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Non-invasive assessment and treatment of autonomic function using retinal circuitry

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Abstract

Introduction: Cardiac stress tests are used as an informative method of gathering information regarding cardiovascular tolerance. An analogous test measuring retinal tolerance is beneficial in assessment and treatment of neurological function. An emerging subset of optometrists is prescribing customized eyeglasses to influence biochemical and neurological activity in physiological systems. Viewing the eye as a portal into brain activity, retinal circuitry is used as a conduit into the constant, dynamic interaction involving parallel cortical and subcortical processes. Neuro-optometry modifies direction, intensity, amount or wavelength of light to assess and treat tolerance to retinal changes.

Methods: This atypical use of eyeglasses leads to more than simply altering central eyesight. Stimulation of three photoreceptor groups initiates a cascade of signaling in visual and non-visual retinal pathways, resulting in measureable shifts in attention and eye movements.

Results: Two patients with positional orthostatic tachycardia syndrome (POTS) had frequent symptoms of fainting spells due to autonomic dysregulation. Each was successfully treated by the use of individualized therapeutic eyeglasses. One pair of lenses angled light, reflexively inducing a shift in head and body position; the other pair was tinted to filter the incoming wavelength of light, stimulating the autonomic nervous system. Both patients stopped fainting when wearing the lenses. One patient's cardiologist no longer needed to install a pacemaker.

Conclusions: Results suggest the possibility that patients with POTS, who cannot be stabilized with medications, might wear eyeglasses designed to balance sympathetic and parasympathetic responses. A device to test retinal stress tolerance could provide a clinical indicator in assessment of brain activity.