Antioxidant supplementation and kidney function status of Wistar rats following high fat diet-streptozotocin (HFT-STZ) induced type 2 diabetesMagid Althbety,

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Abstract

The kidney function status of high fat diet-streptozotocin (HFD-STZ) induced non-insulin dependent diabetes mellitus (NIDDM) in albino rats fed antioxidant supplementation was monitored in vitro. Appropriate and recommended dietary allowed proportions of some potent antioxidant substances including: minerals, vitamins, α-lipoic acid, phytochemicals and a D-ribose-L-cysteine conjugate were assembled together in corn oil and stored at 4oC for use. Kidney function indices were assayed using standard methods, kits and equipments. Data analysis was done with SPSS version 20.0 and significant level was set at p≤0.05. There were a total of five study groups with ten rats each. Immediately after the induction of diabetes with HFD-STZ combination, treatment commenced and lasted for a total of 12 weeks, and analysis carried out at the 4th, 8th and 12th week of the study. Results obtained from the kidney function status investigation indicates that there was significant decrease (p≤0.05) in urea levels of the treated groups when compared to the controls (normal and diabetic) and this decrease was consistent as the treatment progressed. Creatinine, bicarbonate and potassium levels of both the treated and normal control groups were not statistically different (p≥0.05) when compared with the diabetic control group which increased steadily for creatinine and bicarbonate, but inconsistent for potassium level within the treatment duration. However, there was a significant increase (p≤0.05) in sodium and chloride levels of the treated and normal control groups, when compared with the diabetic control group respectively. The observed increase was consistent with treatment duration. The results therefore suggest that the antioxidant supplement might have a restorative effect on kidney function and also enhance effective electrolyte balance and control for easy movement of ions across cell membrane. Type 2 diabetes (DM2) could be reproduced in rats with alimentary obesity by using low doses of streptozotocin (LD-STZ) as well as STZ in high doses with preliminary nicotinamide (NA) administration. However, STZ could induce tubulotoxicity. Aim. To develop rat model of DN in NA-STZ-induced DM2 and compare it with LD-STZ-model in order to choose the most relevant approach for reproducing renal glomerular and tubular morphofunctional diabetic changes. Starting at 3 weeks after uninephrectomy, adult male Wistar rats were fed five-week high-fat diet and then received intraperitoneally either LD-STZ (40 mg/kg) or NA (230 mg/kg) followed by STZ (65 mg/kg). Control uninephrectomized vehicle-injected rats received normal chow. At weeks 10, 20, and 30 (the end of the study), metabolic parameters, creatinine clearance, albuminuria, and urinary tubular injury markers (NGAL, KIM-1) were evaluated as well as renal ultrastructural and light microscopic changes at weeks 20 and 30. NA-STZ-group showed higher reproducibility and stability of metabolic parameters. By week 10, in NA-STZ-group NGAL level was significantly lower compared to LD-STZ-group. By week 30, diabetic groups showed early features of DN. However, morphofunctional changes in NA-STZ-group appeared to be more pronounced than those in STZ-group despite lower levels of KIM-1 and NGAL. Data analysis was done with SPSS version 20.0 and significant level was set at p ≤ 0.05. There were a total of five study groups with 10 rats each. Immediately after the induction of diabetes with HFD-STZ combination, treatment commenced and lasted for a total of 12 weeks, and analysis using serum was carried out at the 4th, 8th and 12th week of the study. Results obtained from the kidney function status investigation indicates that there was significant decrease (p ≤ 0.05) in serum urea levels of the treated groups when compared to the controls (normal and diabetic) and this decrease was consistent as the treatment progressed. Serum creatinine, biocarbonate and potassium levels of both the treated and normal control groups where not statistically different (p ≥ 0.05) when compared with the diabetic control group which increased steadily for creatinine and biocarbonate, but inconsistent for potassium level within the treatment duration. However, there was a significant increase (p ≤ 0.05) in serum sodium and chloride levels of the treated and normal control groups, when compared with the diabetic control group respectively. The observed increase was consistent with treatment duration. The results therefore suggest that the antioxidant supplement might have a restorative effect on kidney function and also enhance effective electrolyte balance and control for easy movement of ions across cell membrane.

Note: This work was partly presented at Euro Scion congress on Biochemistry, Molecular Biology & Allergy October 11 -12 , 2018 Amsterdam , Netherlands

subunits and receptors were initiated. Already in its first year Neurocypres celebrated the first structure solved of an entire cys-loop receptor by one of its partners (P-J Corringer, Pasteur, Paris). A combined genomic search, functional expression and X-ray crystallography yielded the discovery and atomic structural resolution of bacterial homologs of LGICs. The homolog from the cyanobacterium Gloeobacter violaceus (GLIC) revealed that it functions as a proton-gated ion channel. Its X-ray structure was solved at 2.9 Å resolution in an apparently open conformation. Work on the bacterial receptors yielded various new insights. For instance, now having the transmembrane domains available in the structure allowed to discover novel binding sites for substances long known to act as modulators of CLRs. Crystallization studies revealed new insights in compounds normally acting on the GABAA receptors, e.g. acting at the benzodiazepine binding site. In addition, the sites to which the binding of general anesthetics (used in the clinic during surgery) occurs were revealed.

Note: This work was partly presented at European Conference on Agriculture, Horticulture & Epigenetics
February 25- 26, 2019 | Paris, France