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Surrounding Progenitors Contribute Differently to Distinct Phases of Taste Bud Development

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Taste buds (TBs) emerge in late embryos (formation phase), and postnatally continue to mature until a taste pore forms (maturation phase), after which they undergo continuous maintenance (maintenance phase). Based on these different phases of TB development (i.e., initial formation, maturation, and maintenance), we examined the commonly held belief that TBs have a sole origin, the surrounding epithelium. We used *K14-Cre* crossed with a nuclear tdTomato to eGFP switch Cre-reporter (nTnG) to label basal epithelial cell lineage, and found that none of the developing TBs appear to be labeled by K14-Cre until embryonic day (E) 18.5, while labeled cells were frequently seen in 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. *Dermo1-Cre/nTnG* mice, labeling mesenchymal cell lineage, were examined as a potential alternative progenitor source, since embryonic TBs did not apparently possess K14 lineage. Interestingly, *Dermo1-Cre*-labeled cells were rarely observed at 1d and 1w, ruling them out as a putative progenitor population for initial development of TBs. However, at 2-4w, labeled cells were seen within many TBs. By 8w, *Dermo1-Cre*-labeled cells were abundant in the majority of TBs. 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.