Abstract-EPKIZILCAOGLU.docx

By Abstract

WORD COUNT	492	TIME SUBMITTED	21-OCT-2024 11:18AM
		PAPER ID	112455450

Development of Conductive Dextran Based-on Cardiac Patches

Esra Pervin KARAKUZU KIZILCAOĞLU [1], ***Bengi ÖZKAHRAMAN*** [2,*]

[1] **0009-0001-0293-6502** *Faculty of Engineering, Department of Polymer Materials Engineering, Hitit University, Çorum, Türkiye*

[2] **0000-0003-1535-4381** *Faculty of Engineering, Department of Polymer Materials Engineering, Hitit University, Çorum, Türkiye*

Abstract

In this study, the aim was to develop modified dextran-based conductive cardiac patches that biomimicked heart tissue to prevent myocardial degeneration after acute myocardial infarction. With the scope of study, dextran and alginate natural polymer was modified with methacrylic anhydride. The resulting modified polymers were confirmed using Fourier Transform Infrared Spectroscopy (FTIR) and Proton Nuclear Magnetic Resonance Spectroscopy (^{1}H-NMR). We synthesized methacrylated dextran and methacrylated alginate films with varying amounts of inductive graphene oxide (iGO) incorporated to impart electroconductive properties and Vitamine-E to enhance healing performance [1-3]. The cardiac films were prepared by crosslinking using UV methods in the presence of photoinitiator 2-hydroxy-4'-(2-hydroxyethoxy)-2-methylpriophenone (Irgacurre 2959) [4]. The development biomimicked cardiac patches were characterized FTIR, X-Ray Diffraction (XRD), conductivity analysis as well as *in vitro* swelling, and degradation tests [5]. The antioxidant activity of Vitamine E loaded cardiac patches were determined by the 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay [6]. The cytotoxicity of the dextran based cardiac patches was evaluated on L929 fibroblast cell line using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. The results suggest that the developed dextran based conductive cardiac patches exhibit promising potential for use as biomaterials in cardiac tissue engineering.

Acknowledgement

This study is the Master's Thesis of titles "Development of Dextran Based-on Conductive Cardiac Patches" prepared at Hitit University, and it has been supported by the Research Fund of the Hitit University, Project Number MUHMİTEK19004.24.002.

References:

[1] Li, P., Hu, J., Wang, J., Zhang, C., Wang, L., & Zhang, C. (2023). The Role of Hydrogel in Cardiac Repair and Regeneration for Myocardial Infarction: Recent Advances and Future Perspectives. *Bioengineering*, 10(2), 165.

[2] Song, Y., Wang, H., Yue, F., Lv, Q., Cai, B., Dong, N., Wang, Z., & Wang, L. (2020). Silk-Based Biomaterials for Cardiac Tissue Engineering. *Advanced Healthcare Materials*, 9(23), 2000735.

[3] Pang, J., Bi, S., Kong, T., Luo, X., Zhou, Z., Qiu, K., Huang, L., Chen, X., & Kong, M. (2024). Mechanically and functionally strengthened tissue adhesive of chitin whisker complexed chitosan/dextran derivatives based hydrogel. *Carbohydrate Polymers*, 237, 116138.

[4] Bozer, B., Özkahraman, B., & Mert, H. (2024). Photocrosslinked methacrylated pectin and methacrylated hyaluronic acid wound dressing loaded with oleuropein as bioactive agent. *International Journal o Polymeric Materials and Polymeric Biomaterials*, 73(11), 961.

[5] Morsink, M., Severino, P., Luna-Ceron, E., Hussain, M A., Sobahi, N., & Shin, S. R. (2022). Effects of electrically conductive nano-biomaterials. Efects of electrically conductive nano-biomaterials on regulating cardiomyocyte behavior for cardiac repair and regeneration. *Acta Biomaterialia*, 139, 141.

[6] Mirzaei-Mohkam, A., Garavand, F., Dehnad, D., Keramat, J., & Nasirpour, A. (2019). Optimisation, antioxidant attributes, stability and release behaviour of carboxymethyl cellulose films incorporated with nanoencapsulated vitamin E. *Progress in Organic Coating*, 134, 333.

Keywords: *Modified Dextran, Cardiac Patches, Vitamine E, Antioxidant Activities*

Abstract-EPKIZILCAOGLU.docx

ORIGINALITY REPORT

24%
SIMILARITY INDEX

PRIMARY SOURCES

1	www.omicsdi.org Internet	18 words — 6%
2	Ali Reza Monfared, Sasan Rezaei, Saadman Sakib Rahman, Yu Nakamura et al. "Unleashing the power of SAN: Innovative in situ fibrillation and moisture-crosslinking techniques yield stronger, tougher, and Greener material than ABS", Composites Part B: Engineering, 2024 Crossref	14 words — 5%
3	ikstc.karatekin.edu.tr Internet	12 words — 4%
4	www.freepatentsonline.com Internet	11 words — 4%
5	www.science.gov Internet	11 words — 4%
6	Saba Fooladi, Mohammad Hadi Nematollahi, Navid Rabiee, Siavash Iravani. "Bacterial Cellulose-Based Materials: A Perspective on Cardiovascular Tissue Engineering Applications", ACS Biomaterials Science & Engineering, 2023 Crossref	7 words — 2%

EXCLUDE QUOTES ON EXCLUDE SOURCES OFF