



Lasers in Medicine

Presented by

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Third year students

1. Retinal Images of Diffuse Reflections

diffuse reflection is the opposite of regular reflection, which is the reflection that does not fulfill the law of reflection, so the light rays are scattered and reflected as they are, and the angle of incidence violates the angle of reflection. And the reflection in this way is what allows the human eye to see objects. For example, when the light falls on the book, it is reflected in various directions, so everyone around it sees it, unlike the mirror, which reflects the light in one direction and at one angle, so only the one standing in front of it sees the mirror. And random reflection is the principle of the work of the scatterer, which scatters all the rays of light falling on it. And the randomness of rebounds increases with the increase in the roughness of the surface of the body, and therefore it is used to examine the smoothness and roughness of surfaces.

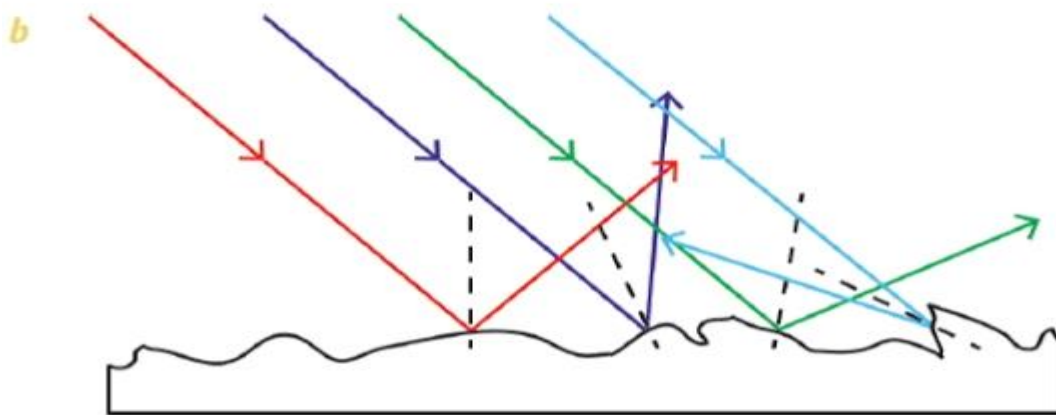


Figure (1) shows Diffuse Reflections



2. How the Eyes Sense Light

With the rare exceptions of animals that live deep underground and that have lost their sight, all living organisms can sense light.

In human eye (The human eye is similar to a camera), light passes through a clear protective covering (the cornea) to enter the eye, and then passes through a small aperture (the iris) to enter the eye itself. Inside the eye and behind the iris is a small lens (Just as with a camera lens), the light is refracted and focused on the back of the eye. Finally, at the back of the eye is the retina, which plays the same role as film (in a non-digital camera) or a light-sensing CCD (Charge-Coupled Device) chip (in a digital camera). The retina is filled with cells that detect the focused image, transform that into nerve impulses, and shoot the information off to the brain through the optic nerve. The brain is where the image is formed – not in the eye. The eye is simply a light detector, and the brain is where “seeing” takes place.

3. How does the eye work?

We can liken the idea of the eye to the camera that we use in photography, that process in which the camera collects the light reflected from the body by the camera lens on the film, and then the chemical process takes place to convert the image stored in



the film into an image that can be printed on paper to get a picture in our hands of a scene Specific photographed, and the eye also collects the light reflected from the object or scene we are looking at and focuses it inside the eye. To clarify how the vision process takes place, we will look at the structure of the eye.

Given the environment around an individual, the vast majority of visible objects are seen primarily by reflection diffuse from their surface. This applies with a few exceptions, such as glass, reflective liquids, polished or smooth metals, shiny objects, and things that emit light themselves: the sun, lamps, computer screens (which emit diffused light). It's the same outdoors, except maybe a transparent stream or the iridescent colors of the beetle. In addition, Rayleigh scattering is responsible for the blue color of the sky, and Mei scattering for the white color of water droplets in clouds. Light scattered from the surfaces of objects is by far the primary light that humans perceive visually.

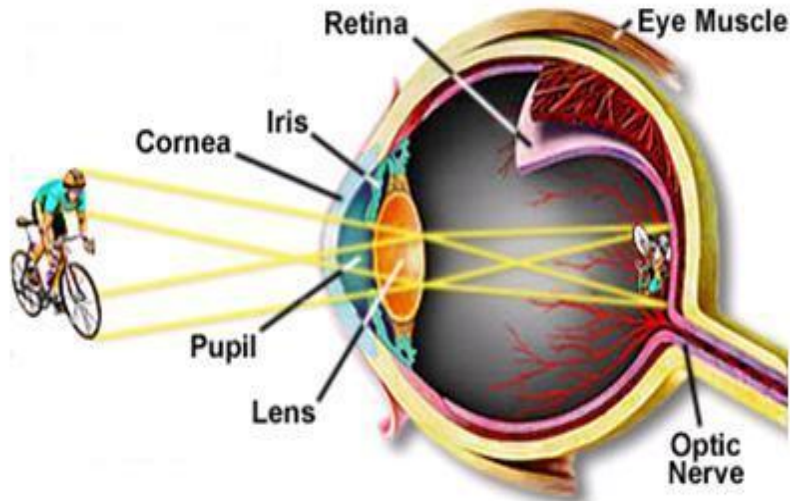


Figure (2) shows how objects are seen by the eye

4. **The importance of vision**

The image formed by the diffused reflection is never a sharp or a clear image because of the roughness of the surface as the rays are randomly reflected in all directions. We can obtain a blurry image or no image at all. But the rays falling on the irregular objects around us, enter our eye lens which form a real image on the retina of the eye. Hence, we are able to see the objects. On the other hand, in the image formed by a plane mirror, first the light rays fall on the object, get reflected towards the mirror which forms a virtual image. Then the light rays from the virtual image fall on the eye lens which forms a real image on the retina of the eye. Hope you understand the difference.