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## The advantage of bioengineering and stem cell approach for immunorejection free human islet

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Islets transplantation holds promise as a long term treatment to Type I diabetes. We have previously reported that bone marrow cells (BM) co-cultured with human islets generate a microenvironment suitable for repairing islets and promoting longevity. Our work strongly supports that BM and its subpopulation creates a microenvironment which sustains human islet beta cell function and survival in long-term. In additional, we found that the role from BM derived populations is of diversity. We hypothesize that mechanism of BM support human islet includes repair human islet injury, initiating human isle regeneration through vascularization and initiating beta cell transcription factor activations. Coculture human allogeneic BM and islet generates a reinstituted human islet tissue which suitable for transplantation in vivo for diabetes therapy. However, in vivo immunorejection issue still yet overcome with this reinstituted tissue. We hypothesize that co-encapsulated BM will generate microenvironment for human islet longevity while preventing immunorejection. This work provides exciting results for supporting the hypothesis. APA encapsulation was established by coating gel beads with additional layers of poly-L-ornithine and alginate to create a 4-layered immunoisolatory membrane. Optimal condition was created and tested. After 4 weeks of culture, encapsulated human islets with BM formed a 3D structure while groups without encapsulation formed a 2D structure. The advantage of this new approach also approved in vivo by transplantation encapsulated human islets in immunologically competent STZ-induced diabetic rats. Our results show that encapsulated human islets with BM creates a microenvironment benefitting human islet function/longevity while preventing immunorejection. We will summarize the advantage from our and others to propose potential clinical application of this novel discovery.

### Biography

Luguang Luo has been trained by medical physician and molecular biology background (Umass Medical Center and Brown Medical School USA) for more than 30 years. He initiated his career with senior outstanding endocrinologist Dr. Ivor Jackson at Brown Medical School. Dr. Luo's significant contribution is to identify Thyrotropine Releasing Hormone (TRH) expression in pancreatic β-cell and may contribute β-cell regeneration. Since he became independent investigator, he collaborates with Dr. Quesenberry, experts in hematology, his efforts have been focusing bone marrow stem cells and diabetes and published more than 50 articles in peer reviewed Journals and about 100 abstracts presentations in American Diabetes Association Annual Meeting and Endocrine Association Annual meeting and others which lead him to receive numerous funds from JDRF, NIH and local hospitals. Recently, Dr. Luo focuses on to establish a microenvironment in retaining a balance of β-cell apoptosis and regeneration, resulting in the support of pancreatic β-cell survival and function while developing bioengineering approach to create immunorejection free human islet tissue. Dr. Luo is a Director of stem cell and diabetes Research Center in Roger William Hospital and professor affiliated with BU and Brown Medical schools. Dr. Luo is a reviewer in NIH study section and cNSF and has also been invited to review articles for numerous Journals such as Molecular Endocrinology, Journal of Neurology, Endocrinology, et al and Editor Board members.

**Notes:**