# PERIPHERAL RETINAL DEGENERATIONS

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OF THE REQUIREMENTS

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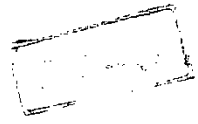


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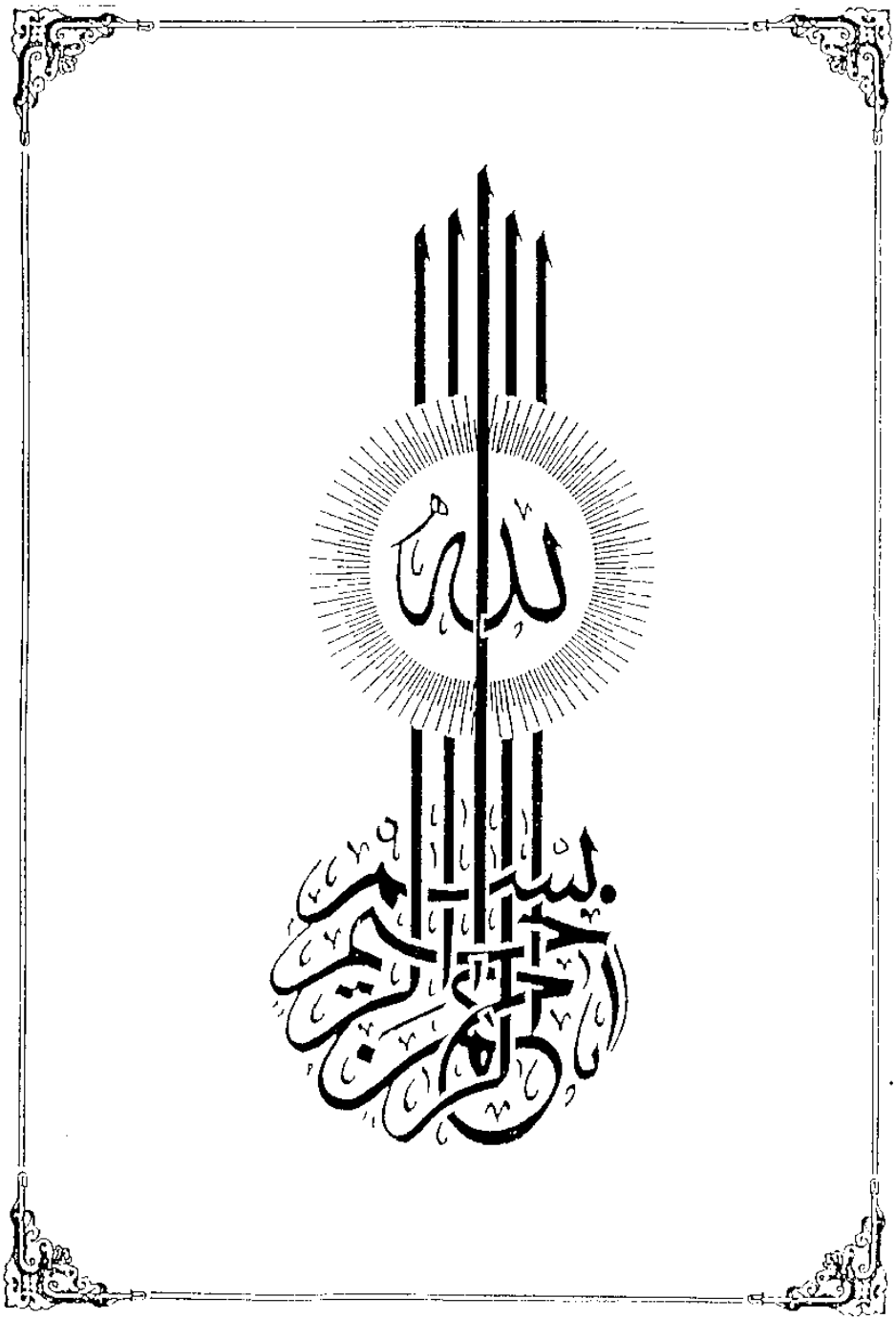

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# INTRODUCTION

## INTRODUCTION

In recent years the peripheral retina has been the subject of increasing attention. Improved methods for its clinical examination have been developed, and as a result of this, conditions which previously often escaped detection or only detected in their late stages are now being detected more frequently and earlier **(Dobbie, 1969).**

The degenerations of the peripheral retina are classified by **Foos, Spencer and Straatsma in 1969** into:

a- Trophic degenerations which include vitreous base excavation, retinal holes, cystoid degeneration, degenerative retinoschisis and paving-stone degeneration.

b- Tractional degenerations which include retinal tufts, folds and tears.

c- Trophic and Tractional degenerations which is represented by lattice degeneration.

This thesis intends to be a review of the literature about the degenerations which affect the peripheral retina.

The following will be studied:-

1- Anatomy of the retina.

2- Different degenerations of the peripheral retina.

   a- Histopathology.

   b- Clinical picture.

   c- Methods of diagnosis.

   d- prognosis.

3- Treatment of different degenerations.

# ANATOMY OF THE RETINA

## Anatomy of the Retina

The retina is the innermost of the ocular tunics. External to it is the choroid and internaly it rests on the hyaloid membrane of the vitreous body. It extends from the entrance of the optic nerve to the pupillary margin of the irris. The retina is extremely thin, its thickness at the posterior pole is approximately 0.5 mm, at the equator 0.2-0.3 mm, and at the ora serrata about 0.1-0.2 mm. Microscopic examination of the sensory retina reveals 10 layers. Fig. (1):

### 1- Pigment epithelium:

It is derived from the outer layer of optic cup. The pigment epithelial cells at the posterior pole are smaller, and greater in number per unite area than at the periphery. The cells are bound together by zonula occludents preventing exchange of fluid in between pigment cells. There are no tight junctions between the pigment epithelium and sensory retina, only mucopoly saccharide ground substance fills the inter-cellular spaces (Peyman, 1980).

### 2- Rod and cone layer:

Rods and cones are the neural elements that transform light into electrical energy. Cons are approximately

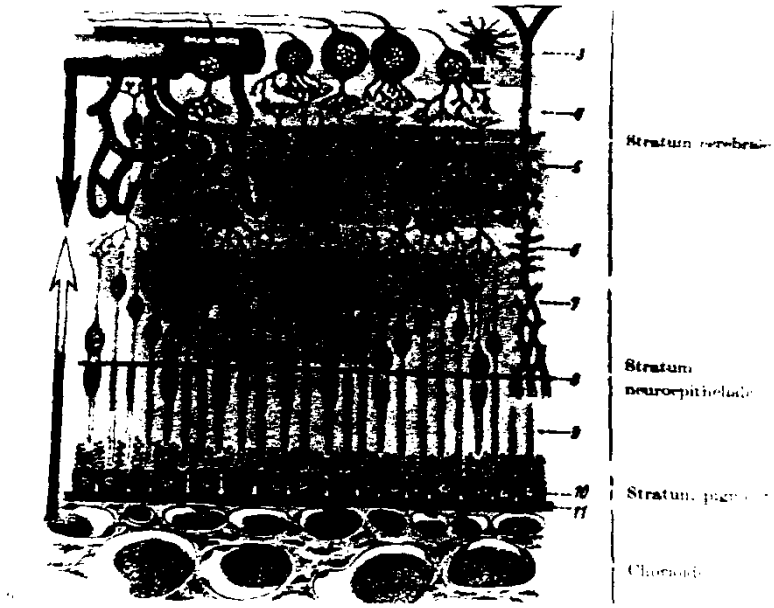


Fig. (1). Section through retina (Schematic diagram of retinal neurons). From (Atlas of diseases of the eye) by Dr. Thiel, R. Vol. II, 1963.

6 million with highest density at the fovea. Rods are approximately 120 million, which are absent at the fovea and reach their maximum density about 20° from it. Each photo receptor consists of a cell body and nucleus in the outer nuclear layer, a cell process that extends into the outer plexiform layer, and inner and outer segments. The rod outer segments are composed of numerous lipid-protein lamellar discs, and surrounded by cell membrane. The outer segment is attached to the inner segment by the cillium. The inner segment consists of outer portion (ellipsoid) containing abundant numbers of mitochondria and an inner portion (myoid). The cone outer segments have a more conical shape, the inner segments are similar to the rod structure, however the cone ellipsoid is very plumpand contains large number of mitochondria **(Wolff, 1976).**

3- **Outer limiting membrane:**

It is a series of encircling modifications of the plasma membranes of the photoreceptors and Muller's cells **(Peyman, 1980).**

4- **Outer nuclear layer:**

This layer contains the nuclei of the photoreceptor cells. The rod and cone inner fibres continue to the outer plexiform layer to synapse with the second visual neuron.

Most cone nuclei lie in a single layer next to the outer limiting membrane. Rod nuclei form the bulk of the multi-layered outer nuclear layer **(Peyman, 1980).**

5- **Outer plexiform layer:**

It contains the synapses between the photoreceptors and the processes of the bipolar and horizontal cells

6- **Inner nuclear layer:**

The cell bodies of the four cells can be distinguished in this layer. The most numerous cells are the bipolar cells, the horizontal cells located at the outer border of this layer, the amacrine cells are located within the inner most part of this layer, Muller's cells are located within this layer **(Wolff, 1976).**

7- **Inner plexiform layer:**

This layer contains the synaptic processes between bipolar cells (second neuron), ganglion cells (third neuron) and the integrative amacrine cells **(Peyman, 1980).**

8- **Ganglion cell layer:**

The ganglion cells are the third neuron in the visual pathway. Throughout the retina, the ganglion cell layer is composed of a single row of cells, except at the macular region, it becomes multilayered up to 6-8 layers.

9- **Nerve fibre layer:**

The unmyelinated axons of the ganglion cells form this layer, converging at the optic nerve, passing through lamina cribrosa, and become ensheathed by myelin forming the optic nerve. Nasally the fibres converge towards the disc, while the temporal fibres run in an arcuate fashion passing around the fovea. Axons from the fovea pass directly to the disc in the papillo macular bundle **(Peyman, 1980).**

10- **Inner limiting membrane:**

It is a true basement membrane, forming the inter surface between retina and vitreous.

* **Ora serrata:**

The termination of the retina anteriorly is the ora serrata. It represents the scalloped anterior edge of the retina lying 8 mm from the limbus, about 6 mm from the equator and 25 mm from the optic disc. Nasally the ora is about 1 mm nearer to the root of the irris than on the temporal side. At the ora serrata the retina is firmly adherent to the choroid, here also the vitreous is firmly adherent to the retina. In section, the ora appears as atongue-shaped process having the following features **(Wolff, 1976):-**

1- Dentate processes (Teeth of the ora):

These are forward-pointed extensions of the retina that project anteriorly for 0.5 to 2.5 mm. They are more marked nasally than temporally. Large processes may extend for an appreciable distance on to the pars plana and pars plicata.

2- Ora bays:

These are the convex curves enclosed between the adjacent ora teeth, occasionally abnormal ora bays are observed eg. a deep ora bay which extends more than 2.5 mm and or enclosed ora bays which are completely separated from the pars plana anteriorly by retinal tissue, it would clinically simulate a retinal break (Schepens, 1950).

3- Fixed folds:

Many normal fundi exhibit small meridional fixed retinal folds on the nasal side of the ora serrata particularly in the upper nasal quadrant. These folds are the exaggeration of the teeth of the ora serrata.

4- Granular tags:

These are embryonic remmants, appearing as opaque irregular masses protruding from the retina at the posterior margin of an ora bay. They are adherent to the vitreous and

may lead to retinal breaks, they may be mistaken for small peripheral opercula. However, their extremely small size, their peripheral distribution and their multiplicity are distinguishing features.

5- **Diffuse pigmentation at or close to the ora:**

This is particularly marked in dark fundi.

6- **Attachment of the vitreous base:**

This is 2-4 mm zone of firm vitreo retinal attachment, its anterior limit does not coincide with the ora serrata but lies in the middle of pars plana being marked by an irregularly pigmented line which often raises a low fold. The posterior limit of the vitreous base attachment is evidenced by another fold located in the peripheral retina parallel to the ora serrata and posterior to it.

7- **Ora serrata pearls:**

These are druzen-like structures seen where a retinal dentate process overlies the pars plana. They appear clinically as discrete glistening spherical bodies at the base of or within a dentate process. They are seen more frequently with advancing age **(Smith, 1967).**

8- **Cysts of the ora serrata:**

Cysts and retinoschisis at the ora are frequently seen in the lower temporal region.