Ascending pathways from the cerebral hemispheres to the primary somatosensory cortex involve the thalamus. The trigeminal nerve and spinal nerve, with dorsal roots, convey sensory information to the brainstem and then to the thalamus, specifically to the principal trigeminal sensory nucleus (VPM) and the ventroposterior lateral nucleus (VPL). This information is further processed and transmitted to the primary somatosensory cortex.
if blood flow through
the middle cerebral artery
is severely diminished,
what happens to somatosensation?
nociception

Somatosensory Receptors
- encapsulated receptors
- non-encapsulated receptors

pain receptors

response to several stimuli

pain afferents
- A delta
- C

pain characteristics

congenital pain insensitivity
nociception
ascending pathways

ascending pathways

thalamus
brain stem
spinal cord
spinal nerve
dorsal root

trigeminal nerve

nucleus of descending trigeminal tract

brain stem

substantia gelatinosa

primary somatosensory cortex

limbic cortex

primary somatosensory cortex

VPM
VPL

nucleus of descending trigeminal tract

spinal nerve
dorsal root

spinal cord

VPM
VPL
nociception
pain sensitization
mildly painful stimulation hurts more
innocuous stimulation hurts

pain modulation

in dorsal horn of spinal cord

figure 9-12
nociception
referred pain

take a look at two kinds of pain - referred pain and phantom pain

referred pain - pain from visceral organs feels as though it’s pain coming from another part of the body - often near the surface, nearby or farther away

an explanation for referred pain "spread" of sensory input into another sensory pathway located nearby

*an explanation of how heart damage may be felt as pain in the left arm*

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![Diagram of nociception and referred pain](image)
phantom sensation - pain from a missing body part feels as though it’s still there, and in some cases hurts (perhaps a lot)

two explanations for phantom pain

*first explanation - remnants of sensory afferents are stimulated*

*second explanation - appearance of sensory inputs to somatosensory cortex*