

Editorial

Color Vision has a Place beside Magnetic Resonance Imaging as a Biological Marker to Identify Normal-Pressure Hydrocephalus

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Neuroscience must change the philosophy of mind, and to a great extent has already done so [1].

A problem with vision results in a problem of knowledge of the surrounding habitat. That is, seeing is understanding, and color vision is a perfectly good example of this. The study of color vision has provided us with knowledge into the brain processes involved in vision, ultimately providing an image of how the brain works [2–4]. There is no doubt that the study of the retinal mechanisms involved in color vision has immeasurably enhanced our knowledge of the subject and has provided the key to our understanding of inherited retinal color blindness.

Imaging technologies often give us contrasting images due to the differential absorption and reflection of electromagnetic radiation (e.g., X-ray, computed tomography, ultrasound) in body tissues. Magnetic Resonance Imaging (MRI) has provided an additional and powerful tool to study the central and peripheral nervous system [5]. MRI accomplishes this as a noninvasive imaging technique that provides excellent soft tissue images of normal and pathologic structures as well as fat and body fluids, allowing for comparison of many diverse tissues [6]. Furthermore, the introduction of gadolinium-diethylene-triamine pentaacetic acid has improved the imaging capabilities of MRI to better define intrinsic and extrinsic central nervous system pathologies.

Blindsight is caused by a brain cortical lesion, rather than by a lesion in both retinas, or by a lesion in the optical tract. But what do we mean by blindsight? In normal pressure hydrocephalus (NPH), where patients demonstrate black and white vision, there is a compromise of the pathways from V1 to V4 visive areas. Damage of V1 does not allow for the visual stimulus to arrive at V4. The integrity of both areas is critical for vision and awareness to see colors. Integrity is restored in patients who have renewed normal color vision after surgical introduction of a ventricular-peritoneal shunt. In patients demonstrating color vision deficiency, both on the red/green, and/or on the blue/yellow axes, there is no compromise of the V1 primary visual area, only one of the V4 area. Color vision allows us to monitor the clinical status of both pre- and postsurgical ventricular-

peritoneal shunt in NPH.

We conclude that MRI, and its specific measurement techniques, are fundamental and necessary to identify the most appropriate investigation in NPH, supported by precise clinical recall and clinical history of the patient. Moreover, we confirm that color vision can be considered as a biological marker to identify impaired brain vision pathways.

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AP—Writing, Conceptualization, Original draft; AndQ, AldQ—Conceptualization, Supervision; DLR—Conceptualization. All authors read and approved the final manuscript.

Ethics Approval and Consent to Participate

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