Central Chemosensory pathways and processing

- Gustation
  - Across fiber (population) coding
  - Reflex control pathways

- Olfaction
  - Initial chemotopy, then convergence
  - Cortical, experience-dependent synthesis of odor objects
    - Auto-associative network
    - Pattern recognition
  - Limbic system links

- Flavor
  - Olfactory neocortex
Taste responses in Gustatory cortex neurons

Jones L. M. et al. PNAS 2007;104:18772-18777

©2007 by National Academy of Sciences
Gustatory cortex ensemble activity may reflect both stimulus **quality** and **palatability**.
Zonal OR expression

Receptor central projections

P2 receptor projection
Receptors control projection

Wang et al., Cell, 1998, 93:47

Precise ORN projections

Belluscio et al., Nature, 419:296
Olfaction beyond the receptor

Insect

Mammal
methyl benzoate

Spatial “coding” of odors

Sachse et al., Eur J. Neurosci, 1999

Johnson et al., JCN, 2005, 483-285
Spatial “coding” of odors

Odor mixtures in olfactory bulb may be the sum of their parts

Lin et al., 2006
Olfactory bulb local circuits

The olfactory bulb receives signals from olfactory sensory neurons (ROJ 32). Each sensory axon terminates in a single glomerulus, forming synapses with the dendrites of periglomerular interneurons, and mitral and tufted relay neurons.

Within each glomerulus, periglomerular cells form inhibitory dendro-dendritic synapses with mitral cell dendrites. Granule cells form a second system of inhibitory neurons, through dendritic interactions with relay neurons.

Odor receptive field of second order neurons

A

B
Odor receptive field of second order neurons

Yokoi et al., 1995

Olfactory cortex

Figure 2: The olfactory pathway. Odorants are detected by olfactory sensory neurons in the olfactory epithelium. Signals generated in those neurons are relayed through the olfactory bulb to the olfactory cortex and then sent to other brain areas.
Olfactory functional anatomy

Basic central pathway

Schematic diagram of central olfactory pathways (KS 32-9).