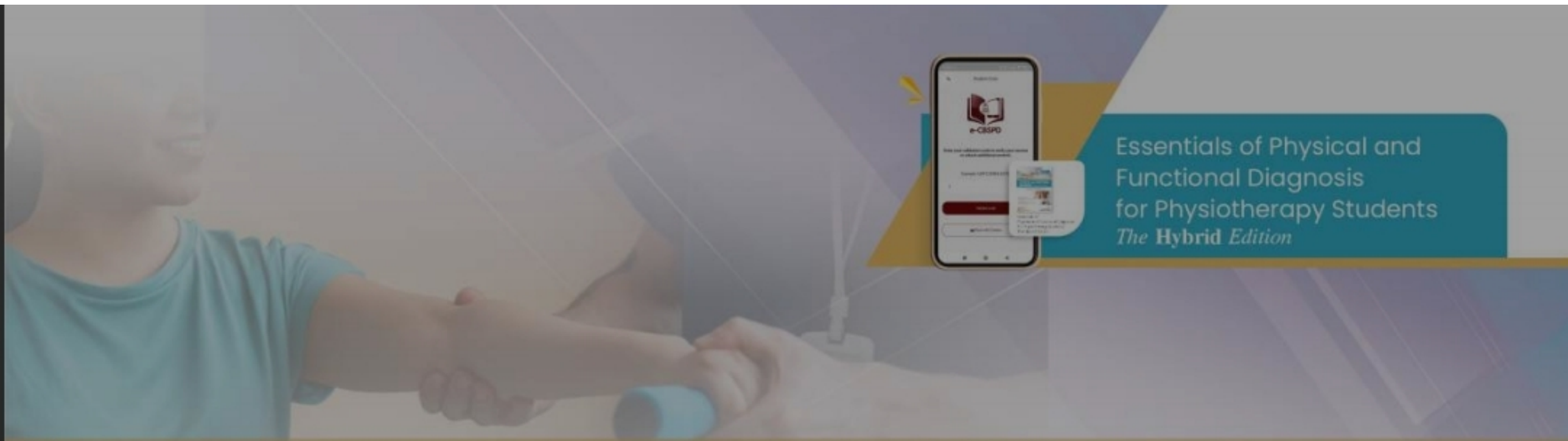


Essentials of

PHYSICAL and FUNCTIONAL DIAGNOSIS for Physiotherapy Students

As per the Physiotherapy Curriculum of the National Commission for Allied and Healthcare Professions (NCAHP)



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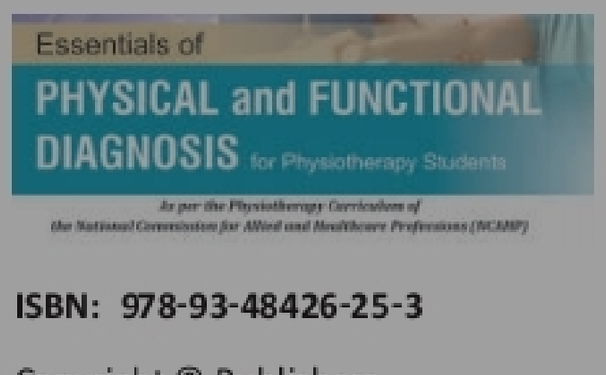
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Reflexes Assessment

Aafreen

LEARNING OBJECTIVES

After studying the chapter, readers will be able to:

- Explain reflexes and reflex arcs.
- Describe the mechanism of reflexes.
- Discuss the interpretation of normal and abnormal reflex responses.
- Explain the clinical indications and relevance of reflex assessment.

CHAPTER OUTLINE

- Introduction
- Anatomy and Physiology of Reflex Arc
- Classification
- Examination of Reflexes
- Interpretation
- Clinical Indications
- Clinical Implications
- Clinical Relevance
- Case Studies

INTRODUCTION

Reflex actions require a stimulus, sensory pathway, connection with a motor unit, motor neuron, and contractile or other effector components. If any part of this sequence is disrupted, a reflex action will not occur. The majority of reflex arcs are also affected by higher centers in the brain, and when there is an interruption in the pathway between these centers and the reflex arc, the reflex behavior is significantly altered.

Reflexes are automatic and involuntary reactions of the body to stimuli that can be either internal or external stressors. They occur rapidly and typically without conscious thought, protecting the body from harmful situations or damage within the body. Reflexes are regulated by neural circuits known as reflex arcs.

There are two main types of reflex arcs: (1) Autonomic and (2) Somatic. Autonomic reflexes involve the inner organs and can occasionally involve the spinal cord, whereas somatic reflexes involve the muscles and are primarily regulated by the brain rather than the spinal cord.

ANATOMY AND PHYSIOLOGY OF REFLEX ARC

A reflex arc is a neural pathway that translates a sensory input into a rapid, involuntary motor response. Reflex arcs, which involve the central and peripheral nervous systems, are responsible for rapid, involuntary responses to stimuli, bypassing conscious thought and allowing for quick protective responses to potentially harmful situations. These neural pathways are essential for survival and play crucial roles in maintaining homeostasis and coordinating body movements.

- **Receptor:** The reflex arc begins with the detection of a stimulus by somatic receptors located in the skin, muscles, and tendons. These receptors are specialized to respond to specific stimuli such as touch, pressure, temperature or pain.
- **Afferent nerve fibers:** Afferent nerves transmit sensory information from peripheral receptors to the spinal cord or brain stem depending on the type of reflex.
- **Integrating center:** An integrating center, the point at which neurons in the gray matter of the spinal cord or brainstem synapse, is responsible for processing sensory information in the CNS. Interneurons located in the spinal cord or brainstem assess sensory input and determine an appropriate response, which may also be relayed to higher brain centers for further processing.
- **Efferent nerve fibers:** The anterior horn sends motor signals to the muscles *via* the efferent nerve fibers. These signals are transmitted to effectors, which include muscles or glands, by motor neurons. Motor neurons send signals away from the central nervous system toward the periphery.
- **Effector:** Efferent nerve fibers innervate the effector muscles that carry out the response. Motor neurons innervate muscles or glands to respond to the original stimulus, whether it is a contraction of skeletal muscles for a somatic reflex or secretion by glands for an autonomic reflex. Anatomy and physiology of a reflex arc are shown in Figure 35.1.

CLASSIFICATION

Classification of reflexes is explained as follows:

Deep Tendon Reflexes

Deep tendon reflexes (DTRs), also known as stretch reflexes, are involuntary muscle contractions elicited by tapping a tendon using a reflex hammer. This reflex involves sensory and motor neurons that communicate through the spinal cord. When a tendon is tapped, sensory receptors send signals to the spinal cord, leading to a motor neuron response and muscle contraction. DTRs are commonly assessed during neurological examinations to evaluate the nervous system function. Abnormalities in DTRs can indicate neurological conditions, such as spinal cord injury, nerve damage or nervous system diseases. DTRs are graded on a scale from 0 to 4, with 0 indicating no response and 4 indicating a very brisk response, with clonus (repetitive, rhythmic contractions) often present.

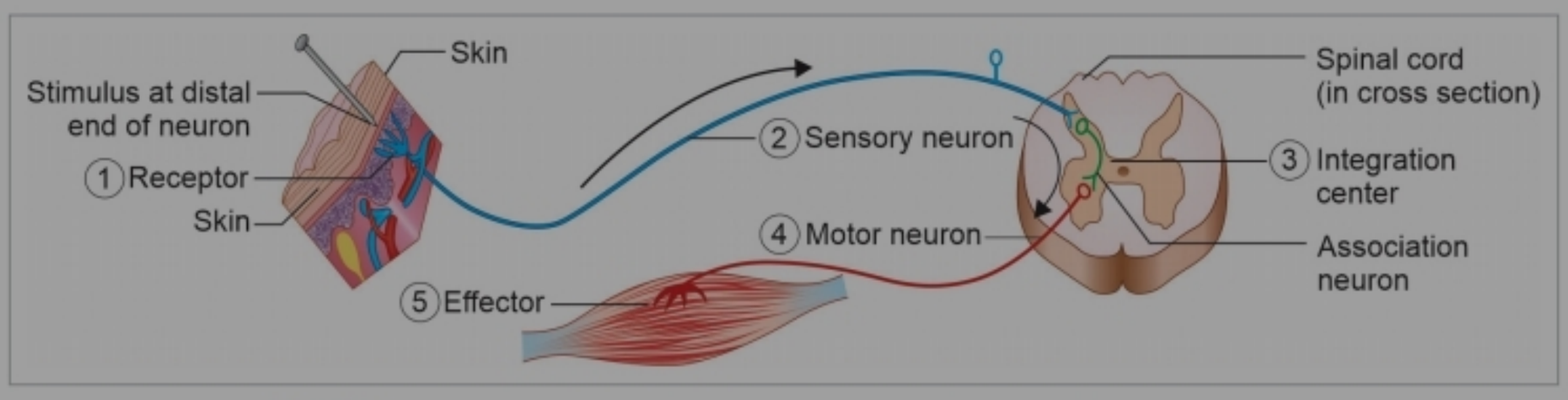


Fig. 35.1: Anatomy and physiology of a reflex arc from stimulus to response