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Using GFP+-GFP- chicken chimera to test a neural crest contribution to taste buds

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Taste cells, the chemoreceptors in taste buds, are specialized cells that transduce gustatory stimuli into neural signals which are conveyed to the central nervous system for the sensation of taste. Taste cell origin and differentiation are fundamental issues for the development of taste organs and taste function. We have recently found species-specific distribution of labeled cells in taste buds in SOX10-Cre mice, a model that specifically labels neural crest lineage in early embryos. In mice there were abundant SOX10-Cre labelled cells, most likely neural crest-derived, within taste buds while in zebrafish, SOX10-Cre labeled cells were not observed within taste buds. Therefore, to get an evolutional insight of this observation, we used a GFP and non-GFP chicken chimera to test the potential neural crest contribution to taste buds in chickens. To generate chimeras, neural fold that contains the progenitors of neural crest from a GFP chicken embryo was dissected and transplanted to a regular non-GFP chicken embryo. This allows us to solidly trace the lineages of neural crest. Embryonic (E) tissues were harvested at E2, E7, E14 and E20.We found that (1) transplanted GFP^+ neural fold were successfully integrated into the host chicken embryo; (2) transplanted GFP^+ neural fold cells were expanded and migrated into the target tissue regions, i.e., primordia of upper beak and lower beak where gustatory tissue developed; (3) GFP^+ cells were extensively distributed in the mesenchyme underlying the epithelium, but no GFP^+ cells were observed within taste buds. Our data suggest that the GFP-chicken chimera model is perfect for long-term lineage tracing studies and there is no contribution from neural crest to chicken taste buds.