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An Update of Utilization of Stem Cell Therapy from Parthenogenetic Esc to Sel's in Case of Cancer Survivors

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Abstract

Treating diseases using regenerative medicine holds a great promise with the development of various kinds of stem cells, be it embryonic stem cells, induce pluripotent cells or parthenogenetic stem cells. The above have a great limitation because of cost factor, number of personnel required along with need for immunotherapy with fear of transplant rejection for ESC's.

Thus in the therapies last decade how stem cells interact with their support niche, namely the microenvironment of stem cells has markedly improved our basics in this field. Hence therapies directed towards resident stem cells are already in clinical trials. They may be gradually used more extensively in regenerative medicine, chronic degenerative disease, obesity and cancer. Problems and challenges in this include assigning the tissue specificity of any intervention, to ensure quality of repair in long term along with avoiding side effects like carcinogenesis. Therapies involving developmental pathways like Wnt, Hedgehog or notch signaling may be teratogenic or carcinogenic. Having broader therapeutic window maybe justified in case of conditions like cancer. Most successful regenerative medicine treatment involving endogenous repair will prove to be combination therapies. Thus targeting the niche is complementary to approach, which targets stem cells directly and in long term apply those are different times to effect recovery on the basis of dynamics of stem cell–niche interactions.

In our previous review we reviewed the history of embryonic stem cells, advantages and disadvantages of ESC, parthenogenetic ESC and their therapeutic applications, cloning along with merits of SCNT, in this shot commentary we have just concentrated on induced pluripotent stem cells, mainly their transcriptomics, along with special emphasis on global transcriptomics in candidate oocyte factors and various advances in therapeutic applications. The field of oncofertility seems to be in the revolutional phase since the debate of presence of SC's presence was proposed in 2004 as reviewed in our earlier article on how PRP administration has been successful in some cases of POF etc. Both human ovary and testis contain a heterogeneity of ovarian stem cells along with the VSELs that had been first isolated in 2006 by Ratajczak in bone marrow and subsequently demonstrated by many groups in different tissues. In India the group of Deepa Bhartiya reported the presence of 2 distinct populations

located on the OSE and contradicted Horan and Williams regarding the question of existence of these cells was still debatable and in fact compared the sizes of theirs with the ones found by others with solving their problem of use of DDX4 for studying OSC's and gave umpteen reasons for not pulling the research of over a decade back to square one just on the bases of DDX4 being a cytoplasmic marker. Basically VSELs express embryonic markers,that include nuclear OCT-4 and get lodged on OSE. These ovarian VSELs have an asymmetric division regarding self-renewal and produce OSC which then divide symmetrically to produce clonal expansion that is followed by meiosis to form an oocyte which gets enveloped to form the primordial follicle. FSHR's are expressed by both OSC and VSELs. What is not clear is since these SC's are responsive to FSH does the SC activation occur at the time of ovarian hyperstimulation which we all use during IVF/ICSI and that needs probing.

Aging compromises niche function that possibly causes menopause and not the compromise of probability of follicle development as shown by transplantation of aging ovaries into younger host leads to DF formation. Importantly since OSE contains these SC's most ovarian cancers are epithelial in origin and these VSEL's are responsible for ovarian cancer as emphasized by Virant-Klun's group as well along with showing that these VSELs are present right at the time of formation of an embryo. Thus these VSEL's are good cells to be studied for restoring fertility following chemo ablation in both sexes without any transplantation of cortical tissues in future along with importance to study the origin of epithelial cancers. Till this gets functional we have to keep following the methods of cryopreservation of gametes prior to chemotherapy or in young children the immature testicular/cortical slices.

Oncofertility Currently the most accepted definition of

Recurrent Implantation Failure (RIF) ,is the absence of achieving clinical pregnancy following transfer of 3 or more good quality embryos in women under 35 years age as well as 4 or in ≥ 35 years age women in fresh or frozen ET's We had reviewed earlier comprehensively how to manage the endometrial factor in cases of RIF utilizing antibiotics not only orally but further using intrauterine antibiotics and then Platelet Rich Plasma (PRP).Despite that there are certain cases that refuse to respond .We have further delved deeper into pathophysiology of Recurrent Implantation Failure (RIF) along with describing innovatively the use of Mesenchymal Stem Cells (MSCs) cells derived from endometrial stem cells in 29 cases of RIF mixed with PRP that was successful in 23/29 cases besides improving Endometrial Thickness (EMT), but further in Clinical Pregnancy (CP) as well as Live Birth Delivery Rates (LBDR). Further we describe the role of Platelet and Endothelial Cell Adhesion Molecule 1 (PECAM) along with Transforming Growth Factor Beta (TGFβ) besides CDYL in RIF.

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