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# Limbic Involvement in Visual Processing

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**Abstract :** The retina filters millions of incoming signals into a smaller amount of exiting optic nerve fibers that travel to different portions of the brain. Most of the signals are for eyesight (called "image-forming" signals). However, there are other faster signals that travel "elsewhere" and are not directly involved with eyesight (called "non-image-forming" signals). This article centers on the neurons of the optic nerve connecting to parts of the limbic system. Eye care providers are currently looking at parvocellular and magnocellular processing pathways without realizing that those are part of an enormous "galaxy" of all the body systems. Lenses are modifying both non-image and image-forming pathways, taking A.M. Skeffington's seminal work one step further. Almost 100 years ago, he described the Where am I (orientation), Where is It (localization), and What is It (identification) pathways. Now, among others, there is a How am I (animation) and a Who am I (inclination, motivation, imagination) pathway. Classic eye testing considers pupils and often assesses posture and motion awareness, but classical prescriptions often overlook limbic involvement in visual processing. The limbic system is composed of the hippocampus, amygdala, hypothalamus, and anterior nuclei of the thalamus. The optic nerve's limbic connections arise from the intrinsically photosensitive retinal ganglion cells (ipRGC) through the "retinohypothalamic tract" (RHT). There are two main hypothalamic nuclei with direct photic inputs. These are the suprachiasmatic nucleus and the paraventricular nucleus. Other hypothalamic nuclei connected with retinal function, including mood regulation, appetite, and glucose regulation, are the supraoptic nucleus and the arcuate nucleus. The retino-hypothalamic tract is often overlooked when we prescribe eyeglasses. Each person is different, but the lenses we choose are influencing this fast processing, which affects each patient's aiming and focusing abilities. These signals arise from the ipRGC cells that were only discovered 20+ years ago and do not address the campana retinal interneurons that were only discovered 2 years ago. As eyecare providers, we are unknowingly altering such factors as lymph flow, glucose metabolism, appetite, and sleep cycles in our patients. It is important to know what we are prescribing as the visual processing evaluations expand past the 20/20 central eyesight.

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