

# Autologous Stem Cell Therapy

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During cord blood banking and bone marrow processing for autologous stem cell therapy, very small embryonic-like stem cells with the highest regenerative potential are discarded. Because of their small size, Very Small Embryonic-Like Stem Cells (VSELs) are likely to be lost during cord blood banking and BM processing for autologous stem cell therapy. To test this idea, the researchers used human Umbilical Cord Blood (UCB, n=6) and the discarded Red Blood Cells (RBC) fraction obtained after separating mononuclear cells from human BM (n=6). According to immunolocalization and Quantitative Polymerase Chain Reaction (Q-PCR) studies, these cells are very tiny (3–5  $\mu$ m), have a high nucleo-cytoplasmic ratio, and exhibit nuclear Oct-4, cell surface protein SSEA-4, and other pluripotent markers such as Nanog, Sox-2, Rex-1, and Tert. In the “buffy” coat, which is normally banked or employed during autologous stem cell therapy, a separate population of slightly bigger, round Hematopoietic Stem Cells (HSCs) with cytoplasmic Oct-4 was discovered. Nuclear Oct-4-positive VSELs and numerous fibroblast-like Mesenchymal Stem Cells (MSCs) were found in immunohistochemical studies on Umbilical Cord Tissue (UCT) sections.

As a result, it may be argued that VSELs are the real stem cells in adult human tissues, whereas HSCs and MSCs are progenitor stem cells derived from asymmetric cell division of VSELs. One of the

main medical accomplishments of the twenty-first century is Bone Marrow Transplantation (BMT), also known as Hematopoietic Stem Cell (HSC) transplantation. Standard sources of “autologous” HSCs and mesenchymal Because the separated stem cells are mostly committed to hematopoiesis, they've been utilised to treat leukaemia, aplastic anaemia, and several immune deficiency illnesses. However, it has been shown that when these stem cells are implanted after tissue injury, they may transdifferentiate and contribute to skeletal muscle, hepatic, brain, and cardiac regeneration. stem cells include Bone Marrow (BM), Peripheral Blood (PB), and Umbilical Cord Blood (UCB) (MSCs).

Growing data reveals that, in addition to HSCs and MSCs, the UCB contains a tiny population of pluripotent stem cells known as Very Small Embryonic-Like Stem Cells (VSELs), which may play a role in organ and tissue regeneration. VSELs were recently obtained by fluorescence activated cell sorting from several adult mouse tissues, blood, and BM, as well as human cord blood and BM. VSELs have been found in adult human gonads, according to our findings. We discovered that when centrifuging the VSELs obtained by scraping the sheep ovary surface epithelium, these cells with a high nucleo-cytoplasmic ratio were consistently destroyed. We expected that VSELs would be lost and discarded during processing of cord blood and BM on a Ficoll-Hypaque gradient in a similar way.

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