

Article

Transcriptome Analysis Reveals High Similarities between Adult Human Cardiac Stem Cells and Neural Crest-Derived Stem Cells

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Simple Summary: The regeneration of nearly all organs of the human body mainly depends on the functionality of adult stem cell populations that reside in their respective niches and can be activated upon injuries or other damages. These stem cell populations greatly differ in their expression profile of molecular markers, which greatly influences their potential use in regenerative medicine. Neural crest-derived stem cells are a prominent subpopulation of adult stem cells and are known for their high regenerative potential. Within this study, we compared two adult human stem cell populations, namely neural crest-derived inferior turbinate stem cells from the nasal cavity and human cardiac stem cells from the heart, using global gene expression profiling. Here, we found differences that correspond to the tissue sources of origin but also similarities in the expression of markers that are associated with the neural crest. Further classifying nasal stem cells and cardiac stem cells in a broader context, we identified clear similarities between both populations and other adherent stem cell populations compared to non-adherent progenitor cells of the blood system. The analyses provided here might help to understand the differences and similarities between different adult human stem cell populations.

Abstract: For the identification of a stem cell population, the comparison of transcriptome data enables the simultaneous analysis of tens of thousands of molecular markers and thus enables the precise distinction of even closely related populations. Here, we utilized global gene expression profiling to compare two adult human stem cell populations, namely neural crest-derived inferior turbinate stem cells (ITSCs) of the nasal cavity and human cardiac stem cells (hCSCs) from the heart auricle. We detected high similarities between the transcriptomes of both stem cell populations, particularly including a range of neural crest-associated genes. However, global gene expression likewise reflected differences between the stem cell populations with regard to their niches of origin. In a broader analysis, we further identified clear similarities between ITSCs, hCSCs and other adherent stem cell populations compared to non-adherent hematopoietic progenitor cells. In summary, our observations reveal high similarities between adult human cardiac stem cells and neural crest-derived stem cells from the nasal cavity, which include a shared relation to the neural crest. The analyses provided here may help to understand underlying molecular regulators determining differences between adult human stem cell populations.