Official Journal of TESMA
Regenerative Research
www.regres.tesma.org.my
E-ISSN 2232-0822
Tissue Engineering and Regenerative Medicine Society of Malaysia

**Regenerative Research 7(2) 2018 44**

# DEVELOPMENT OF GELATIN BASED SCAFFOLD BY GAMMA RADIATION FOR APPLICATION AS PLATELET RICH PLASMA SUPPORT FOR WOUND TREATMENT

**Justine PR Oliveira Varca, André Ferrari, Danilo R Pignata, Stefane K Guazzelli, Maria Fátima Guarizo Klingbeil, Gustavo HC Varca, Ademar B Lugão and Monica B Mathor***

Nuclear and Energy Research Institute (IPEN-CNEN/SP), Av. Lineu Prestes, 2242, 05580-000. São Paulo-SP, Brazil

## ARTICLE INFO

Published online: 26th August 2018
*Corresponding Author: Monica B Mathor
Email: ensino@ipen.br

## KEYWORDS

Gelatin;
Platelet rich plasma;
Wound;
Gamma irradiation

## SUMMARY

Gelatin is a natural polymer originated from the collagen, and presents poor mechanical properties, however it is a natural and biocompatible polymer, and collagen is the main component of the extracellular matrix1. Poly-vynil (alcohol) is an artificial polymer with interesting mechanical properties and biocompatibility. Such polymers have been largely scientific studied for biomedical application2. Platelet Rich Plasma (PRP) has been widely scientific explored in many medical fields in the last decades, especially in orthopedic area and in athletic treatments3. Based on the PRP desired properties regarded to the tissue regeneration, the present work aimed to develop a scaffold to support PRP release for wound treatment and study the influence of different radiation doses on a scaffold formation to apply as support for PRP release for wound treatment. In specific terms, the impact of radiation will be evaluated through physicochemical and morphologic characteristics. In the study, two polymers of different characteristics were applied, and scaffolds were prepared based on two formulations, one composed by gelatin (7%, w/w) and PVA (5%, w/w), and the second by gelatin (10%, w/w) and PVA (5%, w/w). The formulations were solubilized together in distilled water and heated up to 80 ºC under constant stirring for 1 hour. Posteriorly, the blends were disposed in circular glass molds. The samples were cooled at 4 ºC for at least 24 h and then irradiated at 15, 25 and 50 kGy. After irradiation, the samples were frozen and freeze dried. The scaffolds were characterized in terms of structure and morphology by mechanical assays, differential scanning calorimetry, scanning electron microscopy, optical coherence tomography and infrared spectroscopy. In addition, platelet adhesion and release, and cytotoxic assays were also performed. Samples irradiated at 15 kGy presented pore size diameter of around 1.4 μm and porosity of 54%, while samples irradiated at 25 kGy, presented pore size diameter of around 1.1 μm and porosity of 49%. Optical coherence tomography showed that gelatin control samples presented more superficial degradation as irradiation dose increased, while PVA control sample presented higher integrity, indicating that this polymer is less sensitive to gamma radiation. The system presented suitable mechanical properties and the platelet adhesion and release assays showed that the scaffold presented adequate pore size range to host and release the platelets, and non-cytotoxic to platelets, featuring adequate properties to be applied as dressing for wound treatments.