



A REVIEW ARTICLE ON PHYSIOLOGY OF VISION

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ABSTRACT

The visual pathway predominantly travels beneath the cortex for most of its length. Visual signals in the optic nerves may intersect at the chiasma and then proceed through the optic tracts. The term Ayurveda derives from two words: "Ayu," meaning life, and "Ved," signifying knowledge or science. Therefore, "AYURVEDA" as a whole translates to "the science of life." According to Ayurvedic principles, the universe consists of five fundamental elements. The body maintains an ideal equilibrium of these elements, and any disruption to this balance results in a state of unhealthiness we refer to as illness. The classical texts of Ayurveda provide detailed insights into the physiology of the sense organs, sensation, perception, and the mind's role in the perception process in an exceptional manner. Indriya (sense faculty) serves as the specialized tool that helps the soul in recognizing even the slightest changes in both the external and internal environments. Indriya acts as the essential element that differentiates living entities from non-living ones. The concept of Indriya pancha panchak, introduced by Acharya Charaka, delves into both the anatomical and physiological features of the sense organs. The five sensory faculties include sight (chakshurendriya), hearing (shrotrendriya), smell (ghranendriya), taste (rasanendriya), and touch (sparshendriya). Each sensory faculty is associated with a specific object: sound (shabda) pertains to hearing, touch (sparsha) relates to the tactile sense, color (rupa) corresponds to sight, taste (rasa) is associated with the gustatory sense, and smell (gandha) links with the olfactory sense organ. Every sensory faculty possesses an excess of one material element. Developed from particular material constituents, each specific sense faculty perceives the properties of its corresponding element. The mechanics of how the external world is perceived is referred to as the

visual process or the physiology of vision. Ayurveda introduces a special concept known as the Tridosha theory. The three fundamental elements of the human body are collectively termed Tridosha (Vata, Pitta, Kapha). The Tridosha governs the physiological and voluntary activities of the body. Ayurveda elaborates on the physiology of vision by considering the roles of vata and pitta. Pitta encompasses five different types: Ranjak, Pachak, Alochak, Sadhak, and Bhrajak. The "Alochak Pitta" is recognized as the seat of "Drishti." The retinal pigments Rhodopsin, Iodopsin, and Melanin symbolize Alochak Pitta. Alochak pitta is further categorized into two types: chakshu vaisheshik located in the eye and buddhi vaisheshik found in the brain. There are three stages in this visual process: the light refraction phase, the phase in which light energy is transformed into an electrical impulse, and lastly, the peripheral and central neurophysiology involving the geniculate bodies and optic radiations prior to synapsing in the occipital cortex.

Keywords: Ayurveda, physiology of vision, visual process

INTRODUCTION

The sequence of actions involved in visual perception is referred to as the visual process. This process consists of three stages: first, the refraction of light; second, the photo-chemical reaction; and finally, the neural functions of the retina along with central neurophysiology. In the initial stage, light rays from the external environment are focused onto the retina. During the second stage, these light rays are transformed into electrical impulses through various chemical reactions. In the final stage, these impulses travel through the optic nerve to the visual cortex, where they are interpreted, resulting in the experience of vision..

FUNCTIONAL ANATOMY OF EYE

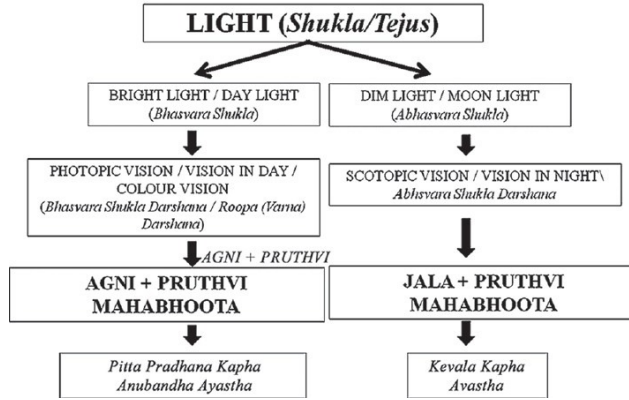
As light enters the eye through the cornea, pupil, and lens, it projects onto the retina. The nerves of the retina process this light and the associated images and then transfer their signals to the optic nerve. The optic nerve transports these signals to the brain, where the perception of the images occurs. The many nerve

cells of the retina allow you to see in low-light conditions, perceive the sharp edges of delicate images like flower petals, perceive a full range of colours, and view a wide field of vision.

CONCEPT OF LIGHT

The Sanskrit word prakasha is used to refer to light. It is the function of Agni mahabhoota, so the properties of light can be explained by the gunas (properties) of Agni mahabhoota. It is the foundation stone of the visual process, which is Ushana (hot), Teekshna (penetrating), and Sookshma. Modern light an electromagnetic radiation that allows the human eye to see orsee objects. These waves have both frequencies and lengths, the differences in light value form other forms of engery in the electromagnetic spectrum.

CONCEPT OF LIGHT ENERGY IN AYURVEDA



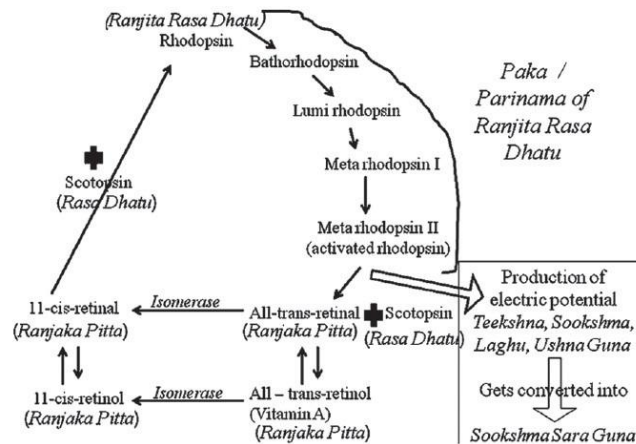
THE SECOND PHASE OF THE VISUAL PROCESS

A second phase of visual process has been postulated to pass through the thalamic pulvinar nucleus and to project to multiple regions of visual cortex. Prakasha is having sookshma guna (minuscule property). The property that makes any substance to pass easily through different materials is termed as sookshma. Hence this guna (property) of prakasha makes it possible to reach till the photo-receptors in retina travelling various layers in front of it.

PHOTO-TRANSDUCTION

Photo-transduction it is the process of conversion of light energy into electrical energy. When light falls on retina the light sensitive photo-receptors, photo-chemicals in them undergo certain biochemical reactions to facilitate this process. It comprises of two essential reactions: photo- chemical and electrical.

PHOTO CHEMICAL REACTION – AYURVEDA VIEW



PRODUCTION OF ELECTRIC POTENTIAL

The photoreceptor layer consists of rods and cones that generate action potentials through photo sensitive cycles using Rhodopsin. The term sravana is used to refer to flow and is done by the teekshna guna of pitta. This Prakasha gun is responsible for Na flow outside the cell membrane and produces electrical poten-

tial. Electricity can never be seen, i.e. it has sookshma guna of vata. It cannot move immediately in any other direction without any provocation, like air movement. Consequently, electricity can be said to have a pitta sara guna (a uniform flow, such as water) and nota vata chala guna (a random movement, such as air). Therefore, electricity is Sookshma-sara.

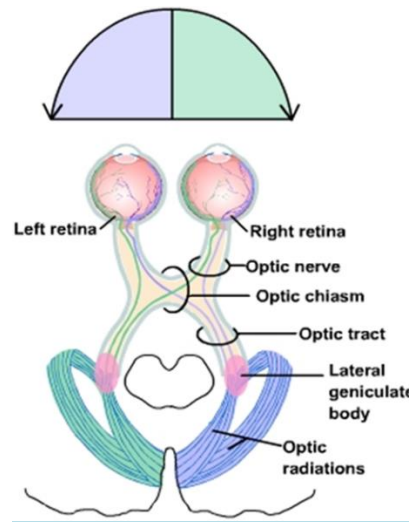
avastha is vata pradhana pitta nubandha. Vata is important because of suksham guna.

THIRD PHASE OF VISION

The third phase comprises of processing and transmission of visual sensation and visual perception.

FUNCTION OF MANAS AND BUDDHI

When an object is encountered for the first time, chakshu vaisheshika pitta gathers this information, which is then interpreted and recorded in memory with the assistance of buddhi vaisheshika pitta. The next time a person observes the same object through the experience of pratyaksha jnana, chakshur vaisheshika pitta activates, and buddhi vaisheshika pitta aids in recalling and accurately identifying the object.



CONCLUSION

The complete visual process has been outlined in Ayurveda with a focus on vata and pitta. With the progress of modern technology, the biochemical alterations occurring at every stage of the visual process have been understood. A detailed analysis of contemporary physiology viewed through the lens of Ayurveda, as illustrated in Figure 3, will offer a more comprehensive and clearer examination of the various stages of vision, aiding in the understanding of related pathologies.

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