Touch

• Touch Physiology
• Tactile Sensitivity and Acuity
• Haptic Perception

Touch

• Proprioception
  – Perception mediated by kinesthetic and vestibular receptors
• Somatosensation
  – A collective term for sensory signals from the body
Touch Physiology

- Touch receptors: Embedded on outer layer (epidermis) and underlying layer (dermis)
  - Multiple types of touch receptors
  - Each touch receptors has three attributes:
    1. Type of stimulation the receptor responds to
    2. Size of the receptive field
    3. Rate of adaptation

The Four Types of Mechanoreceptors ("tactile receptors")
**TABLE 12.1** Response characteristics of the four mechanoreceptor populations

<table>
<thead>
<tr>
<th>ADAPTATION RATE</th>
<th>SIZE OF RECEPTIVE FIELD</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast</td>
<td>FA I (Meissner)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slow</td>
<td>SA I (Merkel)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FA II (Pacinian)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SA II (Ruffini)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FA I = fast-adapting type I, FA II = fast-adapting type II, SA I = slow-adapting type I, and SA II = slow-adapting type II. The receptor ending associated with each type is shown in parentheses.

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**Proposed Sensitivity Ranges of Mechanoreceptors**

• Each receptor type has a different range of responsiveness
Touch Physiology (cont’d)

• Other types of mechanoreceptors within muscles, tendons, and joints:
  – Kinesthetic receptors (collective term)
    • Play important role in sense of where limbs are, what kinds of movements are made

Touch Physiology (cont’d)

• Spindles
  – Convey the rate at which the muscle fibers are changing in length
• Receptors in tendons provide signals about tension in muscles attached to tendons
• Receptors in joints react when joint is bent to an extreme angle
Touch Physiology (cont’d)

• Importance of kinesthetic receptors:
  – Neurological patient Ian Waterman
    • Cutaneous nerves connecting Waterman’s kinesthetic mechanoreceptors to brain destroyed by viral infection
    • Lacked kinesthetic senses, dependent on vision to tell limb positions

Touch Physiology (cont’d)

• Thermoreceptors:
  – Sensory receptors that signal information about changes in skin temperature
  – Two distinct populations of thermoreceptors: warmth fibers, cold fibers
  – Body is consistently regulating internal temperature
  – Thermoreceptors kick into gear when you make contact with object warmer or colder than your skin
Touch Physiology (cont’d)

• Nociceptors:
  – Sensory receptors that transmit information about noxious stimulation that causes damage or potential damage to the skin
  – Two groups of nociceptors
    • A-delta fibers: respond primarily to strong pressure or heat; myelinated
    • C fibers: respond to intense stimulation like pressure, hot/cold, noxious chemicals; unmyelinated