

Stem Cells in the Zebrafish Intestine

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Abstract: In the mammalian intestine, stem cells (ISCs) located in basal crypts, replicate and translocate along the villus where they die and are shed from the tips. This conveyor belt-like pattern of absorptive surface renewal is generally thought to occur in the less advanced architecture of the zebrafish intestine in which villi are elongated into villar ridges (VR) and crypts are absent. To understand how epithelial dynamics is maintained without crypts, we imaged the lineage patterns of epithelia driven by promoters for ISC markers, *Prmt1*, *Lrig1*, and *Bmi1*. All three markers generate distinct stripes of Zebrabow recombinant colors that originate from the intervillus pocket (IVP) between neighboring villa ridges. The striping pattern is not only consistent with ISCs in an IVP but also a non-random ISC distribution in the IVP. We confirmed that the ISC marker, *Prmt1*, is localized to a single cell within a 40-60 μ m diameter flat cluster of cells at the base of the intervillus pocket. Furthermore, the color and width of recombinant epithelial stripes on the flanking VRs share the same recombinant color and dimension as these clusters. These results identify *Prmt1*, *Bmi1*, and *Lrg1* as ISC markers and that the ISCs reside within basal clusters that are functionally analogous to a crypt. We propose that the villus/crypt architecture of our intestine evolved from further differentiation of these flat crypt-like structure into the elongated crypt.

Keywords: keyword 1; keyword 2; keyword 3 (List three to ten pertinent keywords specific to the article yet reasonably common within the subject discipline.)



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