PSYCHIATRY

CHRONIC PAIN

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Pain

- Receptor fields differ in superficial and deep layers
- Inhibitory network limits excitation spread (stronger field)
- Mechanical(touch and proprioception)/vibratory sense fibers ascend in dorsal column
- Pain/temperature sense fibers ascend in ventrolateral column
- Cross either in the brainstem (dorsal columns) or in the spinal cord (ventrolateral system).
- Relay through the thalamus.

Pain

- C fiber is not myelinated (autonomic, pain)
- Aα fiber thickly myelinated (motor)
- Aβ fiber (nociceptor)
- Aδ fiber thinly myelinated
- Aβ, Aδ, C found in layers I, V
- Large Aβ fibers inhibit level V
- Aδ, C inhibitory, principally found in level II (gating)
- In the dorsal horn, NMDA receptor activated by glycine
- Glutamate activates AMPA receptor.
- Voltage gated Na^+ channels altered.
- Hyperexcitability.

Pain

- ATF3 upregulated in small neurons in dorsal root ganglion.
- ATF3 is a cAMP dependent transcription factor
- Part of CREB complex
- c-FOS upregulated in cells of lamina 1 and 2.
- FOS dimerizes with JUN to activate transcription factor AP1.
- Allodynia due to loss of central inhibition (GABA).
- Increased activity in descending inhibitory pathways.

Pain

- Burning pain as a result of ectopic C fiber discharge.
- TRPV1 upregulated, particularly at 41C°.
- If nociceptors damaged (Aβ fibers), TRPV1 production increases.
- TRPV1 is a non-selective Ca^{2+} permeant cation channel that leads to increased H^{+} influx and intracellular acidosis.
- Related to capsaicin function.
- Neuropathic pain characterized by sensory loss and hypesethesia as well as allodynia.

Pain

- Pulsed radiofrequency (ultrasound) induces temperature change (loss) of C and Aδ fibers.
- EPSP diminished.
- Glutamate opens post synaptic NDMA channels, may lead to central hypersensitization.
- Following central sensitization, nociceptive neurons lower firing threshold.
- μ receptors found in PAG, ventral medulla, dorsal horn

Chronic pain

- Ventral posterolateral and ventral posteriormedial nuclei hyperactive in chronic pain
- Stimulation produces parasthesia.
- Cortical stimulation increases interval firing in thalamus
- Effective in reducing pain if central lesion of spinal cord.
- Periventricular gray stimulation leads to endorphin release.
- Amygdala activated in helplessness.
- Increased limbic area activity in pain anticipation.

Complex regional pain syndrome

- Rarely occurs in trunk.
- Women, 4th decade.
- 29% decrease in small fibers in areas involved.
- IL-6 elevated locally; IL-8, sTNFR, substance P elevated systemically
- 40% have autoantibodies to differentiation development neural surface antigen.
- Type I follows injury or immobilization
- Type II follows nerve injury
- Vasomotor or sudomotor changes seen at any time during the course

Complex regional pain syndrome

- Sensory, vasomotor, sudomotor, motor abnormality or trophic change symptoms in addition to two of the four listed above as signs must be found to support a diagnosis of CRPS
- Useful pharmacologic agents
- NMDA agonists (ketamine, dextramorphan)
- Infusion of ketamine to induce and maintain anesthesia over several days reported to produce immediate and long term relief of pain.
- α2 agonists (clonidine)
- α1 blockers (terazosin).
- SNRI and tricyclics effective

Complex regional pain syndrome

- DMSO 50% cream in disorder with vasodilatation
- Free radical scavenger and C fiber blocker
- N-acetyl cysteine in disorder with vasoconstriction
- Free radical scavenger
- Vitamin C 1gm daily also effective
- Steroids to reduce inflammation
- Arachidonic acid blockers also useful as block soluble epoxy hydrolase

Post-herpetic neuralgia

- Vaccination effective in reducing incidence
- Rare before age 30; more common after age 60
- Early antiviral therapy important
- Steroids do not reduce PHN but diminish acute pain
- Topical 5% lidocaine cream as effective as pregabalin but without extent of adverse effects

Post-herpetic neuralgia

- Gabapentin is an A2δ agonist that diminishes Ca^{2+} influx in the neuron.
- Tramadol is a weak μ opoid agonist as well as an SNRI.
- Gabapentin, tricyclic, tramadol effective oral pain combination.
- Topical capsaicin or lidocaine employed as well.

Diabetic neuropathy

- Damage vasa vasorum
- Length dependent damage
- If knee involved, so will be hand
- EMG measures only large fibers
- Nerve conduction velocity related to glycemic control

Complex somatic disorder

- Somatoform disorder if outside cultural norms and not totally medically unexplainable at this time
- Treatments new to the individual lead to poor results