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Rational design of novel water-soluble ampholytic cellulose derivatives

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ABSTRACT

The development of new biocompatible, biodegradable functionalized biopolymers that can serve as scaffold for tissue regeneration or work as carriers for different bioactive molecules such as drugs, proteins, and enzymes remains a continuous challenge that need to be extensively explored. For this purpose, three water-soluble cellulose derivatives; namely 4(celluloseamino) butyric acid (CABA) 2(celluloseamino) succinic acid (CASA), and 3(celluloseamino) propane sulfonic acids (CAPSA) were synthesized from microcrystalline cellulose (MCC) via esterification with tosyl chloride that was followed by nucleophilic substitution by the proper aminoalkyl acid derivative. The products were characterized by elemental analyses, FTIR, ^{13}C NMR spectroscopy. The thermal stability, surface morphology, and the elemental composition of the new ampholytic biopolymers were also studied by TGA, EDX-SEM. The new ampholytic cellulose derivatives were evaluated for their *in vitro* cytotoxicity on normal human retina cell line (RPE1) by MTT assay.

Keywords: Ampholytic cellulose, tosyl cellulose, *in vitro* cytotoxicity.

1. Introduction

The use of smart biocompatible new materials based on renewable natural resources with tolerable biological activity and proper physical and mechanical properties and structure morphology in the pharmaceutical and biomedical applications is considered a promising alternative route to the synthetic toxic or non-biodegradable polymeric materials [1]. Biomaterials demonstrated encouraging prospects in several industrial, environmental, and biomedical applications in the last two decades [2-4].

Cellulose and its derivatives have attracted attention as promising materials for biomedical and pharmaceutical applications because of their outstanding properties such