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Surface modification of islet cells with biocompatible poly-l-glutamic acid

Sercan Mercan[1,2] and **Fatma Arslan**[1]
[1]Gazi University, Turkey
[2]Aziz Sancar Research Center, Turkey

Type 1 Diabetes mellitus is an auto-immune disease in which the immune system is activated to destroy the pancreatic beta cells. The transplantation of pancreatic islet cells from human cadaver donor to patients is a successful treatment method on condition of using immunosuppressive drugs. However, long term use of immunosuppressive drugs has some adverse side effects. So, transplantation of these islet cells after masking the antigens on the cells surface can solve this problem. Poly amino acids are used in many biomedical areas. In this study, biocompatible poly-L-glutamic acid (PLGA) was used for surface modification of islet cells. Covalent interactions were provided with PLGA polymer. For this, carboxylic acid groups contained in this polymer was activated and their structures were elucidated by FT-IR and NMR analysis. The amide bond-forming was provided between these activated polymers and amine groups of lysine amino acid residues on the islet cell surface. In-vitro viability of islet cells and insulin secretion were assessed in both control and experimental group as a response of exposure to cytokine combination. Optimum PLGA concentration was found 2mg/mL. Viability and insulin secretion results of surface modification group islet cells with 48 hours cytokine exposure (%59.1; 6.8) were better than islet cells of control group (%47.7; 4.7) ($p<0.001$). Islet cells, obtained from rats were transplanted to diabetic mice. Surface modification has provided protection against immune response which was determined with monitoring blood glucose level. This method can be considered a promising method for islet cell transplantation.

sercanmrcn@gmail.com

Aortic and carotid intimal medial thickness in adolescent type 1 diabetic patients

Soha M Abd El Dayem[1], **Ahmed A battah**[2] and **Abo El Magd El Bohy**[2]
[1]National Research Centre, Egypt
[2]Cairo University, Egypt

Objective: To assess aortic intima-media thickness (aIMT) and carotid intima-media thickness (cIMT) in adolescent type 1 diabetic patients.

Patients & Methods: The study included 75 type 1 diabetic patients and 30 age and sex matched healthy volunteer. Blood sample was taken for analysis of glycosylated hemoglobin (HbA1), lipid profile and urine sample was taken for analysis of albumin/creatinine ratio. aIMT and cIMT via ultrasound were also done.

Results: cIMT & aIMT were significantly higher in diabetics (0.52±0.06 vs 0.4±0.03, P = 0.0001 and 0.72±0.11 vs 0.46±0.04, P=0.0001 respectively). aIMT was found to be significantly higher than cIMT in diabetic patients (0.72±0.11 vs 0.52±0.06, P = 0.0001). Ten of our patients (14%) with normal cIMT revealed significantly increased aIMT. aIMT had a significant positive correlation with age of patients, waist/hip ratio & cIMT.

Conclusion: Adolescent type 1 diabetic patients had increased aIMT and cIMT with a relatively greater increase in the aIMT than in the cIMT. Because atherosclerosis begins first in the intima of the aorta, these data suggest that the aIMT might provide the best currently available noninvasive marker of preclinical atherosclerosis in children. We recommend frequent follow up of diabetic patients for early detection of diabetic complication.

S_eldayem@Yahoo.com