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Entitled

IDENTIFICATION OF MICRORNAs RELATED TO TYPE 2 DIABETIC OSTEOPATHY

by

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Abstract

T2DM is linked to an increase in the fracture rate as compared to the non-diabetic population even with normal or raised bone mineral density (BMD). Previous studies have addressed the question of how T2DM induces osteoporosis; the exact underlying mechanism is still elusive. Bones undergo continuous remodeling throughout life. Bone remodeling implicates the coupling of osteoclastic bone resorption and osteoblastic bone formation. This process is controlled by numerous genetic, hormonal, and neurogenic mechanisms. Osteoporosis is a result of bone loss that occurs by uncoupled remodeling. The existing evidence indicates that short non-coding RNAs known as microRNAs (miRNAs), are the key post-transcriptional repressors of gene expression, and growing numbers of novel miRNAs have been verified to play vital roles in the regulation of osteogenesis, osteoclastogenesis, and adipogenesis, revealing how they interact with signaling molecules to control these processes. This study aims to identify the changes in miRNAs levels related to the bone remodeling cycle in bones of type 2 diabetic rats. Three-month-old female Wistar rats were obtained from the animal house facility at United Arab Emirates University for this study. All animal procedures were approved by the animal ethical committee at United Arab Emirates University (ERA_2017_5597). Animals were fed with a high-calorie diet (D12492 diet; Research Diets, Inc, USA) for 3 weeks followed by injection of two lower doses of STZ (30 mg/kg intraperitoneally) which was administered at weekly intervals. Rats having blood glucose >15 mmol/liter were considered as diabetic and were used for our study. The animals were sacrificed after 8, 10, and 14 weeks of the onset of diabetes. The tibia was dissected out and used for the extraction of miRNAs using the mirVana™miRNA isolation kit provided by Ambion (AM 1560). MiRNAs known to be related to bone metabolism were assayed by quantitative RT-PCR using Taqman probes and primers (4427975, Thermofisher Scientific) in the serum and bone tissue samples. The research project resulted in a novel and innovative perspective in defining the mechanism of osteoporosis in type 2 diabetes mellitus through MicroRNAs with the potential to be used as diagnostic biomarkers to assess fracture risk and therapeutic targets for type 2 diabetic osteopathy.

Keywords: Type 2 diabetes mellitus, osteoporosis, bone remodeling cycle, microRNAs.