

Treating male infertility with stem cells

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New research has examined the usefulness of bone marrow stem cells for treating male infertility, with promising results. The related report by Lue et al, "Fate of bone marrow stem cells transplanted into the testis: potential implication for men with testicular failure," appears in the March issue of *The American Journal of Pathology*.

When a couple experiences infertility, the man is just as likely as the woman to be the cause. Male infertility may arise from failed proliferation and differentiation of the germ cells (precursors of sperm) or from dysfunction of the supporting cells. New research is looking to stem cells as a means of replacing nonfunctioning cells, whether germ cells or supporting cells.

Researchers, directed by Dr. Ronald S. Swerdloff of the Harbor-UCLA Medical Center, collected bone marrow stem cells from mice expressing the green fluorescent protein (GFP). These green cells, which could be easily tracked in recipient mice, were injected into the testes of infertile mice, in which infertility was induced either chemically or genetically (via mutations in a gene required for sperm production).

The donor GFP-expressing cells took up residence in the testes and survived within the recipient mice for the entire 12-week study period. The donor stem cells displayed the characteristic shape of either germ cells or supporting cells, suggesting that the stem cells had differentiated. These differentiated donor (green) cells were also found near the native recipient cells of the same type, demonstrating that the local cellular environment likely influenced the fate of the donor stem cells.

As further confirmation of the differentiation status of the donor cells, the expression of specific proteins on the cell surface was examined. Both germ and supporting cells expressed marker proteins known to be found only on the differentiated cells, not on stem cells.

These data demonstrate that bone marrow stem

cells have the potential to differentiate into cells of the testes involved in sperm production, both germ cells and supporting cells. Interestingly, the germ cells did not differentiate fully into sperm, suggesting that additional factors or cellular signals are needed.

Future studies will characterize the other factors, such as hormones, required to complete sperm production in this transplant model. In addition, since the bone marrow cells used here represent a mixed population of stem cells, further studies will determine which specific stem cell type was able to colonize and differentiate in the testes. The results of future studies could have dramatic implications for treating male infertility or testosterone deficiency.

Source: American Journal of Pathology

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