

# The effect of ocular melanin density on human vision

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## Research Article

**Keywords:** eye melanin, sun light, Cylindrical Cells, color, difference

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# Title page:

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## Introduction:

The role of melanin density in eye protection has been known for several years, but its effect on vision is an issue that has not yet been answered. While we see every day people with different eye colors always disagree with each other about the exact color of objects. Our goal is to find out, does the density of melanin in the eye affect vision? If so, how is it?

## Abstract:

**Background:** Without discussing the effect of ocular melanin density on vision, let us make the logical assumption that since melanin is a protective factor for the eye, its lower density causes more sunlight to damage vision cells. The question is not how the melanin density of the eye affects vision, but how the melanin density of the eye affects vision. The purpose of this manuscript is to try to answer this question.

**Results:** After the test, it was found that in lighter eye color, due to the lower density of melanin, less protection against the sun's rays is provided to the vision cells, which caused the destruction or damage to the vision cells and makes the person perceive colors darker than people see that the density of melanin in the eyes is higher.

**Conclusion:** the color of each person's eyes indicates the density of melanin in the eye, the lighter it is, the lower the density of melanin in the eye, and since the melanin in the eye has a protective role for the vision cells against solar rays, the lower its density, the more severe the damage from solar rays. The

visual cells, especially the cylindrical ones, are increased and may affect the person's vision.

## Keywords:

eye melanin - sun light – Cylindrical Cells – color – difference

## Background:

The reason for the difference in color vision in different eye colors is an issue that has not been answered yet, but the effect of melanin concentration in the eye to protect the vision cells against solar rays has been investigated and proven. The purpose of this research is to investigate the effect of eye melanin density on vision and how it is.

## Methods:

The purpose of this research was to investigate the effect of eye melanin concentration on vision, so that at first an experiment was designed in which four 16-year-old girls with different eye colors were asked to accurately explain the color of a curtain and it was observed that the person who had a lighter eye color and in fact the density of melanin in her eyes was less than the others clearly described the color of the curtain as darker than the others and it was found that because melanin is considered a protective factor for the eyes, the denser the It protects the vision cells more, and in fact, the difference in the density of melanin in the eye, which causes the difference in eye color, causes the eyes to function differently by the vision cells to recognize the color of objects.

## Results:

An experiment was designed in which out of four 16-year old girls, two of them have black eye color (eye melanin density = high), one is brown (eye melanin density = relatively high) and the other is honey

( very light brown – eye melanin density = medium ), was asked to explain the color of a curtain under the same conditions, light and angle. Three of them, who had high or relatively high melanin density in their eyes, described the color of the curtain as a very bright red-orange-red, while the one who Melanin density of the eye was determined to be average, she clearly saw the color of the curtain darker in the same environmental conditions and described it as reddish brown.

Gender	Age	Eye color	Eye melanin density	The color seen by the person
Female	16	Black	High	Red-orange-red
Female	16	Black	High	Red-orange-red
Female	16	Brown	Relatively high	Red-orange-red
Female	16	Honey(very light brown)	Medium	Brown-red-brown

## Discussion:

The issue of the effect of eye melanin density on vision is a subject that has not been researched so far, and because I have done a study in this field for the first time, I needed more facilities and resources to be able to do my research in the best possible way. But since the internet speed in Iran is very low and many of the world's most reputable sites are filtered in Iran, and due to the protest conditions of the people inside the country, this situation has intensified so that I can hardly even access my email page. I do, because of this I couldn't even find the instructions needed to write a standard article to in what framework I should format the obtained data.

## Conclusion:

The test results prove that the brighter the eye color is due to the less density of melanin in the eye, due to the less protection of the vision cells against solar rays, some of them are damaged or destroyed, which affects the person's vision. And it makes him or her see colors a little darker than people who have more melanin density in their eyes and more protection of the vision cells of their eyes.

## Declarations section:

**Ethical Approval and Consent to participate:** Not applicable

**Consent for publication:** Not applicable

**Availability of data and materials:** Not applicable

**Competing interests:** Not applicable

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## List of Abbreviations:

I did not use any abbreviations.

Declarations Sections:

I am pleased to publish this manuscript.

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## Manuscript:

Under the same environmental conditions, there may be disagreement over the color of an object between two different people, and the factor that causes this disagreement is pigments called Melanin, which are the main factors in determining eye color. The higher the amount of these pigments in the Iris and the denser their texture, the darker the color of a person's eyes; The same melanin concentration also depends on many factors such as hereditary, environmental, and other factors. The most important role of eye melanins is to protect the eyes from the sun's harmful rays. People with bright eyes (honey, blue, or green) have fewer sunscreens than other people. Therefore, they should protect their eyes from the sun more than other people.

The human eye consists of two types of light and color receptors in the Retina. Cylindrical cells are the photoreceptors of the eye that have a black and white vision and, depending on the amount of light received from the environment, determine the amount of darkness and brightness of objects. The number of cylindrical cells is more than the number of color receptors and reaches about 120 million; Cone cells, which are smaller in number than light receptors, have color vision and are divided into three distinct categories, each of which recognizes one of the colors blue, red, and green, allowing the individual to distinguish colors.

When a person is exposed to sunlight, the rays of sunlight hit a part of the back of the eye called the Yellow spot. The cylindrical cells receive these rays, make a neural message from them, and send them to the occipital region of the brain, where they are examined and answered if necessary. At this time, a large amount of ultraviolet light is received by the eye and destroys parts of the light receptors. Because

people with bright eyes have less melanin in their eyes than people with dark eyes, the lack of this protective factor means that the light receptors in their eyes are more damaged and destroyed than in other people. This difference in the number of light receptors in the eyes of different people causes a difference in the amount of light they receive from the environment; For this reason, people with bright eyes see colors a little darker than others; But this amount is so small that it is not very visible in everyday life and only appears as a slight difference of opinion between people with different eye colors.