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Cytoglobin expression in transplanted pancreatic islets improves insulin production by enhanced oxygen supply and protects from cell death in diabetes

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Despite recent advances in pancreatic islet isolation techniques and changes in the regimen of immunosuppressive drugs, between 50-70% of islet cells are lost to hypoxic cell death within the first 10 to 14 days after isolation and subsequent transplantation. Islet survival must be increased, during the ischemic period between isolation and revascularization if islet transplantation is to succeed as a preferred treatment modality. The present study directly addresses the problem of isolated and transplanted islet survival. The use of exogenous growth factors has decreased the period required for islet revascularization, potentially reducing the total time of ischemia, however the resultant blood vessels surround but do not penetrate the islets sufficiently to prevent prolonged ischemia and central islet cell death. Therefore, it must be recognized that revascularization is only part of the islet survival equation in islet transplants. Cytoglobin (CYGB) is a recently discovered intracellular oxygen binding protein inducible in islet beta cells during hypoxia. Transfection of islet cells with CYGB DNA induces the production of CYGB and increases islet survival and preserves insulin secretion in cultured and immunoisolated islets, and significantly reduces the generation of toxic reactive oxygen species (ROS). Our results also suggest that the increased survival of islets by the overexpression of CYGB promotes increased vascular density in transplanted islets and surrounding immunoisolation chambers. This result is of prime interest as CYGB induces VEGF either directly or indirectly as a consequence of enhanced islet survival. The hypothesis examined by the present study is that the induction of cytoglobin will increase islet survival in isolated islets and islet transplants, thereby reducing the number of islets required to prevent the reoccurrence of diabetes in the recipient. World population contains a significant percentage of diabetic patients or those at risk to develop diabetes from aging and diet, and from pancreatitis or pancreatic malignancy. The present study will provide new information relevant to the prevention of diabetes in those patients.

Biography

Bhuvarahamurthy Venugopal has gained his research and teaching experience at prestigious institutions including Harvard Medical School (Boston, USA), Weizmann Institute of Science (Israel), and Humboldt University (Berlin, Germany). His research areas are Cancer Genetics, Metabolic Disorder, Cardiovascular and Neurobiology. He is skilled in assay development, cell culture, molecular biology, biochemistry, KO mouse model creation and human genetics and genomics. He has excellent skills in teaching, presentation, collaboration and working in a team. He also has experience of working in a supervisory role (experiment planning and oversee the plan execution), highly inquisitive, creative, resourceful and a fast learner. Due to vast knowledge in research field, he gained experience in writing validation protocols for biotech, medical devices and managing the protocol to completion.

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