MEDWIN PUBLISHERS
Committed to Create Value for Researchers

Open Access Journal of Ophthalmology
ISSN: 2578-465X

Optical Biology of Controlling Axial Dimension of Ocular Myopia

Aggarwala KRG*
Ocular and Metabolism Research Education Consulting Sales, USA

***Corresponding author:** Karan R Gregg Aggarwala, Founder-President of OAMRECS (Ocular and Metabolism Research Education Consulting Sales), Newyork, USA, Tel: 917-678-9848; Email: aggarwala@zoho.com

Review Article
Volume 6 Issue 1
Received Date: February 05, 2021
Published Date: February 16, 2021
DOI: 10.23880/oajo-16000212

Abstract

This is not just another commentary on developmental biology of myopia. It is a call to justice. As responsible physicians we could restore credibility and reclaim the Oath attributed to Hippocrates. Our journey has never been more complicated. We may never again require anything more than the trust we betrayed. Ocular sciences here below lead into clinical practice with a smattering on technology. A sincere attempt is made to concisely convey to the reader: multiple interlinking subject area domains perhaps regarded as unrelated by traditional science. The debate has only just begun.

Keywords: Ocular Myopia; Golden Age; Axial Dimension; Optical Waveband; Glaucoma

Recent Historical Roots

The scourge of myopic progression in the two decades leading up to year 2013 was so hopelessly uncontrolled in regions such as China and South-East Asia that being an eye doctor witnessing the same was sufficient reason for poetic self-deprecation [1,2]. Being a dispensing optician in the days prior to acrylic and polymer meniscus lenses was mostly a labour of love until multifocal lenses became the rage [3]. In a "Golden Age" that balanced research and clinical excellence with moderated profits: from perhaps 1931 till 1985, funding of professional schools and colleges of optometry became a flagship for national development. Optometrists back then balanced equal parts clinical fee and retail sale incomes for many of their typical patients, and occasionally ventured to explore non-traditional therapeutic avenues. Some pioneers were so poorly compensated and yet so phenomenally dedicated, that their likeness to the painter El Greco was no surprise [4].

Mapping Colors of Focusing Optics

Initial development of color perception theory was motivated mostly in service of navigation for military sea-faring operations [5]. Polar coordinate schematics that included blue-yellow versus red-green threshold maps and incremental flash sensitivity: produced what is termed The Standard Human Observer. Shape and texture interactions with color-filled spots, bars and gratings make up huge volumes of interpreted data [6] not limited to terrestrial vertebrates. Recent updates inspired by marine species on human blue light threshold [7] have toppled the mistaken view that age-related changes are necessarily unforgiving. Increment threshold detection and discrimination are subject to the mathematics of neuronal comparison by inhibitory synapse: mostly a type of ratio-proportion Weber-Fechner psychophysical scaling.

Growing Vertebrates Restore Axial Image Plane

Biology of myopia from animal studies despite differences, points toward one interesting implication: That during daylight visual activity, a vertebrate avian eyeball grows in either direction to overcome focus displacement from its retinal plane: induced by a head-mounted plus or minus power lens [8]. Ocular elongation when the young fowler views through a minus lens depends on exposure duration and also on focusing power of the attached lens disc but excess power degrades the optics too much so as to scramble the control signal. The stronger part of the

control signal is an optical waveband comparator [9] in the retinal processing neural tapestry. Substantial evidence and meaningful derivations scattered across a time-span of nearly five decades is the remainder of a legacy commencing with Zeno's paradox and reaching a summit with the leading myopia research biologist of this past generation: Professor Josh Wallman of the City College at 138th Street Manhattan.

Emerging Neural Representational Physiology

Research to understand the neural representational schematics for optical waveband comparison requires measuring on a retinal coordinate system the correspondence for common spatial geometric patterns [10-13]. It became evident that in the vicinity of individual cells, chemical messengers that alter membrane conductance play a critical role to sustain burst neuron firing rate and slow neural modulated ionic charge potentials. Such neural biochemistry and membrane physiology points to the dedicated work of Golgi and Cajal [14] but surely others can be named. Chemical messengers engender local inhibitory and global cooperative pattern detecting biological machines capable of locomotion. Dedicated unit receptive fields claim physical response properties adjustable to adaptation bias. Although cyclic GMP effectively increases membrane conductance to ionic localized charge even for smaller molecular aggregates; alterations of charge concentration ampere flows generally are not characteristic of cyclic GMP [15].

Ergonomic And Epidemiology Linkages [Myopia And Glaucoma]

Time-interval longitudinal biometric measures of vitreous chamber dimension along the optical viewing axis can be useful to understand ergonomic and epidemiology linkages and multiple study results from New England USA have been subjected to mathematical model [16]. Habitual ergonomic patterns: if repeated often and long sustained, can make stressors on biochemical regenerative mechanisms. Relative potency of ergonomic habits to effectively change clinical pathology parameter is dependent not just on restorative biology but also upon dietary precursor input, assimilation rate, and metabolism [17]. There is a general inclination for prolonged multi-session near focus habitual reading to predispose toward distance blurring and some of the predisposing factors are recently [18,19] described. Long-term efficacy of ergonomic intervention to reduce progression of myopia leans toward being null and void [20] but there might be individual morphological and functional differences as well as diversely powerful neural and muscular metabolic biochemistry that has thus far been merely a matter of speculation between doctor and patient. Now that younger, and as well older presbyopic agents have been found equally glued to a viewing distance [21] closer than 35 cm for multiple hours on end, day after day: elevations of eye pressure from internal muscle hypertrophy [19] more than likely will challenge optic nerve integrity.

Our Dysfunctionally Radiant Society

For even the best news reporter to easily separate opinion from substantiated fact requires some minimal understanding of physiological truisms. That filtering out visible blue during electronic display operational task does NOT make for additional safety has been shouted emphatically in recent popular scientific press [22] by renowned and accomplished research physician Professor Mark Rosenfield. When CB Radio was replaced by the very first cellular phone technology, the rage in New York back then was Nokia. Not that we could be better off without Stockholm [23]. Societal dysfunction is only the visible iceberg. Short wavelength radiation is high-frequency oscillating; whether microwave, X-Ray or ultraviolet: all having the general consequence to knock-out charged particles such as those functioning as pulsed ionic membrane channel selector doorways. Most vulnerable are neural dendrites but also the cellular somatic microstructures of both neural tissue and as well lymphatic aggregates. Toxic effects on internal epigenetic cellular communication concerning micro-organelle endoplasmic reticulum could be inevitable. Osmotic and lymph dysbiosis results into pain with swelling: especially tenderness in the armpit and overused joints. Delicate internal organs such as the pancreas will more damage and with lesser recovery upon rest. Conclusively evident mitochondrial energy ATP molecule synthesis with impaired cycling is now demonstrated [24].

Design By Distance

Viewing distance from display to the iris aperture must be consistent with the linear dimension of the alphanumeric character. Text on a small display must necessarily be viewed from a distance several inches closer. By inverse square law: radiant intensity of microwaves emanating from the cellular phone quadruples for 9 inch compared to 18 inch. Ecological design of the human visual apparatus [25] enables complete utilization of the natural ocular spectral dispersion disparity analysed as R-G and B-Y waveband comparisons [26-28] bringing equality of perceptual analytics to rhesus monkey, guinea pig, goldfish and poultry fowler: each and all enabled with clear motivation toward evolutionary niche explorations by exposure to chromatic extremes [29] yet in search for our very own [30] Madagascar paradise. But in this tortuous pathological ranting, did we completely ignore the jumping spider?

References

1. Liang YB, Lin Z, Vasudevan B, Jhanji V, Young A, et al. (2013) Generational difference of refractive error in the baseline study of the Beijing Myopia Progression Study. Br J Ophthalmol 97(6): 765-769.

2. Aggarwala KR (2011) Ecological Meditations: 155 Poems in 4 sub-domains; Xlibris, USA.

3. Borish IM (1987) In-Person Communication at Banquet Dinner.

4. Nathan J (2002) The painter and handicapped vision. Clin Exp Optom 85(5): 309-314.

5. Captain Alan Lewis of the US Navy: Lecture-Discussions at SUNY College of Optometry New York.

6. Hargroves JA, Hargroves RA (1971) Bibliography of work on flashing lights (1711-1969). Vision Res 11(2): 1-111.

7. Werner JS (2016) The Verriest Lecture: Short-wave-sensitive cone pathways across the life span. J Opt Soc Am A Opt Image Sci Vis 33(3): 104-122.

8. Aggarwala KR (1998) Chromatic mechanisms in the control of ocular accommodation. USPTO Copyright All Rights Reserved.

9. Flitcroft DI (1989) The interactions between chromatic aberration, defocus and stimulus chromaticity: implications for visual physiology and colorimetry. Vision Res 29(3): 349-360.

10. Guth SL, Massof RW, Benzschawel T (1980) Vector model for normal and dichromatic color vision. J Opt Soc Am 70(2): 197-212.

11. Westheimer G (2008) Illusions in the spatial sense of the eye: geometrical-optical illusions and the neural representation of space. Vision Res 48(20): 2128-2142.

12. Levi DM, Carney T (2009) Crowding in peripheral vision: why bigger is better. Curr Biol 19(23): 1988-1993.

13. Cooper RF, Brainard DH, Morgan JIW (2020) Optoretinography of individual human cone photoreceptors. Opt Express 28(26): 39326-39339.

14. Fishman RS (2007) Nobel Prize of 1906. Arch Ophthal 125(5): 690-694.

15. Fesenko EE, Kolesnikov SS, Lyubarsky AL (1985) Induction by cyclic GMP of cationic conductance in plasma membrane of retinal rod outer segment. Nature 313(6000): 310-313.

16. Thorn F, Gwiazda J, Held R (2005) Myopia progression is specified by a double exponential growth function. Optom Vis Sci 82(4): 286-297.

17. Aggarwala KR, Timur J (1997) Clinical Records Review and Literature Searches: Morris County of New Jersey.

18. Aggarwala KRG, Richer SP (2019) Influencing Myopia: Science and Clinical Practice; Review of Optometry (Jobson Publishing).

19. Aggarwala KRG (2020) Ocular Accommodation Intraocular Pressure; Development of Myopia and Glaucoma: Role of Ciliary Muscle, Choroid and Metabolism. Med Hypothesis Discov Innov Ophthalmol 9(1): 66-70.

20. Liang YB, Vasudevan B, Lin Z, Zhou HJ, Ciuffreda KJ (2020) The Effect of Eye Exercises of Acupoints on Myopia Progression: A 3-Year Cohort Report from the Beijing Myopia Progression Study. Risk Manag Healthc Policy 13: 2793-2799.

21. Boccardo L (2020) Viewing distance of smartphones in presbyopic and non-presbyopic age. J Optom.

22. (2020) What Science Says About Blue-Light-Blocking Glasses.

23. Hardell L, Carlberg M, Koppel T, Hedendahl L (2017) High radiofrequency radiation at Stockholm Old Town: An exposimeter study including the Royal Castle, Supreme Court, three major squares and the Swedish Parliament. Mol Clin Oncol 6(4): 462-476.

24. Hao Y, H., Zhao L, Peng, RY (2015) Effects of microwave radiation on brain energy metabolism and related mechanisms. Military Medical Research 2: 4.

25. Kruger PB (2009) Aberrations of the Eye-Crude flaws or ecological design?. Journal of Optometry 2(4): 162-164.

26. Aggarwala KR, Kruger ES, Mathews S, Kruger PB (1995) Spectral bandwidth and ocular accommodation. J Opt Soc Am A Opt Image Sci Vis 12(3): 450-455.

27. Rucker F (2019) Monochromatic and white light and the regulation of eye growth. Exp Eye Res 184: 172–182.

28. Rucker F, Britton S, Taylor C (2018) Color and Temporal Frequency Sensitive Eye Growth in Chick. Invest Ophthalmol Vis Sci 59(15): 6003–6013.

29. Okano K, Ozawa S, Sato H, Kodachi S, Ito M, et al. (2017) Light- and circadian-controlled genes respond to a broad light spectrum in Puffer Fish-derived Fugu eye cells. Sci Rep 7: 46150.

30. Wright PC, Tecot SR, Erhart EM, Baden AL, King SJ, et al. (2011) Frugivory in four sympatric lemurs: implications for the future of Madagascar's forests. Am J Primatol 73(6): 585-602.