Pathophysiological Classification of Pain

- **Nociceptive pain**
  - Somatic
  - Visceral

- **Multiple pain mechanisms may coexist (MIXED PAIN)**

- **Neuropathic pain**
  - Peripheral
  - Central

Central sensitization/dysfunctional pain

References:
Nociception: Neural Process of Encoding Noxious Stimuli

Consequences of encoding may be autonomic (e.g., elevated blood pressure) or behavioral (motor withdrawal reflex or more complex nocifensive behavior). Pain perception is not necessarily implied.

Nociceptive Pain

• Usually aching or throbbing and well-localized
• Usually time-limited
  – Resolves when damaged tissue heals
  – Can be chronic
• Generally responds to conventional analgesics

# Nociceptive Cancer Pain Syndromes

<table>
<thead>
<tr>
<th>Origin of Pain</th>
<th>Pain Syndromes</th>
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| Visceral        | • Hepatic distension syndrome  
|                 | • Midline retroperitoneal syndrome  
|                 | • Chronic intestinal obstruction  
|                 | • Peritoneal carcinomatosis  
|                 | • Malignant perineal pain  
|                 | • Adrenal pain syndrome  
|                 | • Ureteric obstruction  |
| Somatic         | • Tumor-related bone pain  
|                 | • Tumor-related soft tissue pain  
|                 | • Paraneoplastic pain syndromes (e.g., muscle cramps)  |

What Is Neuropathic Pain?

Neuropathic Pain
Pain caused by a lesion or disease of the somatosensory nervous system

Peripheral Neuropathic Pain
Pain caused by a lesion or disease of the peripheral somatosensory nervous system

Central Neuropathic Pain
Pain caused by a lesion or disease of the central somatosensory nervous system

Neuropathic Pain

• Pain often described as tingling, shock-like, and burning
  – Commonly associated with numbness
• Almost always a chronic condition
• Responds poorly to conventional analgesics

Common Descriptors of Neuropathic Pain

Burning

Tingling

Pins and needles

Electric shock-like

Numbness

Numbness is a cardinal sign of nerve damage
### Nociceptive vs. Neuropathic Pain

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Mixed Nociceptive and Neuropathic Pain in Cancer

Sensitization
Peripheral and central sensitization

Axonal damage
Degeneration and regeneration

Mechanisms of Neuropathic Pain

- Nerve lesion/disease
- Loss of inhibitory control
- Descending modulation
- Central sensitization
- Ectopic discharge
- Peripheral sensitization
- Nociceptive afferent fiber
- Spinal cord
- Brain

Clinical Example of Nociceptive Cancer-Related Pain

- Bone metastases
  - Pain may be due to
    - Direct invasion
    - Secondary pathologic fracture
    - Damage to adjacent structures

Clinical Example of Nociceptive Cancer Pain

• Epidural spinal cord compression
  – Can cause pain and potentially irreversible loss of neurologic function
  – Diagnosed through radiographic evidence of indentation of the thecal sac
Clinical Examples of Neuropathic Cancer Pain

- Malignant painful radiculopathy
- Plexopathies
- Metastatic spine compression
- Painful peripheral neuropathies
- Paraneoplastic sensory neuropathy

Transduction via Endogenous Mediators

**Noxious stimuli**
- Mechanical
- Thermal
- Chemical

**Mediators**
- Prostaglandins
- Leukotrienes
- Substance P
- Histamine
- Bradykinin
- Serotonin
- Hydroxyacids
- Reactive oxygen species
- Inflammatory cytokines and chemokines

**Receptors/channels on nociceptors**

Pathophysiology of Neuropathic Pain

Peripheral mechanisms
- Membrane hyperexcitability
- Ectopic discharges
- Transcriptional changes

Central mechanisms
- Hyperexcitability
- Loss of inhibitory controls
- Reorganization

Sensitization
- Peripheral
- Central

Neuropathic pain

Literature Cited


