

COMMONWEALTH OF AUSTRALIA
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SOMATOSENSORY SYSTEM

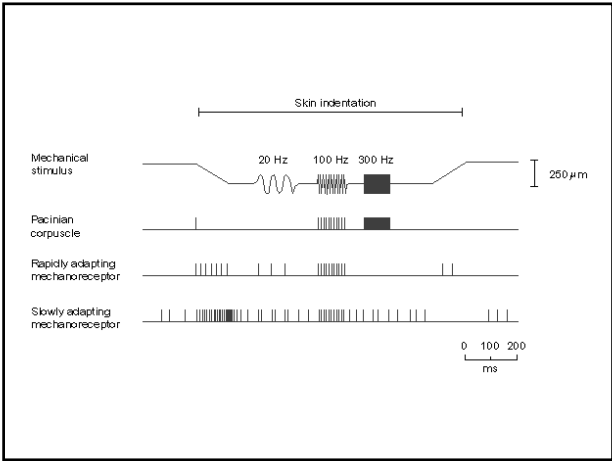
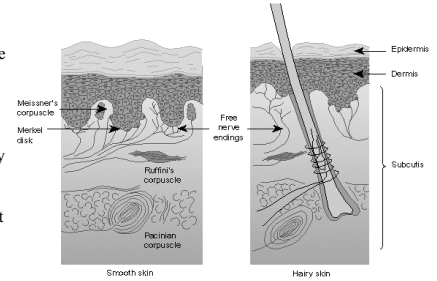
- the somatosensory system includes the sensory modalities of touch, temperature, pain and proprioception (sense of position and movement)

Touch

-Merkel disks and Ruffini corpuscle are slowly adapting

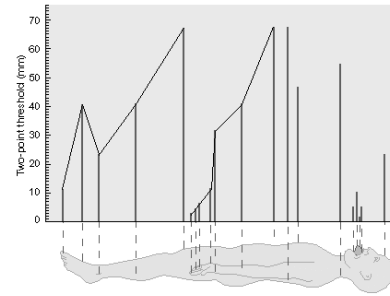
-Meissner corpuscle and Pacinian corpuscle are rapidly adapting

-hair follicle afferent is rapidly adapting



-distribution of cutaneous receptors over the body varies - greatest density on distal pads of the fingers and the lips, lowest density on back and thighs

- tactile spatial resolution:- two point discrimination for the fingerpads and lips is about 1-2mm and for the back about 40-60mm



Thermoreception

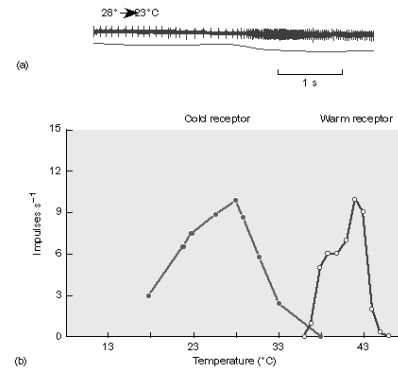
- receptors are most likely free nerve endings, with some free nerve endings responsive to cold stimuli (ie cold receptors, usually supplied by Aδ fibres) and some to warm stimuli (ie warm receptors, usually supplied by C fibres)

-cold spots and warm spots – receptive field of approximately 1mm²

- number of spots varies over the different regions of the body, but generally more cold spots than warm spots

- thermoreceptors display a maintained discharge at constant skin temperatures, with the discharge rate proportional to skin temperature

- a change in skin temperature results in a rise or fall in receptor discharge



- at skin temperatures above 45°C sensation of warmth becomes one of heat pain

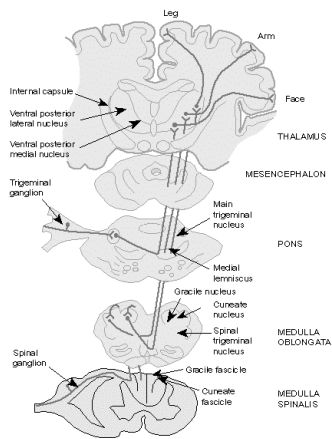
Pain

- pain can be categorized in terms of its site of origin or by its nature
- the major division is into somatic pain and visceral pain
- **somatic pain** - from skin → superficial pain
 - from deep structures (muscle, connective tissue) → deep pain
 - superficial pain has two components:
 - fast pain - readily localized
 - slow pain - the initial fast pain is often followed 0.5 - 1 sec later by a delayed pain dull sensation, poorly localized
 - deep pain - dull and poorly localized (headache)
- **visceral pain** - pain with a dull or diffuse character (like deep pain)

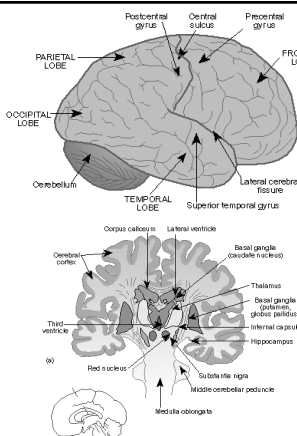
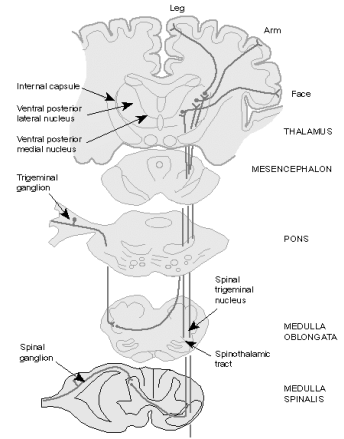
- the fast component of superficial pain mediated by Aδ (Group III) fibres
- while slow pain is mediated by C (Group IV) fibres
- pain receptors (nociceptors) are free nerve endings mechanosensitive, chemosensitive and polymodal
- projected pain - the site at which the noxious stimulus acts is not that at which the pain is sensed
- referred pain - nociceptive stimulation of the viscera often produces sensation of pain not in the affected organ but rather in distant superficial structures

CNS projections

- information about discriminative touch is conveyed to the brain by nerve fibres in the dorsal column-medial lemniscal system



- information about pain, temperature and crude touch is conveyed to the brain by nerve fibres in the spinothalamic tract



- tactile information is represented in the somatosensory cortex in a topographic fashion (somatotopic representation)

- the area of the somatosensory cortex devoted to the processing of information from a specific region of the body is related to the innervation density of that body region - the areas with higher innervation densities have larger areas of cortex devoted to them (homunculus)

