

Publication

A mosaic world: puzzles revealed by adult neural stem cell heterogeneity

JournalItem (Reviews, Editorials, Rezensionen, Urteilsanmerkungen etc. in einer wissenschaftlichen Zeitschrift)**ID** 3657030**Author(s)** Chaker, Zayna; Codega, Paolo; Doetsch, Fiona**Author(s) at UniBasel** [Doetsch, Fiona](#) ; [Chaker, Zayna](#) ;**Year** 2016**Title** A mosaic world: puzzles revealed by adult neural stem cell heterogeneity**Journal** WIREs Developmental Biology**Volume** 5**Number** 6**Pages** 640-658

Neural stem cells (NSCs) reside in specialized niches in the adult mammalian brain. The ventricular-subventricular zone (V-SVZ), adjacent to the lateral ventricles, gives rise to olfactory bulb (OB) neurons, and some astrocytes and oligodendrocytes throughout life. In vitro assays have been widely used to retrospectively identify NSCs. However, cells that behave as stem cells in vitro do not reflect the identity, diversity, and behavior of NSCs in vivo. Novel tools including fluorescence activated cell sorting, lineage-tracing, and clonal analysis have uncovered multiple layers of adult V-SVZ NSC heterogeneity, including proliferation state and regional identity. In light of these findings, we reexamine the concept of adult NSCs, considering heterogeneity as a key parameter for analyzing their dynamics in vivo. V-SVZ NSCs form a mosaic of quiescent (qNSCs) and activated cells (aNSCs) that reside in regionally distinct microdomains, reflecting their regional embryonic origins, and give rise to specific subtypes of OB interneurons. Prospective purification and transcriptome analysis of qNSCs and aNSCs has illuminated their molecular and functional properties. qNSCs are slowly dividing, have slow kinetics of neurogenesis in vivo, can be recruited to regenerate the V-SVZ, and only rarely give rise to in vitro colonies. aNSCs are highly proliferative, undergo rapid clonal expansion of the neurogenic lineage in vivo, and readily form in vitro colonies. Key open questions remain about stem cell dynamics in vivo and the lineage relationship between qNSCs and aNSCs under homeostasis and regeneration, as well as context-dependent plasticity of regionally distinct adult NSCs under different external stimuli. WIREs Dev Biol 2016, 5:640-658. doi: 10.1002/wdev.248 For further resources related to this article, please visit the WIREs website.

Publisher Wiley-Blackwell**ISSN/ISBN** 1759-7684 ; 1759-7692**edoc-URL** <http://edoc.unibas.ch/44886/>**Full Text on edoc** No;**Digital Object Identifier DOI** 10.1002/wdev.248**PubMed ID** <http://www.ncbi.nlm.nih.gov/pubmed/27647730>**ISI-Number** WOS:000385524200001**Document type (ISI)** Article