

## Third Laureate Fundamental Research

26<sup>th</sup> Khwarizmi International Award (KIA)



● **Project Title:** Production of Neural Lineage Cells: From Pluripotent Stem Cells to Transplantation in Animal Models

● **Executive Organization:** Royan

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● **Abstract:**

Pluripotent stem cells are a source of renewable cells, which possess a phenomenal potential to differentiate into a myriad of cell types. Thus, they offer a potentially unlimited supply of cells, which can be deployed in developing cell-based therapies and mammalian neural development. In this study, to establish neural lineage cells, different types of mouse and human pluripotent stem cells were initially generated and characterized. In second step, the *in vitro* differentiation capacity of them into derivatives of the neuronal lineage cells e.g., neural progenitor cells, types of mature neurons, astrocytes, oligodendrocytes, and photoreceptors has been demonstrated using various approaches. Next, the functional recovery of the pluripotent stem cell-derived neural lineage cells, upon transplantation into *in vivo* models of spinal cord injury, Alzheimer, retinal injury, and multiple sclerosis has been investigated. Our findings have demonstrated the potential issues related to the transition to the clinic.

The specific results of this study include: the publication of 67 ISI papers, three chapter books, 23 presentation in national and international meetings as invited speaker, more than 1270 citation in ISI, h index 20, cover page of five international journals, establishment of a pluripotent stem cell bank, and a proof of principle for therapeutic application of pluripotent stem cell-derived neural lineage cells by treating neural diseases in animal models.

Symbol of project: Fluorescence-microscopic view of a cluster of neuronal cells derived from human embryonic stem cells. Outgrowing processes are labeled by beta-Tubulin III (green) and aggregate of Nuclei by propidium iodide (red).

