Mei-Chen Lo, Metabolomics 2016, 6:2(Suppl)
http://dx.doi.org/10.4172/2153-0769.C1.032

Nε-(carboxymethyl) lysine decreases insulin secretion in beta cells through mitochondrial dysfunction and mitophagy

Mei-Chen Lo
Taipei Medical University, Taiwan

We proposed that advanced glycated end-products (AGEs) reduce insulin secretion from beta cells by damaging mitochondrial function and inducing mitophagy. Mitochondrial morphology and autophagy were examined in pancreatic islets from diabeticdb/db mice and the insulinoma cell line RIN-m5F, both of which were treated with Nε-(carboxymethyl) lysine (CML)-conjugated bovine serum albumin, which is a major component of AGEs. In addition, the effects of the antioxidant alpha-lipoic acid (ALA) on mitochondria in AGEs-damaged cells were evaluated. Diabetic db/db mice exhibited increased numbers of mitochondria and autophagosomes; however, administration of ALA for 12 weeks induced greater numbers of mitochondria with well-organised cristae and fewer autophagosomes. CML treatment of RIN-m5F cells increased autophagosome formation, promoted mitochondrial dysfunction, and decreased insulin secretion. We determined that CML lowered the mitochondrial membrane potential, reduced ATP production, and increased the production of reactive oxygen species (ROS) and lipid peroxides, which was accompanied by mitochondrial DNA deletions. Elevated fission protein dynamin-related protein 1 (Drp1) levels and mitochondrial fragmentation indicated the disruption of the balance between mitochondrial fusion and fission in CML-treated cells. Additionally, elevated Parkin and PTEN-induced putative kinase 1 (PINK1) expression suggested that fragmented mitochondria were associated with increased mitophagic activity in CML-treated cells. Lastly, we observed that ALA treatment attenuated CML-induced mitophagy. Our results suggest that AGEs may damage beta cells and affect insulin secretion in the diabetic disease.

Biography

Mei-Chen Lo is a PhD student at the School of Graduate Institute of Medical Sciences, College of Medicine, Taipei Medical University, Taipei, Taiwan. She has published 3 papers in reputed journals.

d119103002@tmu.edu.tw

Notes: