Why a stem cell diagnosis is quite difficult

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Editor

If one is interested in finding information by use of the key terms "*stem cells*" and "*liver*" more than 10,000 papers will be indicated, either on PubMed, or in Web of Science. The combination of terms "*hepatitis*" and "*stem cells*" will return approximately 1,000 titles, while the keywords "*hepatitis*" and "*progenitor cells*" will return less than 500 titles in Web of Science.

However, further filters would be needed in order to reach specific information in humans, as an impressive amount of data resulted from experimental studies in various non-human species.

There are different types of stem cells, such as embryonic stem and germ cells, fetal stem cells, adult or postnatal stem cells, induced pluripotent stem cells and cells obtained by somatic cell nuclear transfer. Furthermore, there are different methods used for evaluating the stem cells in the liver, and there are different pathological conditions involving hepatic stem cells.

On the other hand, stem cells reside in microenvironments – stem cell niches. In a heterogeneous niche environment, the more or less differentiated progeny of stem cells also reside.

Transit-amplifying cells are committed progenitors among the stem cells and the differentiated daughter cells. It is difficult, if not impossible, to differentiate between stem and progenitors cells within the niches.

In humans, *in situ* studies of the hepatic stem niche are limited by tissue-donor issues. However, the gold standard for identification of multipotent mesenchymal stromal cells (usually indicated as mesenchymal stem cells) includes their plastic adherence, which is an *in vitro* criterion. The *in vivo* identity of such cells remains largely unknown.

On the other hand, if a putative stem/progenitor cell is identified, is it indeed resident in the tissue, or was it brought there? A hepatic cell with a hematopoietic stem phenotype, for example, would be a resident one, or a bone marrow-derived cell?

To complicate the matter even further, concepts are constantly changing. Numerous researchers currently claim that the universal niche is vascular/perivascular and its key players are different subsets of pericytes. The adult mesenchymal and hematopoietic niches are perivascular.

In conclusion, to indicate the hepatic stem niche or to look for it, in various studies dealing with liver physiological and pathological remodeling, is a difficult task where caution is warranted, in order to avoid speculations.

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