

# Other Perceptual Impairment

# The Senses

## **Traditional**

- ~~Vision~~
- ~~Hearing~~
- Taste
- Smell
- Touch

## **Non-traditional**

- Equilibrioception (balance, acceleration)
- Temperature
- Proprioception (body part positioning)
- Nociception (Pain)
- Interoception (internal senses, e.g., hunger, bladder, etc)

# Taste/Flavor

- Combination of three functions
  - Taste
  - Smell
  - Trigeminal nerves
    - Literal temperature
    - Hotness (spiciness)
    - Coolness (e.g., when eating mints)

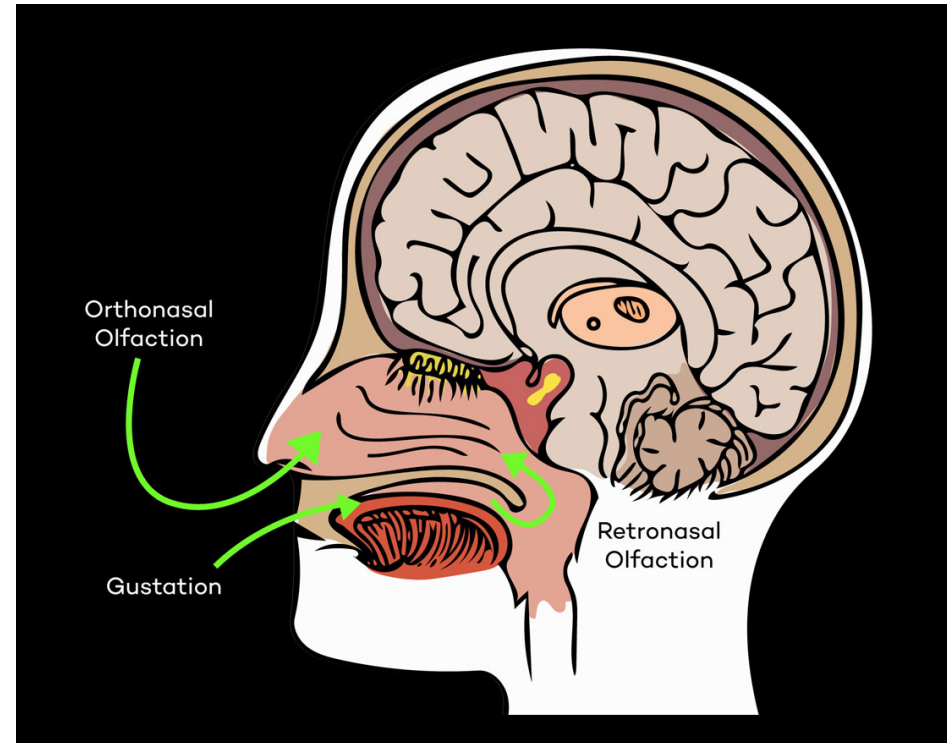


Image link: <http://winefolly.com/wp-content/uploads/2016/11/tasting.jpg>

# Taste

- Papillae
  - Taste Buds
    - Taste Cell
    - Receptors
      - Bitter
      - Sweet
      - Sour (acid)
      - Salt
      - Umami

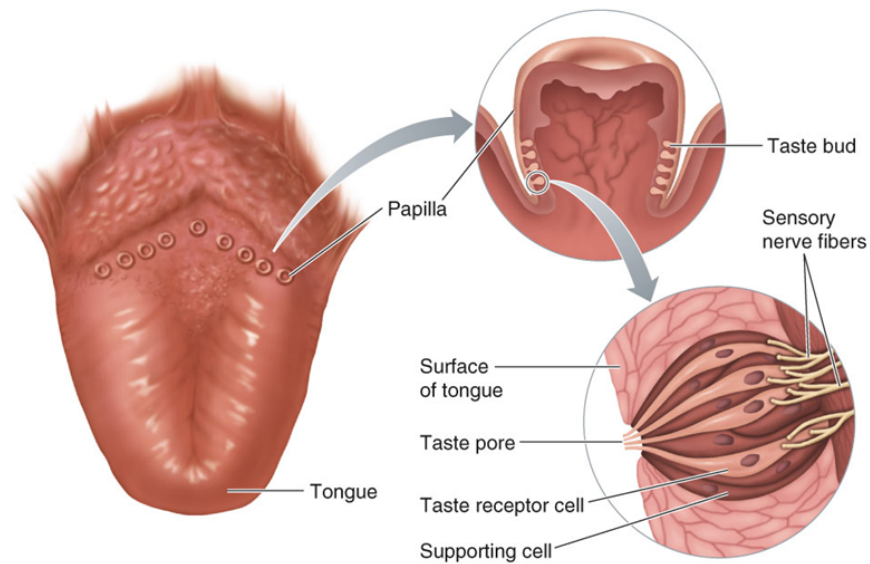


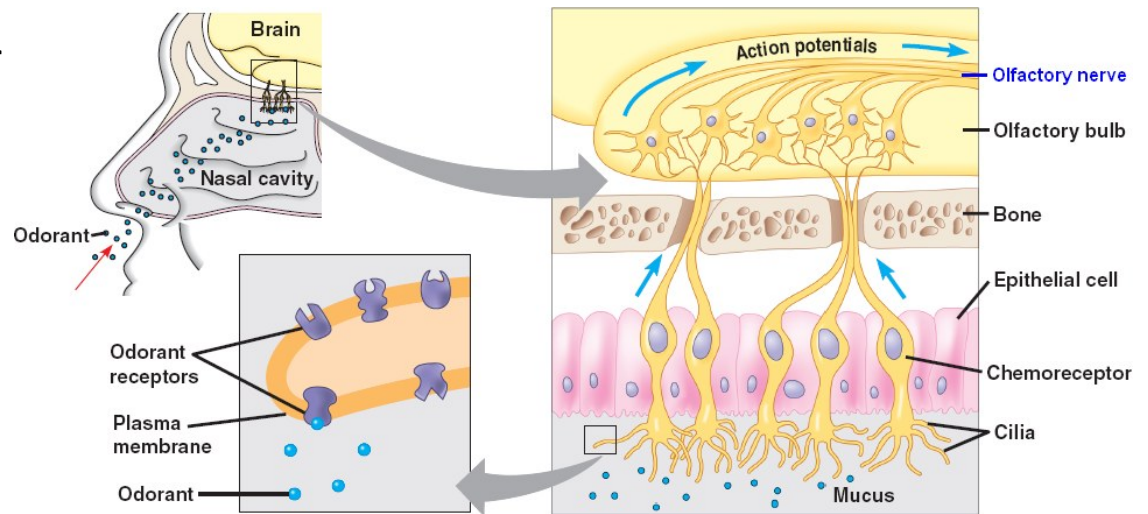
Image link: <https://bhupiblog.files.wordpress.com/2014/08/toung.png>

# Taste Impairments

- Ageusia – complete loss of taste
  - Hypogeusia – partial loss
  - Hypergeusia – enhanced sensitivity
  - Dysgeusia – different/incorrect perception (e.g., everything tastes bitter)
  - Impairments are **not** common and often not permanent
    - Taste cells can regenerate
    - Lots of redundancy
    - 5% of suspected taste disorders are actually taste disorders
- Causes
    - Head trauma
    - Upper respiratory infections
    - Toxins
    - Medications
    - Burning mouth syndrome
    - Radiation

# Smell

- Air carrying odorants enters the nasal cavity and makes contact with the mucus layer
- Receptors on cilia in the mucus layer pick up the odorants
- Pattern of activation determines smell perception
- Neural connections to orbitofrontal cortex, amygdala and hippocampus, among others



# Smell (Olfaction) Impairments

- Quantitative
  - Anosmia – complete loss of smell (acquired or congenital)
    - Specific anosmia – inability to detect particular smell
  - Hyposmia – partial loss
  - Hyperosmia – enhanced sensitivity (rare)
  - Smell sensitivity decreases with age (presbyosmia)
- Qualitative
  - Parosmia – smell something “incorrectly”
  - Phantosmia – smell something that is not there
- Many olfactory impairments are temporary
  - Olfactory cells regenerate
- Causes
  - Aging
  - Genetics
  - Trauma
  - Viral infections
  - Sinus infection
  - Medications
  - Neurological illness
    - Often comorbid with Parkinson’s, Alzheimer’s, other dementia, etc.

# Smell and Taste Impairment Effects

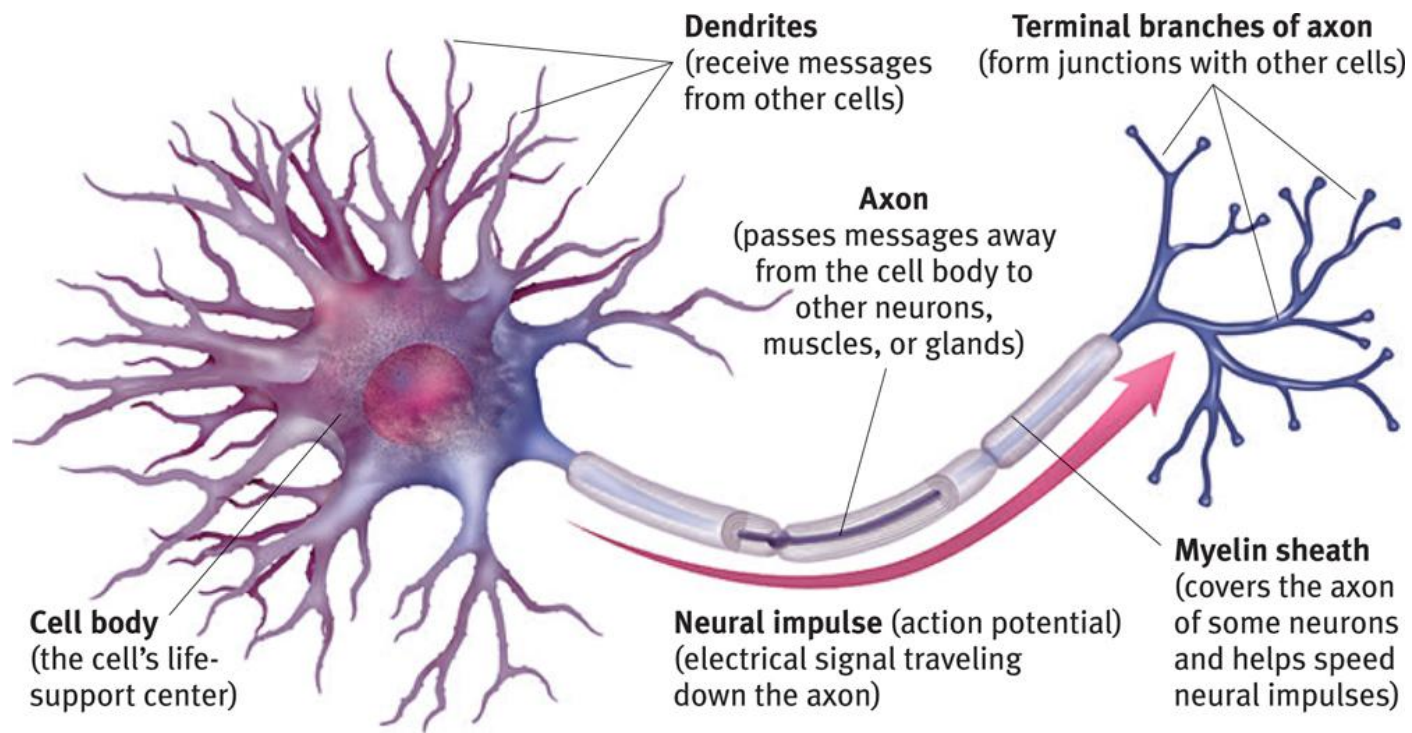
- Are these disabilities? Why?
  - Food – rotting, burning
  - Smoke and fume detection
  - Hygiene – self and others
- What might be different for someone who acquired an impairment compared with someone born with it?
  - Recommended reading: *Living in a smell-free world*, by Lars Lundqvist
- Assistive Technologies?
  - Emergency detection
    - Smoke
    - Other toxic fumes
  - Less time-sensitive detection
    - When to ventilate the house
    - When to do laundry
    - Food gone bad
  - Active sensors – point and shoot
  - Electric Nose
    - Currently just used for laboratory quality control types of work
  - Well-trained dog?



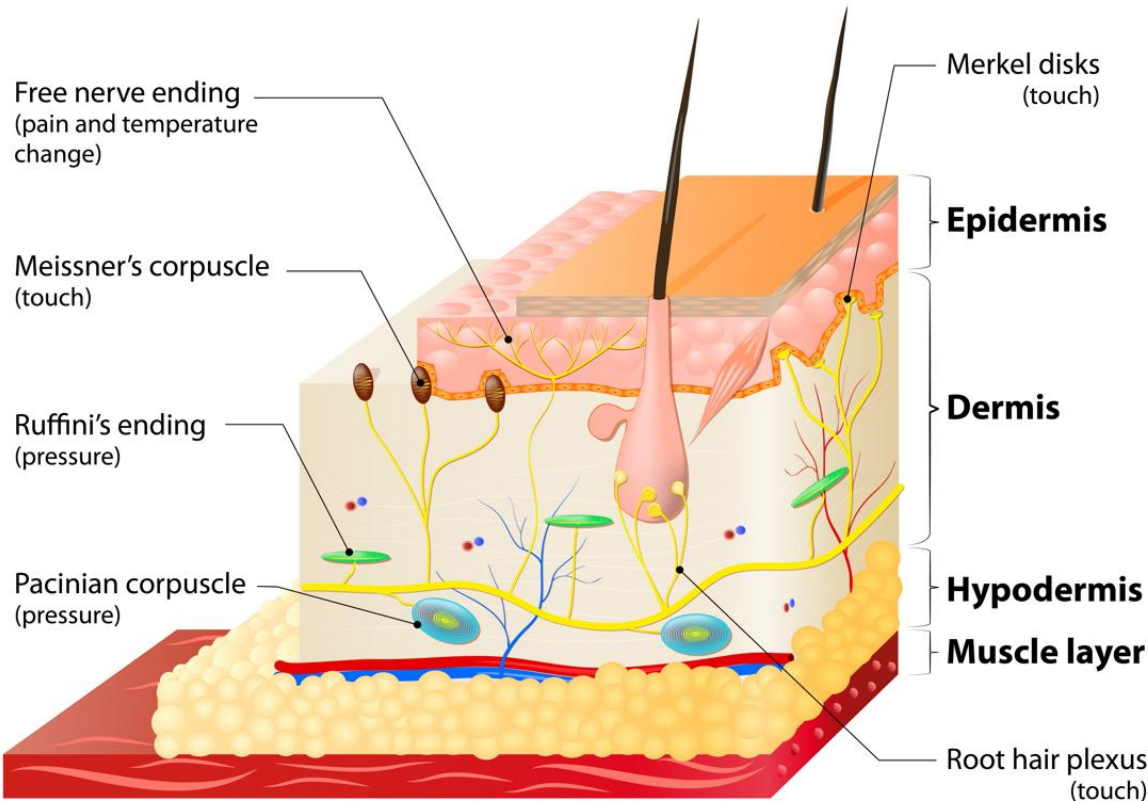
# Neuropathy / Peripheral Neuropathy

- Disorder of the nerves
- Broad term that encompasses many different types of nervous system problems
- General categories
  - Sensory
    - Pain
    - Touch sensitivity
    - Temperature sensitivity
  - Motor – power and movement
  - Autonomic – nerves that control body systems
- Common causes
  - Diabetes (60-70%)
  - Idiopathic
  - Chemotherapy (30-40%)
  - Trauma
  - HIV (33%)
  - Repetitive injury
  - Infection
  - Toxins
  - Drugs
  - Other diseases

# Nerve



# Sense of touch



# Neuropathy symptoms

- Types of symptoms

- Loss of sensation
- Partial loss
- Increased sensitivity
- Feeling things that have no obvious cause
  - Tingling
  - Pricking
  - Burning
  - Pain
- Muscle twitching

- Muscle weakness
- Muscle wasting
- Paralysis
- Organ dysfunction
- Other system dysfunction (bladder, breathing, etc.)

# Girl who feels no pain

- What is disabling about Gabby's inability to feel pain?
  - Activity limitations?
  - Dangers?
- What assistive technologies did Gabby's family use?
- What else could be used?

[https://www.youtube.com/watch?v=1vLsZ\\_dXFAg](https://www.youtube.com/watch?v=1vLsZ_dXFAg)

# Adult with paralysis

- Aside from mobility issues, what are the implications of the lack of feeling?
  - Injury detection
  - Pressure sores or ulcers
    - Reeve foundation suggests proactive care and movement strategies
    - Are there technologies that might help?

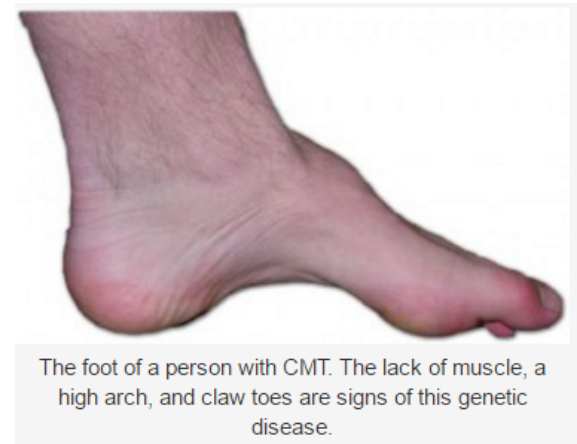
# Daily Activity Issues

- Imagine you have peripheral neuropathy.
  - You have reduced sensitivity in your hands and feet.
  - Your leg muscles are relatively weak
  - Your fine motor skills are not as good as they used to be.
- What problems might you run into while trying to shower?
  - What about brushing your teeth or hair?

<https://www.foundationforpn.org/living-well/lifestyle/assistive-devices/>

# Charcot-Marie-Tooth Syndrome

- Myelin sheath damage to motor and sensory nerves
- Weakness and deformity in feet and lower leg muscles
- Net effect is high-stepped gait, frequent falls
- What assistive technologies would help?



The foot of a person with CMT. The lack of muscle, a high arch, and claw toes are signs of this genetic disease.



# Vibrating insoles

- <https://www.walkwithpath.com/products>