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A comparison between islet and stem cell transplantation for treatment of type 1 diabetes mellitus: A systematic review

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Introduction: The incidence of Type 1 Diabetes Mellitus (T1DM) has been increasing rapidly worldwide, while the current standard therapy exogenous insulin supply is considered unsustainable and highly associated with poor glycemic control that may lead to a life-threatening condition. On the other hand, cellular based therapy including either islet cell or stem cell transplantation has been recently developed, making it pertinent to compare the effectiveness between the two alternative treatments. The aim of this systematic review is to compare the safety and effectiveness between islet cell transplantation and stem cell transplantation for future practice change.

Methods: Literature search using two databases, PubMed and Ovid Medline was conducted for primary studies published from January 2000 to November 2015. A quality assessment of identified studies were conducted using ARRIVE, NOS and MINORS assessment tools. The comparisons between treatments were done based on the mean values of insulin independence period and blood glycemic level of the subjects in the studies.

Results: In 15 out of 17 included studies, the average insulin-independent period in T1DM patient post-islet cell transplantation was proven to be four years longer compared to post-stem cell transplantation that could only achieve one year at most. The studies also found and support that islet cell transplantation has better blood glycemic control, observed through random blood glucose level ranges from 140 mg/dL to 200 mg/dL and c-peptide levels ranges from 0.3-4.5 ng/ml which marks the presence of insulin production. However, certain challenges e.g., donor shortage and poor engraftment hinder the widespread application. The studies also revealed that stem cell transplantation differentiated into β -cell-like cells that produce insulin, glucagon and somatostatin, as well as acting in glucose stimulated manner, imitating the physiologic mechanism of β -cells, this is in fact considered as a major potential for future development.

Conclusion: The current studies had proven a conclusive result in which islet transplantation has relatively higher effectiveness and better outcome compared to stem cell transplantation for treating T1DM patients.

Biography

Astrid Indrafebrina Sugianto is currently an Advanced Medical Science degree student at the University of Melbourne. She was nominated as one of the 300 young brightest scientists by Ministry of Education of UK in 2013. She was also the former Ambassador of the year for Harvard Project of International Relations in 2014 and also the only female representative of Indonesia for ASEAN Youth in 2014. She was previously involved in breast cancer stem cell research, before decided to focus on cellular based therapy research in 2015. She is interested in politics, international relations, psychology, biology and medical science.

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