Effects of ROS in human adrenocortical carcinoma SW-13 cells

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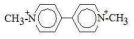
Background

・Herbicide "**paraquat**" is known as an inducer of active oxygen, which causes oxidative stress in the living body.

・Active oxygen is reported to be a bioactive factor such as cell proliferation and differentiation.

The relationship between PQ and cell proliferation/ differentiation is unknown.

Paraquat (PQ)

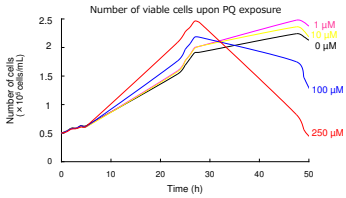


One of non-selective herbicides. It shows strong toxicity against humans and mammals besides plants.

Purpose of this study

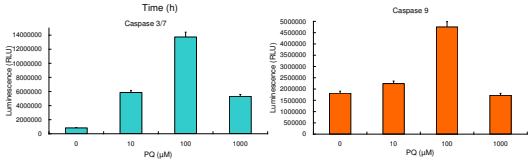
Verify the effect on cell morphology and activation signal by exposing PQ on human adrenocortical carcinoma SW-13 cells.

Result① Cell toxicity

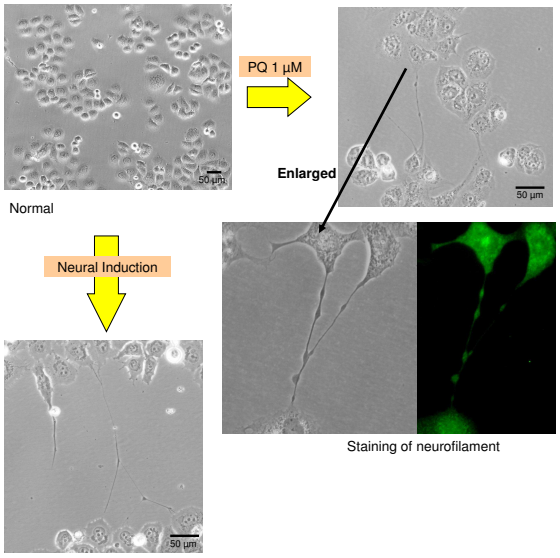


・Cell proliferation increased with PQ concentration dependent manner.
(The cells died with 1 mM or more PQ within 24 h)

・It was suggested that PQ stimulation induced apoptosis which was mediated via the caspase pathway.



Result② Cell morphology



Staining of neurofilament

・PQ exposure caused SW-13 cells to differentiate neural-like filament.

・Neural induction supplement also differentiate the cells to neural-like filament.

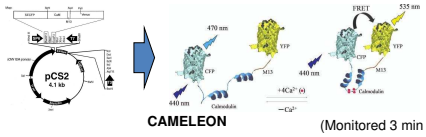
It was suggested that SW-13 had neural differentiation potential, and the differentiation switch was turned ON even by oxidative stress.

Result③ Calcium dynamics

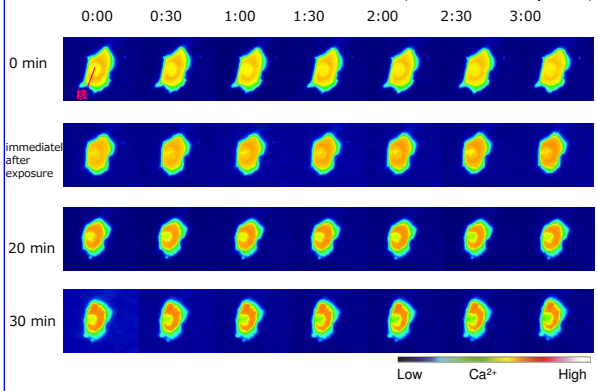
Transfected Ca^{2+} indicator "Cameleon" in SW-13 cells

↓

Exposed the cells with PQ 1 mM and monitored Ca^{2+} dynamics



(Monitored 3 min every 30 sec)



・Normal SW-13 cells (0 min) showed that Ca^{2+} concentration changed wavy around the nucleus at the 90-sec cycle.

・PQ Exposure caused an increase in the intracellular Ca^{2+} concentration and exerted some influences around the nucleus after 2:30.

・SW-13 cells seemed to control the Ca^{2+} concentration in the nucleus for 20 min after exposure, however, their control behavior was no longer observed after 30 min, which resulted in the cell death.

Conclusion & Future study

・SW-13 cell proliferation was increased by PQ exposure.
→It has been reported that a low concentration of drug stimulation promotes cell proliferation, and PQ also worked similarly.

・PQ differentiated SW-13 cells to neural-like cells.
→We will examine the association between SW-13 neuronal differentiation ability and oxidative stress and analyze gene expression during neural differentiation.

・PQ increased intracellular Ca^{2+} concentration and affected around the nucleus, in particular .
→It is conceivable that the nucleus tried to control the fluctuation of Ca^{2+} concentration to get back to usual state in order to cell survival.