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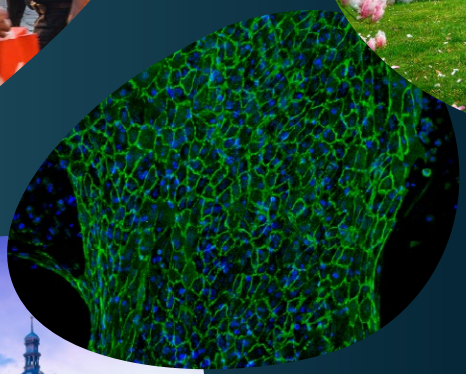

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INJECTABLE THERMOSENSITIVE METHYLCELLULOSE/AGAROSE HYDROGEL AS SMART SCAFFOLD FOR TISSUE ENGINEERING APPLICATIONS

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Introduction
The aim of this research was to design and obtain an injectable thermosensitive hydrogel consisting of methylcellulose (MC) and agarose which would serve as a smart scaffold for tissue engineering applications. The MC provides thermal sensitivity, while heated up to c.a. 37°C becoming a physically crosslinked hydrogel. While agarose enhances crosslinking of MC rate and increases its mechanical properties. To evaluate the usefulness of such an injectable thermosensitive hydrogel system from the perspective of tissue engineering applications, injectability studies and biological tests with the use of two cell lines were carried out.

Methodology
In these studies, the injectability of MC/agarose hydrogel was studied using a dynamometer system, in which the maximum force needed for making injections was measured and compared to the literature reports. Additionally, in vitro cellular studies were performed using fibroblasts and mesenchymal stem cells (MSCs). Cellular morphology was analyzed via scanning electron microscopy (SEM) and fluorescence microscopy (FM), while a cytotoxicity test was carried out on extracts using the Presto Blue assay.

Results
The injectability tests showed the maximum force needed for making the injection of MC/agarose hydrogel was less than 30 N which according to Kim et al. [1], is the maximum force required for injection by a human. Biological studies showed proper cell morphology in comparison to control (tissue culture plastic -TCP). Additionally, cytotoxicity tests confirmed the nontoxic character of studied hydrogel systems.

Conclusions
Injectability studies showed the investigated MC/agarose hydrogel systems might be readily injected by humans, proving their injectability. Investigated MC/agarose hydrogels provided a hospitable ECM-mimicking environment enhancing cell spreading, migration, and proliferation. These studies demonstrate the high potential of investigated materials for tissue engineering applications.

Acknowledgments: Financial support was received from Polish National Science Center (NCN), grant number 2018/29/N/ST8/00780.

References:
1. Kim, M et al. Int. J. Biol. Macromol. 109,57-64 (2018).

keywords: injectable, hydrogel, methylcellulose, agarose