YEDITEPE UNIVERSITY
Department of Biomedical Engineering

SEMINAR

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Engineering Building B-306

UV-Curable and Injectable Hydrogels for Cell Growth

Zümrüt Seden Akdemir, Ph.D.

A tissue engineered implant is a biologic-biomaterial combination in which cells are transplanted to penetrate and proliferate in all directions to populate all regions of the implant.Cell proliferation can be facilitated and enhanced with the addition of a cell adhessive sequence.The properties of the implant such as biocompatibility,porosity and biodegradability have an impressive role in the formation of the new tissue. Injectable photopolymerizable biomaterials are prefered in bone treatment due to their ease of usage and ability to fill the defected area completely.

The aim of preparing an UV-curable and injectable hydrogels for cell growth, fumaric acid modified poly(ethylene glycol) diglicidyl ether (PEGDGE) resin and poly(ethylene glycol) monoacrylate modified with tripeptide unit known as Arginine-Glycine-Aspartic acid, as a cell-binder agent, were sythesized. Then, these new oligomers were used for the preparation of UV-curable hydrogels. The characterization studies of the prepared hydrogels were done and mechanical properties were investigated. For the determination of the biomaterial properties of the hydrogels either *in vitro* or *in vivo* studies were performed. Hydrogels had shown biocompatible behaviour and after placed into the rat tibia induced no allergic efficacy. Bone mature tissue formation was observed in the border of the hydrogels kept in the rat bone for three months and new bone cells were replaced with the hydrogel while the 90% of the hydrogel was resorbed.

Following these studies, a new oligomer was synthesized to improve the degradation kinetic of the previously prepared hydrogels. 2-ethyl-2-hydroxymethyl-1,3-propanediol was reacted with lactide and glycolide by ring opening polymerization technique and poly(lactic acid/glycolic acid/2-ethyl-2-

hydroxymethyl-1,3-propanediol) [PLGAEHPD] was synthesized. With the purpose of double bonds attachment to the terminal of this polymer, monoethyl fumarate was reacted with PLGAEHPD and monoethyl fumarate modified PLGAEHPD was achieved. The degradation studies of the prepared hydrogels had shown that after 90 days % of the mass loss was 52 for the hydrogel composition having 15 % wt of the PLGAFAME. Osteoblast cells were used to evaluate the *in vitro* studies and it was observed that osteoblast cells penetrated through the hydrogel pores, because of osteogenic activity the fibres of the collagen were seen on the surface of the hydrogel. According to *in vitro* cytotoxity measurements, at the end of third day, cell viability of the cells seeded onto hydrogel surface was observed 100% (This work was supported by TÜBİTAK TBAG Project no 105T254).

Biography

Dr. Zümrüt Seden Akdemir was born in İstanbul, 1980. She attended Nişantaşı Anadolu Lisesi. She obtained a Ph.D in Chemistry from Marmara University. Her Ph.D topic was to develop new photopolymerizable, injectable biomaterials for bone tissue applications and was founded by TUBITAK. After her graduation, she started to work at Aksa Akrilik Kimya R&D Center as a laboratory specialist. She has 9 publications, 5 presentations in international conferences and one oral presentation in national chemistry conference.