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[Review Article]

The Effects of Hormones on The Eyes and Blurry Vision in Rabbits, Kittens, Rats, and Humans

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Abstract

THIS REVIEW explains that various hormones are chemical messengers affecting eyesight and vision. Several factors, including side effects, hormonal changes during pregnancy, and pharmaceuticals, which include hormone replacement treatment or oral contraceptives, can cause blurred vision. Furthermore, hormones like thyroid hormones, melatonin, estrogen, testosterone, cortisol, insulin, growth hormone, prostaglandins, adrenaline, and noradrenaline can affect the function of the eyes and vision, and their imbalances or abnormalities can cause changes in vision, including blurry vision. Consequently, growth hormone (G.H.) plays an important role in the visual organs of birds, reptiles, and mammals. The importance of growth hormone in ocular function, both under normal physiological conditions and in abnormal pathological conditions, appears significant. In addition, stress can impact hormone levels and potentially lead to vision problems. Cortisol is a hormone that is secreted during stress times which has been studied in both wild and domestic cats. Hence, medical conditions such as diabetes can affect the ocular and visual systems through changes in hormone levels. So, the neurotransmitters dopamine, noradrenaline, and serotonin have an inhibitory effect on the visual cortex. Additionally, they inhibit the neurotransmitter acetylcholine. When excitations are induced for extended periods, this can result in inhibition. The results show significant differences between species that could affect their vision abilities. In conclusion, hormones play an important role in maintaining visual health and regulating any hormonal irregularities or dysfunctions that may arise in these systems. Thus, animals with hormonal systems like humans may experience blurry vision due to the effects of hormones on their eyes.

Keywords: Blurry vision, Hormones, Animals, Humans.

Introduction

Hormones are chemical messengers affecting eyesight and vision. In addition, they play a significant role in the eyes' function and vision. Some research has proven that disorders or irregularities can affect hormone levels in the eyes and cause alterations in vision, such as blurred vision (1). The thyroid glands of all animals secrete the hormones triiodothyronine and thyroxine hormones, which have an essential function in the growth and initial metamorphosis of mammals and amphibians. Hypothyroidism and hyperthyroidism can lead to dry eyes, resulting in blurred vision (2,3,4). Thyroid hormones are main for maintaining the structure and function of the tear film, which is critical for preserving the vision adequately tearful and lubricated. As a result, imbalances in thyroid hormones are the root cause of numerous eye-related problems (5). The endocrine system has a comprehensive influence on the cells and tissues of the human body. However, the outer layer of the eye, which is consistently exposed to hormones in the bloodstream, has receptors that

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react to these hormones. Thus, dry eye disease has multiple causes, one of which is endocrine abnormalities (6,7). The change in levels of hormones such as testosterone and estrogen can affect the eye and vision. When pregnant, hormonal fluctuations may cause dry eyes and changes in vision, causing a blurry vision (8). Women who have menopause are reduced in estrogen levels. It causes changes in the tear film of the eye and leads to visual problems and dry eyes (9,10). In addition, dry eye syndromes are more prevalent in women than in men, as estrogen effects the meibomian gland, resulting in blur of vision (11). Moreover, hormones may affect animal eyes differently and influence blurred vision. Endocrinopathies in small animals with endocrinopathies is susceptible to ophthalmic disorders such as cataracts, uveitis, keratopathy, and retinopathy, lipid abnormalities and systemic hypertension (12). Thus, growth hormones are essential for the development and growth of the eye. Deficiency in growth hormones can cause an eye disease, including impaired visual acuity and retinal detachment (13,14). Cortisol hormones have been shown to affect the eyes and vision of both humans and animals. Elevated cortisol levels can impair neuronal plasticity and excitability in the brain activity, impairing hippocampal function and memory retrieval (15).

Furthermore, cortisol receptors were found in various anatomical structures of the human eye, including the iris, trabecular meshwork, ciliary body, retina, and optic nerve (16). Complex hormones and nervous systems regulate tear film homeostasis. Sex hormones, especially androgens, are vital to the regulation of the immune system, the tear glands developmental functions, and meibomian glands functioning. These processes are necessary to maintain the visual aesthetics of the eyes. The cornea, tear glands, mucous cells, and meibomian glands have a large concentration of nerves, underscoring the crucial role of neural regulation in ensuring optimal functioning. Although specific processes are not entirely understood, sex hormones, especially androgens, are essential for controlling tear production. Androgens affect the structure, function, and immune response of the lacrimal gland in rats, rabbits, hamsters, and humans. Various hormones, including lutein, follicle-stimulating, prolactin, thyroid-stimulating, progesterone, and estrogen, appear to influence the normal regulation of tear formation (17,18,19).

The effects of hormones on the eyes and blurry vision in rabbits

Hormones have several effects on the eyes and vision. However, in certain pathological conditions of visual organ, alterations in the activity and localization of lysosomal enzymes and distribution in the functional state of lysosomal membranes, have been observed (20). The development of eye diseases may also be influenced by hormonal imbalances (21). Hormone replacement therapy (HRT) affects the opacity of the lens, levels of inflammatory cytokines, and antioxidant levels in rabbits (22). Abuse of drugs of like morphine and cocaine may impact in visual function in rabbits by modifying electroretinogram (ERG) amplitudes and the wavelength of maximum rhodopsin absorbance. It has been observed that estrogen affects eye function and low vision, particularly in older women, and may lead to visual impairments. Estrogens impact the histological structure of iridocorneal region and enhance the circulation of aqueous fluid in rabbits (23,24).

A study on rabbits found that alpha-melanocyte-stimulating hormone plays a significant role in the regulation of the blood-aqueous barrier in rabbits. In rabbits induced α-MSH leads to decrease the absorption of 3H-prostaglandin E1 in the iris with the ciliary body, as well as causing substantial damage to the blood-aqueous barrier. On the other hand, α-MSH cause moderate water-flushing response and increase the absorption of prostaglandin. As a result of severe barrier damage, the uptake of prostaglandin E1 decreased. Some studies have shown that the absorption of prostaglandin E1 increases with mild stimulation. It is uveitis that lowers prostaglandin uptake in the ciliary body of the rabbit iris. Imidazole and alpha-MSH also affect prostaglandin uptake (25). A study investigated the effects of injecting prostaglandins E1, E2, F1a, F2a, and A1 directly into the eye on the intraocular pressure (IOP) of rabbits that were under urethane anesthesia showed that except prostaglandin F1a, all prostaglandins studied caused a significant and lasting increase in intraocular pressure (IOP), often accompanied by miosis.

Prostaglandins primarily impact intraocular pressure (IOP) by causing local vasodilation and enhancing the permeability of the blood-aqueous barrier. The involvement of prostaglandins in the rabbit eye›s reaction to irritation has been a

subject of discussion (26). A study was conducted to investigate the impact of corticosteroids on the absorption of segmental hyphema in the eyes of rabbits have shown that systemic chloroquine has the same effect as steroids by causing partial hyphemas in the eyes of rabbits that were treated with corticosteroids and rabbits that were not treated (27). Testosterone and desoxycorticosterone stimulate the corneal regeneration of rabbits as these hormones can affect the eyes and cause blurry vision impairment. The results of these studies showed that testosterone, desoxycorticosterone, penicillin, and biomyci n were administered to rabbits, they have a stimulatory effect on corneal defect healing was observed (28,29).

The study discovered a transient increase in intraocular pressure when rabbits were administered high dosages of estrogens. Estrogens transiently elevate intraocular pressure in rabbits and have an impact on the iridocorneal (30). Another study investigated the effect of adrenaline, indomethacin, acetylsalicylic acid, dexamethasone, and cyclic adenosine monophosphate on the activity of lysosomal hyaluronidase in the iris of rabbits. The experiment was carried out using in vitro methodologies. Indomethacin and acetylsalicylic acid suppressed the catalytic function of lysosomal hyaluronidase (31). Hormones have a vital role in developing and advancing several eye diseases. Nevertheless, additional investigation is necessary to fully understand their influence and potential implementation in therapy (32).

The effects of hormones on the eyes and blurry vision in kittens

Hormonal signs, including sex steroids, play a role in the development and maintenance of the eyesight and vision of kittens (33,34). Increased levels of sex steroids, such as testosterone, were found to have a minor effect on ocular dominance in male kittens. Still, they did not significantly terminate the critical period for monocular deprivation (35). Furthermore, catecholamines, specifically norepinephrine, were found to be essential for ocular dominance plasticity in kittens during the critical period (36). Also, the infusion of 6-hydroxydopamine, a catecholamine-depleting agent, eliminated the effects of ocular deprivation, such as monocular and directional deprivation, indicating a general effect of catecholamines on ocular plasticity (37).

Hormones can potentially affect a kitten›s vision, which can result in blurred vision. The endocrine system contributes to the development and maintenance of normal vision. Estrogen, a type of hormone, has a notably impact on the visual abilities and low-level eyesight of elderly females, including kittens. Estrogen levels have been implicated in the development of various vision-related illnesses, including dry eye, cataracts, elevated glaucoma, intraocular pressure, and Leber›s hereditary optic neuropathy, and age-related macular degeneration (23).

Hyperthyroidism, a condition characterized by elevated levels of thyroid hormones, can cause vision impairment in kittens. A unilateral thyroidectomy and radioactive iodine therapy are the two main treatments for this illness which leads to the development of clinical hypothyroidism (38). Blurred vision in kittens can be caused by hormonal imbalances, specifically estrogen, thyroid hormone imbalances, and stress (39). Furthermore, cats with lesions in both central retinas may have impairments in their visual acuity. The results show that various factors, such as hormonal imbalances, dietary deficiencies, and retinal lesions, can affect the visual health of kittens (40).

The hormonal effect on the eyes of rats that leads to blurred vision

Estrogen, among other hormones, has been observed to impact rats› eyes and visual capabilities. Several studies on rats have shown that when ovarian or pituitary hormones are removed (oophorectomy or hypophysectomy), photoreceptors in adult rats that are exposed to constant light are not damaged as much (41). Conversely, there was a significant decrease in the total number of cell layers in the outer nuclear layer of the rat›s retina when exposed to high amounts of estrogen and continuous light (11). Additionally, studies have shown that giving rats higher doses of the anti-estrogen drugs tamoxifen and toremifene after exposing them to sunlight for a long time may cause a decrease in the thickness of the outer nuclear layer cell layers (42). Sex steroids and melanin aggregation hormones (MAH) are endocrine signals that impact the ocular system and visual perception in rats.

The endocrine system contributes to the development and maintenance of normal vision (34). Sex hormones, including testosterone and estradiol, are synthesized in the brain and gonads, influencing behavior and gene transcription (43). During early postnatal development, melanin-

aggregating hormones (MAH) activity has been detected in rats› blood and eye homogenates, with variations observed between different strains of rats (44). Estrogens can have positive and negative effects of feedback on gonadotropin secretion in female rats of various ages, testosterone inhibits gonadotropin secretion in rats at 20 days of age but not at 28 days of age (45). Hormonal fluctuations can cause blurred vision in rats. In one study, injecting rats with N-methyl-d-aspartate (NMDA) caused visual impairment with only partial recovery after a few weeks (46). Another study investigated the effects of exposure to bright light on rats and found that it caused degeneration of the outer retina, resulting in retinal photic injury(47). Furthermore, a study on retinal transplantation in rats indicated that human fetal retinal sheets developed mature photoreceptors and other retinal cells, resulting in enhanced vision (48). Consequently, hormonal changes and exposure to bright light can contribute to blurry vision in rats (49).

The effects of hormones on the eyes and blurry vision in humans

Sex steroid hormones, including estrogen, progesterone, and androgen, have been discovered to affect human ocular function and vision. Research suggests that estrogen levels have a notable effect on the functioning of the eyes and the ability to see at low levels, especially in older women (23). Males and females have different ocular physiopathology, and changes in hormone levels associated with age, menstrual cycles, pregnancy, and menopause can affect vision (8). Although the impact of estrogen on ocular disorders remains uncertain, androgens could potentially improve dry eye symptoms (50). Sex hormones like androgen, estrogen, and progesterone can provide neuroprotection to the retina and regulate blood flow in the eye (32).

Research has shown that being exposed to estrogen can help guard against glaucoma, whereas a lack of estrogen has been associated with the early development of the illness (51). Moreover, growth hormone has been linked to ocular dysfunctions, such as diabetic retinopathy. Excessive production of growth hormone within the eye may play a role in these dysfunctions (52). The occurrence of dry eye syndrome, which can result in unclear vision, is also associated with hormone disorders, but the connection is intricate and necessitates additional research (53,54). Hormones significantly impact the development and progression of eye disorders and may offer prospective therapy possibilities (55).

Thyroid hormones

Thyroid hormones, such as thyroxine and triiodothyronine, control ocular metabolism and maintain regular eye function. Thyroid hormones preserve regular ocular function, thyroid hormones have been observed to impact visual acuity and refraction. The thyroid gland secretes these hormones, which are crucial in regulating the metabolism of the eyes and other tissues (56). Thyroid hormones have been observed to impact visual acuity and refraction. Thyroid dysfunction is associated with decreased visual acuity and a higher occurrence of myopic refraction (57). In thyroid abnormalities, the thyroid gland produces hormones that regulate the metabolism. When there is an imbalance in these hormones, eye changes may result. For instance, hyperthyroidism (an overactive thyroid) can result in eye problems such as bulging eyes, double vision, and blurred vision (58).

Hyperthyroidism (an overactive thyroid) is a medical disorder when the thyroid gland produces a high thyroid hormone level which can cause eye problems in cats, including changes in the shape and size of the eyes and vision problems, including blurred vision and trouble observing in low light. The thyroid gland is found in the neck region and produces hormones that control the rate at which the body burns metabolism, when the thyroid gland is hyperactive and produces excessive thyroid hormone, various symptoms and health complications can occur (59,60,61,62,63,64). Chemicals that impact the development of zebrafish eyes may cause a disturbance in thyroid hormone. An investigation was conducted to examine the transcriptional alterations of genes associated with vision and their connection with ocular abnormalities and dysfunction. The study investigated the effects of propylthiouracil, a chemical that suppresses the synthesis of thyroid hormones, and tetrabromobisphenol-A, a compound that attaches to thyroid hormone receptors, were investigated. Regarding retinal defects, such as extreme microphthalmia and ganglion cell layer (GCL) cell density increases, the effects of THDC exposure on eye development were evaluated (65,66). The number of zebrafish affected was more significant in larvae treated with propylthiouracil compared to larvae treated with tetrabromobisphenol-A, as determined by analyzing the entire genome using microarray

technology to examine RNA extracted from eye tissue (67). Given the pivotal significance of thyroid hormones in controlling several physiological and developmental processes, any disruptions in these systems can impact the organism›s overall fitness characteristics. The transformation of lower vertebrates, encompassing the development of the skull and face and the formation of the eyes, is a crucial biological process controlled by thyroid hormones (TH), as seen in Figure 1 (68,69).

Melatonin

Melatonin is a hormone that regulates the sleep-wake cycle and is associated with eye effects. According to studies, the retina of most animals, including humans, is where melatonin synthesis occurs. It also affects the eyes because it may cause pupils constriction and dilation, affecting vision sensitivity (70,71). Melatonin receptors are also identified in ocular tissues, indicating that melatonin may play functional roles in various eye regions (72). Likewise, melatonin has been found to have antioxidant properties. It can scavenge free radicals in ocular tissues, which may protect against ocular disorders like glaucoma, age-related macular degeneration, and cataracts (73,74). Melatonin has been observed to regulate visual sensitivity and pupil size in the eye. It can cause pupil constriction and dilation, altering the amount of light entering the eye and the clarity of vision. Research on animals suggests that melatonin may protect the retina, reducing oxidative stress and inflammation (75,76).

It has been shown that melanin improves the blurred vision under certain conditions. In a study conducted by Sandyk, patients with multiple sclerosis (MS) have improved their visual awareness during the day, but they improve at night, coinciding with the circadian secretion of Melatoin (77). Melatonin has been demonstrated to affect animal vision. A study on rats with optic neuritis (ON) found that optic neuritis (ON) decreased the blue light-evoked pupillary light reflex (PLR), indicating an effect on visual function (78). A further investigation of uveitis in hamsters found that melatonin preserved the blood-ocular barrier and prevented inflammation-induced morphological changes in photoreceptor outer segments (79). The result visual acuity improved dramatically following the administration of melatonin in humans (80).

Estrogen

It has been observed that estrogen levels have a significant affect on low vision and ocular function, particularly in older women. Estrogen is a hormone of women that affects normal eye function. When estrogen levels decrease during menopause, women may have dry eyes, blurred vision, and other eye problems (23,81,82). The effects of sex steroid hormones have shown differences in eye physiopathology between men and women (8). The effect of estrogen has been shown in a number of vision-related disorders, such as dry eyes, cataracts, ocular hypertension, glaucoma, age-related macular degeneration, and optic neuropathy (83).

Previous animal studies have demonstrated that replacing estradiol for an extended period within a low physiological range improved the condition of ischemia-induced brain injury in female rats who had undergone ovariectomy. Thus, estrogen may have a potential neuroprotective impact (84). Moreover, the interaction between DYX1C1 and estrogen receptors (ERs) has been observed, suggesting that estrogen may play a role in brain development and cognitive functions (85). Consequently, estrogen replacement therapy may be beneficial in preventing glaucomatous neurodegeneration and minimizing neuronal loss in optic nerve infarcts (86,87). Studies on female rats have demonstrated that reduced estrogen increases retinal vascular permeability (88). Furthermore, estrogen and progesterone directly affect corneal cells, as estrogen receptors have been identified in the corneas of mice (89). Additionally, ovarian steroids, such as estrogen, have widespread effects throughout the brain, including the hippocampus, spinal cord, and basal forebrain cholinergic system, which can influence cognition and affect mood (90). Hence, estrogen hormonal levels can influence blurred vision in animals by affecting ocular function, retinal vascular leakage, corneal cells, and brain structures involved in vision and cognition (91).

Testosterone

Testosterone is generated mainly in the testes of men’s and women’s ovaries. It is essential in developing and preserving reproductive tissues and secondary sex characteristics. Yet, testosterone also affects other body tissues, such as the eyes (92,93,94). Testosterone may also have anti-inflammatory effects on the eye, which could help reduce the risk of certain eye disorders (95). The testosterone hormone can affect vision. A man with low testosterone levels was found to have bilateral peripheral vision loss, which was subsequently attributed to a sellar mass

compressing the optic chiasm (96). Another study examined the relationship between testosterone and retinal microvascular caliber and found that low testosterone levels in men are associated with changes in retinal microvascular caliber, associated with hypertension and cardiovascular disease risk (97). Testosterone is the hormone affected by visual animals. Studies have shown that sex steroids, including testosterone, can influence preference, mate choice, emotion and recognition, cerebral/perceptual asymmetries, and visual-spatial abilities (43).

Testosterone also induces morphological sex differences in the brain, including those associated with visual perception. It has been observed that testosterone stimulates particular cellular pathways in the brain, resulting in behavioral differences between the sexes in visual perception (98,99). Further, testosterone can influence the transcription of specific proteins involved in neurotransmission, resulting in neuronal function alterations mediating behavioral changes (100). These results indicate that testosterone has both organizational and activational effects on the visual processing of animals, influencing both the formation and activation of visual pathways in the brain (101).

Cortisol

Cortisol is an estrogen-like hormone produced by the adrenal cortex of mammals. It is also known as hydrocortisone. It plays a role in how the body reacts to stress and has multiple functions, including regulating metabolism, blood sugar levels and influencing memory formation. Cortisol also affects eye health and vision (102). Cortisol, a glucocorticoid hormone, has been linked to several ocular disorders. Continuous illumination (CI) can lead to light-induced retinal degeneration (LIRD) by inducing oxidative stress in the retina (103). Glucocorticoids, including cortisol, are commonly used for their anti-inflammatory and immunosuppressive effects, but their mechanism of action in the eye still needs to be fully understood (104).

Due to the effects of corticosteroids on the trabecular meshwork of the eye, steroid-induced glaucoma, characterized by raised intraocular pressure, can occur (105,102). Increases in cortisol have been shown to affect perceptual learning and plasticity, possibly influencing visual function (106). Additionally, cortisol promotes the immune-stimulating effects of proinflammatory cytokines, such as interferon-υ, in human mononuclear phagocytes (107). Cortisol, a hormone the adrenal gland produces, has consequently been discovered to affect animal vision. Elevated cortisol levels have been linked to blurred vision and eye problems in fish and small marsupial mice (108).

Insulin

The hormone insulin is that controls the sugar level in the circulatory system. Diabetes retinopathy, which can result in vision loss, can be caused by high insulin levels (109,110). Insulin is involved in retinal function and can influence the a- and b-waves of the electroretinogram in bovine retinas (111). Insulin treatment in diabetic mice to increase vascular leakage in the retina, so the role of insulin in the retina remains controversial (112). Retinal degeneration throughout diabetes involves retinal neural cell apoptosis, which is treatable with insulin (113). Chronic administration of insulin eyedrops in conjunction with permeation enhancers is a safe method of treating diabetes (114). In the mice model of diabetes type 2, dysfunctional insulin signaling was observed in the retina, leading to elevated TNF levels and caspase 3 cleavage (115). Therefore, insulin has both beneficial and detrimental effects on the retina. Insulin has demonstrated potential as a therapeutic target for promoting dendrite regeneration and restoring synaptic density (116). However, insulin treatment has been linked to increased vascular leakage in the retina, possibly mediated by betacellulin and signals through the epidermal growth factor receptor in diabetic retinopathy (112).

In diabetes, insulin signaling in the retinal pigment epithelium has also been found to regulate photoreceptor function and contribute to reducing the oxidative stress and inflammation that occurs in the retina (117). In addition, Blurry vision in humans is influenced by insulin (118). It has been observed that uncontrolled diabetes mellitus can result in blurred vision, which is often the first and only symptom of type I diabetes mellitus (119). In diabetic retinopathy, retinal neovascularization, which can result in vision loss, has also been linked to insulin and IGF-1 signaling (120). Furthermore, insulin levels have been found to correlate positively with the severity of retinopathy in diabetic patients (121).

Growth hormone

Growth hormone (GH) has been observed to influence ocular development and function in fish, amphibians, birds, and mammals, among

other vertebrates (122,123). Some studies have shown that growth hormone (GH) is produced and functions extrapituitarily in ocular tissues (124). Nevertheless, concerns have been raised regarding the safety of growth hormone replacement therapy (GHRT) on the organ of vision, especially in children (34). (GHRT) on young patients› retina and optic nerve observed no adverse effects (125). Ocular dysfunctions and diabetic retinopathy were associated with growth hormone (52). In patients with ocular disease, growth hormone (GH) immunoreactivity is identical. The presence of recombinant pituitary GH was identified in the retina and vitreous fluid (126). Blurred vision can be a manifestation of uncontrolled diabetes mellitus (118). Growth hormone (GH) deficiency has been related to hypoplasia of the optic nerve and decreased blood vessel formation in the retina (127). Nevertheless, insulin-like growth factor1and fibroblast growth factor2 are associated with ocular enlargement, myopia, and lens changes (128).

Prostaglandins

Prostaglandins are a class of hormones found to influence the eyes. At high concentrations, they can cause ocular inflammation and hypertension, but at lower concentrations, they can reduce these effects (129). Prostaglandin analogues, including latanoprost and bimatoprost, are frequently used to treat glaucoma by decreasing intraocular pressure (IOP) (130). Obviously is evidence that prostaglandin F2 (PGF2) can increase uveoscleral outflow, which contributes to decreasing intraocular pressure (IOP) (131). Additionally, prolactin, another hormone, has been realized to provide trophic support to retinal cells, possibly preventing retinal degeneration (132). The effect of prostaglandins in ocular inflammation and glaucoma therapy suggests that they may influence vision (133). Thus, prostaglandins have been found to affect ocular function, including intraocular pressure elevation (131).

Adrenaline and noradrenaline

Adrenaline and noradrenaline are stress hormones released by the adrenal gland (132). Also, these hormones can cause blurry vision in humans (133). Additionally, adrenaline and noradrenaline can cause blurry vision in animals. Topical epinephrine administration to albino rabbit eyes resulted in a temporary increase in intraocular pressure in approximately 75% of the eyes (134). This increase was dose-dependent, occurring at 4% and 8% levels of the drug but not at 2% (135). Thus, adrenaline and noradrenaline infusion in conscious rabbits resulted in higher plasma levels of these catecholamines and decreased pressure responses to -methyl noradrenaline (136). Therefore, using adrenaline and noradrenaline can affect intraocular pressure and cardiac function, leading to blurry vision in animals (137).

Conclusion

In conclusion, hormones can significantly affect the eyes and vision, and hormonal imbalances or abnormalities can cause changes in the body that affect the eyes, leading to blurry vision as a symptom in animals and humans. Hormones like thyroid hormones, melatonin, estrogen, testosterone, cortisol, insulin, growth hormone, prostaglandins, adrenaline, and noradrenaline can affect the function of the eyes and vision. Several studies have shown the significant impact of hormones on the eyes and vision. Thyroid hormones, for example, play a pivotal role in the function of the eyes, and thyroid hormone imbalances can cause dry eyes, leading to blurry vision. Several studies have demonstrated that alterations in visual acuity and dry eyes, such as blurred vision, were caused by a change in estrogen level. Hormonal changes during pregnancy can cause hazy vision and dry eyes, contributing to blurry vision. Elevated glucose levels linked to diabetes can impair circulation of blood in the blood vessels of the eye, resulting in diabetic retinopathy. These signs could indicate the development of a syndrome that results in blurred vision and visual impairment, with its symptoms being either complete blindness or impaired vision. As a result, diabetes can cause hormonal imbalances that lead to poor vision. Moreover, hormone replacement treatment or birth control tablets might induce alterations in eyesight, such as blurred vision, as an adverse reaction.

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Conflict of interest

The authors of this review declare that there are no conflicts of interest to disclose in connection with its publication.

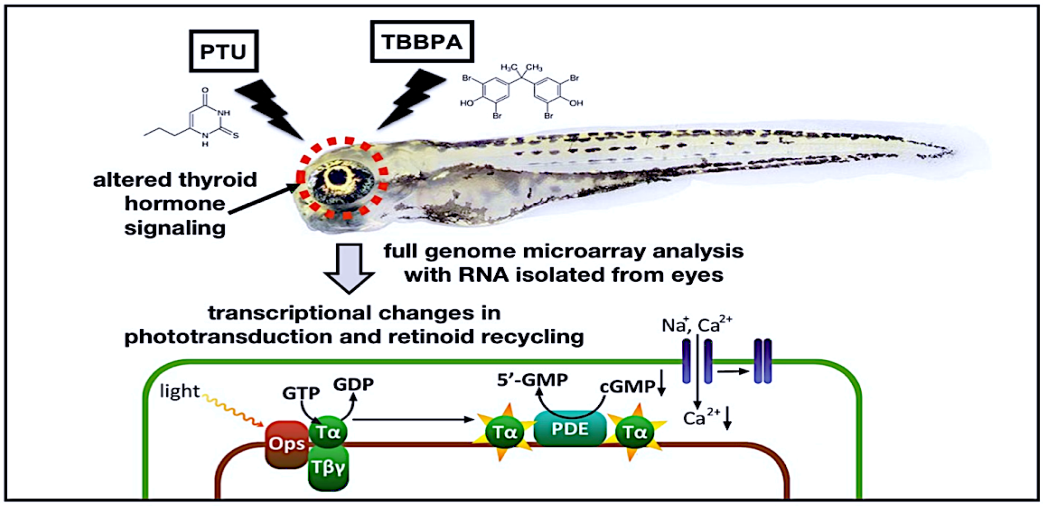

Fig. 1. The influence of thyroid hormones on the eyes of fish (67)

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مقالة لتأثير الهرمونات على العين وضبابية الرؤية عند الأرانب، القطط، الجرذان والبشر

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توضح هذه المقالة أن الهرمونات المختلفة عبارة عن رسل كيميائية تؤثر على البصر والرؤية. يمكن أن تتسبب عدة عوامل، بما في ذلك الآثار الجانبية والتغيرات الهرمونية أثناء الحمل والأدوية مثل العلاج بالهرمونات البديلة أو حبوب منع الحمل، في عدم وضوح الرؤية. علاوة على ذلك، يمكن أن تؤثر الهرمونات مثل هرمونات الغدة الدرقية، الميلاتونين، الأستروجين، التستوستيرون، الكورتيزول، الأنسولين، هرمون النمو، البروستاجلاندين، الأدرينالين، والنورادرينالين على وظيفة العينين والرؤية، ويمكن أن تؤدي اختلالاتها وافرازها غير الطبيعي إلى تغيرات في الرؤية، بما في ذلك الرؤية الضبابية. وبالتالي، يلعب هرمون النمو دورًا في عيون الزواحف والطيور والثدييات. الأهمية الفسيولوجية والفيزيولوجية المرضية لهرمون النمو في وظيفة العين مهمة. بالإضافة إلى ذلك، يمكن أن يؤثر الإجهاد على مستويات الهرمونات وقد يؤدي إلى مشاكل في الرؤية. الكورتيزول هو هرمون يفرز في أوقات التوتر. تمت دراسته في كل من القطط البرية والمنزلية. وبالتالي، يمكن أن تؤثر الحالات المرضية الطبية مثل مرض السكري على أنظمة العين والبصر من خلال التغيرات في مستويات الهرمون. لذلك، فإن النواقل العصبية الدوبامين والنورادرينالين السيروتونين لها تأثير مثبط على القشرة البصرية. بالإضافة إلى ذلك، فإنها تمنع الناقل العصبي أستيل كولين. عندما تحدث الإثارة لفترات طويلة، يمكن أن يؤدي ذلك إلى تثبيط. تظهر النتائج اختلافات كبيرة بين الأنواع التي يمكن أن تؤثر على قدراتهم البصرية. في الختام، تلعب الهرمونات دورًا مهمًا في الحفاظ على الصحة البصرية وتنظيم أي اضطرابات هرمونية أو خلل وظيفي قد ينشأ في هذه الأنظمة. وبالتالي، فإن الحيوانات التي لديها أنظمة هرمونية مشابهة للإنسان قد تعاني من رؤية ضبابية بسبب تأثيرات الهرمونات على أعينها.

الكلمات المفتاحية: الرؤية الضبابية، الهرمونات، الحيوانات، البشر.