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Antioxidants as an Appropriate Approach to Improve the Outcome of Pancreatic Islet Isolation: Evidences from Animal Studies

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Diabetes mellitus has become an important disorder with socioeconomic burden and complications worldwide. It is noteworthy that, efficacy or safety of treatments for diabetes is still a concern (Mohseni Salehi Monfared *et al.*, 2009; Salari *et al.*, 2011).

Pancreatic islet transplantation has been reported to be a widespread successful step toward a cure in diabetic patients. Despite recent extensively improvements in islet isolation and transplantation techniques, loss of healthy functional islets are one of the major obstacles to this therapy (Irani *et al.*, 2009). Oxidative stress by imbalance between production and manifestation of reactive oxygen species plays an essential role in cell injury during islet isolation and transplantation procedures. The result of this process is cellular death and β -cell failure. Islet transplantation involves the exposure of islets to several forms of stress, including activation of free radicals, oxidative stress-induced apoptosis as the result of islet isolation and pancreatic preservation (Mohseni Salehi Monfared *et al.*, 2009). Therefore, methods are urgently needed to improve islet resistance to oxidative stress even during diabetes (Rahimi *et al.*, 2005). Antioxidants that act against oxidants include enzymatic and non-enzymatic types. Enzymatic antioxidants include Super Oxide Dismutase (SOD), catalase (CAT) and Glutathion Peroxidase (GPx). Non-enzymatic antioxidants include vitamins like C, E, zinc, uric acid and selenium (Abdollahi *et al.*, 2004).

In the recent years, some antioxidants have been examined on isolated rat Langerhans islets that showed optimistic effects such as facilitating conditions of islet transplantation, improvement of islet cell function before transplantation, improvement of transplant outcome and graft function. These substances include IMOD (Larijani *et al.*, 2011), specific phosphodiesterase inhibitors (Mohammadi *et al.*, 2011), low-level laser irradiation (Irani *et al.*, 2009), calcium channel blockers, autonomic nervous system blockers and free radical scavengers (Pourkhalili *et al.*, 2009), cAMP and cGMP phosphodiesterase inhibitors (Ghafour-Rashidi *et al.*, 2007).

Therefore, the benefits of antioxidants in islet isolation procedures cannot be ignored but studies should be continued. These findings suggest that antioxidants may help facilitate conditions of islet transplantation.

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