Immunano: The Future of the Immune Response

Elkaim, Adam (School: Marianopolis College)

The novel use of stem cells (SCs), specifically induced pluripotent stem cells (iPSCs), in regenerative medicine to treat degenerative, autoimmune, and genetic disorders has shown great promise in the development of tailored therapeutics. Recent studies have also linked the use of nanotechnology in regenerative medicine to aid in the identification of biomarkers and biological variables such as transcription factors (TFs) that encourage various types of cell differentiation. Research on over 290 genes shows the different differentiation potential of cells based on the introduction of specific markers and transcription factors (TFs). Using an Artificial Neural Network (ANN), it will be possible to understand which factors optimize each different type of cell lineage as well as what conditions would promote the survivability of iPSCs in vivo. Furthermore, innovations in nanotechnology now enable the development of nano platforms that can mimic these topological effects to provide favorable conditions for SC differentiation allowing for greater control over their differentiation potential. The focus of this research will be to understand these parameters and establish the Immunano app, a platform that stores this biological data. In essence, this project aims to reduce the time it takes doctors to find correct diagnoses by providing them with immense amounts of patient-specific data in real-time by creating individual genetic profiles. Essentially, by utilizing data collected by nano sensors, professionals could use this platform to engineering individual-specific tissue or cells, for emergency applications such as organ replacement, blood transfusions or other surgical procedures.

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