Quadrant II – Transcript and related materials

Programme: Bachelor of Science (Second Year)

Subject: Zoology

Course Code: ZOC 103

Course Title: Anatomy of animal body systems

Unit: 08

Module Name: Classification of receptors- Part I

Name of the Presenter: Ms. Karishma Vaman Naik

Notes:

INTRODUCTION TO RECEPTORS

Sensory receptors are specialized organs that respond to selected information that is translated into **nerve impulses** which are transmitted to the central nervous system (CNS) via afferent fibers. These impulses may or may not be received at conscious levels of the brain. Sensations that an organism becomes conscious of are referred to as **perception**. Sensory nerve with its associated tissues is termed as **sensory organ**.

Sensory neurons are nerve cells specialized for detecting and transmitting information about external or internal environment. Each sensory neuron sends out nerve fibers to the tissues. Sensory receptor contains dendrites responsive to stimuli and that carry impulses towards nerve cell. They receive information from environment in form of energy (mechanical, chemical, electrical, thermal or radiant) and transform it into nerve impulses which are transmitted to the brain /spinal cord via afferent or sensory nerve fibers to which they are connected. Afferent fibers carry information from tissue to the brain and efferent fibers carry information from brain to the tissue.

Receptor system is classified into **General sensory system and Special sensory system.** General sensory system comprises receptors in skin, joints, skeletal muscles and internal organs. Whereas special sensory system consists of localized receptors wherein the sensory epithelium has sunken away from the surface, into deeper positions. Example: Eyes and ears.

Classification of receptors- ***by location***

Based upon location of receptors they are classified into Exteroceptors and Enteroceptors/ Interoceptors/ Visceroceptors. Exteroceptors are external receptors stimulated by the external stimuli such as vision, sound, touch, taste, smell, temperature, pain etc.

Classification of receptors- ***by stimulus***

Based on stimuli, receptors are classified into Chemoreceptors (chemicals), Mechanoreceptors (pressure), Photoreceptors (light), Thermoreceptors (temperature).

CHEMORECEPTORS

Chemoreceptors consists of olfactory organs & organs of taste; both these organs are stimulated by substances in solution. Medium for dissolving stimulatory substances is water for aquatic animals & mucus for land animals. Olfactory organs are able to respond to low concentration of dissolved substance whereas Organs of taste need a higher concentration of dissolved substance for a response.

- **OLFACTORY ORGANS/ OLFACTORECEPTORS**

The olfactory system detects airborne or waterborne chemical cues and involves chemoreceptors usually located in nasal passages. Consist of a pair of cavities known as olfactory/nasal sacs, on anterior end of head.

Anatomically, the olfactory organ consists of 3 components:

- olfactory epithelium
- olfactory bulb
- olfactory tract

Olfactory epithelium is a specialized patch of epithelium within nasal cavity that contains

- basal cells- replacement cells
- sustentacular/ supporting cells- mucous secreting cells
- olfactory sensory cells/ receptor cells

Olfactory receptor cells are abundantly present in an olfactory epithelium within the nasal cavity. A single external process of each receptor extends to the epithelium surface and gives

rise to a number of long, slender extensions called cilia covered by the mucus of the nasal cavity. Olfactory receptor cells have axons extending directly into a highly organized olfactory bulb, where olfactory information is processed. The new cells developing from basal cells replace the receptor cells in the olfactory epithelium.

Organ of Jacobson/ Vomeronasal organ

The vomeronasal organ, or Jacobson's organ, is the paired auxiliary olfactory sense organ with an elongated **C shaped lumen**. It is located just above the roof of the mouth (the hard palate), in the soft tissue of the nasal septum, within the nasal cavity. It is present and functional in all **snakes and lizards**, and in many mammals, but in humans it vestigial. It contains the receptors that detect non-volatile (liquid) organic compounds (chemical stimuli) which are conveyed to them from the environment.

ORGANS OF TASTE /GUSTATORECEPTORS

Gustation is the special sense associated with the tongue. The surface of the tongue, along with the rest of the oral cavity, is lined by a stratified squamous epithelium. There are **four** types of papillae, based on their appearance: **circumvallate, foliate, filiform, and fungiform**.

Taste buds harbor specialized elongated **gustatory receptor cells** for the transduction of taste stimuli. Basal cells at the base of the taste bud form new epithelial cells called supporting cells which grow and develop into taste receptor cells. These receptor cells have thin cellular projections called taste hairs that extend into taste pores, which are tiny pockets connecting to the surface of the papilla.