Pruritus

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If you've seen one Type C neuron, you've seen them all (1990's)

How quaintly 20th century.

Capsaicin vs. Histamine
(Pain vs. Itch)

Subsets of Type C and Aδ Neurons

Neurotransmitters
Peptidergic
- CGRP
- CGRP + SP/NKA
- Other peptides
  - GRP, galanin, VIP?, CCK?
Nonpeptidergic
- DRG cells bind lectin IB4
- Excitatory amino acids?
  - glutamate?
  - aspartate?
  - Purinergic?

Receptors / Stimuli
Histamine H1 Receptor
Vanilloid Receptor VR1

Type C
Mechanosensitive
Heat-insensitive
Histamine-sensitive
CM(his) nerve endings

Capsaicin Receptor
Vanilloid Receptor VR1

Histamine H1 R = 700
PGE2 = 100
Ach = 100
Serotonin (5HT) = 76

THE ITCH

Distinct Sensations

Subsets of Type C and Aδ Neurons
Dorsal Horn Spinal Selectivity of Itch vs. Pain

**Distinct Sensations**

**Receptors / Stimuli**

- Capsaicin Receptor
- Vanilloid Receptor VR1 / TRPV1
- Histamine H1-R
- Histamine-sensitive
- Capsaicin-sensitive
- Cowhage spicule sensitive
- Mechanosensitive
- Other peptides
- CGRP + SP/NKA
- CGRP

**CMH nerve endings**

- Heat sensitive
- Mechanosensitive
- Cowhage spicule sensitive
- Type C

**CMH**(par4+)**/ CMi**(his-)**

- Heat and histamine-insensitive
- Mechanosensitive
- Other C or Aδ Pain

**CMi**(his+)**

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**Dorsal Horn Spinal Selectivity of Pain > Itch**

Histamine (H1-R) → CMi(his+) ("Pure itch") → Itch (GRP-R) → Itch Inhibitory Neuron → Pain (Burning Itch Spinothalamic)

**Subsets of Type C and Aδ Neurons**

**Neurotransmitters**
- Peptidergic: CGRP, CGRP + SP/NKA
- Nonpeptidergic: Glutamate, heat & H1R insensitive, Mechanical Heat

**Distinct Regulation of Sensations and Perceptions**

Neuroplasticity of receptor and neurotransmitter expression in inflammation mediated by LTβ4. NGF (TrkA), BDNF & NT-4 (TrkB), and NT-3 (TrkC) (AR).

**Dorsal Horn Spinal Selectivity: Opiate Itch**

Histamine (H1-R) → CMi(his+) ("Pure itch") → Itch (GRP-R) → Itch Inhibitory Neuron → Pain (Burning Pain Spinothalamic)

**Dorsal Horn Spinal Selectivity: Descending**

Histamine (H1-R) → CMi(his+) ("Pure itch") → Itch (GRP-R) → Itch Inhibitory Neuron → Pain (Burning Pain Spinothalamic)

**Home Remedies for Itch and Stinging Jelly Fish**

Prototypic Medications for Commercial Investment

Papain, also known as papaya protease (EC 3.4.22.2) present in papaya (Carica papaya) and mountain papaya (Vasincola cundina-marocanensis). It is a home remedy treatment for jellyfish, bee, and yellow jacket venoms. Pressure immobilization bandages should never be used for jelly stings.

Acetic acid, found in vinegar, disables the box jelly’s nematocysts that have not yet discharged into the bloodstream (though it will not alleviate the pain).

There is no scientific evidence that urine, fresh water, ammonia, papaya, meat tenderizer (papain), lemon juice, sodium bicarbonate, hydrogen peroxide, cold packs, steroid cream, methylated spirits, vodka or other alcohols will disable further stinging. These substances may even hasten the release of venom. Pressure immobilization bandages should never be used for jelly stings.