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Impacts of the Aging Process on the Eyesight and its treatment by Avastin

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Abstract

The eye is one of the delicate organs that easily suffer the physiological processes of aging. However, an explicit mechanism of how aging affects human eye sight is not well expressed. Hence, this article seeks to present a review of the age-related physiological such as Age-related Macular Degeneration processes that affects human eyes sight. A 2-year comparison showed that the drugs Avastin (Bevacizumab) and Lucentis (Ranibizumab) lead to similar vision improvements in patients with Age-related Macular Degeneration (AMD).

Keywords: Avastin; Macular Degeneration; Lucentis; Choroidal Blood Capillaries, Choroidal Neovascular Membrane

Impacts of the Aging Process on the Eyesight

This article seeks to detail some of the age-related physiological processes and their negative consequential impacts on the human eyesight and vision. As such, the intrinsic changes in the retina as well as the choroidal blood capillaries are examined. Aging is a complex process with gradual impacts on the efficiency of many organs which poses several intrinsic changes to diverse cellular and molecular activities within the body. The eye is one of the vulnerable organs that readily suffer the negative consequences of aging due to the fragility in its photoreceptor elements. As denoted by Bonilha et al., aging exposes the pigment epithelial cells of the retina to a number of structural changes that can gradually lead to loss of vision [1]. In their review, Ehrlich et al., also present the same idea and further explicate that these structural changes severely affect the retinal Macula and predisposes one to Age-related Macular Degeneration [2]. As cells age, they experience significant physiological changes that are

inexorably responsive to the genetic modulations. The pigment epithelial cells of the retina are example of such cells whose efficiency rolls back with age. While still young, potent and powerful, these cells actively discriminate the substances that stream from the choroidal blood capillaries to the outer sections of the retina [3]. On top of that, de Jong et al. also explain that they are also charged with the responsibility of rejuvenating the photoreceptors (cones and rods) of the retina. Still on the same note, pigment epithelial cells also contribute to the generation signals that are relayed through the optic nerves [4]. Bonihla et al. further highlights that as time progresses, the functioning and competency of the pigment epithelial cells suffer from the accumulated debris (lipofuscin) and other residual bodies [1]. These inflict undesired structural changes in the retina that are accompanied by irreversible pleomorphism, reduction in the melanin accumulation and a general decreased cellular number. As a result, the active role of the Bruch's membrane deteriorates, retina macula befalls the impairment, light is not received, and vision acuity is either reduced or lost. Away from the pigment epithelial cells, Funk & Alamouti et al. also explain that the thickness of the retina decreases with age [5]. This is another equal input that demonstrates a high possibility of ocular hypertension, glaucoma and vision loss in the aged. From their experiment, Funk & Alomauti et al. established that the average decrement in the retinal thickness is 0.53 μm per year [5]. This, decrease comes about as a reciprocated effect of the enlargements of the neuroretical rim, a condition that often precedes glaucoma. Arguably, the reduced plasticity of the choroidal blood capillaries could also contribute to the restricted retinal thickness. Aging is already unmasked as a naturally irresistible phenomenon that affects most of the fundamental cellular processes. With more serious effects on rapidly dividing cells and fragile organs like the eye, aging produces gradual and debilitating effects on vision. It directly leads to the buildup of metabolic debris within the pigment epithelial cells. Such metabolites are large efficacious agents that easily interrupt the light-receiving role of the retinal macula. Together with the slow contraction of the retina, these structural changes successfully result into reduction of vision acuity. There are many drugs that are used to treat age related eye disorders but the most effective is Avastin and Lucentis [6]. Avastin (Bevacizumab) is a medication used for the treatment of a number of types of cancers and a specific eye disease. For, cancer it is given by slow injection into a vein and used for colon cancer, lung cancer, glioblastoma, and renal-cell carcinoma. For age-related macular degeneration it is given by injection into the eye. It was first approved by FDA in February 2004. It has recently been used by ophthalmologists in an off-label use as an intravitreal agent in the treatment of proliferative (neovascular) eye diseases, particularly for Choroidal Neovascular Membrane (CNV) in AMD [7]. Many retina specialists have noted impressive results in the setting of CNV, proliferative diabetic retinopathy, neovascular glaucoma, and diabetic macular edema, retinopathy of prematurity and macular edema secondary to retinal vein occlusions. Avastin (Bevacizumab) inhibits the growth of blood vessels, which is part of the body's normal healing and maintenance. The body grows new blood vessels in wound healing, and as collateral circulation around blocked or atherosclerotic blood vessels. One concern is that Avastin (Bevacizumab) will interfere with these normal processes and worsen conditions like coronary artery disease or peripheral artery disease [8]. A 2-year comparison showed that the drugs Avastin (Bevacizumab) and Lucentis (Ranibizumab) lead to vision improvements in patients with age-related macular degeneration (AMD). The study also found that visual gains were slightly better with monthly rather than as-needed treatments. In 2008, NIH's

National Eye Institute (NEI) launched a 2-year clinical trial to compare the 2 drugs. The study, called the Comparison of AMD Treatments Trials (CATT), published its first-year results in May 2011. That initial report found that both drugs were equally effective in preventing vision loss from AMD. The new report describes the findings from the trial's second year. It appeared in the April 30, 2012, online edition of Ophthalmology. At enrollment, about 1,200 patients with AMD were randomly divided into 4 treatment groups. The groups were defined by drug (Avastin or Lucentis) and dosing regimen (monthly or as-needed). After the first year, patients on monthly dosing were randomly reassigned to monthly or as-needed regimens. All continued to receive their initial drug. By year 2, the researchers found that both drugs led to similar improvements to vision. At least 60% of patients in all groups achieved 20/40 vision or better-the level needed for driving. In contrast, earlier research showed that less than 15% of AMD patients receiving previously available treatments could attain that level of visual accuracy. The study found slightly less vision gain with as-needed than with monthly dosing, regardless of the drug. As measured on an eye chart, monthly treatment resulted in a mean improvement of about half a line better than as-needed dosing. Switching to as-needed treatment after a year of monthly dosing led to outcomes nearly equal to those obtained with 2 full years of as-needed treatment. Moreover, it has some side effects like GI perforation, abnormal passage in the body, severe high blood pressure, Kidney problems, serious bleeding, Infusion-related reactions and severe stroke or heart problems [9-10].

Ethics Approval and Consent to Participate

Not Applicable.

Human and Animal Right

No animals/Humans studies that are base of were used for this research.

Consent for Publication

Not applicable.

Conflict of Interest

The author confirmed that this article content has no conflict of interest.

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