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Editorial
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Stem Cells In IVF: Hope or Hype?

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Editorial

My dear friend, colleague, and mentor Bob Edwards (who received the Nobel Prize for his work in IVF) had a deep and profound interest in stem cell technology [1-3]. I was even lucky enough to be supervised by Bob Edwards for my PhD at Cambridge University on the stem cells found in the developing mouse embryo. IVF and stem cell technology therefore have a long history together which few people may realize. Despite this long joint history there has been little progress in the use of stem cell technology in IVF. This short Editorial will briefly explore the history of stem cells in IVF and then look at the future which is not only potentially exciting but also potentially ground-breaking.

Stem Cells and IVF

Perhaps the most obvious link to IVF and stem cells is the development of human Embryonic Stem Cells (hESC) from the inner cell mass of human embryos [4]. Whilst hESC are pluripotent and therefore an excellent candidate for gamete production, very little progress has been made because of the legal, ethical, moral, and religious objections to creating hESC which requires the destruction of a viable human embryo [5]. Induced Pluripotent Stem Cells (iPSC) have a similar history when it comes to IVF. These are somatic cells (e.g., skin cells) which are 'transformed' into pluripotent stem cells by the introduction of various genes [6]. These iPSC are pluripotent and autologous, so they have the ability, in theory, to be able to carry out gametogenesis in patients undergoing fertility treatment [7]. The problems with the routine clinical use of iPSC in fertility treatment is the cost but most importantly ongoing safety concerns about iPSC because of the genes needed to be inserted to convert a somatic cell into a stem cell [8]. Mesenchymal stem cells (MSC) can be obtained from adipose tissue, bone marrow, the umbilical cord and even inside teeth [9]. These MSC stem cells can produce bone, connective tissue and adipose tissue and there are some data suggesting that MSC may be useful in premature ovarian failure [10]. The drawbacks of using MSC in the treatment of infertility are the cost and the standardization of MSC to ensure safety and efficacy [11]. All these stem cell types have their problems when considering their use in the treatment of infertility. It may be many years, if ever, before they come to routine clinical practice in the treatment of infertility.

Human Very Small Embryonic Like (hVSEL) Stem Cells in IVF

It has been shown that hVSEL stem cells are found in every tissue of the body and in the peripheral blood [12]. They can easily be obtained from peripheral blood by preparing Platelet Rich Plasma (PRP) which has high numbers of hVSEL stem cells [13]. The hVSEL stem cells are pluripotent and arise from the primordial germ cell making them the ideal stem cell to use in autologous format in the treatment of infertility [14,15]. Most workers agree that the hVSEL stem cells in the peripheral circulation are biologically inactive (quiescent) [16]. Despite this, we have shown that hVSEL stem cells in PRP made from peripheral blood can be biologically activated by a modulated laser (called the QiLaser). Following exposure of the QiLaser to hVSEL stem cells in PRP they become biologically active possibly through a mechanism of action involving quantum mechanics [13,17]. This means that in hVSEL stem cells we have a source of biologically active pluripotent stem cells which can be easily collected from peripheral blood for autologous treatment [13]. This makes hVSEL stem cells an ideal candidate stem cell to treat both male and female infertility very easily and cheaply [18].

Further clinical trials are needed to fully assess the potential of autologous QiLaser activated hVSEL stem cells in PRP. Our unpublished data to date show significant benefits of simple intravenous infusion of QiLaser activated hVSEL stem cells not only in the treatment of infertility but also in the treatment of the menopause. These QiLaser activated hVSEL stem cell technologies hold great hope for a new generation of treatments in fertility which may revolutionize the way in which we think about and treat infertility.

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