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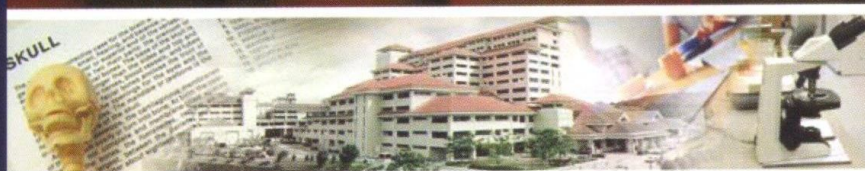


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CARBODIIMIDE IS A BETTER CROSSLINKER FOR OVINE COLLAGEN SPONGE

Mohd Amri A^{1,2}, Mohd Firdaus AB^{1,2}, Fauzi MB¹, Wan Hamirul WK³, Reusmaazran BY³, Aminuddin BS⁴ and Ruszymah BHI^{1,5}

¹*Tissue Engineering Centre, Universiti Kebangsaan Malaysia Medical Centre, Kuala Lumpur, Malaysia*

²*Department of Biomedical Science, Faculty of Allied Health Science, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia*

³*Malaysian Nuclear Agency, Selangor, Malaysia*

⁴*Ear, Nose & Throat Consultant Clinic, Ampang Puteri Specialist Hospital, Selangor, Malaysia*

⁵*Department of Physiology, Faculty of Medicine, Universiti Kebangsaan Malaysia Medical Centre, Kuala Lumpur, Malaysia*

Background:

Collagen is a natural polymer which is well known to be a biocompatible biomaterial. Collagen is one of the common scaffolds for skin substitute. The main collagen that is available in the market is from bovine and porcine origin. These two sources have some limitation due to religious issues. We have successfully extracted collagen from the sheep tendon and in this present study, cross-linked it with two cross-linking agent to enhance the biomechanical properties. The pure form is very compatible to dermal fibroblast cells but it is too soft and has poor mechanical strength. This study was conducted to produce cross-linked ovine collagen sponges and to determine its biomechanical properties as well as porosity and cell attachment.

Materials and methods:

1-ethyl-3-(3-dimethylaminopropyl) carbodiimide (EDC) and glutaraldehyde (GA) were used to crosslink the collagen. Biomechanical properties of non cross-linked and cross-linked collagen were compared by tensile test.

Results:

Tensile strength for non cross-linked collagen is 0.060 ± 0.009 , collagen cross-linked-EDC is 0.110 ± 0.034 while collagen cross-linked-GA is 0.190 ± 0.028 . The elongation value for non cross-linked collagen was 48.06 ± 5.02 mm, collagen cross-linked-EDC was $35.48 \text{mm} \pm 5.19$ while collagen cross-linked-GA was $16.81 \text{mm} \pm 2.31$. The modulus of non cross-linked collagen was 0.32 ± 0.26 , collagen cross-linked-EDC was 0.81 ± 0.51 while collagen cross-linked-GA was 1.12 ± 0.28 . Scanning Electron Microscope (SEM) showed collagen cross-linked-EDC had moderate porosity and good cell attachments as compared to collagen cross-linked-GA. Although collagen cross-linked-GA demonstrated higher biomechanical properties but for porosity and cell attachment, collagen cross-linked-EDC was better.

Conclusion:

EDC is a better ovine collagen crosslinker agent for future use as a scaffold in skin tissue engineering.

Keywords:

tissue engineering, collagen, biomechanical, carbodiimide (EDC), glutaraldehyde (GA)