



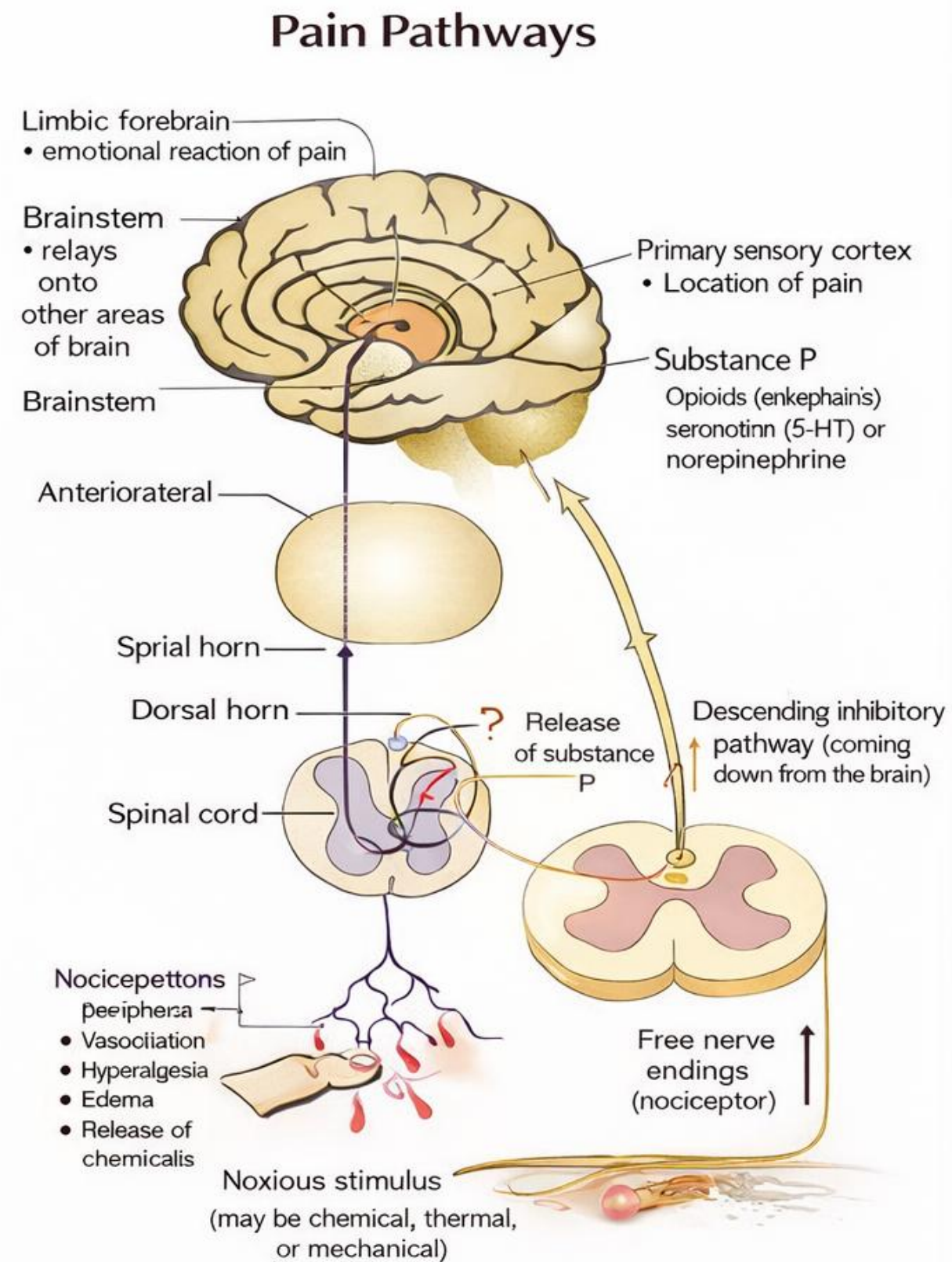
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Mechanism and Illness of Human Body 2

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Disorders of the Nervous System (part 2)



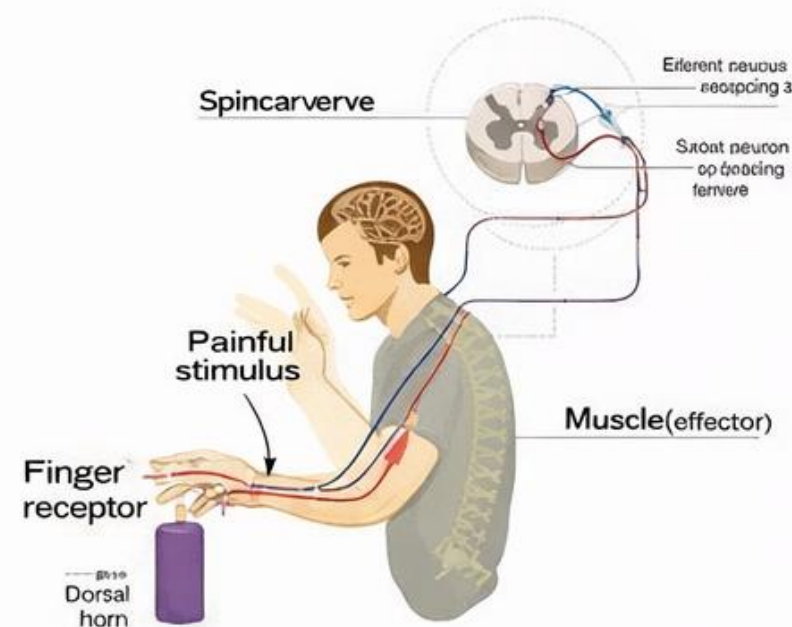
Disorders of the Nervous System (part 2)



Central Pain Pathways

Posterior (dorsal) column

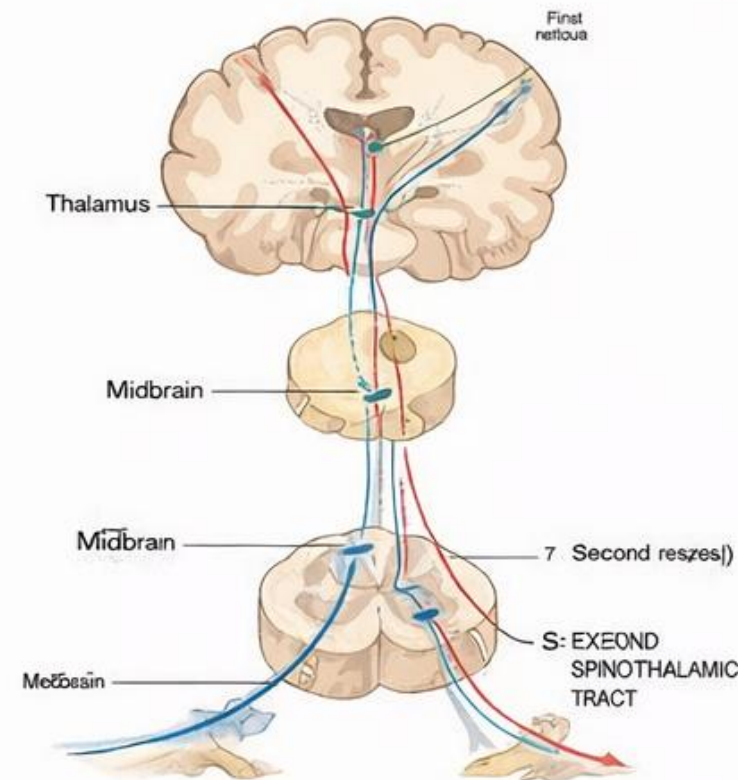
- Triggers the Withdrawal or nociceptive reflex
- Causes automatic, non-trait pain avoidance behavior



Posterior (dorsal) column

Spinothalamic tract

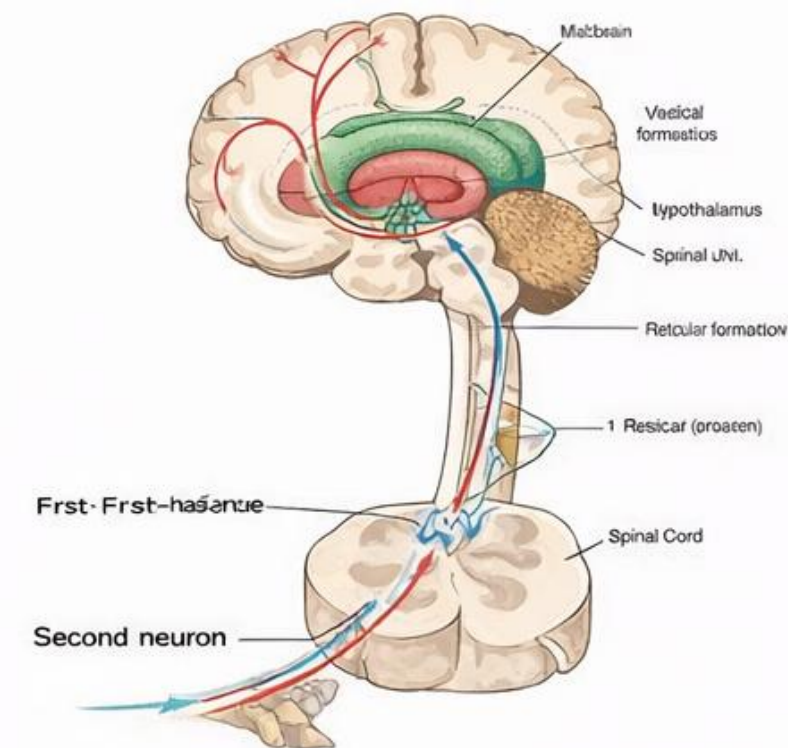
- Lateral spinothalamic tract
- A delta
- Conveys sharp pain that is easily localized
- Transmits pain from nerve endings in the periosteum, muscle, and
- Connects to trigeminothalamic tract



Spinothalamic tract

Spinoreticular system

- Medial spinoreticular system
- C fiber
- Connects to the Limbic system that triggers unconscious reactions of discomfort, unease and memory of pain
- Involves Reticular, hypothalamus, and cortical association areas that contribute to awareness and emotions



Spinoreticular system

Disorders of the Nervous System (part 2)



Processing and Response to Pain Involves Three Interacting Systems

- **Sensory discriminative system**

- Recognizes the location and intensity of the pain
- Transmits pain to **lateral spinothalamic tract**



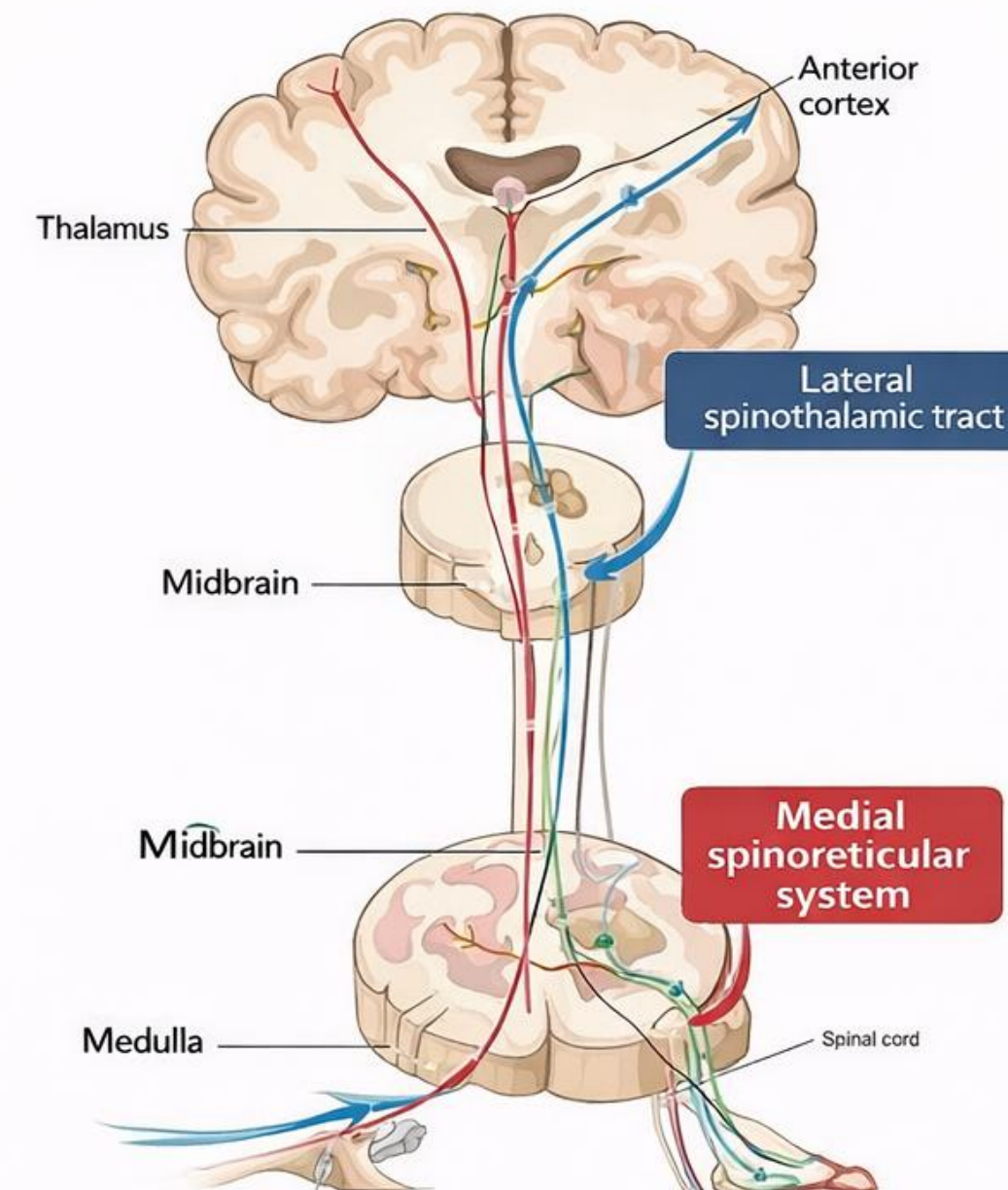
- **Motivational affective system**

- Arouses **emotional** responses and behaviors
- Transmits pain impulses to the medial spinoreticular
- Connects to autonomic systems



- **Central control cognitive system**

- Evaluates and determines response to pain
- Relates pain signals to past experiences and memory of the context that initiated the pain
- Stimulates limbic regions associated with awareness and emotions, integrating autonomic and cognitive systems located in the limbic region



Disorders of the Nervous System (part 2)



Effects of Pain Physiological Changes

Pain causes stimulation of afferent nerves that trigger the following physiological changes:

- Activation of the **sympathetic nervous system** by directly acting on the sympathetic nervous system at the first synapse
- Release of catecholamines causing increases in sympathetic output and decreases in **parasympathetic** output
- Endocrine response such as increased cortisol secretion and release of antidiuretic hormone

Parasympathetic

- **PUPIL**
Constrict
- **HEART**
Decreases heart rate
- **AIRWAYS**
Bronchoconstriction

Parasympathetic

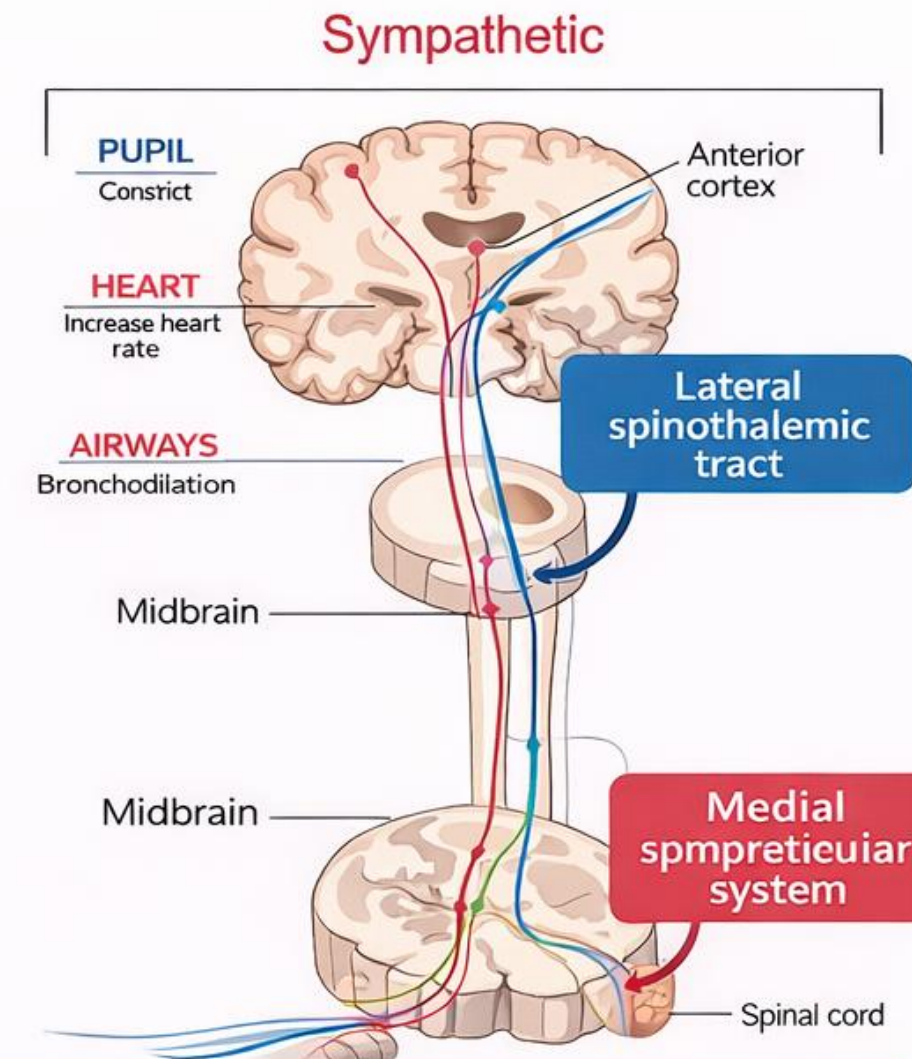
- **PUPIL**
Constrict
- **HEART**
Decreases heart rate
- **BLADDER** Contracts
Relaxes sphincter

Sympathetic

- **Dilate**
Increases heart rate
- **HEART**
Increases heart rate
- **AIRWAYS**
Bronchodilation

Sympathetic

- **DILATE** Dilate
- **HEART** Increase heart rate
- **AIRWAYS** Bronchoconstriction
- **DIGESTIVE SYSTEM**
Relaxes sphincter wall
- **URINARY SYSTEM**



Parasympathetic

- **PUPIL**
Constrict
- Increase heart rate
- **DIGESTIVE SYSTEM**
Increases peristalsis
- **BLADDER** Contracts
Relaxes sphincter

Sympathetic

- **Dilate**
- Increased heart rate
- **SWEAT GLAND**
Increased secretion
- **RELAXED** Bladder wall
- Constricts sphincter

Disorders of the Nervous System (part 2)

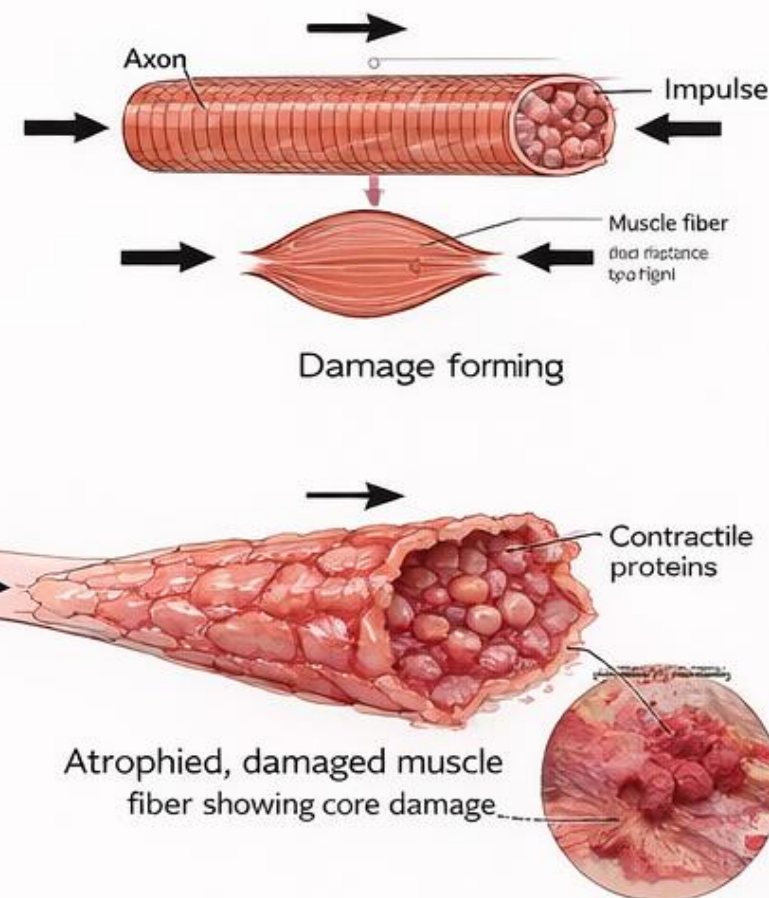


Effects of Pain

Effects on Muscles

Effects on Muscles

- Causes damage within muscle cells
- Leads to weakness and reduced muscle flexibility
- Contributes to tissue inflammation and increased sensation of pain
- Results in muscle atrophy
- Lowers blood flow to the muscles
- Decreases muscle energy stores, reducing the production of adenosine
- Increases lactic acid production due to anaerobic metabolism



Pro Inactivity and immobility prevent damage to muscles and reduce the risk of further injury.

Con Strong, spasming muscles constrict blood vessels and cause inflammation and core damage that can cause stiffness, kept muscles, difficulty swallowing, and tightness in the chest.

Responses to Pain

Emotional Response

- Intense pain causes emotional distress, including anxiety, fear, despair, or anger.

Behavioral Response

- Persistent pain leads to negative behaviors such as reduced mobility, limited social interactions, distraction, irritability, avoidance of activity, and suicidal thoughts.

Physiological Response

- Pain triggers physical reactions as part of fight-or-flight responses.
 - Increased heart rate, and tense muscles, and increased blood pressure.
 - Prolonged pain can weaken the immune response and lead to fatigue, chronic anxiety, or





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