Real-time xCELLigence analysis of antioxidant agents on human gingival fibroblast cells viability

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【Background】 Periodontitis is a chronic inflammatory disease and has some influence on the immune system. The immune system produces reactive oxygen species (ROS) to protect the host from bacterial invasion, but instead generates collateral tissue damages, that may affect the oral health. As continuous ROS production is the key factor, it would be possible that some antioxidant agents would prevent or reduce the detrimental effects of ROS on periodontal tissues. The aim of this study was to determine, by monitoring cells in real-time, the protective effects of three antioxidant agents, Resveratrol, Quercetin and N-acetyl cysteine, on human gingival fibroblasts (HGFs) during 72h exposure to hydrogen peroxide (H_2O_2) using the xCELLigence system.

【Methods】 The cellular levels of electrical impedance which is termed Cell Index (CI) were monitored by the xCELLigence system. HGFs were suspended in Dulbecco's Modified Eagle Medium (DMEM) supplemented with 10% heat-inactivated fetal bovine serum (FBS) and seeded into xCELLigence system plates (10^4 cells/well) and incubated for 24h at 37°C in 5% CO_2 atmosphere. Subsequently, the antioxidants of various concentrations and 0.25mM H_2O_2 were added to the wells, incubated and monitored every 15min for a period of up to 72h.

【Results】 The results were based on the shape of the impedance curve patterns and reflected the cell proliferation and cytotoxicity. Analyzing these patterns, we were able to identify protective and cytotoxic concentrations of each antioxidant agent when they were compared with the samples with H_2O_2 alone.

【Conclusions】 The data show that real-time cell analysis is a convenient, easy handling and reliable method to characterize the kinetics of HGF proliferation and differentiate between protective and cytotoxic effects of antioxidant compounds on cells in real-time and label free-manner.

Keywords: Reactive oxygen species, Human gingival fibroblast, Antioxidant