Astragaloside

Astragaloside IV (AS-IV) is one of the main active components isolated from the traditional Chinese medicinal herb, Astragalus membranaceus.

Findings showed that the astragaloside IV can prevent or reverse the uncoupling of eNOS, increase eNOS and NO, and enhance several activating enzymes to activate the antioxidant system. In-depth validation and quantitative experiments still need to be implemented [1].

Wang et al. aimed to investigate the mechanisms underlying the beneficial effects of exercise rehabilitation (ER) and/or astragaloside (AST) in counteracting amyloid-beta pathology. Aβ oligomers were microinjected into the bilateral ventricles to induce Aβ neuropathology in rats. Neurobehavioral functions were evaluated. Cortical and hippocampal expressions of both BDNF/TrkB and cathepsin D were determined by the western blotting method. The rat primary cultured cortical neurons were incubated with BDNF and/or AST and ANA12 followed by exposure to aggregated Aβ for 24 h. In vivo results showed that ER and/or AST reversed neurobehavioral disorders, downregulation of cortical and hippocampal expression of both BDNF/TrkB and cathepsin D, neural pathology, Aβ accumulation, and altered microglial polarization caused by Aβ. In vitro studies also confirmed that topical application of BDNF and/or AST reversed the Aβ-induced cytotoxicity, apoptosis, mitochondrial distress, and synaptotoxicity and decreased expression of p-TrkB, p-Akt, p-GSK3β, and β-catenin in rat cortical neurons. The beneficial effects of combined ER (or BDNF) and AST therapy in vivo and in vitro were superior to ER (or BDNF) or AST alone. Furthermore, we observed that any gains from ER (or BDNF) and/or AST could be significantly eliminated by ANA-12, a potent BDNF/TrkB antagonist. These results indicate that whereas ER (or BDNF) and/or AST attenuate Aβ pathology by reversing BDNF/TrkB signaling deficits and mitochondrial dysfunction, combining these two potentiates each other's therapeutic effects. In particular, AST can be an alternative therapy to replace ER [2] [3].

The present study was designed to investigate whether the regulation of microRNA-1 (miR-1)-mediated inflammation and autophagy contributes to the protective effect of AS-IV against cardiac dysfunction in rats treated with lipopolysaccharides (LPS).

Methods: Animal model of cardiac dysfunction in rats or cellular model of injured H9c2 heart cell line was established by using LPS. Echocardiography, electron microscopy, enzyme-linked immunosorbent assay, immunofluorescence, quantitative RT-PCR, and Western blotting were used to determine the cardiac function and expression of inflammation- and autophagy-related proteins at both the mRNA and protein levels.

Results: LPS caused cardiac dysfunction in rats or injury in H9c2 cells and induced inflammation and autophagy. Compared with LPS treatment, AS-IV treatment attenuated cardiac dysfunction or cell injury, accompanied by inhibition of inflammation and autophagy. However, the miR-1 mimics partly abolished the effects of AS-IV. In addition, the effect of the miR-1 inhibitor was similar to that of AS-IV in the LPS model. Further analyses showed that AS-IV treatment decreased the mRNA expression of miR-1 in the heart tissue of rats and H9c2 cells treated with LPS.

Conclusion: These results suggest that AS-IV attenuated cardiac dysfunction caused by LPS by inhibiting miR-1-mediated inflammation and autophagy, thereby providing a novel mechanism for the

protection against cardiac diseases [4].

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