Induced pluripotent stem cells (iPSCs) hold great promise in all the fields of regenerative medicine. In this review, a retrospective of the progress in the potential treatment for diabetes mellitus is offered. The challenges this technology encounters are also assayed and future directions examined in order to bypass these issues.

**INTRODUCTION**

The progress made during the end of the last century in reprogramming by nuclear transfer and fusion lead to Takahashi and Yamanaka to hypothesize that there should be certain factors that determine the differentiation fate of cells. Thus, iPSCs were created in 2006 and a new scientific stream started developing. Despite their origin, iPSCs are very similar to embryonic stem cells (ESCs), avoiding most of the issues related to the latter, and may be even able to replace them in a future. This technology is in its early days, but lots of possible applications have already been found. One of them is the production of β-like cells in order to treat and study diabetes mellitus (DM).

**FIRST REPORTS AND MOVING FORWARD**

Soon after the discovery of iPS cells, a series of reports suggested that developing insulin producing β-like cells from iPSCs was feasible. One of the most remarkable reports was in 2010 when Alipio’s group was able to stably engraft these cells into the liver of 30 T2DM and 6 T1DM mice and normalize their blood glucose levels for more than 3 months2. Jeon was able to repeat the experiment with very similar results on T1DM mice3 (Figure 3).

Since then, a vast amount of research has been done in order to improve the technology and bypass its main issues. A combination of small molecules like DNA methyl transferase inhibitor 5-aza-2’-deoxycytidine (5-AZA) can guide the cellular reprogramming and even the generation of β cells, thus avoiding immunogenicity4.

Another important breakthrough was made by Pagliuca’s group (Figure 2) with the discovery of a strategy for large-scale production of functional β-cells allowing the cultivation of 300 million cells per single 500 ml flask5.

**CONCLUSIONS**

iPSC technology offers a promising solution for the understanding and treatment of DM and it has become a pillar of regenerative medicine. The main challenges have been clearly defined which allows for better approach strategies and more structured research.

**REFERENCES**