

Stem Cell Therapy and Research Status in Iran : at A glance

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Stem cells constitute a group of human body's cells with the ability to develop into any tissue type. They are responsible to repair and renew different tissues and organs. It is accepted that stem cell therapy has the potential to treat several diseases. Applying stem cells in both ways (therapy and research) has been considered in during past years throughout the world. Elie Dolgin says: " Iran is investing in stem cell research and despite working with limited access to laboratory equipment and resources; the country may emerge as a scientific force to be reckoned in the stem cell field".¹

The history of stem cell research in the world goes back to mid-1800s with the discovery that: some cells could generate other cells, followed by oral administration of bone marrow to treat patients with anemia and leukemia in the early 1900s.² The world's first successful bone marrow transplantation was performed in 1968. But the history of stem cell therapy is younger in our country and goes back to nearly 20 years ago, when Ghavamzadeh established the first bone marrow transplantation ward in Shariati hospital, Tehran in 1991. Hematology ward was founded in the hospital in 1974. Ghavamzadeh promoted this ward to hematology-oncology wards in 1979. Then he expanded the wards to a therapeutic/research center named: Hematology Oncology and BMT Research Center of Tehran University of Medical Sciences in 2000. He is current director of the center and reported 2426 patients with different diseases underwent hematopoietic stem cell transplantation (HSCT) in his center between 1991 and 2009.³

In stem cell research area, many institutes, research centers, and departments in several universities are active in Iran . According to a joint study by Harvard university and Massachusetts Institute of Technology, Iranian scientists are considered to be in the forefront of embryonic stem cell research. Iran stands after Sweden , Japan , the United States , Australia , Britain , India , South Korea , and Singapore in the world to produce, culture, and freeze hES cells. Morrison and Khademhosseini remarked issues regarding stem cell development throughout the world in their article entitled "Stem cell science in Iran ".⁴ Human embryonic stem cell research is surrounded by moral and ethical debates, in their opinion. They mentioned Iran as a leader in hES cell research among Islamic countries. They notified some challenges of conducting stem cell research in Iran such as lack of a governmental agency or private sources for financial support, lack of stem cell community in Iran , and difficulties in importing materials and reagents. They mentioned that challenges are not limited to those factors. Many stem cell researches are conducted in Royan institute which was originally established by Ashtiani in 1991 as an infertility clinic. The word "royan" means embryo in Farsi. In 1998, Ministry of Health approved Royan institute as a cell-based research center. Stem cell department of the institute was established in 2002. In 2006 August, birth of the first cloned sheep named Royana in Iran was reported by researches in Royan institute.⁵

Royan institute supports many basic and therapeutic researches such as hES differentiation into various cell types (cardiomyocytes, beta cells, and neural cells),⁶The institute is responsible for holding an annual scientific congress regarding stem cell science by inviting many national and international speakers in Tehran. Stem cell researches are supported by the current government policies in Iran . Research and technology deputy of Ministry of Health, organized Iranian stem cell network in November 2005 to develop and promote quantity and quality of stem cell researches and deliver new treatments for diseases. Many research projects from different universities and research centers are supported by this network. Another effort of Research and technology deputy of Ministry of Health was establishment of Iranian council of stem cell technology in 2008. The main goal of this council is to promote community health via development of stem cell clinical and research centers. Allocation of funds and facilities, supervising universities activities and research centers functions regarding stem cells, improvement of universities/ companies as the foundation of knowledge by gratuitous aids, supporting production of reagents related

to stem cell researches, and supporting strategic plans/researches regarding stem cells are other activities of this council. The council has recently started to work and is too soon to evaluate its effect on stem cell research and therapeutic activities in the country. One of its most important roles is expected to act as a coordinator among different research and clinical therapeutic centers under powerful authorization and national policy approved by all centers involved in activities regarding stem cells in the country. This council plays role as a bridge between deputy of technology innovation of Iran presidency and research/education/clinical centers to support projects regarding stem cells such as Iranian stem cell donor registry establishment in Iranian Blood Transfusion Organization (IBTO) in January 2009. Establishment of public cord blood bank is another project supported by this council in IBTO in 2010. Cord blood donation to this public bank is free of charge and will be used for every patient in need for cord blood. These two banks have recently started to recruit adult donors and collect cord blood units. IBTO tries to give related service to patients in 2011 after suitable donor size is collected in these banks. Several researches are approved by IBTO research centers presented by IBTO board members and researchers from other research centers or universities which are published in scientific journal of IBTO named *Khoon* (meaning blood in Farsi) and other national or international journals. The first cord blood bank was opened in 1993 in New York . There are two other cord blood banks in Iran . The first cord blood bank was built in Royan institute in 2005 as a private cord blood bank which recently changed to a public bank. The second cord blood bank in Iran was constructed in Hematology Oncology and BMT Research Center in Shariati Hospital in Tehran a couple of years ago as a public cord blood bank to use cord blood units for patients undergoing HSCT in the center. There are many researchers in different universities and centers involved in stem cell researches. Sometimes we hear or read news about success of a clinical research to treat a disease such as success of Iranian scientists in using stem cells to treat vascular occlusion and critical limb ischemia in lower extremities,⁷ differentiation of stem cells to hepatic cell,⁸ isolation of stem cell from kidney,⁹ and so many other topics. Despite our progress in stem cell knowledge during past decade, lacking stem cell community or national network, lacking a centralized database about stem cell researches and their projects results, performing simultaneous and separated researches with small sample size instead of joined multicenter researches, and lacking national regulations for clinical trials and measures for monitoring such activities are important issues needed to be solved to acquire more success in the stem cell field.

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