Research with L-glutamate, a prototypical L-amino acid that activates umami taste pathways, suggests two G-protein coupled receptors, T1R1+T1R3 and t-mGluR4, are important in umami taste. Umami taste is transduced by PLC-β_2 dependent rise of IP_3 followed by release of intracellular calcium. Umami research also suggests a G_α-dependent pathway that down-regulates cAMP. 5' inosine monophosphate (IMP) is another umami taste stimulus and a potent flavor enhancer that synergistically enhances umami taste of L-glutamate. HEK cell expression data show that IMP also potentiates the response to other L-amino acids (Nelson et al., 2002). However, the transduction mechanism for IMP and its synergy are largely unknown. Further, while T1R1+T1R3 receptors appear to detect L- amino acids other than glutamate, it is not known whether other receptors may also be involved in their detection. We used calcium imaging of isolated taste sensory cells (TSCs) and taste buds of mice to study if: **(1) receptors other than T1R1+T1R3 are involved in L-amino acids detection, (2) transduction of L-amino acids other than glutamate also utilize the PLC-β_2 mediated pathway, and (3) L-amino acids also use a cAMP-dependent pathway.** In our calcium imaging study, we found that response patterns elicited by L-amino acids vary across TSCs. Further, TSCs also show synergy for different L-amino acids when mixed with IMP. We also found that TSCs from T1R3-/- and T1R1-/- mice can respond to various L-amino acids and IMP. Our data suggest that receptors or possibly receptor complex other than T1R1+T1R3 may be involved in detection of L-amino acids. Currently we are using pharmacological approach to elucidate the role, if any, of mGluR4 in L-amino acid and IMP transduction and downstream signaling pathways for L-amino acids transduction.