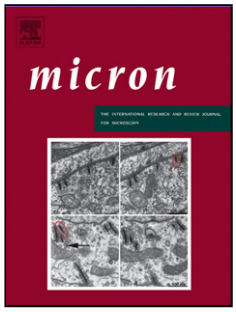
Accepted Manuscript



Title: A new method of SC image processing for confluence estimation

Authors: Sajjad Soleimani, Mohsen Mirzaei, Dana-Cristina Toncu

PII: S0968-4328(17)30265-2
DOI: http://dx.doi.org/doi:10.1016/j.micron.2017.07.013
Reference: JMIC 2463

To appear in: *Micron*

Received date: 29-6-2017
Revised date: 23-7-2017
Accepted date: 29-7-2017

Please cite this article as: Soleimani, Sajjad, Mirzaei, Mohsen, Toncu, Dana-Cristina, A new method of SC image processing for confluence estimation.Micron http://dx.doi.org/10.1016/j.micron.2017.07.013

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

A New Method of SC Image Processing for Confluence Estimation

Sajjad Soleimani[1], Mohsen Mirzaei[2], Dana-Cristina Toncu[3]

[1]Politecnico di Milano, Department of Chemistry, Materials, and Chemical Engineering, Milan, Italy, sajjad.soleimaniamiri@polimi.it

[2]Vali-e-Asr University of Rafsanjan, Department of Engineering, Rafsanjan Iran

[3]Kazakh-British Technical University, Department of Chemical Engineering, 53 Tole-bi, Almaty, Kazakhstan

Highlights

- Stem Cells are expanded and proliferated by culturing on petri dish
- The level of stem cell confluency was estimated by image processing method
- Coupling a novel image denoising method with an adaptive thresholding technique
- Our method can process Cell images with various defects and uneven background

Abstract:

Stem cells images are a strong instrument in the estimation of confluency during their culturing for therapeutic processes. Various laboratory conditions, such as lighting, cell container support and image acquisition equipment, effect on the image quality, subsequently on the estimation efficiency. This paper describes an efficient image processing method for cell pattern recognition and morphological analysis of images that were affected by uneven background. The proposed algorithm for enhancing the image is based on coupling a novel image denoising method through BM3D filter with an adaptive thresholding technique for improving the uneven background. This algorithm works well to provide a faster, easier, and more reliable method than manual measurement for the confluency assessment of stem cell cultures. The present scheme proves to be valid for the prediction of the confluency and growth of stem cells at early stages for tissue engineering in reparatory clinical surgery. The method used in this paper is capable of processing the image of the cells, which have already contained various defects due to either personnel mishandling or microscope limitations. Therefore, it provides proper information even out of the worst original images available.

Key-words: Image Processing, Uneven Background, Denoising, Stem Cells, Confluency

1. Introduction

Stem Cells (SCs) have shown great promise in regenerative and reconstruction therapies, where missing or damaged tissues could be reinserted into the human body (Bradhurst 2010, Delaine-

Download English Version:

https://daneshyari.com/en/article/5456963

Download Persian Version:

https://daneshyari.com/article/5456963

Daneshyari.com