



RCSI

RCSI Bahrain

RSS PROJECT SUMMARY YEAR 2017

RCSI DEVELOPING HEALTHCARE LEADERS WHO MAKE A DIFFERENCE WORLDWIDE

Project Title	Neuroprotective effects of gum Arabic in the ageing brain of diabetic rats
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Project Summary	
<p>Dementia and Alzheimer's disease (AD) are real consequences of uncontrolled diabetes. Central insulin receptors are clustered in learning and memory areas of the brain such as the hippocampus, and brain insulin resistance is linked to impairment of hippocampal synaptic plasticity, hippocampal atrophy and cognitive impairment [1]. The mechanisms underlying these effects of brain insulin resistance include impairment of mitochondrial function and biogenesis [2, 3].</p> <p>Peroxisome proliferator-activated receptor gamma coactivator-1α (PGC-1α) coordinates mitochondrial biosynthesis and energy expenditure. In diabetes and AD, hippocampal mitochondrial dysfunction is associated with down-regulation of PGC-1α, and its overexpression improves mitochondrial function [4].</p> <p>Dietary fibres are a mixture of polysaccharides that are fermented in the large intestine to produce the short chain fatty acids (SCFAs) acetate, propionate and butyrate that are then absorbed. Intake of dietary fibre has both preventative [5] and therapeutic effects for diabetes [6]. The mechanisms for these effects are complex, however, SCFA's have anti-diabetic and anti-obesity effects, in part through activation of PGC-1α driving mitochondrial function and biogenesis in skeletal muscle and brown fat [7]. Furthermore, consumption of dietary n-3 fatty acid counteracts memory deficits as well as disrupted insulin receptor signaling, and markers of synaptic plasticity in the hippocampus of mice with metabolic syndrome [8].</p> <p>Gum Arabic (GA) behaves as a dietary fiber and stimulates large intestinal fermentation to produce SCFA [9]. Chronic ingestion has beneficial effects on blood glucose, fat deposition and body weight in rodent models of high-glucose or high-fat feeding [10, 11].</p> <p>Aim: The aim of the student component of this project will be to determine the effects of GA supplementation on learning and memory in the type 2 diabetic rats using the Morris water maze.</p> <p>Student applications: This study is a collaboration between RCSI Bahrain and Arabian Gulf University (AGU). We require n=2 students to work alongside students from the AGU. Applicants should be comfortable handling animals.</p>	

Subjected to Ethics Approval	Submitted to REC (RCSI) and awaiting outcome. Ethical approval already received from Arabian Gulf University.
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Primary References	
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