Nanofibrillar cellulose as a Lyoprotective Matrix in The Freeze-Drying of HepG2 Liver Cancer Cells

INTRODUCTION

Freeze-drying of complex human cells has yielded insufficient viabilities due to the lack of compatible lyoprotective matrices [1]. The usage of nanofibrillar cellulose (NFC) as a lyoprotective matrix is not defined in previous literature. The aim of this thesis is to study the effects of NFC when it is freeze-dried and rehydrated while carrying 3D cell spheroid systems.

OBJECTIVES

We have evaluated the capabilities of NFC as a lyoprotective matrix in the freeze-drying process of HepG2 cells under sterile conditions. The highest viability was reached through optimization of the process itself and testing of most suitable compounds for cryo- and lyopreservation (5).

METHODS

A human liver carcinoma cell line HepG2 was cultivated in a mixture of NFC and medium (1) and then freeze-dried and stored in controlled conditions (3). Simultaneously, HepG2 control samples without NFC were freeze-dried and stored in corresponding manner. After rehydration, the viabilities of both sample types were measured (4) and the mitochondrial activity evaluated. In addition, the morphology of the cells during each step was analyzed (2, 6).

RESULTS

Results demonstrate that without the protective NFC matrix the HepG2 cells could not survive the freeze-drying process. However, when protected by the NFC matrix, the cells gained noticeable viability when rehydrated.

CONCLUSIONS

Nanofibrillar cellulose appears to be a promising candidate as a lyoprotective matrix in the freeze-drying of human cells. The preserved viability during the freeze-drying could lead to the development of new cell products for research and clinical applications in the future.

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References