran, Tehran, Iran*

Skin is the largest organ in the human body, and it has the function of protecting the body from exogenous substances and stand as a barrier to fluid loss and trauma. It also maintains the balance and protects the body from external factors such as bacteria, chemicals, and temperature. When the integrity of skin is compromised due to injury as in burns the coverage of skin has to be restored to facilitate repair and regeneration. Conventional wound care may sometimes lead to suboptimal wound healing and significant morbidity and mortality for patients. In cases like chronic wounds, including diabetic ulcers, pressure ulcers, venous ulcers, and arterial insufficiency ulcers, and second- or third-degree burns which are both difficult and expensive to treat, skin substitutes are preferred for wound coverage, not only because of mentioned benefits, but also because of their advantages in cosmetic issues and scar treatment. Recent advances in tissue engineering techniques, enabled developing new arising skin substitutes. The aim of this paper is to discuss and classify the different types of currently available commercial skin substitutes, and to mention their limitations, to gain a more precise and practical perspective, leading us to identify and meet the essential needs in this area.

**Keywords:** Tissue Engineering, Wound Healing, Skin Substitutes, Chronic Wounds, Burns, Commercial Products

## Intelligent Nanoparticle-Based Dressings for Bacterial Wound Infections

Mohammad Amin Mojaradi<sup>1</sup>

Raziyeh Hasanvand<sup>2</sup>

Parsa Veysi<sup>3</sup>

Leila Ali Nasab Maleki<sup>3</sup>

Zahra Shahzad<sup>4</sup>

Setayesh Sadr<sup>4</sup>

Elaheh Oliyaei<sup>5\*</sup>

*1. Student of Medicine, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran*

*2. Student of Medicine, School of Medicine, Iran University of Medical sciences, Tehran, Iran*

*3. Student of Medicine, School of Medicine, Qom Islamic Azad University of Medical sciences, Qom, Iran*

*4. Student of Medicine, School of Medicine, Mashhad Islamic Azad University of Medical sciences, Mashhad, Iran*

*5. Bachelor student of radiology, Faculty of Paramedicine, Department of medicine, Bushehr University of Medical Science, Bushehr, Iran*

**Introduction:** As wound restoration stays a project for the scientific place, wound manipulate has stopped up an essential detail for healthcare systems. Nanoparticles were produced and carried out in a huge fashion of merchandise worldwide, which embody silver nanoparticles (AgNP) and tremendous compounds consisting of nitric oxide and chitosan.

**Method:** In the forthcoming systematic study, the required data were collected using keywords and citing valid databases such as: Scopus PubMed, Google Scholar and ProQuest. The statistical population of the study includes all studies conducted up to 2022 in the field of Intelligent Nanoparticle-Based Dressings for Bacterial Wound Infections. After reviewing the relevant findings and evaluating the data quality, a total of 33 articles were analyzed.

**Results:** Nanoparticles withinside the meantime is taken into consideration a possible opportunity to antibiotics and that they have high ability to resolve the trouble of the emergence of bacterial multidrug resistance. The in vitro of nitric oxide nanoparticles stimulates the migration of fibroblasts and collagen to

the wound place. Furthermore, calcium-based totally really nanoparticles raise up pores and skin wound restoration. The microbial invasion breaching the pores and skin's intact facility end result in do away with restoration. AgNP have the capability to damage germs whilst furthermore selling pores and pores and pores and skin regeneration. The unic assets improves that they can each affectively shop you wound infections and beautify the restoration processin comparison with conventional topical treatments. AgNPs offer a massive surface-place-amount ratio wich may additionally permit nanoparticles to attach to a microbe's surface, boom its permeability and end result in membrane dissolution. Increased permeability can also permit AgNPs to consequences penetrate a microbe and harm the intracellular organisms.

**Conclusion:** Combining a hydrogel matrix with Ag nanoparticles has fantastic advantages for each wound-restoration and antibacterial purposes. The physical, chemical and biological homes of engineered matrices and AgNP were considerably studied and severa makes use of were defined, however there stay fantastic possibilities to discover AgNP interest from cell to cell in human beings and network in choice to systemic toxicity.

**Keywords:** Nanoparticle-Based, Infection, Bacterial Wound, bandages Intelligent

## Allograft Acellular Dermal Matrix as a Potential Substitute for Wound Healing Application

Mahsa Delyanee<sup>1</sup>

Amirhossein Tavakoli<sup>2\*</sup>

Reza Samanipour<sup>3</sup>

Sara Tabatabaee<sup>4</sup>

*1. Ph.D in Biomaterial; Biomedical Engineering Department, Amirkabir University of Technology, Tehran, Iran*

*2. MD in Psychiatry; University of Tehran; Tehran; Iran*

*3. Ph.D in Tissue Engineering; Shahid Beheshti University; Tehran; Iran*

*4. Msc in Biomaterials Engineering; Tarbiat Modares University; Tehran; Iran*

Wounds that do not heal can be a severe clinical complication. The extracellular matrix (ECM) is frequently defective in chronic wounds because of the relative lack of protease inhibitors, which generally regulate protease, and the inflammatory and proteolytic environment of chronic wounds, which breaks down ECM. Alternative strategies, especially the use of acellular dermal matrixes (ADM)s, are now expanding for wound healing application to overcome the limitations, including further injury at the donor site of the patient, which is required when autograft skin is applied, and final rejection of homologous tissue for the presence of foreign cellular component. ADMs were created in an effort to take advantage of native ECM's benefits and encourage orderly regenerative of the host tissue in several therapeutic situations. ADM has been shown to influence wound healing through several previously identified mechanisms, including scaffolding for the formation of granulation tissue, the presence of receptors for fibroblast attachment, stimulation of angiogenesis, activity as a chemoattractant of vascular endothelial cells, and the inclusion and protection of growth factors. The optimum technique was used in this study to decellularize the human allograft dermis product, and the procedure was verified using histological staining. The outcomes showed that this treatment's removal of the epidermis was advantageous for a future procedure to eliminate cells from the dermal structure. ADM product appears to have a suitable potential as a substitute in wound healing based on overcoming the rejection of the allograft product with cells.

Keywords: Wound healing, Allograft, Acellular dermal matrix (ADM), Decellularization.

## **A Review on the Use of Silver Nanoparticles in the Production of Wound Dressings with the Aim of Healing and Disinfecting Wounds**

**Kimia Rezaee Moghadam<sup>1\*</sup>**

**Faezeh Hasani<sup>1</sup>**

**Nahid Hassanzadeh Nemati<sup>2</sup>**

*1. MS.c, Department of Biomedical Engineering,*

*Faculty of Applied Medical Sciences and Technologies, Science and Research Branch, Islamic Azad University, Tehran, Iran*

*2. Assistant Professor, Department of Biomedical Engineering, Faculty of Applied Medical Sciences and Technologies, Science and Research Branch, Islamic Azad University, Tehran, Iran*

Body skin plays an important role in Homeostasis and precaution of micro-organism invasion, and in case of skin damage, immediately covering the wound area with the help of wound dressings is necessary. Wound healing is one of the body's most complex processes that includes Epithelial cell proliferation and implementing inflammatory cells. Positional wound dressings are one of the most prominent external causes in the process of wound healing. With the advancement of technology, various types of modern wound dressings have been developed which amongst these, the usage of wound dressings that contain silver nanoparticles, due to their special physical and chemical characteristics in addition to its anti-bacterial feature which is widely used in pharmaceutical, medical and curing bacterial infections, has become commonplace. In the current study in order to reach the objective, the information related to wound dressings and the effect of the silver nanoparticles on healing process's acceleration as well as the healing process, is gathered according to databases such as SID, Science Direct, Google Scholar, Pubmed, Civilica, and the results have been tested. In this paper by reviewing on available papers, the aim is to investigate the merits and downsides related to the usage of silver nanoparticles in wound dressings and the actual extent of effectivity that they have on the wound healing process and containing the infection. The outcome of numerous experts' research in wound healing field indicates the positive effect of the silver nanoparticles provided that it is used properly.

Keywords: Wound Dressings, Silver Nanoparticles, Biofilm  
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

## **Piezoelectric Wound Dressings Modified with Bioceramic Nanoparticles**

**Mobina Soltani<sup>1,2</sup>**

**Zahra Mohammadi<sup>1,2,\*</sup>**

**Abdorrezza Sheikh–Mehdi Mesgar<sup>1</sup>**

*1. Bioceramics and Implants Laboratory, Faculty of New Sciences and Technologies, University of Tehran, Tehran, Iran*

*2. Institute of Biomaterials, Tehran University and Tehran University of Medical Sciences, Tehran, Iran*

A wound is defined as a disruption in the continuity of the epithelial of skin or mucosa resulting from physical or thermal damage. Wound healing is a complex and dynamic process. In wound healing, the damaged epithelial layer creates an endogenous electric field (EF) to regulate the wound healing process, which causes increased cell migration and proliferation, increases blood flow, collagen deposition, and promotes regeneration activity. Therefore, mimicking the endogenous electric field by creating an external electric field can be effective in wound healing. Piezoelectric polymers were considered as wound dressings due to their desirable properties, however, compared to bioceramics, they have a low piezoelectric constant. The use of bioceramic nanoparticles in polymer composites leads to increasing the dielectric constant, excellent thermal and mechanical properties. In this research, principles and properties of piezoelectric polymers used in wound dressings such as polyvinylidene fluoride, graphene and the effect of adding bioceramic nanoparticles such as zinc oxide were investigated. Studies have shown that the presence of bioceramic nanoparticles causes an increase electrical conductivity, followed by an increase in cell behavior, including growth, adhesion and migration.

## Recent Advances in the Application of Herbal Nanomaterials as Biological Materials Derived from Nature in Wound Healing

Azizeh Rahmani Del Bakhshayesh\*

Ahmad Mehdipour

Maryam Ghahremani Nasab

*Department of Tissue Engineering, Faculty of Advanced Medical Sciences, Tabriz University of Medical Sciences, Tabriz, Iran*

The wound healing process involves a complex sequence of various biochemical and cellular processes that are well organized and ultimately restore the integrity of the tissue. Any disturbance and interruption in the correct process of wound healing can lead to the creation of chronic wounds, which will ultimately have potential effects on the quality of life. Since the beginning of life, nature has shown that it can inspire the development of completely biological and biodegradable materials with bioactive and sustainable potential. In such a way that materials derived from nature are considered effective materials in wound healing today. Various studies have shown that plant extracts or plant compounds obtained from them can act as suitable and promising agents to facilitate the wound healing process due to the presence of various active components, ease of access, appropriate effectiveness, and limited side effects. By using them, appropriate and potential extracellular matrices can be designed to support tissue regeneration in such a way that they have the ability to deal with factors interfering with the repair. Hence, here we provide an overview of various biological materials derived from nature, especially herbal nanomaterials in the management of wounds as well as their therapeutic and practical purposes.

Keywords: wound healing, biological materials, nature, herbal, nanomaterials

## 3D Bilayer Skin Bioconstruct for Scarless Healing of 3rd Degree Burns in Rats

Simin Nazarnezhad<sup>1\*</sup>

Alireza Ebrahimzadeh-Bideskan<sup>2</sup>

Seyede Atefe Hosseini<sup>3</sup>

Marjan Mosayebzadeh<sup>1</sup>

Zoleikha Azari<sup>2</sup>

Ali Moradi<sup>4</sup>

Reza Kazemi Oskuee<sup>3</sup>

Vahid Reza Askari<sup>5</sup>

Sahar Mollazadeh<sup>6</sup>

Saeid Kargozar<sup>1</sup>

*1. Tissue Engineering Research Group (TERG), Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran*

*2. Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran*

*3. Department of Medical Biotechnology and Nanotechnology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran*

*4. Orthopedic Research Center, Mashhad University of Medical Sciences (MUM), Mashhad, Iran*

*5. Immunopharmacology and Regenerative Pharmacology International UNESCO Center for Health-Related Basic Sciences and Human Nutrition, Mashhad University of Medical Sciences, Mashhad, Iran*

*6. Department of Materials Engineering, Faculty of Engineering, Ferdowsi University of Mashhad (FUM), Mashhad, Iran*

A third-degree burn is one of the main clinical problems that cannot be repaired spontaneously. Herein, the acellular dermal matrix (ADM) was prepared by the decellularization of calf skin chemically and enzymatically. Copper- and zinc-doped bioactive glasses as well as electrospun nanofibers loaded with PL were synthesized and characterized in previous studies. Finally, a third-degree burn model was created in male Wistar rats and then treated with the bilayer construct. The results revealed that the ADM preserved its integrity and structure, while the residual DNA of ADM was reduced by more than 95% compared to intact skin. Histological and immunohistochemistry

staining of grafted bilayer construct showed increased re-epithelialization, angiogenesis, and collagen deposition compared to the control group. The prepared bilayer scaffold was able to improve the repair and regeneration of the damaged site after 21 days in the rat animal model.

Keywords: Third degree burns, Decellularized dermis, Electrospun nanofibers, Bioactive glasses

## **Comparison of the Effect of Biopolymer Complex Dressing ALGIPAD (Chitosan, Calcium Alginate and Cellulosic Fibers) with Alginate Dressing in the Management of Diabetic Wounds**

**Amir Hossein Abidi\***

**Neda Soltannejad**

**Zahra Khazaeipour**

**Masoom Ashtari**

**Fatemeh Rahimi**

**Esmail Zeinali**

**Mehran Nori**

**Sanami Kimia**

**Soltaniha Yasaman**

**Firouzi etminan**

**Maryam Sardashti**

**Ali Safavi**

MSc, Master of Science in Critical Care Nursing, Tehran University of Medical Sciences, Tehran, Iran.

**Aim:** In treating diabetic foot ulcers, using effective wound dressings is one of the most critical challenges for therapists. So far, a dressing that meets all the requirements for treating diabetic foot ulcers alone has not been produced.

**Method:** This study is a single-blind clinical trial on 80 diabetic patients; 40 patients with diabetic foot ulcers were treated with algipad dressing, and 40 patients with alginate dressing and compared.

**Results / Discussion:** There were no significant differences between the two groups. We used

repeated measures analysis. The results showed that the healing process was good in the two groups ( $P < 0.001$ ), but the healing in the algipad group was significantly faster than in the alginate group.

**Conclusion:** Algipad dressing is a simple and practical method that is preferable to alginate dressing in terms of treatment cost and duration.

Keywords: Algi-Pad dressing, Alginate dressing, Biopolymer dressing

## **Preparation and evaluation of antibacterial wound dressing based on vancomycin loaded silk/dialdehyde starch nanoparticles**

**Sajjad Khan Eini Pour<sup>1</sup>**

**Alireza Rezapour<sup>2\*</sup>**

*1. Cellular and Molecular Research Center, Qom University of Medical Science, Qom, Iran*

*2. Department of Tissue Engineering and Regenerative Medicine, Qom University of Medical Sciences, Qom, Iran*

One of the main reasons infected wounds go untreated is that antibiotic-resistant bacteria mainly cause infection. Vancomycin is an antibiotic used against Gram-positive bacteria, such as MRSA, but it has limited intravenous use due to its toxicity. This study describes using a local drug delivery approach at the wound site. The aim is to prepare a silk dressing containing dialdehyde starch nanoparticles loaded with vancomycin that can cure infection through the controlled release of antibiotics. It may be concluded that the fabricated dressing based on silk and dialdehyde starch nanoparticles opens up a new option for topical administration of antibiotics. We believe its properties can be considered a new dressing for infectious wounds by reducing infection associated with controlled drug delivery.

Keywords: Synthesized wound dressing · Nanoparticles · Drug delivery · Dialdehyde starch



## Comparative Study of 2-octyl Cyanoacrylate and Hyaluronic Acid Effects on Trypsin Protein Using Molecular Docking Method in Wound Healing Process.

**Bahareh Mohammadi<sup>1</sup>**

**Farnoosh Ahmadi<sup>1</sup>**

**Mina Sadat Naderi<sup>2\*</sup>**

*1- Department of Cellular and Molecular Biology, Faculty of Biological Science, North Tehran Branch, Islamic Azad University, Tehran, Iran*

*2-Department of Biophysics, Faculty of Biological Sciences, North Tehran Branch, Islamic Azad University, Tehran, Iran*

**Introduction:** Trypsin is an enzyme in the first section of the small intestine that starts the digestion of protein molecules by cutting these long chains of amino acids into smaller pieces. Trypsin: chymotrypsin is a widely used oral proteolytic enzyme combination to hasten repair of traumatic, surgical, and orthopedic injuries. It shows high bioavailability without losing its biological activities as an anti-inflammatory, anti-edematous, fibrinolytic, antioxidant, and anti-infective agent. 2-Octyl cyanoacrylate is a cyanoacrylate ester typically used as a wound closure adhesive (under the brand name Dermabond). When the 2-octyl cyanoacrylate monomers are exposed to anions, provided either by moisture from the skin or exudate, they quickly polymerize causing an exothermic reaction binding to the most superficial layer of epithelium. The seal formed by the cyanoacrylate is water tight allowing for the wound to heal uninterrupted. Hyaluronic acid (abbreviated HA; conjugate base hyaluronate), also called hyaluronan, is an anionic, nonsulfated glycosaminoglycan distributed widely throughout connective, epithelial, and neural tissues. As a major component of the extracellular matrix, hyaluronic acid has a key role in tissue regeneration, inflammation response, and angiogenesis, which are phases of wound repair. In this descriptive-analytical study, we investigate 2-octyl cyanoacrylate and Hyaluronic acid effects on

trypsin protein using molecular docking method.

**Material and method:** In this study, we used pubchem.ncbi.nlm.nih.gov, www.drugbank.com, and www.uniprot.org to examine 2-octyl cyanoacrylate and Hyaluronic acid. Also, software ViewerLite, AutoDockTools-1.5.6, Chimera 1.15 and PyRx were used.

**Result:** After performing molecular docking separately for 2-octyl cyanoacrylate and Hyaluronic acid, we found that conformation 1 of Hyaluronic acid with negative binding affinity and RMSD had a better effect on trypsin protein in wound healing process.

**Discussion:** Molecular docking is one of the most common methods in drug design due to its ability to predict the binding and incorporation of small molecular ligands into the appropriate binding site. Determining the binding properties and behavior plays an important role in the rational design of drugs as well as elucidating the basic biochemical processes. In the end, considering the high effectiveness and docking results, it can be concluded that conformation 1 of Hyaluronic acid with negative binding affinity and RMSD had a better effect on trypsin protein in wound healing process.

## Effects of Microchimeric Fetal Cells on Wound Healing

**Mohaddeseh Zeinali Ali Abadi<sup>1\*</sup>**

**Mohsen Eslami Farsani<sup>2</sup>**

*1. Faculty of Medicine, Qom University of Medical Sciences, Qom, Iran*

*2. Cellular and molecular research center, qom university of medical sciences, qom, iran*

**Background:** tissue regeneration is a compound process that involved different factors such as signaling molecules, growth factors, and cell cycle regulators in wound healing. These factors excellently regulate cell division and differentiation at sites of injury. The 3 stages of wound healing, namely inflammation, proliferation, and remodeling are finely controlled. Extensive skin wound therapy is a worldwide problem due to

major morbidity. Therefore, we try to find methods that reduce the wound healing period. One of these methods is the use of microchimeric fetal cells (MFCs). The existence of small amounts of genetically heterogeneous cells in an organism is known as microchimerism and these cells may transport of fetus to the maternal system during and after pregnancy. In this research, we reviewed the molecular mechanism of this process and its effect on wound healing.

**Methods:** Several of keywords including microchimeric fetal cells, pregnancy, wound healing and repairing tissue were searched in databases such as PubMed, Google Scholar, ScienceDirect, Web of Science, etc. from 2018 to 2022, and some information was obtained.

**Result:** The majority of research showed that the presence of microchimeric fetal cells may help to improve more accelerate wound healing in pregnant mice or immediately after pregnancy. The molecular mechanisms of this process are as follows: 1) Monocytes secrete Ccl2 early in the site of skin wound 2) Ccl2 recruits a specific subpopulation of fetal cells to maternal wounds through Ccr2 3) Ccl2 improves wound healing in postpartum mice.

**Conclusion:** These findings proved that the use of microchimeric fetal cells as a new way can provide an effective strategy in maternal tissue repair that can reduce period of wound healing.

**Keywords:** Microchimeric fetal cells, Pregnancy, Wound healing, Tissue repairing

## **A Case Report of Pressure Ulcer Healing Using 2 g of Sucralfate Daily**

**Abdollah Abolfathi<sup>1</sup>**

**Yasaman Pourandish<sup>2</sup>**

**Fatemeh Mehrabi<sup>2\*</sup>**

**Nima Abbasi Veldani<sup>3</sup>**

*1. MSc Student in Nursing, Student Research Committee, Arak University of Medical Sciences, Arak, Iran*

*2. Nursing Instructor, Department of Nursing, Faculty of Nursing and Midwifery, Arak University of Medical Sciences, Arak, Iran*

*3. Resident in Neurosurgery, Student Research Committee, Arak University of Medical Sciences, Arak, Iran*

**Introduction:** pressure ulcer is a kind of tissue damage made by pressure and can involve various tissues such as skin, muscle, cartilage, and bone. Hospitalized patients in intensive care units (ICU) and the elderly are more exposed to this type of ulcers. A pressure ulcer can reduce life quality, disability, and even death. On the other hand, it increases the risk of nosocomial infections, hospitalization duration, and so the financial load on the medical system. In addition, it is considered as one of the important medical and nursing challenges.

**Introducing patient:** the patient is 60-year-old man who was hospitalized in ICU for one month in January 2018 because of decreased level of consciousness. A pressure ulcer, grade 4, at about 15\*15 cm with a depth of 4 cm with exudate secretion and discoloration of the yellow substrate (slab tissue) with necrotic tissue was made around the ulcer. The patient ulcer in ICU sector was dressed daily with silver sulfate ointment which had no improvement. The necrotic tissue of the ulcer was healed and washed with normal daily saline after the increase of consciousness level and patient transfer to the hospitalization sector and was covered by 2 g of sucralfate tablets (4 tablets of 500 mg) dissolved in 5 ml of distilled water and mixed with 15 g of sulfur sulfate ointment. Finally, it was dressed by sterile gas and glue. PUSH tool was used to improve ulcer. The patient ulcer was changed to a pressure ulcer, grade 2, after 7 weeks with the dimension of 5\*5 cm with pink bed (Granular tissue enclosed with epithelial tissue) as same as skin. The patient was discharged home on a daily dressing order.

**Conclusion:** pressure ulcer is considered as an important challenge in the medical system and the proper and timely remedy for this type of ulcers is vital. Using sucralfate with the mechanism of stimulation of prostaglandins, providing a

protective coating on the ulcer, enhancing local blood flow, stimulating the development of epithelial growth factors, and cell migration in ulcer healing is useful among the used medicines and various plant and chemical compounds to improve and amend the ulcers quickly.

Keywords: pressure ulcer, healing, sucralfate, silver ointment

## **Effect of Hydroalcoholic Extract of Trigonella Foenum Graecum Leaves on Mast Cell Numbers and Degranulation in Diabetic Rat Wound Healing**

**Amene Nikgoftar Fathi**

*Msc of Anatomical Science, Department of Anatomical Sciences, Medical School, Arak University of Medical Sciences, Arak, Iran*

**Objective:** Many studies have revealed the prominent effects of mast cells in wound healing. In the present study, we assessed the probable therapeutic features of TFG hydroalcoholic extract on wound contraction and mast cell degranulation in experimental diabetic rats.

**Method:** Skin wounds were generated and treatments were applied with TFG hydroalcoholic extract intraperitoneally in the sham, control and experimental groups, respectively. 16,800 microscopic images used to count the mast cells and degranulation level (Image J software).

**Results:** Time-lapse photography revealed that the TFG significantly ( $p < 0.05$ ) increased the total number of mast cells in all experimental groups on days 5 and 7. The count of grade III (degranulated) mast cells were reduced significantly ( $p < 0.05$ ) on days 5 and 7 in experimental groups.

**Conclusion:** The rate of wound healing was accelerated considerably following TFG hydroalcoholic extract administration.

Keywords: trigonella foenum graecum, wound healing, Diabetes

## **The Effect of Lavender on Wounds Healing**

**Amin Hajhosseini<sup>1\*</sup>**

**Zeinab sadat Jalali<sup>2</sup>**

**Reihane khorasanian<sup>3</sup>**

**Shekoofe Jokar<sup>4</sup>**

**Mina Darabi<sup>5</sup>**

**Zahra Teshnizi<sup>6</sup>**

*1. Student of Research committee, Bushehr UNIVERSITY of medical science, Bushehr, Iran*

*2. Student of Research committee, Jahrom UNIVERSITY of medical science, Jahrom, Iran*

*3. Meical genetics and Molcular biology, Iran University of medical science, Tehran, Iran*

*4. Shiraz University of Medocal science, Shiraz, Iran*

*5. Kermanshah University of Medocal science, Kermanshah, Iran*

*6. School of medical science, Shahrekord branch, Islamic Azad University, Sharekord, Iran*

Burn is one of the leading causes of mortality in the world. Delay in wound healing can lead to poor anatomical outcomes, increase the risk of infection, and ultimately lead to dangerous complications and even death. Herbal preparations are among the Earliest methods adopted in episiotomy wound healing and pain relief. Wound diseases and inflammatory-related illnesses have been more common in recent Decades. Cure complexity, an increase in multidrug-resistant bacteria, side effects of medical therapies, and medication costs are both reasons for the need for the identification, and development of new, efficient treatments with low toxicity and low cost. Lavender, *Lavandula angustifolia*, is an herbaceous plant belonging to the mint family, Lamiaceae. Linalool and linalyl acetate are among the effective compounds of this plant with positive and significant effects on the gastrointestinal and central nervous systems. Therefore, our aim in this study was to investigate the effect of Lavender on the treatment of wounds.

**Method:** For this review, we conducted advanced research in PubMed, Google Scholar, and Science direct with "lavender" and "wound healing" key terms. After reviewing the relevant articles, 17 articles were evaluated.

**Results:** The use of lavender oil showed a significant decrease in the area of the wound in rats. Lavender oil-treated mice showed increased expression of both type I and II collagen, as the result of the increased number of fibroblasts, which synthesize collagen. Also, lavender oil increased the expression of TGF- $\beta$  compared to the control, furthermore, the number of myofibroblasts increased which is needed for wound contraction via fibroblast differentiation by TGF- $\beta$ . Using lavender in combination with sesame oil showed significant improvement specifically in the accumulation of collagen, fibroblasts, and re-epithelialization.

**Conclusion:** Lavender oil is an herbal extracted flower oil with different effects including antibiotic, antifungal, and sedative and also antimicrobial. This oil is effective in early wound healing. This essential oil also can use as an adjuvant agent or therapeutic alternative in surgical wounds but require skills and nursing care. Additional research and studies are needed to explore the different effects and mechanisms of this essential oil.

**Keywords:** Lavender, Wound, healing

and application of NI in wound repair including (a) data interoperability such as terminology/standardization and care transition/handoffs, (b) mobile health, (c) clinical informatics research that deals with various clinical information applications such as Electronic Medical Records (EMR) and decision support systems, (d) human factors such as human computer interaction and communication and patient safety, and (e) big data research.

In current year, we created and distributed a special nursing form between 78 nurses occupied in Tehran about current NI trends on wound repair. A total of 73 responses were submitted. This work provides an important view of the research trends and valuable insights on the status of nursing informatics research. Further research is needed to find the role and impact of these trends in health care. From 78 form distributed, the top five reported (n=73, 93/6%) research areas were as follows: data interoperability (n=43, 55/1%); mobile health (n=57, 78/1%); clinical informatics research (n=47, 64/4%); patient safety (n=32, 48/8%); and big data research (n=23, 31/5%).

**Keywords:** Information Technology, Nursing Informatics, Clinical informatics research.

## **An Analysis on Application of Nursing Informatics in Wounds Repair in Tehran: a Survey**

**Zhila Saneipour<sup>1</sup>**

**Mohammad Reza Nami<sup>2\*</sup>**

*1. Besat Hospital, AJA University*

*2. QIAU*

Information Technology (IT) has been identified as a key factor in achieving improved patient safety and quality of care. Nurses as one of hospital staffs involve information from assessing the health care needs of patients, to developing care plans, to communicating patient information to other health professionals, to developing reports. Nursing informatics (NI) can help provide effective and safe healthcare. In this paper, we identify and describe broad topics of research trends in NI

## **Effect of Silybum Marianum Plant Extract (Silymarin) on Wound Healing**

**Ali Torkamandi<sup>1\*</sup>**

**Reihaneh Seyedebrahimi<sup>2</sup>**

*1. Student Research Committee, Faculty of Medicine, Qom University of Medical Science, Qom, Iran*

*2. Anatomy Department, Faculty of Medicine, Qom University of Medical Sciences, Qom, Iran*

**Background:** Since wound and its treatment are an important issue in daily life, we are trying to provide methods that have less side effects in addition to quick and effective treatment. From the past until now, medicinal plants have been used to heal wounds and, they had effects on wound healing due to their properties. This has caused researchers to have a special look at medicinal plants and their

effect on tissue and wound healing. The objective of this research is to investigate the effect of silymarin (extract of *Silybum marianum*) on wound healing.

Methods: By reviewing of several published articles in reliable global databases such as Web of Science PubMed, Scopus and etc, between 2018 and 2022, we obtained results about the beneficial effects of silymarin on wound healing in rats.

Results: Silymarin has strong antioxidant properties and prevents tissue damage caused by oxidative substances such as hydrogen peroxide. Because oxidative stress is one of the major mechanisms for delaying in the wound healing process, substances with proven antioxidant activity, such as silymarin, can be useful for treating many dermatologic conditions as well as wound healing. Topical administration of this extract on wounds made on rats stimulates epithelialization in full-thickness wounds and also reduces inflammation in skin wounds. In addition, silymarin increased the percentage of contraction and the amount of collagen in the wound site of rats.

Conclusion: By observing the beneficial effect of silymarin on wound healing in rats, the use of this extract for human wounds can be effective and this issue needs serious attention. Also, future studies can be performed to determine the molecular mechanisms of silymarin in wound healing.

Keywords: *Silybum marianum*, Silymarin, Wound healing, Medicinal plants

## **Examining the Knowledge, Attitude and Performance Quality of Nurses in the Prevention of Pressure Ulcers; A Systematic Review**

**Mobina imandust<sup>1\*</sup>**

**Ferdows pelarak<sup>2</sup>**

*1. Bachelor of Nursing student, Student Research Committee, Islamic Azad University, Dezful Branch, Dezful, Iran*

*2. Instructor, Senior Expert in Pediatrics, Islamic Azad University, Dezful Branch, Dezful, Iran*

Introduction: Pressure ulcers are known as one of the events that threaten patient safety and the third most costly disorder after cancer and cardiovascular diseases. On the other hand, pressure ulcer is an indicator of the quality of care in health care centers and one of the important indicators of the quality of nursing care, so this study aims to investigate the knowledge, attitude and performance quality of nurses in the prevention of pressure ulcers.

Search method: The current study is a systematic review study that is based on searching Google Scholar and Elmnet search engines and SID, Magiran, Pubmed, Elsevier, ScienceDirect databases with keywords knowledge, attitude, quality, nurses> performance, prevention, pressure sores, bedsores and their English equivalents were carried out in the time range of 2000 to 2022, and 25 articles were selected from all the articles found for the purpose of research and were analyzed.

Findings: According to the conducted studies, nurses> knowledge about pressure ulcer prevention is high, but there is still room for improvement, on the other hand, nurses refuse to use their knowledge at the bedside for various reasons. According to the studied articles, examination of the patient's skin in terms of the initial symptoms of pressure sores in each shift, moving and massaging the skin of pressure areas is related to a sense of responsibility, lack of facilities, manpower and time, which affects the quality of nurses> performance. According to the reviewed articles, contradictory results were found regarding the relationship between knowledge scores and attitudes of nurses with gender, work experience, service experience in specific departments, working hours per week, and among the provision of codified and up-to-date educational courses, regular participation of nurses in the course and the final evaluation of the participants was observed to be significantly related to the knowledge and work quality of the nurses.

Conclusion: According to the obtained results, a positive and significant relationship was found between the knowledge and attitude of nurses with

prevention of pressure ulcers as the main part of care, but their attention to this issue is not enough and they should apply preventive activities related to pressure ulcers in practice. Therefore, it is suggested to use pressure ulcer examination forms in the file and a trained nursing team to examine pressure ulcers in the hospital.

**Keywords:** Nursing knowledge, performance quality, prevention, pressure ulcer

## **Investigating the Non-destructive Effects of Cold Atmospheric Plasma on the Induced Wound in Healthy Mice**

**Mahdiyeh Bakhtiyari-Ramezani<sup>1\*</sup>**

**Mojtaba Nohekhan<sup>1</sup>**

**Mohammad Ismaeil Akbari<sup>2</sup>**

**Atiyeh Akbari<sup>2</sup>**

**Fereshteh Abbasvandi<sup>2</sup>**

**Afshin Moradi<sup>2</sup>**

*1. Plasma and Nuclear Fusion Research School, Nuclear Science and Technology Research Institute (NSTRI), Tehran, Iran*

*2. Cancer Research Center Shahid Beheshti University of Medical Sciences, Tehran, Iran*

**Introduction:** Non-thermal or cold atmospheric plasma (CAP) is a new therapy method that is effective in the field of medicine such as wound healing, oncology, dermatology and so forth [1-3]. According to the findings about the effect of CAP as a beneficial treatment method with low complications in accelerating wound healing, this study was conducted to investigate the safety and effectiveness of CAP on wounds in healthy mice (i.e., mice without disease).

**Materials and methods:** Male, Wistar, 8-week-old rats were divided into three groups (n=5) and two wounds were created on the back of each mouse. The left wound of each mouse was considered as control and the right one was treated with plasma (Figure 1 (A, B)). G1 and G2 groups were treated with plasma for three and five

minutes, respectively. While, in the G3, the right wound was treated for three minutes and then both wounds were sutured. In this research, direct treatment with helium plasma has been performed and samplings were collected on days 1, 7 and 21.

**Results:** Pathology tests, proliferation index, neovascularization, re-epithelialization, N/C ratio and possible changes of cells in the direction of cell aggressiveness or malignancy after plasma therapy were examined. The mice were kept for 3 months. No side effects such as weight loss and wound malignancy were observed. (Figure 1 C, D).

**Conclusion:** Malignancy and side effects were not observed in wound mice after plasma therapy and it can be considered a safe treatment.

**Keywords:** plasma, cold atmospheric plasma, non-thermal plasma, plasma jet, plasma therapy, wound treatment, wound healing, wound, mice

## **The Role of Microbiota in Nonhealing Diabetic Wounds**

**Fateme Khodapara<sup>1</sup>**

**Seyed Mahdi Arfazadeh<sup>2</sup>**

**Mohadeseh Farahmandnia<sup>3</sup>**

**Parsa Manouchehri<sup>4</sup>**

**Mahsima Eskandarzadeh<sup>5</sup>**

**Helia Sadat Mousavi<sup>6</sup>**

**Fereshteh Gholami<sup>7\*</sup>**

*1. Birjand university of medical sciences, Faculty of medicine, Birjand, Iran*

*2. Medical sGuilan university of medical sciences, faculty of medicine, Guilan, Iran*

*3. Student of Msc counselling in Midwifery, Mashhad, Iran*

*4. Urmia university of medical sciences, faculty of medicine, Urmia, Iran*

*5. Semnan azad university of medical scienc, department of nursing and midwifery, Semnan, Iran*

*6. Mashhad azad university of medical sciences, faculty of medicine, Mashhad, Iran*

*7. Bachelor student of Surgical Technology, Faculty of Paramedicine, Department of medicine, Bushehr University of Medical Science, Bushehr, Iran*

**Introduction:** A chronic wound can be described as a wound that cannot heal in the expected time frame (of less than 3 months). The 5-year mortality rate of diabetic foot ulcers is 30.5%, which is comparable to the mortality rate linked with cancer (31%) Management of chronic diabetic wounds remains problematic due to the lack of diagnostic tools allowing the distinction between colonization and infection of the wounds. 50% of patients that develop clinically overt infection require amputation.

**Method:** In the forthcoming systematic study, the required data were collected using keywords and citing valid databases such as: Scopus PubMed, Google Scholar and ProQuest. The statistical population of the study includes all studies conducted up to 2022 in the field of the role of the microbiome in nonhealing diabetic wounds. After reviewing the relevant findings and evaluating the data quality, a total of 25 articles were analyzed.

**Results:** Biofilm increases virulence, reduces treatment success, offers a physical barrier to biological and antimicrobial substances, facilitating microorganism attachment to surfaces or to each other. In biofilm, anti-proliferative signals derived from pathogens aborts fibroblasts and keratinocyte functions. Thus, the consequence is failure in granulation tissue formation and the re-epithelialization trajectory. Among the common species, *Staphylococcus aureus* is the most commonly observed species, followed by the negative. More evidence suggests that. Are common in wounds. Of beneficial microbiota is *Staphylococcal SPP. S. biofilm*, is one of them. *Staphylococcus fibroblasts* produces Thus which was shown to be effective in decreasing the nasal carriage of *S. aureus*. *P. granulation* and *S. aureus* secrete a plethora of proteases resulting in collagen, fibrinogen and elastin degradation, inhibition of PMNs.

**Conclusion:** The microbiome is a therapeutic target that can be modified; a fundamental understanding of its components will reveal novel targets for managing and treating diabetic wounds. With its central role for microbiota, the gut-skin

axis represents an exciting field of research with a wide range of therapeutic applications, including diabetes wound healing.

**Keywords:** diabetic wounds, wounds microbiome, nonhealing diabetic wounds, wound care

## **Immunotherapy: A Promised Approach for the Treatment of Cutaneous Metastatic Melanoma**

**Samin Khosravi<sup>1</sup>**

**Seyed Mehdi Tabaie<sup>2</sup>**

**Mina Sadat Naderi<sup>1\*</sup>**

*1. Department of Cellular and Molecular Biology, Faculty of Biological Science, North Tehran Branch, Islamic Azad University, Tehran, Iran*

*2. Department of Medical Laser, Medical Laser Research Center, Yara Institute, Academic Center for Education Culture and Research ACECR, Tehran, Iran*

**Background:** Skin cancer is divided into two main types: nonmelanoma and melanoma skin cancer. Melanoma originates from skin melanocyte cells and it is more likely to invade nearby tissues and spread to other parts of the body. Stage IV melanoma is classified as metastatic melanoma due to the presence of distant metastases, while stage III is only marked by metastases in regional lymph nodes (LN). Having said that, cancer DNA vaccines and novel approaches in which mRNA vaccines are applied can induce a systemic immune response and are effective on metastases and tumors which are not easily removable by surgery. Melanoma is an outstanding example of a tumor that has manifested the most response to immune therapy due to having a wide range of neoantigens caused by mutations on its surface.

**Methods:** Here in this study, we looked for the most common variations found on key glycoprotein receptors in metastatic melanoma. The data regarding antigen's structure, number of epitopes, antibody-antigen affinity, and the site of mutations have exported from MedGen and PubChem online databases as well as recent articles published over the last 15 years.

**Results:** The most common driver mutations observed in cutaneous melanoma are BRAF, NRAS, NF1, microphthalmia-associated transcription factor (MITF), and PTEN. Since their discovery, these tumor antigens have been used for multiple purposes such as diagnostic markers and cancer vaccines. This new generation of vaccines can be delivered into cells using viral or nonviral gene delivery systems. Vaccines ideally need to present all of the tumor-associated antigens on the antigen-presenting cells (APC) to stimulate an adequate and long-lasting immune response. According to studies conducted in preceding years, a significant improvement in melanoma treatment was observed using targeted therapies, which pharmacologically inhibit key mutations in melanoma.

**Discussion:** Since melanoma is a heavy burden on public health, a better understanding of its main leading causes can cast new light on approaches used as a treatment for this cancer. Over the last decade, the importance of DNA and RNA vaccines has been highlighted more than ever in the history of Molecular biology. So that, by finding related links between the immune system and designed DNA/RNA vaccines, a significant improvement in treating metastatic melanoma is expected to happen.

**Keywords:** Skin cancer, Melanoma, Neoantigen, Immunotherapy, Vaccine

## **Evaluation the Effect of Honey Bee Venom on Dermal Fibroblast Cells**

**Pooriya Teimoori**<sup>1</sup>

**Afsaneh Tavasoli**<sup>2</sup>

**Samira Ansari**<sup>3</sup>

**Atefeh Hajiagha Bozorgi**<sup>4</sup>

**Hossein Mahboudi**<sup>5\*</sup>

*1. Pharmacy student, pharmacy students research committee, school of pharmacy, alborz university of medical science, karaj, iran*

*2. Department of Biotechnology, Faculty of Pharmacy, Alborz University of Medical Sciences, Karaj, Iran.*

*3. Alborz University of Medical Sciences, Karaj, Iran*

*4. Department of Medicinal Chemistry, Faculty of Pharmacy, Alborz University of Medical Sciences, Karaj, Iran; Evidence-based Phytotherapy and Complementary Medicine Research Center, Alborz University of Medical Sciences, Karaj, Iran*

*5. Assistant Professor of Biotechnology, Alborz University of Medical Sciences*

Skin aging is considered as one of the problems of skin health, and prevention this process with anti-aging skin strategies is one of the attractive branches in dermatology.

In recent years, extensive researches have been conducted on various anti-aging mechanisms, especially endogenous mechanisms and numerous treatment strategies have been provided.

Based on the structure of the skin, which includes three layers: epidermis, dermis and subcutaneous tissues, there are different types of cells in these layers. In the dermis layer most of the cells are fibroblasts which form the extracellular matrix by producing elastin and collagen, and their proliferation and population decrease significantly in the aging process of the skin. In recent years, using the natural ingredients in cosmetics such as bee venom (BV) has been significantly developed. According to the studies, BV is an effective substance in healing wounds due to its renovation, anti-inflammatory and antimicrobial properties. Therefore, the aim of this study is to investigate the effect of bee venom on stimulating the proliferation of dermal fibroblast cells (DF).

In this study first we analyzed BV through HPLC-UV in order to standardization and afterwards we treated DFs with different concentrations of BV in different time periods, finally evaluated proliferation of cells by MTT assay.

The most effective concentration of BV was observed at 0.5 µg/ml and during 24-hour treatment. These results suggest the possibility of using BV as an API for antiaging skin products.

**Keywords:** bee venom, dermal fibroblast, proliferation, skin aging



## Investigating the Effects of Herbal Medicines in Episiotomy Wound Healing

Maryam Alahdadian<sup>1</sup>

Marziyeh Ahmadi<sup>2\*</sup>

*1. Department of Nursing and Midwifery, Falavarjan Branch, Islamic Azad University, Isfahan, Iran*

*2. Student of midwifery, Falavarjan Branch, Islamic Azad University, Isfahan, Iran*

**Introduction:** Episiotomy or cutting of the vulva is the most common cut in midwifery, which facilitates the exit of the fetus and needs care like any other operation. Despite many benefits, episiotomy has complications such as pain, paronychia, and infection, so that patients report pain in the episiotomy area more severe than during childbirth. Although comprehensive statistics of episiotomy have not been published in Iran, this incision is a common practice in Iranian hospitals. Many factors such as age, blood circulation and oxygen supply to the wound, nutritional status, wound status, mother's health and economic and social status are effective in the treatment process. One of the usual methods of episiotomy care is to use a sitting bath

and use an antiseptic. It is also effective to observe perineal hygiene, keep the wound dry and use medicinal and non-medicinal methods. At present, the use of herbal medicines with minimal side effects and high efficiency is more and more the attention of researchers.

**Methods:** This article is written in the form of a review of articles extracted from Google scholar and sid sites.

**Findings:** Based on the extracted articles, lavender essential oil with olive oil base reduces inflammation and reduces infection and episiotomy pain. Bromelain and chamomile cream accelerate episiotomy wound healing. The use of gerbera flower ointment and thirst-quenching plant reduces the intensity of pain in the wound. The cream of the plant also reduces pain while healing the wound. Alpha ointment (Fandermol)

is a 100% herbal ointment and a combination of several different herbs, but it has not shown any effect on episiotomy wound healing.

**Conclusion:** Some herbal medicines are effective in healing episiotomy wound and while reducing pain and inflammation, they accelerate the process of pain recovery.

**Keywords:** Episiotomy, herbal medicines, wound healing

## Production of Recombinant Trypsin as a Potential Tool for Wound Debridement

Armin Nazemi Zadeh<sup>1</sup>

Fereshteh Sarafrazi<sup>1</sup>

Seyedeh Sara Azadeh<sup>1</sup>

Masoud Habibi<sup>1</sup>

Mohsen Fateh<sup>2</sup>

Hassan Rassouli<sup>1\*</sup>

*1. Department of Photo Healing and Regeneration, Medical Laser Research Center, Yara Institute Academic Center for Education, Culture and Research (ACECR), Tehran, Iran*

*2. Lifestyle Medicine Department, Medical Laser Research Center, Academic Center for Education, Culture and Research (ACECR), Tehran, Iran*

**Background:** Skin wound healing depends on different and overlapping phases including hemostasis, inflammation, proliferation, and dissolution/remodeling. Wound healing will be delayed by any blockage period, which often enters the wound into a state of pathological inflammation. Wound debridement is the process of removing dead tissue from wounds. The dead tissue may be black, gray, yellow, tan, or white. Also, Foreign material that needs to be removed may be on the wound. There are a few ways like Sharp debridement, Autolytic debridement, Enzymatic debridement, and Mechanical debridement where dead tissue can be removed from the wound. Recombinant proteins are proteins encoded by recombinant DNA technology. In

recent years, the number of recombinant proteins used for therapeutic applications has increased dramatically. Many of these applications involve complex glycoproteins and antibodies with relatively high production needs. Trypsin is a serine protease that is found in the digestive system of many vertebrates. Trypsin hydrolyzes proteins at the carboxyl side of lysine or arginine amino acids in the polypeptide chain. Trypsin also is an important enzymatic tool used in proteomics and biopharmaceutical studies and also is a potential tool for Wound debridement. This research was designed to produce recombinant trypsin in a microbial expression system.

**Methods:** In this study, we've built a microbial expression vector containing the coding sequence for optimized trypsin and transformed it into the E. coli BL21 (DE3) strain. then We developed a complete production process that includes, expression, purification, and biological activity assay.

**Results:** The purified trypsin was well-folded and active but the activity was lower than that of other commercially available products. The whole procedure is fast and scalable.

**Conclusions:** E. coli BL21 (DE3) can produce and fold recombinant trypsin. Although the produced trypsin has biologically active, the level of this activity is low and it is not cost-effective compared to commercial tryptins.

**Keywords:** Recombinant Trypsin, Recombinant DNA Technology, Microbial Expression System, Wound Healing, Wound Debridement

## The Role of Fetal Cells in Maternal Wound Healing

Soraya Babaie<sup>1\*</sup>

Azizeh Rahmani Del Bakhshayesh<sup>2</sup>

Nahideh Asadi<sup>2</sup>

*1. Physical Medicine and Rehabilitation Research Center, Aging Research Institute, Tabriz University of Medical Sciences, Tabriz, Iran*

*2. Faculty of Advanced Medical Science, Tabriz University of Medical Sciences, Tabriz, Iran*

The health of both the mother and baby may be affected by many events that occur during pregnancy. The passage of fetal cells into the maternal circulation is one such event. Cell trafficking by fetal cells into the maternal circulation starts very early in pregnancy and has long-lasting effects. These embryonic cells, known as microchimeric cells, can remain in the bone marrow and mother's organs for a long time. It has been shown that acute or chronic tissue damage causes the proliferation and differentiation of embryonic stem cells in different organs of the mother. Due to the attractiveness and importance of this subject, the present review mainly describes the subsequently effect of microchimeric fetal cells in maternal wound healing.

**Keywords:** Fetal cells, Microchimeric cells, Pregnancy, Wound healing

## Preventive Nursing Care in Pressure Ulcers in 2022

Maedeh Nasirifar

*Bachelor of Nursing student at Falavarjan Islamic Azad University/ Isfahan, Iran*

A pressure ulcer (PU) is a localized skin injury that is one of the most important and frequent complications of hospitalization. PU leads to complications for patients, with increased morbidity and mortality rates. Nurses are the most effective healthcare professionals in outcomes. Prevention of PUs, which can have serious physiological, psychological and economic effects on individuals and their families, is a major concern in health care and the primary professional responsibility of nurses. Education of health care workers is an important component of PU prevention; educational programs should include a wide range of factors that reflect the multifactorial nature of PU period. Nursing personnel should have sufficient preparation for the prevention of PU in order to avoid heavy treatment costs and patient suffering, more attention should be paid to the training of nurses and increasing their level of

awareness to prevent the development of PUs. In a study, the knowledge, attitude and behavior of nurses in the field of prevention of pressure injuries were investigated, which was at a relatively good and moderate level, but still far from the desired level. Considering the importance of patient safety and its promotion, it is necessary to pay attention to the training of people in healthcare services in the field of pressure injury prevention standards and necessary measures to overcome problems, including the availability of stress reduction equipment in all cases. Centers, nursing motivation, solving the shortage of capable nurses and holding educational workshops should be considered. Considering that pressure injury is one of the most dangerous threats to the safety of patients, it is necessary to hold continuous training courses to increase awareness and strengthen their positive attitude and correct some wrong actions caused by false beliefs for nurses and other medical personnel in hospitals. It is very important to motivate nurses with different management methods and coordination between doctors and nursing colleagues in treatment programs on the one hand and putting pressure injury prevention training and care on the agenda on the other hand. It is essential to have a good level of knowledge in the prevention and management of PU. Therefore, several different interventions: risk assessment, position changes, skin care, nutrition and documentation have been developed with the aim of improving knowledge about PU prevention.

**Keywords:** Pressure ulcer, nursing care, nursing education, prevention

## **Immune Checkpoint Inhibitors that Cause Adverse Cutaneous Side Effects: Etiology, Management, and Monitoring**

**Fatemeh Amini**

*West China School of Medicine, Sichuan University, Chengdu, China*

**Introduction:** As more and more effective

anticancer medications, immune checkpoint inhibitors (ICPi) that are humanized monoclonal to the antigens programmed cell death 1 (PD-1) and programmed cell death ligand-1 (PD-L1) (atezolizumab, avelumab, and durvalumab) is being employed. Anti-PD-1/PD-L1 therapy leads to stimulation of cytotoxic CD4+/CD8+ T cells and subsequent cancer cell death, which has specific immunologic adverse effects that are exclusive to this therapy. These drugs are recognized to have the most prevalent immune-related adverse effects, and they can cause a range of cutaneous reactions (irAEs). Most cutaneous irAEs range from ambiguous skin eruptions to obvious skin signs. While some of these cutaneous irAEs may be self-limiting and have tolerable skin toxicity profiles, others may have adverse effects that might even be lethal.

**Purpose:** This study seeks to provide light on the relevant mechanism(s), treatment, and associated cutaneous irAEs of oncology-related medications. **fields represented:** Several databases, including Pub-Med, Google Scholar, and Medline, were used to search the literature. Research publications, retrospective studies, case reports, and clinicopathological results made up the bulk of the search. This review paper provides a summary of the cutaneous irAEs associated with anti-PD-1/PD-L1 therapy as well as recommendations to aid in better managing these side effects and avoiding treatment termination. **HIGHLIGHTS** The majority of immune-related adverse events brought on by anti-PD-1/PD-L1 immune-checkpoint antibodies are instantaneous adverse effects. Most cutaneous toxicities present as maculopapular rash and pruritus. Additionally, more specialized skin issues such as vitiligo, aggravated psoriasis, lichenoid dermatitis, mucosal involvement (such as an oral lichenoid response), dermatomyositis, and lupus erythematosus might develop. Skin symptoms, such as Stevens-Johnson syndrome and toxic epidermal necrolysis, can be fatal (TEN). Skin toxicities are typically minor, easily controlled, and seldom cause major morbidity. Inadequate

care of the cutaneous adverse event and early detection may prevent the lesions from getting worse and reduce treatment interruption.

Keywords: Cutaneous eruptions; anti-PD-1; anti-PD-L1; atezolizumab; avelumab; durvalumab; immune-related adverse events (irAEs); immunotherapy; nivolumab; oncology; pembrolizumab.

## **Virtual Reality Systems (VR) for post Burn rehabilitation**

**Parisa Arzani<sup>1\*</sup>**

**Fatemeh Rahimi<sup>2</sup>**

*1. Assistant Professor, Department of Physiotherapy, School of Rehabilitation sciences, Semnan University of Medical Sciences, Semnan, Iran*

*2. Assistant Professor, Shahrekord University of Medical Sciences, Shahrekord, Iran*

Over the past two decades, VR has been the subject of growing interest in burn care.

Methods: We proceeded stepwise using five databases: Google Scholar, PubMed, Cochrane, CINAHL, and Sciencedirect to search for relevant studies from 2000 to 2021. In each database, we used the search terms: VR and post-burn rehabilitation.

Results: six studies met the inclusion criteria. The primary outcome measures were pain and range of motion (ROM). Four studies were analyzed for pain scores after burn rehabilitation. These studies were too heterogeneous to be pooled. No significant difference was found between VR treatment and standard care for ROM.

conclusion: The main reason for such equivocal results could be the high heterogeneity in the overall comparison and differences in VR techniques over the years. Future studies will need larger sample sizes to examine the impact of VR on the rehabilitation process of burn patients.

Keywords: Virtual Reality, Rehabilitation, burn

## **Reinforcing of Decellularized Human Amniotic Membrane laminates for Skin Transplantation**

**Seyede Atefe Hosseini<sup>1</sup>**

**Saeid Kargozar<sup>2\*</sup>**

**Seyed Javad Hoseini<sup>1</sup>**

**Alireza Ebrahimzadeh-Bideskan<sup>3</sup>**

**Simin Nazarnezhad<sup>1</sup>**

*1. Department of Medical Biotechnology and Nanotechnology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran*

*2. Tissue Engineering Research Group (TERG), Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad*

*3. Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran*

Human amniotic membrane (HAM) has been widely used as a biodegradable and bioactive matrix for simulating the natural microcellular environment and tissue regeneration. This study fabricated a multilayered composite of decellularized HAM (d-HAM) for skin transplantation. The multilayered d-HAM was created by repeatedly depositing wet layers of d-HAM and dehydrating them, followed by chemical cross-linking to tighten integration at the layer interfaces and within the layers. Our findings revealed improved physical properties of the laminates by increasing mechanical strength. The microstructure analysis of laminate indicated the tightened cross-linking of layers and flattened structure. Furthermore, the laminates had sufficient biocompatibility and cell migratory impacts in vitro that are crucial factors in wound healing process. conclusion: The current findings are a promising advance in the engineering of novel biomaterials and the alteration of existing tissues for medical use.

Keywords: Human amniotic membrane, laminate, skin tissue regeneration, decellularization

## **Barriers and Facilitators of Nurses Competence in Chronic Wound Care in the Elderly: A Focus Group Study**

**Hajar Sadeghi<sup>1\*</sup>**

**Alireza Salmani<sup>2</sup>**

*1. Ph.D. Candidate in Nursing, University of Social welfare and Rehabilitation, Tehran, Iran*

*2. Master of Nursing, Tehran University of Medical Sciences, Tehran, Iran*

**Background:** Nurses do not have sufficient competence in chronic wounds in the elderly. While specialized wound care is one of the professional duties of nurses. The purpose of this study is to identify the barriers and facilitators of the competence of nurses providing chronic wound care.

**methods:** To collect data, a focused group interview was used (N=22). Participants included general nurses, wound specialists, nursing Instructor and physicians. Data analysis was done through two-step inductive comparative content analysis.

**Result:** Nurses need to acquire competence in evaluation, recognition of the type of wound, treatment planning and follow-up. Educational, managerial, elderly and economic factors were among the important obstacles. Professional values and commitment to increase the quality of care were the facilitators.

**conclusion:** Elderly people with chronic wounds need specialized nursing care. Effective training of nurses on chronic wound care can increase their competence.

**Keywords:** Nursing, Wound care, competence, Elderly

## **Coactivity of Mast Cells and Stem Cells on Angiogenesis and Antioxidants' Potentials at Inflammation, Proliferation, and Tissue Remodeling Phases of Wound**

**Farzaneh Chehelcheraghi**

*Associate Professor of Anatomical Sciences,  
Department of Anatomical Sciences, School of  
Medicine, Lorestan University of Medical Sciences,  
Khorramabad, IR Iran*

**Background** Reactive oxygen species cause serious damage to the physiological function of tissues. Determination of total antioxidant capacity of skin tissue is one of the determinants of damaged tissue function. Mast cells (MCs) are one of the groups of cells that are invited to the site of injury. The healing process begins with the rapid release of various types of MCs' intermediate factors at the site of injury. Bone marrow mesenchymal stem cell (BMMSC) production and secretion have been shown to regenerate the skin. The aim of this research was to evaluate the wound-healing and antioxidant effects of BMMSCs per MCs. **Methods** Fifty-four albino Wistar male rats were divided into three groups: (1) non-surgery, (2) surgery, and (3) surgery+BMMSCs. Groups 2 and 3 were operated with a 3X8 cm flap and in group 3, cell injections (7X 10<sup>9</sup> cell injection at the time of surgery) were performed. After days 4, 7, and 15, percentage of the surviving tissue, histological characteristics, superoxide dismutase (SOD) activity, and amount of malondialdehyde (MDA) were measured in the groups. For results, Graph Pad Prism 8 software was used, and data were analyzed and compared by analysis of variance and Tukey test. **Results** BMMSCs' application decreased the amount of MDA, increased SOD activity and survival rate of the flaps, and improved the histological characteristics. **Conclusion** This study revealed the protective effects BMMSCs alongside MCs against oxidative stress on the survival of the flaps. However, for clinical use, more research is needed to determine its benefits.

**Keywords:** reactive oxygen species, antioxidant, superoxide dismutase, wound healing

## Objectives, Curriculum and Content of Effective Wound Care Training in Iranian Nurses: A Delphi Study

Hajar Sadeghi<sup>1\*</sup>

Afsaneh Karami<sup>2</sup>

1. *Ph.D. Candidate in Nursing, University of Social Welfare and Rehabilitation, Tehran, Iran*

2. *Master of Nursing, Isfahan University of Medical Sciences, Isfahan, Iran*

**Background:** this study aimed to investigate the content of effective wound care training in Iranian nurses from the perspective of experts in this field.

**methods:** This study was conducted with the Delphi approach. Data were collected in 2022 with three online Delphi rounds via email: 38 participants in the first, 34 participants in the second, and 28 participants in the third round. The data were analyzed using statistical and qualitative analysis. **Results:** The Educational content were divided into six areas of competence: The basics of the integumentary system including anatomy and physiology of skin, therapeutic response in acute and chronic wounds, evaluation of patients with wounds, Wound diagnosis including vascular, lymphatic, pressure, diabetic, unusual wounds, skin flaps and grafts, burn wound management, wound healing, Bed preparation and debridement, dressing, Biophysical technology. **Conclusion:** The results can be used in presenting the specialize curriculum of nursing.

**Keywords:** Wound care, training, nurse, Delphi

## Treatment of Oral and Dental Diseases Through Herbal Medicine

Amir nouri

*abriz Technical and Engineering University - Iran Tabriz*

Oral hygiene is essential for healthy teeth and gums. Oral and dental health is directly related to a person's overall health. Tooth decay or gum problems can lead to pain, damage or loss of teeth.

These issues can lead to malnutrition, speech problems, etc. People can prevent many of these problems by taking care of their teeth at home and visiting the dentist regularly (every 6 months). By reviewing the costs of oral and dental treatment in clinics and dental offices and considering that the price of many dental equipment and materials has skyrocketed, you will definitely come to the conclusion that the best way is to care for and prevent oral and dental diseases. It might be a good idea to visit the apothecary's room with us and use medicinal plants and natural substances for the treatment and prevention of oral and dental diseases.

**Keywords:** Health, teeth, mouth, treatment, traditional medicine, herbal therapy, disease

## Effect of Ortokin on Tissue Healing

Delaram Kashani Javid<sup>1</sup>

Masoud Habibi Fozon Abadi<sup>2</sup>

Aabdolreza Mohammadi Kooshki<sup>3</sup>

Mina Sadat Naderi<sup>1\*</sup>

1. *Department of Biophysics, Faculty of Biological Sciences, North Tehran Branch, Islamic Azad University, Tehran, Iran*

2. *Department of Photo Healing and Regeneration, Medical Laser Research Center, Yara Institute, Academic Center for Education Culture and Research (ACECR), Tehran, Iran*

3. *Department of Medical Laser, Medical Laser Research Center, Yara Institute, Academic Center for Education Culture and Research (ACECR), Tehran, Iran*

Orthokine therapy is an injection therapy that strengthens the body's natural defense mechanisms against inflammation to reduce pain. And also helps to improve function. Orthokine is an intra-articular Autologous Conditioned Serum (ACS or autologous conditioned serum). Orthokin's usage may have a beneficial biological effect on arthritis pain and function. One possibility may be that therapeutic molecules help reestablish healthy joint homeostasis. ACS produces a stronger anti-inflammatory effect and modulates proinflammatory cytokines (IL-1 $\beta$  and TNF- $\alpha$ ) that are involved in cartilage destruction in OA

(osteoarthritis). The main anti-inflammatory agent is called IRAP (Interleukin Receptor Antagonist Protein). This compound is obtained by taking serum from blood and incubating it. Interleukin-1 is a powerful protein that causes inflammation. The antagonist is an agent that can prevent the effects of other substances. Therefore, IRAP is a powerful protein that prevents inflammation. The review of the articles of the last ten years provided by the sites Pubmed, ScienceDirect, Scopus, and Google scholar lets us achieve this information. Orthokine has been used as a non-aggressive treatment method to cure pain and joint injuries, and has had a positive effect in cases such as osteoarthritis (OA). By using the biological effect of ACS serum, changes in cartilage function are obvious; The pathological change of OA is the destruction of hyaline cartilage. One of the catabolic cytokines identified in osteoarthritis (OA) joints, interleukin-1 (IL-1) is the best-known mediator of cartilage loss. The natural inhibitor of IL-1, IL-1 receptor antagonist (IL-1Ra), can potentially limit the intra-articular activities of IL-1, as a result, the disease process is controlled. According to mentioned reviews, this treatment method can be effective in the treatment of sports injuries, joint injuries, the treatment of various types of arthritis including osteoarthritis and wound healing.

### **Investigating the Expression Levels of *cdr1* and *mdr1* Genes in the Stages of Biofilm Formation by Candidate Species Isolated from Sick and Normal People.**

**Mohaddeseh Larypoor<sup>1\*</sup>**

**Tahereh Moradi Braijani<sup>2</sup>**

**Fatemeh Ashrafi<sup>2</sup>**

*1. Assistant Professor of Mycology, Faculty of Biological Sciences, Islamic Azad University, Tehran North Branch, Tehran, Iran*

*2. Faculty of Biological Sciences, Islamic Azad University, Tehran North Branch, Tehran, Iran*

In this study, 100 clinical samples were isolated

from the oral cavity, vaginal area, and feces of people with immunodeficiency, diabetes, and Alzheimer's disease. After determining the strains by PCR method, the process of biofilm formation in the presence and absence of amphotericin B- and the expression level of *CDR1* and *MDR1* genes were determined by Real-time PCR method. More than 50% of strains isolated from patients included *Candida albicans*, and the frequency of *Candida tropicalis*, *Candida glabrata*, *Candida Guillermondi*, *Candida krusei* and *Candida parapsilosis* strains was 8.33%. 48 strains simultaneously had two *CDR1* and *MDR1* genes. Amphotericin-B significantly reduced gene expression at 11 hours and 30 hours after biofilm formation compared to the control ( $P < 0.05$ ). Genetic diversity can play a role in transmission, pathogenicity and biofilm formation of *Candida albicans*.

**Keywords:** *Candida albicans*, Candidiasis, *CDR1* gene, *MDR1*, Multiplex PCR

### **The Role of Mesenchymal Stem Cells in Wound Healing**

**Dorsa Tavakoli**

*Cellular and molecular biology, BA, North Tehran University, Tehran*

Stem cells are «undifferentiated» cells because they can become any cell. Wound healing requires a coordinated interaction between cells, growth factors and extracellular matrix proteins. It is an endogenous mesenchymal stem cell (MSC) that coordinates the repair response by recruiting other host cells and secreting growth factors and matrix proteins. Normal wound healing is a dynamic and complex process that involves a series of coordinated events, including hemorrhage and coagulation, acute inflammation, cell migration, proliferation, differentiation, angiogenesis, re-epithelialization, and ECM synthesis and remodeling. Chronic wounds are wounds that do not progress through the three normal stages of healing, resulting in tissue damage that does not repair within the usual time frame. Chronic

wounds are caused by various underlying disorders, including diabetes, pressure, vascular insufficiency, burns, and vasculitis. MSCs in vivo can migrate to the site of injury in response to chemotactic signals that modulate inflammation, repair damaged tissue, and facilitate tissue regeneration. Differentiation and paracrine signaling have both been proposed as mechanisms by which MSCs improve tissue repair. Mesenchymal stem cells support wound clearance from infection by directly secreting antimicrobial agents and by stimulating phagocytosis by immune cells. The ability of MSCs to promote the transition from the inflammatory phase to the proliferative phase is especially critical for the treatment of chronic wounds where high levels of inflammation impede healing. Thus, multiple mechanisms are involved in MSC-mediated wound healing, including anti-inflammatory and antimicrobial, immunomodulatory, and tissue repair activities.

Keywords: Mesenchymal stem cells, MSC, tissue repair

## From the Mesenchymal Stem Cells to Cardiomyocytes and Heart: To Heal Critical Wounds

Vahid Mohammadzadeh amir<sup>1</sup>

Roosbeh Takook<sup>1</sup>

Zahra Soodmand<sup>1</sup>

Hossein Heydari<sup>1</sup>

Mina Sadat Naderi<sup>2\*</sup>

*1. Department of Microbiology, Faculty of Biological Sciences, North Tehran Branch, Islamic Azad University Tehran Iran*

*2. Department of Biophysics, Faculty of Biological Sciences, North Tehran Branch, Islamic Azad University Tehran Iran*

Background: Stem cells have a great ability to regenerate and repair. These cells are being made and processed from the embryonic period and are also seen in adulthood. Stem cells are divided into four categories term potential home cells belong

to the embryonic period and some of them belong to adults. These cells can make many samples of themselves so that new cells can replace the old ones if something happens. There are different types of stem cells. These cells can differentiate. A group of these cells can differentiate into other organs to form multiple organs and tissues. Now we want to find out the structure of mesenchymal stem cells and how they differentiate into cardiomyocytes, as well as heart stem cells. The heart muscle has special cells. These cells are unique because they are unable to repair damaged tissue in the event of damage. From the time stem cells were identified until today, we have found that stem cells can be used to regenerate heart tissue to replace damaged heart tissue. The most important part of stem cells is the mesenchymal stem cells. Because they are more accessible and have a very high differentiation power. It is also much easier to culture these cells in the laboratory and it is much more likely to control their differentiation. Today, we can treat many heart defects by differentiating stem cells and attaching them to heart tissue. Different cells can be used for this purpose. Embryonic stem cells, somatic stem cells, and induced pluripotent stem cells are good options for this procedure. Some cardiovascular diseases, such as heart attack or myocardial infarction, cause fibrosis, which in turn causes scarring.

Methods: The method used in this article is based on summarizing and classifying related articles of the last 10 years. The collected data have been exported from high-rated articles which are available on PubMed, NCBI, and Elsevier.

Results: As a result, the contractile power and pumping power of the heart are reduced and it turns out that the heart is being destroyed. Human heart cells lose their ability to regenerate after birth and are also unable to repair damaged tissues. There are many ways to treat these heart conditions, but none of them can cure the complications of the disease. But new stem cell-based methods are much safer and more efficient. One of the latest methods studied for this disease is



heart transplantation. This operation is very risky for example in addition to very high costs and drugs the transplant recipient's immune system is suppressed. But in the latest results, a new treatment has been developed in which damaged cells are injected into myocardial muscle tissue, and under certain conditions, these cells increase angiogenesis and the production of new heart cells.

Discussion: There is a perspective that the usage of mesenchymal stem cells (cardiomyocytes) in medical cases will be highly considered. For instance, the replacement of cardiomyocytes in the cardiovascular system or even in a damaged heart can be done. Although the high cost of this accomplishment, few advanced countries have preliminary experiments in this case.

Keywords: Stem cell, Wound Healing, mesenchymal stem cells, cardiomyogenesis, mesenchymal differentiation

## **Increasing the Quality of Melanoma Dermatoscopic Images Using the Structure of Deep Learnings**

Haleh Fateh\*

*Mojtaba Khayat Ajami*

*Zohreh Fakhari Zavareh*

*Lifestyle medicine Research Group, Academic Center for Education, Culture and Research (ACECR), Tehran, Iran*

In the image-based diagnosis of diseases, good-quality of images enhances the accuracy of diagnosis. Skin cancers are one of the most common cancers in the human body and Melanoma is one of the most dangerous types of it. diagnosis in the early stages reduces the mortality caused by this fatal cancer. Therefore, the diagnosis of benign or malignant and the tumor location is very important in medicine. Dermatoscopes are non-invasive means of photographing skin damage. Today, the volume of data available in images allows us

to create useful tools for extracting information from images and video sequences so that we can categorize or analyze content without human intervention. Artificial intelligence technology has grown dramatically in recent years and the tools used in this technology have the potential to improve the quality of low-resolution images. By improving the quality and improving the visualization of small tissues in dermatoscopic images, the final diagnosis of benign or malignant mass will be more accurate. Nowadays, deep learning techniques for medical image analysis have provided the possibility for the development of medical imaging-based intelligent diagnostic systems that can assist the expert in making better decisions about patients' health. In this article deep learning has been used to enhance the quality of dermatoscopic images and will also improve the quality of the final image that we measure this quality with the PSNR criterion. PSNR output is the recommended method for several standard 46.07 images, while the best output of previous methods on these images is 44.02.

Keywords: Skin cancer, Melanoma, deep learning, Artificial intelligence, dermatoscopic images

## **Exosomes and it's Role in Wound Healing**

Fereshteh Sarafrazi<sup>1\*</sup>

Armin Nazemi Zadeh<sup>1</sup>

Malihe Javadi Arjmand<sup>2</sup>

Seyedeh Sara Azadeh<sup>1</sup>

Hassan Rassouli<sup>1</sup>

*1. Department of Photo Healing and Regeneration, Medical Laser Research Center, Yara Institute Academic Center for Education, Culture and Research (ACECR), Tehran, Iran*

*2. Depatement of Medical Genetics, School of Medicine, Tehran University of Medical Sciences. Tehran, Iran*

Extracellular vesicles are divided into two main categories, ectosomes, and exosomes. Exosomes are double-layered lipid membrane vesicles

containing various cellular biomolecules such as proteins, DNA, mRNA, and miRNA. So far several studies exhibited that exosomes are secreted by multiple cell lines and cell types, such as tumor cell lines, stem cells, and neuron cells and they have been found in plasma, urine, semen, , cerebral spinal fluid (CSF), breast milk, serum, amniotic fluid and, etc. A great discovery in exosome research was the finding of different constituents including protein, DNA, and RNA of the cells that secrete them. Thus when exosomes are taken up by distant cells, they affect cell function and behavior. Recent studies have suggested that exosomes have a role in regulating intercellular communication. One of the well-known mechanisms of intercellular communication is through signaling molecules like proteins. Signaling molecules interact with receptors on the target cells. By transferring molecules such as proteins, RNA, DNA, and lipids via exosomes, different pathways in the recipient cells are regulated. In addition to participating in cell-cell communications, exosomes have been found to help promote myelin formation, neurite growth, and neuronal survival in the nervous system and therefore have an essential role in tissue repair and regeneration.

Exosomes from different sources can modulate the function of cells involved in wound

healing and promote neovascular growth, stimulate collagen deposition, and inhibit inflammation, thereby accelerating wound healing. Exosomes can modulate the function of cells involved in wound healing. Exosomes accelerate wound healing by promoting neovascular growth, stimulating collagen deposition, and inhibiting inflammation. Also, the difficulty of healing diabetic wounds can partially be alleviated by silencing the highly expressed microRNAs (miRNAs) in exosomes. exosomes integrate well with Hydrogels which have good water retention, biocompatibility, and biodegradability; they maintain moisture inside wounds. A combination of Exosomes and hydrogels can synergistically facilitate diabetic wound healing