Quantitative confluency measurement of culture growth (Ramot)

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The invention is an image processing method of light microscopy images for the purpose of quantifying density of cells in cultures . A grayscale image of a cell culture is digitally captured using a light microscope and a CCD camera. Our method evaluates the culture's confluency using an image processing algorithm on the image which is able to differentiate between background medium and cultured cells. It provides a quantitative, objective, standard and reproducible confluency measure, it is non-invasive, and it employs the most basic equipment found in biology labs: an optical microscope.

Background

A culture's confluency is a fundamental measure in the field of biology. Confluency is used as a measure of the density of cells in a culture dish or a flask, and refers to the coverage of the dish or flask by the cells. For example, 100% confluency means that the dish is completely covered by cells and no more space is available for cells to grow; whereas 50% confluency means that roughly half of the dish surface area is covered, so there is still space available for cells to grow. The most routine processes in cell culturing, such as passaging (process of sub-culturing cells), induction of differentiation or formulation of any repeatable experimental protocol requires that the confluency of cultures be carefully controlled and documented. However, current techniques for obtaining this measure are complicated, or inaccurate. Confluency is currently being determined mostly qualitatively by the observer, which frequently introduces inaccuracies and errors in experiments and lab tests, and hampers reproducibility of biological procedures which involve cell culturing. Another widespread technique is using chemical stains which may result in cell damage or death in the culture and involve costs in terms of consumables, time and equipment.

Advantages

Our method is fast (immediate results), accurate, and objective and usually requires no additional hardware equipment, being based on image acquisition which most laboratory microscopes are equipped with. A sample of the results is shown below:

3T3L1 preadipocyte cells in a culture Algorithm result; calculated confluency= 30%

Stage of Development

The algorithm has been validated in several studies and is ready to be developed into a laboratory product.

Patents

PCT patent PCT/IB2011/054025 has been submitted

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