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Skin Stem Cells in Iran

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Dear Editor,

During the recent decade, Iran has been keeping pace with the exponentially growing field of stem cell research and therapy, with skin-related investigations constituting a considerable share of the contributions of Iranian researchers to the field. It is thanks to immense collaborations at various levels among regulatory and administrative bodies, as well as enormous drive at the level of individuals, that the advancements have been realized. In many of the projects, the collaborations extended beyond the geographical borders to research centers all over the world.

Owing to a collective will to expedite the science of stem cells and also support from the Council for Development of Stem Cell Sciences and Technologies, increasingly more related research facilities are being established and equipped in the country. Royan Institute for Stem Cell Biology and Technology was the center that took the lead in the science of stem cells in Iran. Subsequently, several universities and academic centers, such as Tehran, Iran, Tabriz, Shiraz, Mashhad, Kerman, and Yazd universities of medical sciences, came aboard. The National Cell Bank of Iran (Pasteur Institute), Tarbiat Modares University, Cell Therapy and Regenerative Medicine Research Center affiliated with Endocrinology and Metabolism Research Institute of Tehran University of Medical Sciences are other centers active in the field. The Skin and Stem Cell Research Center, supported by the Tehran University of Medical Sciences, was established in 2011 and has been entirely dedicated to applying the science to cutaneous disorders (1).

For skin-related purposes in Iran, stem cells are obtained from a variety of sources, such as adipose tissue, hair follicles, menstruation blood, placenta, amniotic membrane, endometrial tissue specimens, umbilical cord Wharton's jelly, and bone marrow aspirates (2-9). Reprogramming of differentiated somatic cells to pluripotent stem cells, performed by the Royan Institute, offers another valuable source for the cells.

Stem cells have been experimentally put into use by Iranian researchers for many dermatologic purposes, including wound repair, wrinkle, and scar enhancement (10), hair loss treatment (11, 12), and the improvement of conditions such as scleroderma (13), chronic graft versus host disease (14), and atopic dermatitis (15). Ulcers caused by diabetes (16) or burns (17) have been the most common subjects of these studies. Stem cells obtained from different sources are loaded onto a variety of natural/bioengineered scaffolds as wound dressings (18-22), spread onto the wounds (23), or delivered in injectable forms (24-28) into them. Several researchers have been seeking methods for increasing the viability of the cells and the overall efficacy of the treatments (25-33). Furthermore, the cell-free method is a novel therapeutic approach in the field of cellular therapy that is actively performed in Iran. In this method, exosomes are used to convey stem cell signals to target cells and tissues without delivering the actual cells, whereby many of the issues associated with cell-based therapies are avoided (9, 33, 34).

The many capacities of stem cells have given them great commercialization potential. Several knowledge-based companies in Iran have already joined the industry. Royan Institute for Stem Cell Biology and Technology and its spin-off companies (Royan Stem Cell Technology Company, Cell Tech Pharmed Company, Royan Biotech Company, and Royan ATMP-TDC) are actively engaged in producing stem cell products. Human Induced Pluripotent Stem Cells, Human Embryonic Stem Cells, Mouse Embryonic Stem Cells, Bone Marrow/Adipose-derived Mesenchymal Stem Cells, etc, are some examples. Cell-Amniosin™, produced by SinaCell Company, is a biologic wound dressing made from the amniotic membrane and its associated stem cells. The company also offers mesenchymal stem cell production services. Several more knowledge-based companies also cooperate with the abovementioned universities and institutes.

Stem cell science opens doors to numerous possibilities for the treatment of hard-to-manage medical conditions. Given enough expertise and financial support, it can turn into a huge industry that benefits not only patients but the investors and all other involved parties. Iranian researchers have great enthusiasm for advancing the field and eagerly look for opportunities to collaborate with their peers from all over the world.

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