

γ - and δ - tocotrienols affect stress induced premature senescence

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Abstract

Background: Senescence is an irreversible permanent cell cycle arrest accompanied by changes in cell morphology and physiology. The aim of this study was to investigate how γ - and δ - tocotrienols can affect stress induced premature senescence.

Methods: Human fibroblasts were treated with hydrogen peroxide or etoposide to induce premature stress senescence. Senescence associated β -galactosidase activity, viability/proliferation of cells and expression of p21, caspase-3 and LC-3 were evaluated by the Senescence Cells Histochemical Staining Kit, MTT assay and western blot respectively.

Results: We have revealed that cotreatment and anti-senescent treatment with γ - or δ -tocotrienol lead to the decrease of cell viability/proliferation in both models of premature stress senescence, but do not change the percentage of senescent cells. An increased level of autophagic protein LC-3 II was detected in cells with hydrogen peroxide - induced senescence after cotreatment with γ -tocotrienol as well as δ -tocotrienol whereas only δ -tocotrienol cotreatment led to an increased level of LC-3 II protein in cells with etoposide - induced senescence.

Conclusions: Our present study suggests that tocotrienols affect stress induced premature senescence depending on the type of inductor of senescence and type of tocotrienol used. According to our work δ -tocotrienol is more effective than γ -tocotrienol.

Key words: senescence, tocotrienols, fibroblasts, apoptosis, autophagy

- Analysis of SA- β -galactosidase activity after cotreatment with γ -tocotrienol as well as δ -tocotrienol have revealed that percentage of senescent cells does not change
- The expression of caspase-3 was not detected after cotreatment with γ -tocotrienol or δ -tocotrienol
- An increased level of autophagic protein LC-3 II was detected in cells in which senescence was induced by hydrogen peroxide after cotreatment with γ -tocotrienol as well as δ -tocotrienol whereas only δ -tocotrienol cotreatment led to an increased level of LC-3 II protein in cells in which senescence was induced by etoposide
- According to our work δ -tocotrienol is more effective than γ -tocotrienol.

Author contributions

Maria Janubova: Conceptualization, Methodology, Data curation, Software, Writing - Original draft preparation; Jozef Hatok: Methodology, Data curation; Ingrid Zitnanova: Funding acquisition, Project administration, Visualization, Supervision, Writing- Reviewing and Editing

Declarations of interest

None

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