

Is perception of light useful to the blind patient.

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Editorial

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Is Perception of Light Useful to the Blind Patient?

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So if your eye is sound, your body will be full of light; but if your eye is not sound, your whole body will be full of darkness.—Matthew 6:22-23

(Revised Standard Bible)

BLINDNESS AFFLICTS more than 1 million Americans, 10% of whom have no conscious perception of light.¹ The most rudimentary form of vision is the ability to see light. In the ancient oceans, life forms developed faint patches of skin that were sensitive to light. They could tell light from dark and the direction of the light source but that was all. Phototropism in organisms from *Amoeba* to *Drosophila* may represent the elemental form of light perception in our biological roots.² Presumably, these ancient ancestors found some value and usefulness in light

perception "vision" despite having no eyes in many cases. We now perceive light with the help of our complex eye, but has the view of "useful vision" in humans traveled a parallel course? Does the loss of light perception leave our bodies as "full of darkness" as the biblical reference suggests?

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Our modern literature suggests that a visual acuity of 5/200 is the lower limit of vision needed for ambulation and implies that any visual acuity less than 5/200 is not useful.³ A 1992 survey of members of the American Retina Society found a similar bias—only 3% of the respondents defined useful vision in children as light perception vision, while 31%, the mode, defined a visual acuity of 5/200 as useful.⁴ In at least one Stage V Retinopathy of Prematurity study, visually impaired children with form identification abilities were able to ambulate in strange environments using visual clues.⁵ The authors of that study suggest that 5/200 is not the lower limit of visual acuity needed for ambulation, especially in children deprived of vision in early infancy. They speculate that children may value any residual vision and use their limited vision better than we have been able to measure. Much of our bias as to what defines useful vision is based on legal definitions of blindness, lack of vision rehabilitation training during residency training,⁶ and cultural bias. Our society defines useful vision as the ability to drive, read a book, and perform daily tasks from cooking to signing checks. Based on the finding of excellent visual acuity in the fellow eye, we often guide our patients to defer initial surgery or reoperation or to discontinue current medications in the involved eye that has poor visual acuity (hand motions or light perception) measured conventionally. We may have learned to devalue visual acuity measurements worse than 5/200. With diseases that may eventually affect both eyes, it is useful to review the benefits, if any, of preserving the ability to see light.

Blind persons who obtain leader dogs are believed to be a young, healthy, and highly motivated subgroup

of blind persons who have been profoundly impaired for prolonged periods.⁷ One would speculate that they would represent a fairly well-adjusted subset of blind patients. At the Rochester Leader Dog School in Rochester, Mich, I asked previously sighted adults without light perception about the usefulness, if any, of light perception vision. Thirty-two consecutive persons with a mean age of 43 years (range, 16-77 years) were individually surveyed, and I had had no previous contact with any of the participants. Fifteen had childhood loss of visual acuity including retinopathy of prematurity, albinism, congenital cataracts, congenital glaucoma, and aniridia. Seventeen had acquired vision loss including proliferative diabetic retinopathy, retinitis pigmentosa, vascular disease, and retinal detachment. All 32 interviewed felt that light perception had been valuable: 25 (78%) felt that light perception had been useful for mobility and orientation (ambulation), 22 (69%) noted sleep disturbances since losing light perception, and 20 (63%) said they suffered both acute and chronic depression after losing light perception.

Mobility instructors Michael Patten and Rod Handlein, from the Detroit Receiving Hospital, Detroit, Mich, and the Rochester Leader Dog School, respectively, agree that the ability to see light is helpful in both travel and orientation (oral communications, March 1996). A light source at the end of a hallway can facilitate maintenance of a straight line of travel as well as orientation to the space of a room. Outdoors, light may differentially reflect off surfaces such as concrete and grass, with the concrete appearing brighter and the grass darker, aiding in ambulation. Light can also reflect off painted crosswalks and help in identification of street corners.

Distinct from visual imaging, a function of the mammalian photosensory system is to provide photic input to synchronize (entrain) circadian rhythms to a 24-hour period, coordinated with the solar light-dark cycle.^{8,9} If deprived of all environmental time cues, the daily behavioral and physiological rhythms of most human beings will "free run" with a period close to 25 hours. These free-running rhythms reflect the intrinsic, autonomous rhythm of an endogenous circadian pacemaker or clock. Several free-running circadian rhythms have been reported in people without light perception; these free-running rhythms include core body temperature,¹⁰ cortisol,^{11,12} melatonin,¹³ and sleep. Despite maintaining regular schedules of work, sleep, eating, and social contact, many people without light perception still have cyclic bouts of insomnia.⁹⁻¹⁸

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