Cell Adhesion, Proliferation and Diffusion in Semi-IPN Agarose Hydrogels Containing Chitosan and Alginic Acid
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Introduction
Hydrogels have gained great importance in tissue engineering applications as scaffold materials due to their capability of forming tissue-like structures, similarity with ECM and biocompatibility in biological media [1]. This study aims to examine the effect of electrical charge of the hydrogels on the attachment and migration of the cells through the structure. A natural and a neutral biodegradable polymer, agarose (Aga), was used to prepare hydrogels, and semi-interpenetrating network (semi-IPN) structures were prepared by using either positively charged chitosan (Ch) or negatively charged alginic acid (Alg) along agarose. Various semi-IPNs with different compositions were prepared and their chemical, physical, mechanical properties as well as their affinities towards L929 fibroblast cells were investigated.

Materials and Methods
Agarose (Aga) hydrogels were prepared from Aga solutions at 80°C. Ch/Aga and Alg/Aga semi-IPNs (1:1 volume ratio) were obtained in tubular shapes by thermal activation of agarose and with the entrapment of Ch or Alg into the Aga hydrogel. The obtained gels were cut into circular disks. For surface free energy (SFE) measurements, the polymer solutions of were casted on microscope glasses, which were dried at room temperature for 48h, and then vacuumed to remove any solvent remaining. Contact angles of various liquids were measured by Goniometer. Chemical compositions of the dried gels were characterized by FTIR. Swelling ratios were calculated gravimetrically by using the weight differences of the vacuum dried hydrogels swollen in PBS (10 mM, pH 7.4) solution at RT till the equilibrium swelling was achieved. Freeze-dried gels structures were examined by SEM. Cell affinities of the materials towards cells were assessed with L929 fibroblast cell line. Cell numbers were determined by MTS assay at certain time intervals using 24 well plates. Depth profile was obtained by using confocal microscopy after fixation of the cells.

Results
Increasing the concentrations of both Ch and Alg in the Aga, resulted an increase in equilibrium swelling values. SEM images showed porosity of the hydrogels were not similar (Fig 1). According to light microscopy images (Fig 2) and MTS assays, the highest cell numbers were observed for Ch/Aga samples (Fig 3).

Discussion and Conclusions
Charge and pore size are effective in cell attachment and diffusion. Currently, cell diffusion studies are being performed.

References

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Disclosures
Authors have nothing to disclose.