



## Metallic Nanoparticles and De-oxy sugar containing pro-angiogenic synthetic grafts to accelerate healing in burns and diabetic foot ulcer wounds

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### Abstract:

To develop an effective, safe and low cost synthetic grafts to stimulate angiogenesis.

Background: Angiogenesis is an absolute requirement for wound healing. With extensive burns and diabetic ulcers neovascularization is very difficult to achieve due to the loss of blood vessels (with burns) or damage to blood vessels (in diabetes). In case of diabetic wounds this leads to significant number of amputations. Research has shown that growth factors stimulate endothelial cells to migrate, proliferate and form new blood vessels. However the most commonly used proangiogenic growth factor-vascular endothelial growth factor (VEGF) while central to angiogenesis in vivo has not proven an effective therapy when delivered directly to wound beds. Recombinant VEGF and its relatively poor stability, make it unlikely to be adopted by countries lacking financial resources for advanced wound healing biomaterials. Also very high local levels of VEGF have been found to lead to the sort of vasculature associated with tumours. In the body VEGF is produced and released in a highly regulated manner.

Methods and Results: In the current study we explored the ability of a variety of zinc based nanoparticles and D-sugar a simple small organic molecule to stimulate new blood vessels. These angiogenic agents can be loaded into a number of clinically acceptable commercially available carriers. These materials were tested in the chick chorionic allantoic membrane (CAM) assay to investigate their role in angiogenesis and D-sugar containing dressings were further tested on a full thickness diabetic wound model in rats. These materials showed excellent wound healing properties in diabetic rats.

Discussion: The proangiogenic activity is by the activation of the VEGF angiogenic pathway -we have recently found this. D-sugars potency and stability are extremely promising and a biotechnology company, Cannenta Australia has now been established in Australia to bring



affordable, effective advanced wound care products to emerging markets around the world.

### Biography:

Dr Muhammad Yar is serving as Associate Professor for Interdisciplinary Research Center in Biomedical Materials, COMSATS University Islamabad, Lahore Campus. Prior to that, Dr Muhammad Yar worked as Assistant Professor of Synthetic Chemistry for Department of Chemistry, GC University Lahore. Before joining GCU, he worked as Assistant Professor at Department of Chemistry, King Fahd University of Petroleum and Minerals, Saudi Arabia (in top 250 universities in World). He earned his PhD Degree in Chemistry from Bristol University of United Kingdom in 2010. He was awarded with 2003 Gold Medal and Orient Dr Atta-ur-Rehman Science award for Distinction in MSc Chemistry.

### Publication of speakers:

1. pH sensitive hydrogels in drug delivery: Brief history, properties, swelling, and release mechanism, material selection and applications; M Rizwan, R Yahya, A Hassan, M Yar, AD Azzahari, V Selvanathan.
2. An Annulation Reaction for the Synthesis of Morpholines, Thiomorpholines, and Piperazines from Heteroatom Amino Compounds and Vinyl Sulonium Salts; M Yar, EM McGarrigle, VK Aggarwal.
3. Bromoethylsulfonium Salt A More Effective Annulation Agent for the Synthesis of 6-and 7-Membered 1, 4-Heterocyclic Compounds; M Yar, EM McGarrigle, VK Aggarwal.

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