

ACHEM S Annual Meeting
Hyatt Regency Coconut Point
4/16-20/2018 || Bonita Springs, Florida

Abstract #196

ALK3-Mediated BMP Signaling in the Tongue Mesenchyme is Essential for the Proper Development of Tongue and Taste Papillae.

Mohamed Ishan¹, Guiqian Chen¹, Sunny Patel¹, Yuji Mishina², Hongxiang Liu¹

¹*University of Georgia, Athens, GA, United States*

²*University of Michigan, Ann Arbor, MI, United States*

The development of tongue and taste papillae requires mesenchymal-epithelial interactions via multiple molecular pathways, including bone morphogenetic protein (BMP) signaling in which type I receptors (ALK2, ALK3, ALK6) are the main determinant of downstream signaling specificity. Our studies have demonstrated that BMP signaling mediated by ALK2 in the tongue mesenchyme plays an important role in regulating the tongue shape and size. Here we report that BMP signaling mediated by ALK3 (ALK3-BMP signaling hereafter) in the tongue mesenchyme exerts distinct roles in the development of tongue and taste papillae. The RNA-Seq analysis demonstrated that *Alk3* is highly expressed in both tongue epithelium and mesenchyme in embryonic and newborn mice. We used transgenic mouse models to constitutively activate (*ca*) and conditionally knock out (*cKO*) *Alk3* in a mesenchyme-specific manner using *Wnt1-Cre*. At E12.5, *Wnt1-Cre/Alk3 cKO* mutants had a smaller tongue with a truncated tip compared to the littermate controls. In the posterior region, tongue swellings were not fused. At E12.5 when *Shh*⁺ taste papilla placodes normally emerge, taste papilla placodes were absent in the *Wnt1-Cre/Alk3 cKO* tongue. In contrast to *Wnt1-Cre/Alk3 cKO*, *Wnt1-Cre/caAlk3* mutants did not depict obvious changes of tongue shape, size and papilla pattern. Our data indicate that a proper level of ALK3-BMP signaling is needed for the formation of tongue and taste papillae. Absence of taste papillae in the *Wnt1-Cre/Alk3 cKO* mutants suggests that ALK3-BMP signaling in the tongue mesenchyme is critical for the mesenchymal-epithelial interactions in taste papilla formation. Further studies are ongoing to explore the role and mechanism of ALK3-BMP signaling in tongue and taste papillae formation.

Funding Support: NIDCD NIH R01DC012308 to HXL