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# Regenerative therapy by replacement of stem cells in females

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## Regenerative Therapy by Replacement of Stem Cells in Females

Sir,

Primary ovarian failure (POF) or premature ovarian insufficiency (POI) is the loss of function of the ovaries before age 40, which can be idiopathic or as a result of post-cancer treatments and radiations.<sup>1</sup> There is no proven effective means for treatment of POF in humans and contemporary medicinal treatment does not show certainty to fertility.<sup>2</sup> Recent studies on stem cell treatment were done by isolation of the oogonial stem cells from the adult mouse and human ovaries, which later demonstrated the capability of forming mature oocytes showing potential and hopeful treatment of infertility.<sup>2,3</sup>

Stem cells are acknowledged as progenitor cells with the potential to proliferate and differentiate into specialized cells of the body. The major sources of stem cells include embryonic stem cells from human embryos and adult stem cells from adult humans from body organs, bone marrow or adipose tissue.<sup>3</sup> The role of adipose derived stem cells (ADCs) is identified in tissue rejuvenation and restoration by being antiapoptotic, immunomodulatory and hypoimmunogenic nature, holding secretory exosomal neurotrophils and beta-catenin proteins that have been shown to reverse the disease signs in animal models of POF.<sup>4</sup>

ADCs are inoculated with the platelet rich plasma (PRP) of the same subject containing vascular endothelial growth factor (VEGF), fibroblast growth factors 2 and 8 (FGF2&8), sonic hedgehog (SHH) proteins, (important for vertebrate organogenesis), exosomes and adhering Wnt proteins leading to beta catenin synthesis.<sup>4</sup> The interaction between Wnt/ $\beta$ -catenin allows the granulosa cells (GC) of the ovaries to express Notch signaling pathways 1, 2 or 3 to sequel with oocyte-expressed notch ligands like JAG1 and DLL3, that inhibit oocyte apoptosis and stimulate GCs proliferation.<sup>5</sup> ADCs may

be injected into the ovaries of human POF patients through ultrasound guidance technique with monitoring through intricate biochemical analysis and biweekly ultrasound scan of pelvis for the follicular generation. Favorable results of the experiment may be incorporated to improve infertility related issues other than POF in human females. The return of reproductive functions can then either be accomplished by natural manifestation of pregnancy or assisted reproductive treatment, like *in vitro* fertilization (IVF) and intracytoplasmic sperm injection (ICSI).

Stem cell therapy may, therefore, be the imperative technique for the return of fertility in those patients where all the other treatment modalities have exhausted, thus giving infertile couples a hope to smile.

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