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Editorial

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Nobel Prize to Inducent Pluripotent Stem Cells and Cloning: A Milestone for the Regenerative Medicine

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Sir John B. Gurdon from United Kingdom and Shinya Yamanaka from Japan are winners of the 2012 Nobel Prize in Physiology or Medicine for their work on induced pluripotent stem cells (iPS) and cloning.

Shinya Yamanaka (Center for iPS Cell Research and Application, Kyoto University, Japan) wins the prize for figuring out how to develop induced pluripotent stem cells [1,2]. These cells can be reprogrammed into completely different kinds. Indeed, iPS cells are derived from adult somatic cells via reprogramming with ectopic expression of four transcription factors (Oct3/4, Sox2, c-Myc and Klf4; or, Oct3/4, Sox2, Nanog, and Lin28) [3]. The conversion of differentiated cell types into undifferentiated cells and using them to generate whole tissues opens a new era in the field of regenerative medicine [4]. Induced pluripotent stem cells offer unprecedented potential for disease research. Their versatility is due to unlimited self renewal capacity, pluripotency and ease of accessibility to donor tissues [5]. The therapeutic potential of iPS cells in regenerative medicine is very promising. Induced pluripotent stem cells give the opportunity to design customized patient-specific stem cell therapies by reprogramming cells from patients with a particular disease. In this way, obtaining new tissue with the same genetic background offers the hope for curing untreatable diseases, like multiple sclerosis, Parkinson's, Alzheimer's, diabetes, cardiovascular diseases, Huntington's, but also autism, cystic fibrosis and spinal muscular atrophy.

John B. Gurdon (Wellcome Trust/Cancer Research University of Cambridge, UK) won the Prize for being first to figure out how to clone an animal, opening to the idea that nuclear reprogramming may facilitate cell replacement therapy [6]. Indeed, nuclear reprogramming represents a switch in gene expression of one kind of cell to that of another unrelated cell type [7]. Through nuclear reprogramming is possible to derive one kind of specialized cell from another, more accessible, tissue in the same individual [7]. Patient-specific somatic cell reprogramming could have a large impact on medicine by providing a source of cells for disease modelling and regenerative medicine [8].

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