



Advancements in pancreatic islet transplantation have shown promising outcomes in improving glycemic control and quality of life for individuals with Type-1 Diabetes (T1D). However, despite these advancements, several challenges persist, and future directions are needed to optimize the efficacy and accessibility of this therapy [9].

One of the primary challenges in pancreatic islet transplantation is the shortage of donor pancreata. The limited availability of donor organs restricts the number of patients who can benefit from this therapy. Addressing this challenge requires exploring alternative cell sources, such as stem cell-derived beta cells and xenogeneic islets, which offer the potential for a sustainable and scalable supply of insulin-producing cells [10].

### Discussion

Another challenge is achieving durable immune tolerance to prevent islet rejection without the need for lifelong immunosuppressive therapy. Current immunosuppressive regimens are associated with adverse effects and may not provide long-term graft survival. Future research efforts focus on immune tolerance induction strategies, including cellular therapies, biomaterial-based encapsulation, and gene editing technologies, to promote immune tolerance and minimize the risks associated with immunosuppression.

Furthermore, advancements in biomarkers and imaging techniques are essential for predicting islet graft function, monitoring engraftment, and detecting rejection early. Noninvasive methods for assessing graft