NINETEENTH YOUNG RESEARCHERS' CONFERENCE
MATERIALS SCIENCE AND ENGINEERING

December 1-3, 2021, Belgrade, Serbia

Program and the Book of Abstracts

Materials Research Society of Serbia
&
Institute of Technical Sciences of SASA

2021

Book title:
Nineteenth Young Researchers' Conference - Materials Science and Engineering: Program and the Book of Abstracts

Publisher:
Institute of Technical Sciences of SASA
Knez Mihailova 35/IV, 11000 Belgrade, Serbia
Tel: +381-11-2636994, 2185263, http://www.itn.sanu.ac.rs

Conference organizers:
Materials Research Society of Serbia, Belgrade, Serbia
Institute of Technical Sciences of SASA, Belgrade, Serbia

Editor:
Dr. Smilja Marković

Technical Editor:
Aleksandra Stojičić

Cover page: Aleksandra Stojičić and Milica Ševkušić
Cover: Milica Ševkušić

Printing:
Gama digital centar
Autoput No. 6, 11070 Belgrade, Serbia
Tel: +381-11-6306992, 6306962
http://www.gdc.rs

Publication year: 2021

Print-run:
120 copies

CIP - Каталогизација у публикацији

Народна библиотека Србије, Београд

66.017/.018(048)

YOUNG Researchers Conference Materials Sciences and Engineering (19 ; 2021 ; Beograd)
Program ; and the Book of abstracts / Nineteenth Young Researchers' Conference Materials Science and Engineering, December 1-3, 2021, Belgrade, Serbia ; [organized by] Materials Research Society of Serbia & Institute of Technical Sciences of SASA ; [editor Smilja Marković]. - Belgrade : Institute of Technical Sciences of SASA, 2021 (Belgrade : Gama digital centar). - XVIII, 86 str. : ilustr. ; 23 cm

Tiraž 120. - Registar.

ISBN 978-86-80321-36-3

а) Наука о материјалима -- Апстракти б) Технички материјали – Апстракти

COBISS.SR-ID 51231241

2-3

Optimization of Bioreactor Cultures of Glioblastoma Cells Immobilized in Alginate Microfibers

Jelena Petrovic[1,2], Mia Radonjic[1,2], Jasmina Stojkovska[1,2], Bojana Obradovic[1]
[1]*Faculty of Technology and Metallurgy, University of Belgrade, Belgrade, Serbia,*
[2]*Innovation Center of the Faculty of Technology and Metallurgy, Belgrade, Serbia*

Glioblastoma is the most common and aggressive malignant brain tumor in adults. Existing treatment choices that include surgery, radiation and chemotherapy are not successful in long-term survival, while development of new anticancer drugs is being held back by the lack of adequate model systems for anticancer drug testing. Namely, in traditionally used two-dimensional (2D) monolayer cancer cell cultures the native cell morphology, polarity and interactions between both cells and cells and extracellular components are either changed or absent, while studies on animals often produce misleading results due to interspecies differences. Hence, there is a pressing need for new glioblastoma model systems that provide more in vivo-like environment for investigation and development of new anticancer drugs. The aim of this work was to develop a biomimetic 3D environment for cultivation of glioblastoma cells based on alginate microfibers as cell carriers and perfusion bioreactors. Previous studies have shown that static cultures of cervical cancer cells SiHa immobilized in alginate microfibers may be diffusion limited while perfusion, which enhanced mass transport, has induced negative effects on human embryonic teratocarcinoma cells NTERA-2 in superficial zones of alginate microbeads by hydrodynamic shear stresses. Thus, in the present study, the specific focus was on optimization of cell concentration within microfibers and regimes of cultivation to achieve beneficial effects of fluid flow in perfusion bioreactors. A series of experiments were conducted in which the concentration of rat glioma cells C6 was varied between 2 and 8 × 10^6 cell cm^{-3} at several flowrates and regimens of static and perfusion culture periods. Mixed results were obtained implying that efficient mass transport has a higher effect in microfiber cultures at lower cell concentrations (*i.e.* ~2 × 10^6 cell cm^{-3}). In specific, medium flow at the superficial velocity of 100 μm s^{-1} induced considerable cell proliferation as compared to control static cultures, which maintained the initial cell numbers. Mathematical modelling indicated that the convective transport of substances with low diffusion coefficients (~10^{-19} m^2 s^{-1}) may have induced the observed positive effects. Still, exact relations of cultivation conditions and cell responses in terms of viability, proliferation and metabolic activity should be further investigated.