

Pre-treatment of Pancreatic Beta Cells Prior to Islet Transplants; Potential for Improving Clinical Outcomes for Diabetes Mellitus

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Diabetes mellitus (DM) carries an immense burden worldwide, both clinically and economically. The molecular mechanisms implicated are complex and governed by numerous processes. Therapies primarily aim to preserve beta cell mass via modulation of cell differentiation, neogenesis, cell proliferation and/or apoptosis, cell size alterations and insulin signalling. These pathways are affected negatively by saturated fatty acids, metabolic syndrome and obesity (T2DM) and by autoimmune responses (T1DM). Pancreatic islet transplants provide an insulin-free therapy yet are often limited by donor availability, autoimmune reactions and low oxygen levels i.e. hypoxia, which is considered a rate-limiting-step in transplants. Vascular endothelial growth factor (VEGF) has been shown to be essential in both angiogenesis, vasculogenesis and revascularization. Utilising the mouse beta cell line Min6, and the thiazolidinedione Rosiglitazone: (1) H/PI staining and MTT assays were utilized to determine cell viability (2) Transmission electron microscopy (TEM) was used to decipher changes in cell ultra-structure (3) confocal microscopy and (4) Real-Time (RT) PCR elucidated intracellular localisation and determined changes in gene expression of key regulatory proteins respectively. Statistical Student's t-test and ANOVA were used. We have shown that pre-treatment with Rosiglitazone increased cell viability and longevity stimulating multiple anti-inflammatory and apoptotic signalling. Under hypoxic conditions, observed increased angiogenic and neogenic mRNA expression levels occurring in a time dependant manner. We suggest that pre-treatment with agents such as Rosiglitazone can increase cell viability, longevity and can potentially reducing the initial number of beta cells required for transplantation. Further, these significant positive effects were exhibited through various PPARγ-independant mechanisms.

Word Counte: 250
Keywords: diabetes, metabolic syndrome, clinical

Biography

Dr Tomader Ali has completed her undergradtaure, Masters of Research and PhD in the United Kingdom followed by postdoctoral studies in the United States of America where she was then employed as the Head of Undergraduate Reserach. Currently she is an Assitant Professor in the United Arab Emirates. As a scientist and educator over the past 13 years, past experiences have armed Dr Tomader with competencies in the primary and secondary areas of expertise, diabetes and cardiovascular & oncology respectively. This is in the wide range of cell biology to therapeutics and public health contexts, with an emphasis on the pathophysiology and mechanisms of human disease. Dr Tomader aims to share my knowledge and help lessen unnecessary global suffering in the context of chronic diseases.

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Session name/ number: Track 1: Diabetes and Its Treatment or Track 10 : Emerging Focus in Diabetes Research
Category: (Oral presentation)