THE PROTECTIVE EFFECTS OF CATECHIN ON PALMITIC ACID - INDUCED CYTOTOXICITY IN MOUSE BRAIN ENDOTHELIAL CELL

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AIMS: The approximate prevalence of the metabolic syndrome (MS) in patients with coronary heart disease (CAD) is 50%, with a prevalence of 37% in patients with premature CAD. Effective prevention or treatment of MS significantly reduces the risk for developing serious complications. Palmitic acid (PA) is a saturated fatty acid, when being excessive, is a significant risk factor for development of MS or cardiovascular accident. Lipotoxicity in endothelial cells (EC) has been well documented but how PA affects EC Ca2+-signaling and other functions remain largely unexplored. Catechin has been implicated in benefiting almost every organ system such as cardioprotective and anti-obesity; and also beneficial for blood vessel health. This study aims to investigate the lipotoxic alteration of mouse brain endothelial cell line (bEND.3 cells) function mediated by PA; and how PA modulates EC ion channels, and also to assess the potential protective effects of catechin.

METHODS: Cell apoptosis assessed by TUNEL-Assay. Cytosolic Ca2+ in bEND was measured with Fura-2 method. Mitochondria membrane potential (MMP) measured by MMP-Assay Kit. Cell viability was measured By MTT-Assay. The $p < 0.05$ were considered significant (ANOVA).

RESULTS: Exposure of bEND to PA (300 micromolar) for 48 h resulted in apoptosis. PA (100, 300 micromolar) increased expression of CHOP but not phosphorylated eIF2-alpha. PA (300 micromolar) pretreatment diminished (Ca2+agonist) ATP-triggered Ca2+ release and Ca2+ influx. 300 micromolar PA pretreatment diminished (SR Ca2+-pump blocker) CPA-triggered Ca2+ release and Ca2+ influx. Thus PA at this high concentration reduced the size of Ca2+ pool. PA at 100 micromolar, however, did not reduce CPA-induced Ca2+ release but suppressed Ca2+ influx. Thus PA at this concentration inhibits store-operated Ca2+ entry. PA-induced cell death was significantly alleviated by co-treatment of bEND with catechin (300 micromolar).

CONCLUSION: Cell death was apoptotic and related to endoplasmic reticulum(ER) stress and cytosolic Ca2+ elevation. Co-treatment of bEND with catechin (300 µM) significantly prevented PA-induced cell death.