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A 3D investigation of islet vasculature in a regenerating rat pancreas after 90% partial pancreatectomy (PPX)Viantha Naidoo¹, Muller C J F², Lang D M¹ and van der Merwe E L¹¹University of Cape Town, South Africa²South African Medical Research Council, South Africa

Background: The ability of pancreatic islets to maintain blood glucose homeostasis is compromised in diabetes, which has led to numerous past studies investigating islet regeneration. While promising, such investigations have not examined islet revascularization in models of regeneration, the importance of which has been clearly shown in islet transplantation. Furthermore, long-term islet function is thought to be linked to the longevity of its vasculature where pericytes, cells critical for angiogenesis and blood vessel stability, may play a pivotal role. However, investigations by others into islet regeneration are limited to one month after PPX.

Aim: The aim of this study was to investigate islet vascular growth at 30 and 90 days post 90% PPX, by examining islet capillary and pericyte density.

Methods: Fixed whole-mount tissue sections from 30 and 90 day post PPX and sham-operated adult male Wistar rat pancreata were multi-immunostained with anti-insulin, anti α smooth muscle actin and Lycopersicon esculentum lectin-FITC for islet, pericyte and vessel detection, respectively. Islets were imaged by confocal microscopy. 3D reconstructions of acquired Z-stacks were analyzed using Fiji software to determine islet size and vascular and pericyte density. Recorded fasting blood glucose values were included in the analysis.

Results: Thus far, our data show a trend of an increase in capillary and pericyte density and pericyte:capillary ratio (PPX>controls and PPX90D>PPX30D). No differences in islet distribution and blood glucose levels were observed among all groups.

Conclusion & Significance: The results indicate that islet vascular growth occurs until at least 90 days post PPX with no evidence of termination. This concurs with our previous investigation of islet cell proliferation, suggesting potential endurance of islet revascularization. The increase of the pericyte:capillary ratio suggests a stabilization of the vascular bed with an increase in mature vessels during the regenerative period, contributing to normal islet function.

Biography

Viantha Naidoo is currently a PhD student in Cell Biology in the Department of Human Biology at the University of Cape Town in South Africa. Her research interests lie in regenerative medicine and she is presently investigating pancreatic islet vascular and nerve regeneration after a 90% partial pancreatectomy in adult rats.

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