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Distinct Progenitor Cell Niches Are Required for Taste Bud Formation, Maturation and Maintenance

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To investigate the contribution of surrounding tissues to taste buds (TBs), *K14-Cre* and *Dermo1-Cre* were used to trace basal epithelial cell and mesenchymal cell lineage, respectively. TBs were incompletely labeled by *K14-Cre* despite the complete labeling of the surrounding epithelium at postnatal 1 week (1w); at the same time point, *Dermo1-Cre*labeled both mature TB cells and underlying connective tissue cells, raising a question: are there distinct progenitor niches for TBs. To better understand the progenitor niche in surrounding tissues for TB formation, maturation, and maintenance, different stages of *K14-Cre* and *Dermo1-Cre* mice crossed with a nuclear tdTomato to eGFP switch Cre-reporter (nTnG) were used to map labeled cells in lingual TBs. In *K14-Cre/nTnG* mice,labeled cells were not observed at E18.5 when early TBs emerge, but were frequently seen in the TBs at birth. By 1w, the number of labeled cells had increased significantly, and at 2w labeling was extensive. After 4w when TBs are mature and undergo continuous turnover, TBs were almost fully labeled. In contrast, *Dermo1-Cre*-labeled TB cells if any, were rarely observed at 1d and 1w. At 2-4w, labeled cells were seen within many TBs. By 8w, *Dermo1-Cre*-labeled cells were abundant in the majority of TBs. Interestingly, *Dermo1-Cre*-labeled TB cells were not apparent for the immunosignals of K8, a widely used marker for differentiated TB cells. Our data indicate that 1) $K14^+$ epithelial cells contribute to the maturation and maintenance, but not initial formation, of TBs; 2) *Dermo1-Cre* labels a unique population of mature TB cells implicating the presence of $Dermo1^+$ precursors for TB cell renewal. These results suggest that distinct progenitor niches contribute to different aspects of TB formation, maturation and maintenance.

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