Improving Stability and Accuracy of Cell Viability Evaluation by Fusion of Impedance Spectroscopy Information

Yecheng Zhang[1], Mingji Wei[1], Rongbiao Zhang[1], and Fei Zhang[1]

[1]Jiangsu University

December 19, 2020

Abstract

The increasing attention to precision medicine is widely paid in order to greatly improve the cure rate of cancer. Improving the stability and accuracy of cell viability evaluation is the key of precision medicine, for excess dosage of anti-cancer drugs not only kills the cancer cells, but also does harm to normal cells. Electrochemical impedance sensing (EIS) method is widely accepted as a label-free, non-invasive approach for real-time, online monitoring of cell viability. Due to the large effects of many influencing factors, the existing EIS methods that utilized single-frequency impedances show poor stability and low accuracy of cell viability evaluation. In this paper, we proposed a multi-physical information fusion method based on least squares support vector machine (LS-SVM) for improving the stability and accuracy of cell viability evaluation. The results show that the mean relative error of single-frequency method is about 0.08, while that of fusion method is about 0.04. It means that the prediction results of fusion method are more accurate than that of the single-frequency method. Moreover, the maximum relative error of single-frequency method is up to 0.5 due to the influencing of cell micromotion, while that of fusion method is below 0.07, showing that the fusion method is more stable than single-frequency method.

Hosted file

`Manuscript.pdf` available at https://authorea.com/users/347158/articles/499694-improving-stability-and-accuracy-of-cell-viability-evaluation-by-fusion-of-impedance-spectroscopy-information

Hosted file

`Figure.pdf` available at https://authorea.com/users/347158/articles/499694-improving-stability-and-accuracy-of-cell-viability-evaluation-by-fusion-of-impedance-spectroscopy-information