The effects of Tomatidine in stimulating mitophagy in human fibroblast

Chonlaphat Sukthanarak[1], Chayanon Peerapittayamongkol[1,*]

[1] Department of Biochemistry, Faculty of Medicine Siriraj Hospital, Mahidol University; chonlaphat.suk@student.mahidol.ac.th (C.S.); Chayanon.pee@mahidol.ac.th (C.P.)

* Correspondence: Chayanon.pee@mahidol.ac.th.

Abstract: Mitochondria are the powerhouse of cells that provide energy in the form of adenosine triphosphate (ATP) via the electron transport chain. Mitochondrial membrane potential (MMP) is generated during the ATP synthesis. MMP is the indicator of cell healthy and mitochondrial function. Loss of MMP is associated with the PINK/Parkin accumulation on the mitochondrial outer membrane leading to the elimination of mitochondria by autophagy. Moreover, reactive oxygen species (ROS) which occur as by-products through ATP production, can cause the damage of mitochondria. Mitochondria have a process to maintain their functions and get rid of the damaged mitochondria called mitochondrial quality control. Mitophagy is a selective elimination of damaged mitochondria via lysosomes. Interestingly, tomatidine has been reported to enhance the lifespan and healthspan of *C. elegans* through mitophagy. However, the effect of tomatidine on mitophagy in human fibroblast cells remains unclear. This study aimed to investigate the effect of tomatidine on stimulating mitophagy and its mechanism in human fibroblasts using the fluorescent staining techniques under the Operetta-CLS high content imaging system. Our result showed that the 15 μM of tomatidine for 48 h significantly stimulated mitophagy compared to control. Moreover, the concentration of tomatidine higher than 10 μM for 24 h significantly decreased MMP levels in a dose-dependent manner.

Keywords: Tomatidine; Mitophagy; Mitochondrial Membrane potential

Funding: This research received no external funding.

Acknowledgments: We would like to thank Dr. Somponnat Sampattavanich for his advice and access to the Operetta-CLS High Content Image system, Siriraj Initiative in Systems Pharmacology (SISP), Department of Pharmacology, Faculty of Medicine Siriraj Hospital. Siriraj Graduate Scholarship supported Chonlaphat Sukthanarak financially.