In creating/revising this slide-set, I consulted the four BCSC books that have a lot to say on the subject: *Fundamentals*, *Neuro-Oph*, *Path* and *Glaucoma*. Unfortunately, all four differed from one another regarding many aspects of optic nerve anatomy. Some of these differences were trivial; others not so much.

As a comprehensive ophthalmologist, I have no familiarity with the primary literature concerning ophthalmic anatomy and histology. Thus, *I am in no position to declare which book is correct regarding points on which they differ*. The following slides represent my best attempt at compiling the disparate information in a manner that is reasonable and memorable. (As a matter of both interest and information, I have included some of the differing answers regarding certain aspects of the nerve.)

My main point: When answering questions regarding the optic nerve--whether such questions occur in a pimping session, on the OKAP or during the Boards--adopt and maintain a stance of flexibility.
In creating/revising this slide-set, I consulted the four BCSC books that have a lot to say on the subject: *Fundamentals, Neuro-Oph, Path* and *Glaucoma*. Unfortunately, all four differed from one another regarding many aspects of optic nerve anatomy. Some of these differences were trivial; others not so much.

As a comprehensive ophthalmologist, I have no familiarity with the primary literature concerning ophthalmic anatomy and histology. Thus, I am in no position to declare which book is correct regarding points on which they differ.

The following slides represent my best attempt at compiling the disparate information in a manner that is reasonable and memorable. (As a matter of both interest and information, I have included some of the differing answers regarding certain aspects of the nerve.)

**tl;dr:**
--When asked an optic-nerve question requiring a numeric response, phrase your answer along these lines: ‘Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be x.’
--When asked a question about optic-nerve vasculature, begin your response with ‘Bearing in mind that there is not universal agreement regarding this, many experts believe…’

My main point: When answering questions regarding the optic nerve—whether such questions occur in a pimping session, on the OKAP or during the Boards—adopt and maintain a stance of flexibility.
The optic nerves are composed of what?
The optic nerves are composed of what?
The axons of retinal ganglion cells
The optic nerves are composed of what?

The axons of retinal ganglion cells

How many fibers (axons) comprise an optic nerve?
The optic nerves are composed of what?

The axons of retinal ganglion cells

*How many fibers (axons) comprise an optic nerve?*

Depends upon which book you ask, but the answer **1.2M** works

- *Glaucoma book*: 1.2-1.5M
- *Neuro*: 1-1.2M
- *Fundamentals*: “more than a million”
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei.
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei

‘Most’? Where will the others synapse, and what are they responsible for?
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei.

‘Most’? Where will the others synapse, and what are they responsible for?
The hypothalamus, where they are involved in modulating circadian responses.
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei

‘Most’? Where will the others synapse, and what are they responsible for?

There is an important clinical entity caused by damage to the pretectum. This entity has four classic findings, one of which involves the pupils. What is the eponymous name of this clinical entity?
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei

‘Most’? Where will the others synapse, and what are they responsible for?

There is an important clinical entity caused by damage to the pretectum. This entity has four classic findings, one of which involves the pupils. What is the eponymous name of this clinical entity?
Parinaud syndrome
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei

‘Most’? Where will the others synapse, and what are they responsible for?
There is an important clinical entity caused by damage to the pretectum. This entity has four classic findings, one of which involves the pupils. What is the eponymous name of this clinical entity?
Parinaud syndrome

What is the classic pupil finding in Parinaud syndrome?
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei

There is an important clinical entity caused by damage to the pretectum. This entity has four classic findings, one of which involves the pupils. What is the eponymous name of this clinical entity?
Parinaud syndrome

What is the classic pupil finding in Parinaud syndrome?
Light-near dissociation
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei

‘Most’? Where will the others synapse, and what are they responsible for?

There is an important clinical entity caused by damage to the pretectum. This entity has four classic findings, one of which involves the pupils. What is the eponymous name of this clinical entity?
Parinaud syndrome

What is the classic pupil finding in Parinaud syndrome?
Light-near dissociation

What is light-near dissociation?
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei.

‘Most’? Where will the others synapse, and what are they responsible for?
There is an important clinical entity caused by damage to the pretectum. This entity has four classic findings, one of which involves the pupils. What is the eponymous name of this clinical entity?
Parinaud syndrome

What is the classic pupil finding in Parinaud syndrome?
Light-near dissociation

What is light-near dissociation?
A phenomena in which the pupils miose less robustly in response to light than they do as part of the near response.
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei

There is an important clinical entity caused by damage to the pretectum. This entity has four classic findings, one of which involves the pupils. What is the eponymous name of this clinical entity?
Parinaud syndrome

What is the classic pupil finding in Parinaud syndrome?
Light-near dissociation

What are the two noneponymous names for Parinaud syndrome?
1) Dorsal midbrain syndrome
2) Pretectal syndrome

What is light-near dissociation?
A phenomena in which the pupils mirose less robustly in response to light than they do as part of the near response

The near response is often referred to by what number-related name?
The near triad
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei.

There is an important clinical entity caused by damage to the pretectum. This entity has four classic findings, one of which involves the pupils. What is the eponymous name of this clinical entity?
Parinaud syndrome

What is the classic pupil finding in Parinaud syndrome?
Light-near dissociation

What are the two noneponymous names for Parinaud syndrome?
1) Dorsal midbrain syndrome
2) Pretectal syndrome

What is light-near dissociation?
A phenomena in which the pupils miose less robustly in response to light than they do as part of the near response.
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei

‘Most’? Where will the others synapse, and what are they responsible for?
There is an important clinical entity caused by damage to the pretectum. This entity has four classic findings, one of which involves the pupils. What is the eponymous name of this clinical entity?
Parinaud syndrome

What is the classic pupil finding in Parinaud syndrome?
Light-near dissociation

What are the two noneponymous names for Parinaud syndrome?
1) Dorsal midbrain syndrome
2) Pretectal syndrome

What is light-near dissociation?
A phenomena in which the pupils miore less robustly in response to light than they do as part of the near response

The near response is often referred to by what number-related name?
The near triad

Other than miosis, what are the other ocular responses of the near triad?
--Miosis
--
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei.

There is an important clinical entity caused by damage to the pretectum. This entity has four classic findings, one of which involves the pupils. What is the eponymous name of this clinical entity?
Parinaud syndrome

What is the classical pupil finding in Parinaud syndrome?
Light-near dissociation

What are the two noneponymous names for Parinaud syndrome?
1) Dorsal midbrain syndrome
2) Pretectal syndrome

What is light-near dissociation?
A phenomena in which the pupils miosis less robustly in response to light than they do as part of the near response.

The near response is often referred to by what number-related name?
The near triad

Other than miosis, what are the other ocular responses of the near triad?
-- Miosis
-- Convergence
-- Accommodation
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei

‘Most’? Where will the others synapse, and what are they responsible for?

There is an important clinical entity caused by damage to the pretectum. This entity has four classic findings, one of which involves the pupils. What is the eponymous name of this clinical entity? Parinaud syndrome

What is the classic pupil finding in Parinaud syndrome?
Light-near dissociation

What are the two noneponymous names for Parinaud syndrome?
1) 2)
The optic nerves are composed of what?
The axons of retinal ganglion cells

Do they synapse in the region of the optic nerve head?
No

Where will they synapse?
Most will synapse in the lateral geniculate nucleus (LGN)

Most? Where will the others synapse, and what are they responsible for?
Most of the others are involved in the pupillary light reflex; they peel off just prior to reaching the LGN, heading instead to the pretectum of the dorsal midbrain to synapse in the pretectal nuclei.

There is an important clinical entity caused by damage to the pretectum. This entity has four classic findings, one of which involves the pupils. What is the eponymous name of this clinical entity?
Parinaud syndrome

What is the classic pupil finding in Parinaud syndrome?
Light-near dissociation

What are the two noneponymous names for Parinaud syndrome?
1) Dorsal midbrain syndrome
2) Pretectal syndrome
Anatomically speaking, the optic nerve is considered to have four portions. What are they?
Anatomically speaking, the optic nerve is considered to have four portions. What are they?
Anatomically speaking, the optic nerve is considered to have four portions. What are they?
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>Orbital</td>
</tr>
<tr>
<td></td>
<td>Canalicular</td>
</tr>
<tr>
<td></td>
<td>?</td>
</tr>
</tbody>
</table>
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

<table>
<thead>
<tr>
<th>Portion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
</tr>
<tr>
<td>Orbital</td>
</tr>
<tr>
<td>Canalicilar</td>
</tr>
<tr>
<td>Intracranial</td>
</tr>
</tbody>
</table>
The Optic Nerve

Optic nerve (don’t memorize the lengths)
Anatomically speaking, the optic nerve is considered to have four portions. What are they? *How long is each?*

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>?</td>
</tr>
<tr>
<td>Orbital</td>
<td></td>
</tr>
<tr>
<td>Canalicular</td>
<td></td>
</tr>
<tr>
<td>Intracranial</td>
<td></td>
</tr>
</tbody>
</table>
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>?</td>
</tr>
<tr>
<td>Canalicular</td>
<td></td>
</tr>
<tr>
<td>Intracranial</td>
<td></td>
</tr>
</tbody>
</table>
Anatomically speaking, the optic nerve is considered to have four portions. What are they? *How long is each?*

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicualr</td>
<td>?</td>
</tr>
<tr>
<td>Intracranial</td>
<td></td>
</tr>
</tbody>
</table>

*Fundamentals: 25  Path: 25-30  Neuro: 30*
Anatomically speaking, the optic nerve is considered to have four portions. What are they?  

**How long is each?**

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td><strong>Intracranial</strong></td>
<td><strong>?</strong></td>
</tr>
</tbody>
</table>

*Fundamentals: 4-10  
Path: 4-10  
Neuro: 8-10*
Anatomically speaking, the optic nerve is considered to have four portions. What are they? 

**How long is each?**

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

The Optic Nerve

Fundamentals: 10
Path: 10
Neuro: 8-12
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
</tbody>
</table>

How long is the distance between the back of the eye and the orbital apex?
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
</tbody>
</table>

How long is the distance between the back of the eye and the orbital apex? About 18 mm
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

*The intraocular portion is also considered to have four portions. What are they?*

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

The Optic Nerve
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

The intraocular portion is also considered to have four portions. What are they?

### The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

- (innermost) → NFL portion → ? → (outermost)
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

**The intraocular portion is also considered to have four portions. What are they?**

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intraocular</strong></td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

*The intraocular portion is also considered to have four portions. What are they?*
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

The intraocular portion is also considered to have four portions. What are they?
The Optic Nerve

Optic nerve: Intraocular portion
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

How long is each?

The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

To what lamina is this referring?

The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canaliclar</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

The lamina cribrosa is the fenestrated hole in the posterior sclera through which the optic nerve exits. Does the lamina extend the entire thickness of the eye wall?

No, it is about 1/3 the thickness of the adjacent sclera.
**The Optic Nerve**

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicualr</td>
<td>10</td>
</tr>
<tr>
<td>Intracraniatial</td>
<td>10</td>
</tr>
</tbody>
</table>

**To what lamina is this referring?**

**The lamina cribrosa**

Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

- **Intraocular**: 1 mm
- **Orbital**: 30 mm
- **Canalicualr**: 10 mm
- **Intracraniatial**: 10 mm

To what lamina is this referring? The lamina cribrosa.

The lamina cribrosa refers to the fenestrated hole in the posterior sclera through which the optic nerve exits. Does the lamina extend the entire thickness of the eye wall? No, it is about 1/3 the thickness of the adjacent sclera.
Anatomically speaking, the optic nerve is considered to have four portions. What are they? The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

To what lamina is this referring? The lamina cribrosa

Lamina cribrosa? I thought that was the super-thin part of the medial orbital wall.

Lamina cribrosa? No, it is about 1/3 the thickness of the adjacent sclera.

You're thinking of the lamina papyracea.
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

**Portion** | **Length (mm)**  
---|---
Intraocular | 1  
Orbital | 30  
Canalicular | 10  
Intracranial | 10  

To what lamina is this referring? The lamina cribrosa

Lamina cribrosa? I thought that was the super-thin part of the medial orbital wall. You’re thinking of the lamina papyracea

The lamina cribrosa is the fenestrated hole in the posterior sclera through which the optic nerve exits. Does the lamina extend the entire thickness of the eye wall? No, it is about 1/3 the thickness of the adjacent sclera.
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

To what lamina is this referring?
The lamina cribrosa

What is the lamina cribrosa?

The lamina cribrosa is a fenestrated hole in the posterior sclera through which the optic nerve exits. Does it extend the entire thickness of the eye wall?

No, it is about 1/3 the thickness of the adjacent sclera.
Anatomically speaking, the optic nerve is considered to have four portions. What are they? The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

A

### The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

**The lamina cribrosa**

- **What is the lamina cribrosa?**
  - The fenestrated hole in the posterior sclera through which the optic nerve exits.

**To what lamina is this referring?**

- The lamina cribrosa

---

**A**

- Pre-laminar
  - Laminar
  - Retrolaminar
Anatomically speaking, the optic nerve is considered to have four portions. What are they? 

How long is each? 

The intraocular portion is also considered to have four portions. What are they? 

What is the blood supply for each? 

---

**The Optic Nerve**

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicilar</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

To what lamina is this referring? 

The lamina cribrosa

What is the lamina cribrosa? 

The **fenestrated** hole in the posterior sclera through which the optic nerve exits

How many fenestrations are there? 

200-300

---

Pre-laminar

Laminar

Retrolaminar
Anatomically, the optic nerve is considered to have four portions. What are they? The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

To what lamina is this referring? The lamina cribrosa. What is the lamina cribrosa? The fenestrated hole in the posterior sclera through which the optic nerve exits. How many fenestrations are there? 200-300.

Pre-laminar
Laminar
Retrolaminar
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

How long is each?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

(outermost)

---

To what lamina is this referring?

The lamina cribrosa

What is the lamina cribrosa?

The fenestrated hole in the posterior sclera through which the optic nerve exits

How many fenestrations are there?

200-300

Two fenestrations are much larger than the others. What passes through the larger ones?

---

Pre-laminar

Laminar

Retrolaminar

---

Anatomically speaking, the optic nerve is considered to have four portions. What are they?

To what lamina is this referring?

The lamina cribrosa

What is the lamina cribrosa?

The fenestrated hole in the posterior sclera through which the optic nerve exits

How many fenestrations are there?

200-300

Two fenestrations are much larger than the others. What passes through the larger ones?

---

Pre-laminar

Laminar

Retrolaminar

---

The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each? The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

### The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

To what lamina is this referring? The **lamina cribrosa**

What is the lamina cribrosa? The **fenestrated** hole in the posterior sclera through which the optic nerve exits.

Two fenestrations are much larger than the others. What passes through the larger ones? The central retinal artery and vein.

The Optic Nerve is divided into:

- **Pre-laminar**
- **Laminar**
- **Retrolaminar**

Anatomically, the lamina cribrosa is the fenestrated hole in the posterior sclera through which the optic nerve exits. It is about 1/3 the thickness of the adjacent sclera. There are 200-300 fenestrations, with two being much larger than the others. The central retinal artery and vein pass through these larger fenestrations.
The Optic Nerve

Lamina cribrosa

Lamina cribrosa

Central Retinal Vessels
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

How long is each?
The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

Q: To what lamina is this referring?
The **lamina cribrosa**

What is the lamina cribrosa?
The fenestrated hole in the posterior sclera through which the optic nerve exits

Does the lamina extend the entire thickness of the eye wall?
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

To what lamina is this referring? The lamina cribrosa

What is the lamina cribrosa? The fenestrated hole in the posterior sclera through which the optic nerve exits

Does the lamina extend the entire thickness of the eye wall? No, it is about 1/3 the thickness of the adjacent sclera
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

How long is each?
- Intraocular: 1 mm
- Orbital: 30 mm
- Canalicular: 10 mm
- Intracranial: 10 mm

The Optic Nerve

To what lamina is this referring?
- The lamina cribrosa

What is the lamina cribrosa?
- The fenestrated hole in the posterior sclera through which the optic nerve exits

Does the lamina extend the entire thickness of the eye wall?
- No, it is about 1/3 the thickness of the adjacent sclera

With which portion of the eye wall is the lamina aligned; ie, is it the inner third, the middle third or the outer third?
- The inner third

Pre-laminar

Laminar

Retrolaminar
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each? The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

To what lamina is this referring? The lamina cribrosa.

What is the lamina cribrosa? The fenestrated hole in the posterior sclera through which the optic nerve exits. With which portion of the eye wall is the lamina aligned; i.e., is it the inner third, the middle third or the outer third? The inner third.

Does the lamina extend the entire thickness of the eye wall? No, it is about 1/3 the thickness of the adjacent sclera.

The Optic Nerve

Pre-laminar

Laminar

Retrolaminar
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Portion</th>
<th>Blood supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFL portion</td>
<td>?</td>
</tr>
<tr>
<td>Pre-laminar</td>
<td></td>
</tr>
<tr>
<td>Laminar</td>
<td></td>
</tr>
<tr>
<td>Retrolaminar</td>
<td></td>
</tr>
</tbody>
</table>
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?
The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Intraocular</em></td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicilar</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Portion</th>
<th>Blood supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFL portion</td>
<td>Central retinal artery (CRA)</td>
</tr>
<tr>
<td><em>Pre-laminar</em></td>
<td>?</td>
</tr>
<tr>
<td>Laminar</td>
<td></td>
</tr>
<tr>
<td>Retrolaminar</td>
<td></td>
</tr>
</tbody>
</table>
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?
The intraocular portion is also considered to have four portions. What are they?
What is the blood supply for each?

**The Optic Nerve**

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intraocular</strong></td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Portion</th>
<th>Blood supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFL portion</td>
<td>Central retinal artery (CRA)</td>
</tr>
<tr>
<td>Pre-laminar</td>
<td>Short posterior ciliary arteries</td>
</tr>
<tr>
<td>Laminar</td>
<td>?</td>
</tr>
<tr>
<td>Retrolaminar</td>
<td></td>
</tr>
</tbody>
</table>
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?
The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Blood supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFL portion</td>
<td>Central retinal artery (CRA)</td>
</tr>
<tr>
<td>Pre-laminar</td>
<td>Short posterior ciliary arteries</td>
</tr>
<tr>
<td>Laminar</td>
<td>Arterial circle of Zinn &amp; Haller</td>
</tr>
<tr>
<td>Retrolaminar</td>
<td>?</td>
</tr>
</tbody>
</table>

### The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

Q/A
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?
The intraocular portion is also considered to have four portions. What are they? 

*What is the blood supply for each?*

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Portion</th>
<th>Blood supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFL portion</td>
<td>Central retinal artery (CRA)</td>
</tr>
<tr>
<td>Pre-laminar</td>
<td>Short posterior ciliary arteries</td>
</tr>
<tr>
<td>Laminar</td>
<td>Arterial circle of Zinn &amp; Haller</td>
</tr>
<tr>
<td>Retrolaminar</td>
<td>Centrifugal CRA branches, centripetal pial branches</td>
</tr>
</tbody>
</table>
The Optic Nerve

Intraocular optic nerve: Blood supply
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

The intraocular portion is also considered to have four portions. What are they?

To which portion(s) of the intraocular nerve does the term optic disc apply?

### Table: Optic Nerve Portions

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

### Blood Supply

- **NFL portion?**
  - Central retinal artery (CRA)
- **Pre-laminar?**
  - Short posterior ciliary arteries
- **Laminar?**
  - Arterial circle of Zinn & Haller
- **Retrolaminar?**
  - Centrifugal CRA branches, centripetal pial branches
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

To which portion(s) of the intraocular nerve does the term optic disc apply? The portion visible on ophthalmoscopy, ie, the NFL
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicural</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

The portion visible on ophthalmoscopy, ie, the NFL, to which portion(s) of the intraocular nerve does the term optic disc apply? What is the diameter of the optic disc?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Blood supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-laminar</td>
<td>Short posterior ciliary arteries</td>
</tr>
<tr>
<td>Laminar</td>
<td>Arterial circle of Zinn &amp; Haller</td>
</tr>
<tr>
<td>Retrolaminar</td>
<td>Centrifugal CRA branches, centripetal pial branches</td>
</tr>
</tbody>
</table>
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

How long is each?

The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

To which portion(s) of the intraocular nerve does the term optic disc apply?

The portion visible on ophthalmoscopy, ie, the NFL

What is the diameter of the optic disc?

Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

To which portion(s) of the intraocular nerve does the term optic disc apply?
The portion visible on ophthalmoscopy, ie, the NFL

What is the diameter of the optic disc?
Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa?
It doubles to 3-4 mm or so because it is at this point the fibers become myelinated.

To which portion(s) of the intraocular nerve does the term NFL apply?
The NFL portion
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

### The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

### Blood Supply

- NFL portion: Pre-laminar Short posterior ciliary arteries
- Laminar: Arterial circle of Zinn & Haller
- Retrolaminar: Centrifugal CRA branches, centripetal pial branches

To which portion(s) of the intraocular nerve does the term **optic disc** apply?
The portion visible on ophthalmoscopy, ie, the NFL.

What is the diameter of the optic disc?
Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger. At the lamina cribrosa it doubles to 3-4 mm or so.

Why does it double in size?
Because it as at this point the fibers become myelinated.
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

To which portion(s) of the intraocular nerve does the term optic disc apply? The portion visible on ophthalmoscopy, i.e., the NFL.

What is the diameter of the optic disc? Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa? It doubles to 3-4 mm or so.

Why does it double in size? Because it is at this point the fibers become myelinated.
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

Q/A

The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

To which portion(s) of the intraocular nerve does the term optic disc apply? The portion visible on ophthalmoscopy, ie, the NFL

What is the diameter of the optic disc? Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa? It doubles to 3-4 mm or so

Why does it double in size? Because it is at this point the fibers become myelinated.
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

To which portion(s) of the intraocular nerve does the term **optic disc** apply? The portion visible on ophthalmoscopy, ie, the **NFL**

What is the diameter of the optic disc? Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa? It doubles to 3-4 mm or so.

**Why does it double in size?** Because it as at this point the fibers become myelinated.

---

### The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>
### The Optic Nerve

**Portion** | **Length (mm)**
--- | ---
Intraocular | 1
Orbital | 30
Canalicular | 10
Intracranial | 10

---

Anatomically speaking, the optic nerve is considered to have four portions. What are they?

The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

(Q) To which portion(s) of the intraocular nerve does the term **optic disc** apply?

The portion visible on ophthalmoscopy, ie, the NFL what is the diameter of the optic disc?

Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa?

It doubles to 3-4 mm or so

Why does it double in size?

Because it is at this point the fibers become myelinated

Can myelin appear prior to this point?

Yes

When myelinated retinal nerve fibers are present, what are they called?

They are called ‘myelinated retinal nerve fibers’

What is the ophthalmoscopic appearance of myelinated retinal nerve fibers?

They appear as white patches usually near the optic disc

How large are the patches?

It varies widely—they can be very big, or very small

Can multiple patches be present in the same eye?

Yes
### The Optic Nerve

#### Anatomical Portions of the Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

#### Blood Supply

- Pre-laminar: Short posterior ciliary arteries
- Laminar: Arterial circle of Zinn & Haller
- Retrolaminar: Centrifugal CRA branches, centripetal pial branches

#### Optic Disc

- **Optic Disc**: The portion visible on ophthalmoscopy, i.e., the NFL.
- **Diameter of Optic Disc**: A reasonable estimate is 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

#### Myelination

- **At this point the fibers become myelinated**: When myelinated retinal nerve fibers are present, they are called 'myelinated retinal nerve fibers.'
- **Ophthalmoscopic Appearance**: They appear as white patches usually near the optic disc.
- **Size of Patches**: Varies widely—can be very big or very small.
- **Multiple Patches**: Yes, they can be present in the same eye.

#### Intracranial Portion

- **Length (mm): 10**

---

**Can myelination appear prior to this point?**

Yes.
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>10</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>1</td>
</tr>
</tbody>
</table>

The intraocular portion is also considered to have four portions. What are they?

- Pre-laminar
- Laminar: Arterial circle of Zinn & Haller
- Retrolaminar
- Centrifugal CRA branches, centripetal pial branches

What is the blood supply for each?

- NFL portion
- Central retinal artery (CRA)
- Pre-laminar short posterior ciliary arteries
- Laminar: arterial circle of Zinn & Haller
- Retrolaminar:
- Centrifugal CRA branches
- Centripetal pial branches

The Optic Nerve

To which portion(s) of the intraocular nerve does the term optic disc apply?

The portion visible on ophthalmoscopy, i.e., the NFL.

What is the diameter of the optic disc?

Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa?

It doubles to 3-4 mm or so. Why does it double in size?

Because at this point the fibers become myelinated.

Can myelin appear prior to this point?

Yes.

When myelinated retinal nerve fibers are present, what are they called?

They are called 'myelinated retinal nerve fibers'.

What is the ophthalmoscopic appearance of myelinated retinal nerve fibers?

They appear as white patches usually near the optic disc.

How large are the patches?

It varies widely—they can be very big, or very small.

Can multiple patches be present in the same eye?

Yes.

Considerable anatomic variability exists in the size of the optic disc. A reasonable estimate would be a vertical diameter usually a little less than 1 mm.
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

A

The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

Can myelin appear prior to this point? Yes

When myelinated retinal nerve fibers are present, what are they called? They are called ‘myelinated retinal nerve fibers’

Why does it double in size? Because it is at this point the fibers become myelinated

Retrolaminar

Centrifugal CRA branches, centripetal pial branches
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each? The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

Can myelin appear prior to this point? Yes

When myelinated retinal nerve fibers are present, what are they called? They are called ‘myelinated retinal nerve fibers’

What word is sometimes used instead of myelinated? Medullated

Why does the optic nerve double in size? Because it is at this point the fibers become myelinated

Retrolaminar

Centrifugal CRA branches, centripetal pial branches
The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

Portion Blood supply

Portion Length (mm)

Intraocular 1
Orbital 30
Canalicicular 10
Intracranial 10

Anatomically speaking, the optic nerve is considered to have four portions. What are they?

The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

The portion visible on ophthalmoscopy, i.e., the NFL, What is the diameter of the optic disc?

Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa?

It doubles to 3-4 mm or so. Why does it double in size?

Because it is at this point the fibers become myelinated.

Can myelin appear prior to this point?

Yes. When myelinated retinal nerve fibers are present, what are they called? They are called 'myelinated retinal nerve fibers'.

What word is sometimes used instead of myelinated? Medullated retinal nerve fibers

Medullated

What is the ophthalmoscopic appearance of myelinated retinal nerve fibers?

They appear as white patches usually near the optic disc. How large are the patches?

It varies widely — they can be very big, or very small. Can multiple patches be present in the same eye?

Yes.
Anatomically speaking, the optic nerve is considered to have four portions. What are they?
The intraocular portion is also considered to have four portions. What are they?
What is the blood supply for each?

### Portion Length (mm)

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

Can myelin appear prior to this point?
Yes

When myelinated retinal nerve fibers are present, what are they called?
They are called ‘myelinated retinal nerve fibers’

What is the ophthalmoscopic appearance of myelinated retinal nerve fibers?
They appear as white patches usually near the optic disc

How large are the patches?
It varies widely--they can be very big, or very small

Can multiple patches be present in the same eye?
Yes

Why does it double in size?
Because it is at this point the fibers become myelinated

Retrolaminar

Centrifugal CRA branches, centripetal pial branches
**The Optic Nerve**

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

Anatomically speaking, the optic nerve is considered to have four portions. What are they? The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each? (innermost) (outermost)

The Optic Nerve

To which portion(s) of the intraocular nerve does the term optic disc apply? The portion visible on ophthalmoscopy, ie, the NFL. What is the diameter of the optic disc? Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa? It doubles to 3-4 mm or so. Why does it double in size? Because it is at this point the fibers become myelinated. Can myelin appear prior to this point? Yes.

When myelinated retinal nerve fibers are present, what are they called? They are called ‘myelinated retinal nerve fibers’.

What is the ophthalmoscopic appearance of myelinated retinal nerve fibers? They appear as white patches usually near the optic disc. How large are the patches? It varies widely— they can be very big, or very small. Can multiple patches be present in the same eye? Yes.
The Optic Nerve

Myelinated retinal nerve fiber layer
**The Optic Nerve**

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

**Q**

Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

**Table:**

<table>
<thead>
<tr>
<th>Portion</th>
<th>Blood supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFL portion</td>
<td>Central retinal artery (CRA)</td>
</tr>
<tr>
<td>Pre-laminar</td>
<td>Short posterior ciliary arteries</td>
</tr>
<tr>
<td>Laminar</td>
<td>Arterial circle of Zinn &amp; Haller</td>
</tr>
<tr>
<td>Retrolaminar</td>
<td>Centrifugal CRA branches, centripetal pial branches</td>
</tr>
</tbody>
</table>

---

**Q**

The Optic Nerve

To which portion(s) of the intraocular nerve does the term *optic disc* apply?

The portion visible on ophthalmoscopy, ie, the NFL

**What is the diameter of the optic disc?**

Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

**What is the diameter of the nerve after it passes through the lamina cribrosa?**

It doubles to 3-4 mm or so.

**Why does it double in size?**

Because it is at this point the fibers become myelinated.

**Can myelin appear prior to this point?**

Yes.

**When myelinated retinal nerve fibers are present, what are they called?**

They are called ‘myelinated retinal nerve fibers’

**What is the ophthalmoscopic appearance of myelinated retinal nerve fibers?**

They appear as white patches usually near the optic disc.

**How large are the patches?**

It varies widely--they can be very big, or very small.

**Can multiple patches be present in the same eye?**

Yes.
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicilar</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

How long is each?

The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

The portion visible on ophthalmoscopy, i.e., the NFL

What is the diameter of the optic disc?

Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa?

It doubles to 3-4 mm or so

Why does it double in size?

Because it is at this point the fibers become myelinated

Can myelin appear prior to this point?

Yes

When myelinated retinal nerve fibers are present, what are they called?

They are called ‘myelinated retinal nerve fibers’

What is the ophthalmoscopic appearance of myelinated retinal nerve fibers?

They appear as white patches usually near the optic disc

How large are the patches?

It varies widely—they can be very big, or very small

Can multiple patches be present in the same eye?

Yes
Myelinated retinal nerve fiber layer: Very big, and very small

The Optic Nerve
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

**Table: Portion Length (mm)**

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

The intraocular portion is also considered to have four portions. What are they? The blood supply for each?

- **NFL portion**
- **Central retinal artery (CRA)**
- **Pre-laminar Short posterior ciliary arteries**
- **Laminar Arterial circle of Zinn & Haller**
- **Retrolaminar**
- **Centrifugal CRA branches, centripetal pial branches**

Can myelin appear prior to this point? Yes

*When myelinated retinal nerve fibers are present, what are they called?*

They are called ‘myelinated retinal nerve fibers’

*What is the ophthalmoscopic appearance of myelinated retinal nerve fibers?*

They appear as white patches usually near the optic disc

*How large are the patches?*

It varies widely—they can be very big, or very small

*Can multiple patches be present in the same eye?*

Yes

Why does it double in size? Because it is at this point the fibers become myelinated

The Optic Nerve
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

- Intraocular
- Orbital
- Canalicular
- Intracranial

How long is each?

- Intraocular: 1 mm
- Orbital: 30 mm
- Canalicular: 10 mm
- Intracranial: 10 mm

What is the blood supply for each?

- NFL portion Central retinal artery (CRA)
- Pre-laminar Short posterior ciliary arteries
- Laminar Arterial circle of Zinn & Haller
- Retrolaminar Centrifugal CRA branches, centripetal pial branches

Can myelin appear prior to this point?
Yes

When myelinated retinal nerve fibers are present, what are they called?
They are called ‘myelinated retinal nerve fibers’

What is the ophthalmoscopic appearance of myelinated retinal nerve fibers?
They appear as white patches usually near the optic disc

How large are the patches?
It varies widely—they can be very big, or very small

Can multiple patches be present in the same eye?
Yes

Why does it double in size?
Because fibers become myelinated at this point

Optic disc apply?
Considerable anatomic variability in the optic nerve, a reasonable estimate of the vertical diameter usually a little

Diameter of the optic disc

Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

Diameter of the nerve after it passes through the lamina cribrosa

It doubles to 3–4 mm or so

Why does it double in size?
Because the fibers become myelinated at this point
Myelinated retinal nerve fiber layer: Multiple
The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
</tbody>
</table>

In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What?

Q

Can multiple patches be present in the same eye? Yes

Why does it double in size? Because it is at this point the fibers become myelinated

Retrolaminar

Centrifugal CRA branches, centripetal pial branches

Anatomically speaking, the optic nerve is considered to have four portions. What are they?

How long is each?

The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each?

To which portion(s) of the intraocular nerve does the term optic disc apply?

The portion visible on ophthalmoscopy, ie, the NFL

What is the diameter of the optic disc?

Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa?

It doubles to 3-4 mm or so

Why does it double in size?

Because it is at this point the fibers become myelinated

Can myelin appear prior to this point?

Yes

When myelinated retinal nerve fibers are present, what are they called?

They are called 'myelinated retinal nerve fibers'

What is the ophthalmoscopic appearance of myelinated retinal nerve fibers?

They appear as white patches usually near the optic disc

How large are the patches?

It varies widely--they can be very big, or very small

Can multiple patches be present in the same eye?

Yes
In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What? Its meningeal sheaths.

The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each?

- The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

A

To which portion(s) of the intraocular nerve does the term optic disc apply?

The portion visible on ophthalmoscopy, ie, the NFL

What is the diameter of the optic disc?

Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa?

It doubles to 3-4 mm or so.

Why does it double in size?

Because it as at this point the fibers become myelinated.

Can myelin appear prior to this point?

Yes.

When myelinated retinal nerve fibers are present, what are they called?

They are called 'myelinated retinal nerve fibers'.

What is the ophthalmoscopic appearance of myelinated retinal nerve fibers?

They appear as white patches usually near the optic disc.

How large are the patches?

It varies widely— they can be very big, or very small.

Can multiple patches be present in the same eye?

Yes.

In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What?

Its meningeal sheaths.

Does it pick up all three meningeal layers?

Yes.

Does it have a subarachnoid space, and if so, is this space filled with CSF?

Yes and yes.

Is the CSF-filled subarachnoid space of the retrolaminar optic nerve continuous with the CSF-filled subarachnoid space of the rest of the CNS?

Yes.

How does the pressure in the CSF-filled subarachnoid space of the retrolaminar optic nerve compare to that of the CSF-filled subarachnoid space of the rest of the CNS (ie, compared to intracranial pressure, ICP)?

They are exactly the same.
Anatomically speaking, the optic nerve is considered to have four portions. What are they? The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What? Its meningeal sheaths. Does it pick up all three meningeal layers?

Can multiple patches be present in the same eye? Yes. Why does it double in size? Because it is at this point the fibers become myelinated. How large are the patches? It varies widely— they can be very big, or very small. Can multiple patches be present in the same eye? Yes. What is the ophthalmoscopic appearance of myelinated retinal nerve fibers? They appear as white patches usually near the optic disc. How large are the patches? It varies widely—they can be very big, or very small.

Can multiple patches be present in the same eye? Yes. In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What? Its meningeal sheaths. Does it pick up all three meningeal layers? Yes.

How does the pressure in the CSF-filled subarachnoid space of the retrolaminar optic nerve compare to that of the CSF-filled subarachnoid space of the rest of the CNS (ie, compared to intracranial pressure, ICP)? They are exactly the same.
In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What? Its meningeal sheaths.

**Portion** | **Length (mm)**
---|---
Intraocular | 1

Does it pick up all three meningeal layers? Yes.

Can multiple patches be present in the same eye? Yes.

Why does it double in size? Because it is at this point the fibers become myelinated.

**The Optic Nerve**

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
</tbody>
</table>

94

Can myelin appear prior to this point? Yes. When myelinated retinal nerve fibers are present, what are they called? They are called 'myelinated retinal nerve fibers'. What is the ophthalmoscopic appearance of myelinated retinal nerve fibers? They appear as white patches usually near the optic disc. How large are the patches? It varies widely— they can be very big, or very small.

Can multiple patches be present in the same eye? Yes.

How does the pressure in the CSF-filled subarachnoid space of the retrolaminar optic nerve compare to that of the CSF-filled subarachnoid space of the rest of the CNS (ie, compared to intracranial pressure, ICP)? They are exactly the same.
Retrolaminar optic nerve: Meninges
In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What? Its meningeal sheaths.

Does it pick up all three meningeal layers? Yes.

Does it have a subarachnoid space, and if so, is this space filled with CSF? Yes, and yes.

Is the CSF-filled subarachnoid space of the retrolaminar optic nerve continuous with the CSF-filled subarachnoid space of the rest of the CNS? Yes.

How does the pressure in the CSF-filled subarachnoid space of the retrolaminar optic nerve compare to that of the CSF-filled subarachnoid space of the rest of the CNS (ie, compared to intracranial pressure, ICP)? They are exactly the same.
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

- Intraocular
- Orbital
- Canalicular
- Intracranial

How long is each?

- Intraocular: 1 mm
- Orbital: 30 mm
- Canalicular: 10 mm
- Intracranial: 10 mm

What is the blood supply for each?

1. NFL portion
   - Central retinal artery (CRA)
   - Pre-laminar Short posterior ciliary arteries
   - Laminar Arterial circle of Zinn & Haller
   - Retrolaminar
     - Centrifugal CRA branches, centripetal pial branches

In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What?
- Its meningeal sheaths

Does it pick up all three meningeal layers?
- Yes

Does it have a subarachnoid space, and if so, is this space filled with CSF?
- Yes and yes

Can multiple patches be present in the same eye?
- Yes

Can myelin appear prior to this point?
- Yes

When myelinated retinal nerve fibers are present, what are they called?
- They are called 'myelinated retinal nerve fibers'

What is the ophthalmoscopic appearance of myelinated retinal nerve fibers?
- They appear as white patches usually near the optic disc

How large are the patches?
- It varies widely— they can be very big, or very small

Can multiple patches be present in the same eye?
- Yes

Why does it double in size?
- Because it as (innermost) at this point the fibers become myelinated
- (outermost) Retrolaminar

Does it have a subarachnoid space, and if so, is this space filled with CSF?
- Yes and yes

Is the CSF-filled subarachnoid space of the retrolaminar optic nerve continuous with the CSF-filled subarachnoid space of the rest of the CNS?
- Yes

How does the pressure in the CSF-filled subarachnoid space of the retrolaminar optic nerve compare to that of the CSF-filled subarachnoid space of the rest of the CNS (ie, compared to intracranial pressure, ICP)?
- They are exactly the same
In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What? Its meningeal sheaths.

Does it pick up all three meningeal layers? Yes.

Does it have a subarachnoid space, and if so, is this space filled with CSF? Yes and yes.

Is the CSF-filled subarachnoid space of the retrolaminar optic nerve continuous with the CSF-filled subarachnoid space of the rest of the CNS? Yes.

Can multiple patches be present in the same eye? Yes.

Why does it double in size? Because fibers become myelinated at this point.

What is the diameter of the optic disc? Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa? It doubles to 3-4 mm or so.

Can myelin appear prior to this point? Yes.

When myelinated retinal nerve fibers are present, what are they called? They are called 'myelinated retinal nerve fibers'.

What is the ophthalmoscopic appearance of myelinated retinal nerve fibers? They appear as white patches usually near the optic disc.

How large are the patches? It varies widely—they can be very big, or very small.

Can multiple patches be present in the same eye? Yes.

In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What? Its meningeal sheaths.

Does it pick up all three meningeal layers? Yes.

Does it have a subarachnoid space, and if so, is this space filled with CSF? Yes and yes.

Is the CSF-filled subarachnoid space of the retrolaminar optic nerve continuous with the CSF-filled subarachnoid space of the rest of the CNS? Yes.

Can multiple patches be present in the same eye? Yes.

Why does it double in size? Because fibers become myelinated at this point.
Anatomically speaking, the optic nerve is considered to have four portions. What are they? The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
</tbody>
</table>

In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What? Its meningeal sheaths

Does it pick up all three meningeal layers? Yes

Does it have a subarachnoid space, and if so, is this space filled with CSF? Yes and yes

Is the CSF-filled subarachnoid space of the retrolaminar optic nerve continuous with the CSF-filled subarachnoid space of the rest of the CNS? Yes

Can multiple patches be present in the same eye? Yes

Why does it double in size? Because it is at this point the fibers become myelinated

Can myelin appear prior to this point? Yes

What is the diameter of the optic disc? Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa? It doubles to 3-4 mm or so

Why does it double in size? Because it is at this point the fibers become myelinated

Can multiple patches be present in the same eye? Yes

The Optic Nerve

The portion visible on ophthalmoscopy, ie, the NFL

What is the diameter of the optic disc? Well, bearing in mind the considerable anatomic variability that characterizes the optic nerve, a reasonable estimate would be 1.6 mm, with the vertical diameter usually a little larger than the horizontal.

What is the diameter of the nerve after it passes through the lamina cribrosa? It doubles to 3-4 mm or so

Why does it double in size? Because it is at this point the fibers become myelinated

Can multiple patches be present in the same eye? Yes

Can multiple patches be present in the same eye? Yes
**The Optic Nerve**

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
</tbody>
</table>

Anatomically speaking, the optic nerve is considered to have four portions. What are they?

The intraocular portion is also considered to have four portions. What are they?

What is the blood supply for each portion?

---

**Q**

In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What?

Its meningeal sheaths.

Does it pick up all three meningeal layers?

Yes.

Does it have a subarachnoid space, and if so, is this space filled with CSF?

Yes and yes.

Is the CSF-filled subarachnoid space of the retrolaminar optic nerve continuous with the CSF-filled subarachnoid space of the rest of the CNS?

Yes.

How does the pressure in the CSF-filled subarachnoid space of the retrolaminar optic nerve compare to that of the CSF-filled subarachnoid space of the rest of the CNS (i.e., compared to intracranial pressure, ICP)?

They are exactly the same.

Can multiple patches be present in the same eye?

Yes.

Why does it double in size at this point?

Because the fibers become myelinated.
**The Optic Nerve**

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
</tbody>
</table>

In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What? Its meningeal sheaths

Does it pick up all three meningeal layers? Yes

Does it have a subarachnoid space, and if so, is this space filled with CSF? Yes and yes

Is the CSF-filled subarachnoid space of the retrolaminar optic nerve continuous with the CSF-filled subarachnoid space of the rest of the CNS? Yes

How does the pressure in the CSF-filled subarachnoid space of the retrolaminar optic nerve compare to that of the CSF-filled subarachnoid space of the rest of the CNS (ie, compared to intracranial pressure, ICP)? They are exactly the same

Can multiple patches be present in the same eye? Yes

Why does it double in size? Because it is at this point the fibers become myelinated

Can myelin appear prior to this point? Yes

When myelinated retinal nerve fibers are present, what are they called? They are called 'myelinated retinal nerve fibers'

What is the ophthalmoscopic appearance of myelinated retinal nerve fibers? They appear as white patches usually near the optic disc

How large are the patches? It varies widely--they can be very big, or very small

Can multiple patches be present in the same eye? Yes

In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What? Its meningeal sheaths

Does it pick up all three meningeal layers? Yes

Does it have a subarachnoid space, and if so, is this space filled with CSF? Yes and yes

Is the CSF-filled subarachnoid space of the retrolaminar optic nerve continuous with the CSF-filled subarachnoid space of the rest of the CNS? Yes

How does the pressure in the CSF-filled subarachnoid space of the retrolaminar optic nerve compare to that of the CSF-filled subarachnoid space of the rest of the CNS (ie, compared to intracranial pressure, ICP)? They are exactly the same

Can multiple patches be present in the same eye? Yes

Why does it double in size? Because it is at this point the fibers become myelinated

Can myelin appear prior to this point? Yes

When myelinated retinal nerve fibers are present, what are they called? They are called 'myelinated retinal nerve fibers'

What is the ophthalmoscopic appearance of myelinated retinal nerve fibers? They appear as white patches usually near the optic disc

How large are the patches? It varies widely--they can be very big, or very small

Can multiple patches be present in the same eye? Yes
In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What? Its meningeal sheaths.

Does it pick up all three meningeal layers? Yes.

Does it have a subarachnoid space, and if so, is this space filled with CSF? How far forward in the optic nerve does the CSF-filled space extend, ie, what structure provides the anterior limit to the space?

Subarachnoid space of the rest of the CNS? Yes.

How does the pressure in the CSF-filled subarachnoid space of the retrolaminar optic nerve compare to that of the CSF-filled subarachnoid space of the rest of the CNS (ie, compared to intracranial pressure, ICP)? They are exactly the same.

Can multiple patches be present in the same eye? Yes.

Why does it double in size? Because it is at this point that the fibers become myelinated.
The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
</tbody>
</table>

In addition to myelin, the retrolaminar optic nerve acquires something else of significance. What? Its meningeal sheaths.

Does it pick up all three meningeal layers?
Yes

Does it have a subarachnoid space, and if so, is this space filled with CSF?

How far forward in the optic nerve does the CSF-filled space extend, ie, what structure provides the anterior limit to the space?
The lamina cribrosa (which also is the structure delimiting the anterior extent of the retrolaminar space)

Subarachnoid space of the rest of the CNS?
Yes

How does the pressure in the CSF-filled subarachnoid space of the retrolaminar optic nerve compare to that of the CSF-filled subarachnoid space of the rest of the CNS (ie, compared to intracranial pressure, ICP)?
They are exactly the same

Can multiple patches be present in the same eye?
Yes

Why does it double in size?
Because it is at this point the fibers become myelinated

(innermost) (outermost)
Anatomically speaking, the optic nerve is considered to have four portions. What are they? How long is each? The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

### The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicolar</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

To which portion(s) of the intraocular nerve does the term optic nerve head apply?

<table>
<thead>
<tr>
<th>Portion</th>
<th>Blood supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFL portion?</td>
<td>Central retinal artery (CRA)</td>
</tr>
<tr>
<td>Pre-laminar?</td>
<td>Short posterior ciliary arteries</td>
</tr>
<tr>
<td>Laminar?</td>
<td>Arterial circle of Zinn &amp; Haller</td>
</tr>
<tr>
<td>Retrolaminar?</td>
<td>Centrifugal CRA branches, centripetal pial branches</td>
</tr>
</tbody>
</table>
Anatomically speaking, the optic nerve is considered to have four portions. What are they? The intraocular portion is also considered to have four portions. What are they? What is the blood supply for each?

To which portion(s) of the intraocular nerve does the term optic nerve head apply? This one is tougher to answer. The *Glaucoma* book treats the terms optic nerve head and optic disc as synonyms. The *Fundamentals* book initially does as well…

---

### The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canaliccular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

To which portion(s) of the intraocular nerve does the term optic nerve head apply? This one is tougher to answer. The *Glaucoma* book treats the terms optic nerve head and optic disc as synonyms. The *Fundamentals* book initially does as well…

---

<table>
<thead>
<tr>
<th>Portion</th>
<th>Blood supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFL portion</td>
<td>Central retinal artery (CRA)</td>
</tr>
<tr>
<td>Pre-laminar</td>
<td>Short posterior ciliary arteries</td>
</tr>
<tr>
<td>Laminar</td>
<td>Arterial circle of Zinn &amp; Haller</td>
</tr>
<tr>
<td>Retrolaminar</td>
<td>Centrifugal CRA branches, centripetal pial branches</td>
</tr>
</tbody>
</table>
The Optic Nerve

### Intraocular Portion

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

### Blood Supply

- **NFL portion**: Central retinal artery (CRA)
- **Pre-laminar**: Short posterior ciliary arteries
- **Laminar**: Arterial circle of Zinn & Haller
- **Retrolaminar**: Centrifugal CRA branches, centripetal pial branches

---

To which portion(s) of the intraocular nerve does the term optic nerve head apply?

This one is tougher to answer. The Glaucoma book treats the terms optic nerve head and optic disc as synonyms. The *Fundamentals* book initially does as well… but three pages later states that the nerve head is synonymous with the entire intraocular portion of the nerve.
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

One useful way to think about the layers of the intraocular portion of the optic nerve is to relate them to the tissue surrounding them. Obviously, the laminar layer is surrounded by the lamina cribrosa. What are the others surrounded by?

### The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canaliclar</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Portion</th>
<th>Surrounded by…</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFL portion</td>
<td>?</td>
</tr>
<tr>
<td>Pre-laminar</td>
<td></td>
</tr>
<tr>
<td>Laminar</td>
<td>Lamina cribosa</td>
</tr>
<tr>
<td>Retrolaminar</td>
<td></td>
</tr>
</tbody>
</table>
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

One useful way to think about the layers of the intraocular portion of the optic nerve is to relate them to the tissue surrounding them. Obviously, the laminar layer is surrounded by the lamina cribrosa. What are the others surrounded by?

**The Optic Nerve**

### Portion Length (mm)

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicular</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

### Portion Surrounded by...

<table>
<thead>
<tr>
<th>Portion</th>
<th>Surrounded by…</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFL portion</td>
<td>Retina</td>
</tr>
<tr>
<td>Pre-laminar</td>
<td>?</td>
</tr>
<tr>
<td>Laminar</td>
<td>Lamina cribrosa</td>
</tr>
<tr>
<td>Retrolaminar</td>
<td></td>
</tr>
</tbody>
</table>
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

The NFL portion Retina
Pre-laminar Choroid
Laminar Lamina cribrosa
Retrolaminar ?

One useful way to think about the layers of the intraocular portion of the optic nerve is to relate them to the tissue surrounding them. Obviously, the laminar layer is surrounded by the lamina cribrosa. What are the others surrounded by?
Anatomically speaking, the optic nerve is considered to have four portions. What are they?

One useful way to think about the layers of the intraocular portion of the optic nerve is to relate them to the tissue surrounding them. Obviously, the laminar layer is surrounded by the lamina cribrosa. What are the others surrounded by?

### The Optic Nerve

<table>
<thead>
<tr>
<th>Portion</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraocular</td>
<td>1</td>
</tr>
<tr>
<td>Orbital</td>
<td>30</td>
</tr>
<tr>
<td>Canalicilar</td>
<td>10</td>
</tr>
<tr>
<td>Intracranial</td>
<td>10</td>
</tr>
</tbody>
</table>

### Portion and Surrounded by

<table>
<thead>
<tr>
<th>Portion</th>
<th>Surrounded by...</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFL portion</td>
<td>Retina</td>
</tr>
<tr>
<td>Pre-laminar</td>
<td>Choroid</td>
</tr>
<tr>
<td>Laminar</td>
<td>Lamina cribrosa</td>
</tr>
<tr>
<td>Retrolaminar</td>
<td>Sclera</td>
</tr>
</tbody>
</table>
Define papilledema.
Define papilledema.
Disc edema secondary to increased ICP
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
As anterior as it can go--the posterior aspect of the lamina cribrosa
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
As anterior as it can go--the posterior aspect of the lamina cribrosa

How does increased pressure at the lamina lead to edema of the optic disc?
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
As anterior as it can go--the posterior aspect of the lamina cribrosa

How does increased pressure at the lamina lead to edema of the optic disc?
By interfering with anterograde axoplasmic flow. (Remember, the optic nerve fibers are simply the axons of retinal ganglion cells.) Axoplasmic stasis at the lamina cribrosa leads to swelling of the fibers in the pre-laminar and NFL portion of the nerve, which in the aggregate manifests as disc edema. Fiber swelling may also compromise blood flow to the pre-laminar/NFL portions of the nerve, which could lead to further axon compromise (and therefore further swelling) as well as fluid accumulation (ditto).
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
As anterior as it can go--the posterior aspect of the lamina cribrosa

How does increased pressure at the lamina lead to edema of the optic disc?
By interfering with anterograde axoplasmic flow. (Remember, the optic nerve fibers are simply the axons of retinal ganglion cells.) Axoplasmic stasis at the lamina cribrosa leads to swelling of the fibers in the pre-laminar and NFL portion of the nerve, which in the aggregate manifests as disc edema. Fiber swelling may also compromise blood flow to the pre-laminar/NFL portions of the nerve, which could lead to further axon compromise (and therefore further swelling) as well as fluid accumulation (ditto).

Is papilledema a unilateral, or bilateral condition?
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
As anterior as it can go--the posterior aspect of the lamina cribrosa

How does increased pressure at the lamina lead to edema of the optic disc?
By interfering with anterograde axoplasmic flow. (Remember, the optic nerve fibers are simply the axons of retinal ganglion cells.) Axoplasmic stasis at the lamina cribrosa leads to swelling of the fibers in the pre-laminar and NFL portion of the nerve, which in the aggregate manifests as disc edema. Fiber swelling may also compromise blood flow to the pre-laminar/NFL portions of the nerve, which could lead to further axon compromise (and therefore further swelling) as well as fluid accumulation (ditto).

Is papilledema a unilateral, or bilateral condition?
Absent pre-existing damage to one nerve, it is almost always bilateral
The Optic Nerve

Papilledema
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
As anterior as it can go--the posterior aspect of the lamina cribrosa

How does increased pressure at the lamina lead to edema of the optic disc?
By interfering with anterograde axoplasmic flow. (Remember, the optic nerve fibers are simply the axons of retinal ganglion cells.) Axoplasmic stasis at the lamina cribrosa leads to swelling of the fibers in the pre-laminar and NFL portion of the nerve, which in the aggregate manifests as disc edema. Fiber swelling may also compromise blood flow to the pre-laminar/NFL portions of the nerve, which could lead to further axon compromise (and therefore further swelling) as well as fluid accumulation (ditto).

Is papilledema a unilateral, or bilateral condition?
Absent pre-existing damage to one nerve, it is almost always bilateral

There is a classic syndrome which presents with unilateral papilledema--what is it?
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
As anterior as it can go—the posterior aspect of the lamina cribrosa

How does increased pressure at the lamina lead to edema of the optic disc?
By interfering with anterograde axoplasmic flow. (Remember, the optic nerve fibers are simply the axons of retinal ganglion cells.) Axoplasmic stasis at the lamina cribrosa leads to swelling of the fibers in the pre-laminar and NFL portion of the nerve, which in the aggregate manifests as disc edema. Fiber swelling may also compromise blood flow to the pre-laminar/NFL portions of the nerve, which could lead to further axon compromise (and therefore further swelling) as well as fluid accumulation (ditto).

Is papilledema a unilateral, or bilateral condition?
Absent pre-existing damage to one nerve, it is almost always bilateral

There is a classic syndrome which presents with unilateral papilledema—what is it?
Foster Kennedy syndrome (FKS)
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
As anterior as it can go—the posterior aspect of the lamina cribrosa

How does increased pressure at the lamina lead to edema of the optic disc?
By interfering with anterograde axoplasmic flow. (Remember, the optic nerve fibers are simply the axons of retinal ganglion cells.) Axoplasmic stasis at the lamina cribrosa leads to swelling of the fibers in the pre-laminar and NFL portion of the nerve, which in the aggregate manifests as disc edema. Fiber swelling may also compromise blood flow to the pre-laminar/NFL portions of the nerve, which could lead to further axon compromise (and therefore further swelling) as well as fluid accumulation (ditto).

Is papilledema a unilateral, or bilateral condition?
Absent pre-existing damage to one nerve, it is almost always bilateral

*There is a classic syndrome which presents with unilateral papilledema—what is it?*
Foster Kennedy syndrome (FKS)

*What is the pathophysiology of FKS?*
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
As anterior as it can go—the posterior aspect of the lamina cribrosa

How does increased pressure at the lamina lead to edema of the optic disc?
By interfering with anterograde axoplasmic flow. (Remember, the optic nerve fibers are simply the axons of retinal ganglion cells.) Axoplasmic stasis at the lamina cribrosa leads to swelling of the fibers in the pre-laminar and NFL portion of the nerve, which in the aggregate manifests as disc edema. Fiber swelling may also compromise blood flow to the pre-laminar/NFL portions of the nerve, which could lead to further axon compromise (and therefore further swelling) as well as fluid accumulation (ditto).

Is papilledema a unilateral, or bilateral condition?
Absent pre-existing damage to one nerve, **it is almost always bilateral**

There is a classic syndrome which presents with unilateral papilledema—what is it?
Foster Kennedy syndrome (FKS)

What is the pathophysiology of FKS?
An intracranial mass is located such as to compress one optic nerve, thereby causing it to atrophy. By dint of its space-occupying capacity, the mass increases ICP enough to induce papilledema in the other, non-atrophied optic nerve. Ergo, unilateral papilledema.
Foster Kennedy Syndrome in a 52-year-old woman (A) Fundus picture of the right eye showing optic disc pallor. (B) Fundus picture of the left eye showing disc edema with tortuosity of the peripapillary vessels. (C & D) T2 weighted MRI images in axial and sagittal view demonstrating a extra-axial, well circumscribed, homogenous, isointense mass lesion in the fronto-parietal cortex with broad based dural attachment and tenting with surrounding hyperintense cerebral oedema suggestive of meningioma.
Define papilledema.
Disc edema secondary to increased ICP

*Where along the course of the optic nerve does ICP exert its nefarious influence?*
As anterior as it can go--the posterior aspect of the lamina cribrosa

*How does increased pressure at the lamina lead to edema of the optic disc?*
By interfering with anterograde axoplasmic flow. (Remember, the optic nerve fibers are simply the axons of retinal ganglion cells.) Axoplasmic stasis at the lamina cribrosa leads to swelling of the fibers in the pre-laminar and NFL portion of the nerve, which in the aggregate manifests as disc edema. Fiber swelling may also compromise blood flow to the pre-laminar/NFL portions of the nerve, which could lead to further axon compromise (and therefore further swelling) as well as fluid accumulation (ditto).

*Is papilledema a unilateral, or bilateral condition?*
Absent pre-existing damage to one nerve, it is *almost always bilateral*. There is a classic syndrome which presents with unilateral papilledema--what is it? Foster Kennedy syndrome (FKS).

*What is tumor is the classic cause of FKS?*
An *intracranial mass* is located such as to compress one optic nerve, thereby causing it to atrophy. By dint of its space-occupying capacity, the mass increases ICP enough to induce papilledema in the other, non-atrophied optic nerve. Ergo, unilateral papilledema.
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
As anterior as it can go--the posterior aspect of the lamina cribrosa

How does increased pressure at the lamina lead to edema of the optic disc?
By interfering with anterograde axoplasmic flow. (Remember, the optic nerve fibers are simply the axons of retinal ganglion cells.) Axoplasmic stasis at the lamina cribrosa leads to swelling of the fibers in the pre-laminar and NFL portion of the nerve, which in the aggregate manifests as disc edema. Fiber swelling may also compromise blood flow to the pre-laminar/NFL portions of the nerve, which could lead to further axon compromise (and therefore further swelling) as well as fluid accumulation (ditto).

Is papilledema a unilateral, or bilateral condition?
Absent pre-existing damage to one nerve, it is almost always bilateral

There is a classic syndrome which presents with unilateral papilledema--what is it?
Foster Kennedy syndrome (FKS)

What is tumor is the classic cause of FKS?
An olfactory-groove meningioma

An intracranial mass is located such as to compress one optic nerve, thereby causing it to atrophy. By dint of its space-occupying capacity, the mass increases ICP enough to induce papilledema in the other, non-atrophied optic nerve. Ergo, unilateral papilledema.
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
As anterior as it can go--the posterior aspect of the lamina cribrosa

How does increased pressure at the lamina lead to edema of the optic disc?
By interfering with anterograde axoplasmic flow. (Remember, the optic nerve fibers are simply the axons of retinal ganglion cells.) Axoplasmic stasis at the lamina cribrosa leads to swelling of the fibers in the pre-laminar and NFL portion of the nerve, which in the aggregate manifests... 

Mark Twain once said a classic [book] is one that everyone talks about but nobody reads. Likewise, all ophthalmologists are aware of FKS, but no one (I know) has ever seen it.

(No question yet—keep going)

Absent pre-existing damage to one nerve, it is almost always bilateral

There is a classic syndrome which presents with unilateral papilledema--what is it?
Foster Kennedy syndrome (FKS)

What is the pathophysiology of FKS?
An intracranial mass is located such as to compress one optic nerve, thereby causing it to atrophy. By dint of its space-occupying capacity, the mass increases ICP enough to induce papilledema in the other, non-atrophied optic nerve. Ergo, unilateral papilledema.
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
As anterior as it can go--the posterior aspect of the lamina cribrosa

How does increased pressure at the lamina lead to edema of the optic disc?
By interfering with anterograde axoplasmic flow. (Remember, the optic nerve fibers are simply the axons of retinal ganglion cells.) Axoplasmic stasis at the lamina cribrosa leads to swelling of the fibers in the pre-laminar and NFL portion of the nerve, which in the aggregate manifests as disc edema. Fiber swelling may also compromise blood flow to the pre-laminar/NFL portion of the nerve, which could lead to further axon compromise (and therefore further swelling) as well as fluid accumulation (ditto).

Is papilledema a unilateral, or bilateral condition?
Absent pre-existing damage to one nerve, it is almost always bilateral.

There is a **classic syndrome** which presents with unilateral papilledema—what is it?
Foster Kennedy syndrome (FKS)

What is the pathophysiology of FKS?
An intracranial mass is located such as to compress one optic nerve, thereby causing it to atrophy. By dint of its space-occupying capacity, the mass increases ICP enough to induce papilledema in the other, non-atrophied optic nerve. Ergo, unilateral papilledema.

Mark Twain once said a classic [book] is one that everyone talks about but nobody reads. Likewise, all ophthalmologists are aware of FKS, but no one (I know) has ever seen it. However, **pseudo-Foster Kennedy syndrome**—disc edema in one eye + a pale atrophic nerve in the fellow eye—is a relatively common entity (at least a hundred times more common than FKS). What is the classic cause of pseudo-FKS?
Define papilledema.
Disc edema secondary to increased ICP

Where along the course of the optic nerve does ICP exert its nefarious influence?
As anterior as it can go—the posterior aspect of the lamina cribrosa

How does increased pressure at the lamina lead to edema of the optic disc?
By interfering with anterograde axoplasmic flow. (Remember, the optic nerve fibers are simply the axons of retinal ganglion cells.) Axoplasmic stasis at the lamina cribrosa leads to swelling of the fibers in the pre-laminar and NFL portion of the nerve, which in the aggregate manifests as disc edema. Fiber swelling may also compromise blood flow to the pre-laminar/NFL portions of the nerve, which could lead to further axon compromise (and therefore further swelling) as well as fluid accumulation (ditto).

Is papilledema a unilateral, or bilateral condition?
Absent pre-existing damage to one nerve, it is almost always bilateral.

Mark Twain once said a classic [book] is one that everyone talks about but nobody reads. Likewise, all ophthalmologists are aware of FKS, but no one (I know) has ever seen it. However, pseudo-Foster Kennedy syndrome—disc edema in one eye + a pale atrophic nerve in the fellow eye—is a relatively common entity (at least a hundred times more common than FKS). What is the classic cause of pseudo-FKS?
A pt with a remote history of NAION in one eye (so that nerve is now pale and atrophic) with a recent NAION in the eye with disc edema.

There is a classic syndrome which presents with unilateral papilledema—what is it?
Foster Kennedy syndrome (FKS)

What is the pathophysiology of FKS?
An intracranial mass is located such as to compress one optic nerve, thereby causing it to atrophy. By dint of its space-occupying capacity, the mass increases ICP enough to induce papilledema in the other, non-atrophied optic nerve. Ergo, unilateral papilledema.
66-year-old vasculopathy with bilateral, sequential, acute painless vision loss from pseudo-Foster Kennedy syndrome. (A) He initially presented with acute vision loss OS and was noted to have disc edema with peripapillary hemorrhages OS from (NAION).
66-year-old vasculopathy with bilateral, sequential, acute painless vision loss from pseudo-Foster Kennedy syndrome. (A) He initially presented with acute vision loss OS and was noted to have disc edema with peripapillary hemorrhages OS from (NAION). (B) Three months later, he developed acute painless vision loss OD. Dilated fundus examination at that time showed diffuse pallor OS and hyperemic sectoral disc edema OD.
## The Optic Nerve

**Compare and contrast acute vs chronic papilledema**

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shunt vessels</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Refractile bodies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VF loss</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## The Optic Nerve

### Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th><strong>Acute papilledema</strong></th>
<th><strong>Chronic papilledema</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shunt vessels present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Refractile bodies present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VF loss</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## The Optic Nerve

### Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td>Shunt vessels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refractile bodies present?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VF loss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As a practical matter, visual functioning refers to three specific exam findings. What are they?

---

---

---
## The Optic Nerve

### Acute papilledema vs Chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td>Refractile bodies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>present?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VF loss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*As a practical matter, visual functioning refers to three specific exam findings. What are they?*

---

- Visual acuity
- Visual fields
- Color vision
## Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td>Shunt vessels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refractile bodies</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**As a practical matter,** visual functioning refers to three specific exam findings:

-- Visual acuity
-- Visual fields
-- Color vision

**There is a specific clinical circumstance in which a pt with acute papilledema will manifest decreased visual function. What is it?**

It is when the papilledema is accompanied by macular edema. If this macular edema presents in a 'star' formation, it is called a **neuroretinitis**. The classic cause of neuroretinitis is Bartonellosis, aka cat-scratch disease.
### The Optic Nerve

#### Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>largely intact</td>
<td>affected</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shunt vessels</td>
<td>present?</td>
<td></td>
</tr>
<tr>
<td>Refractile bodies</td>
<td>present?</td>
<td></td>
</tr>
</tbody>
</table>

As a practical matter, visual functioning refers to three specific exam findings:
- Visual acuity
- Visual fields
- Color vision

There is a specific clinical circumstance in which a pt with acute papilledema will manifest decreased visual function. What is it? It is when the papilledema is accompanied by **two words**.
The Optic Nerve

Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shunt vessels present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Refractile bodies present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VF loss</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As a practical matter, visual functioning refers to three specific exam findings.

- Visual acuity
- Visual fields
- Color vision

There is a specific clinical circumstance in which a pt with acute papilledema will manifest decreased visual function. What is it?

It is when the papilledema is accompanied by macular edema.
# The Optic Nerve

## Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Large</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shunt vessels present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Refractile bodies present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VF loss</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**As a practical matter,** visual functioning refers to three specific exam findings:
- Visual acuity
- Visual fields
- Color vision

There is a specific clinical circumstance in which a pt with acute papilledema will manifest decreased visual function. What is it? It is when the papilledema is accompanied by macular edema.

If this macular edema presents in a ‘star’ formation, what is the formal name for the condition, ie, for papilledema + a macular star?

It is called **neuroretinitis**.

The classic cause of neuroretinitis is **Bartonellosis**, aka **cat-scratch dz**.
**The Optic Nerve**

**Compare and contrast acute vs chronic papilledema**

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Shunt vessels</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Refractile bodies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VF loss</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As a practical matter, visual functioning refers to three specific exam findings:
- Visual acuity
- Visual fields
- Color vision

There is a specific clinical circumstance in which a pt with acute papilledema will manifest decreased visual function. What is it? It is when the papilledema is accompanied by macular edema.

If this macular edema presents in a ‘star’ formation, what is the formal name for the condition, ie, for papilledema + a macular star? It is called a **neuroretinitis**.
Neuroretinitis
### Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Large intact</td>
<td>Affected</td>
</tr>
</tbody>
</table>

As a practical matter, visual functioning refers to three specific exam findings:
- Visual acuity
- Visual fields
- Color vision

There is a specific clinical circumstance in which a pt with acute papilledema will manifest decreased visual function. What is it? It is when the papilledema is accompanied by macular edema.

If this macular edema presents in a ‘star’ formation, what is the formal name for the condition, ie, for papilledema + a macular star? It is called a **neuroretinitis**.

What is the classic cause of neuroretinitis? It is Bartonellosis, aka cat-scratch dz.
**The Optic Nerve**

---

**Compare and contrast acute vs chronic papilledema**

<table>
<thead>
<tr>
<th></th>
<th><strong>Acute papilledema</strong></th>
<th><strong>Chronic papilledema</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
</tbody>
</table>

As a practical matter, visual functioning refers to three specific exam findings:
- Visual acuity
- Visual fields
- Color vision

There is a specific clinical circumstance in which a pt with acute papilledema will manifest decreased visual function. What is it? It is when the papilledema is accompanied by macular edema.

If this macular edema presents in a ‘star’ formation, what is the formal name for the condition, ie, for papilledema + a macular star? It is called a **neuroretinitis**.

What is the classic cause of neuroretinitis? Bartonellosis, aka cat-scratch dz.
### The Optic Nerve

#### Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Shunt vessels present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Refractile bodies present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VF loss</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**As a practical matter, visual functioning refers to three specific exam findings.**

- Visual acuity
- Visual fields
- Color vision

**There is a specific clinical circumstance in which a pt with acute papilledema will manifest decreased visual function. What is it?**

It is when the papilledema is accompanied by macular edema.

**If this macular edema presents in a ‘star’ formation, what is the formal name for the condition, ie, for papilledema + a macular star?**

It is called neuroretinitis.

**What is the classic cause of neuroretinitis?**

Bartonellosis, aka cat-scratch dz

---

**For more on Bartonellosis, see slide-set U25**
## The Optic Nerve

### Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td><strong>Shunt vessels present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Refractile bodies present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VF loss</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td><strong>Shunt vessels present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Refractile bodies present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VF loss</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Papilledema. (A) Acute; (B) Chronic

*The Optic Nerve*
### Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td><strong>Shunt vessels</strong></td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td><strong>Refractile bodies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VF loss</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Optic Nerve

Q
The Optic Nerve

Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td><strong>Shunt vessels present?</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Refractile bodies present?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VF loss</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chronic papilledema: Shunt vessels (arrow)
### Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td><strong>Shunt vessels present?</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Are shunt vessels ‘new,’ ie, do they represent neovascularization?*
## Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual function</td>
<td>Largely intact</td>
</tr>
<tr>
<td>Disc appearance</td>
<td>Hyperemic</td>
</tr>
<tr>
<td><strong>Shunt vessels</strong></td>
<td><strong>No</strong></td>
</tr>
</tbody>
</table>

*Are shunt vessels ‘new,’ ie, do they represent neovascularization?*

No
### The Optic Nerve

#### Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual function</td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td>Disc appearance</td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td>Shunt vessels</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Are shunt vessels ‘new,’ ie, do they represent neovascularization?**

No

**What are they, then?**
**The Optic Nerve**

### Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th><strong>Acute papilledema</strong></th>
<th><strong>Chronic papilledema</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual function</td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td>Disc appearance</td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td><strong>Shunt vessels</strong> present?</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Are shunt vessels ‘new,’ ie, do they represent neovascularization?
No

What are they, then?
They are pre-existing venules that, over time, have dilated in response to chronically elevated blood flow through them.
The Optic Nerve

**Compare and contrast acute vs chronic papilledema**

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td><strong>Shunt vessels present?</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Are shunt vessels ‘new,’ ie, do they represent neovascularization?*

No

*What are they, then?*

They are pre-existing venules that, over time, have dilated in response to chronically elevated blood flow through them

*Why are these venules subject to chronic elevations in the amount of blood they must transmit?*
Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual function</td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td>Disc appearance</td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td>Shunt vessels present?</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Are shunt vessels ‘new,’ ie, do they represent neovascularization?*
No

*What are they, then?*
They are pre-existing venules that, over time, have dilated in response to chronically elevated blood flow through them

*Why are these venules subject to chronic elevations in the amount of blood they must transmit?*
Because the normal pathway of egress from the retina, ie, the central retinal vein, is partially obstructed in these eyes, and thus blood is forced to find alternate routes out of the eye.
The Optic Nerve

Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td><strong>Shunt vessels present?</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Refractile bodies present?</strong></td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td><strong>VF loss</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q
## The Optic Nerve

### Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th><strong>Acute papilledema</strong></th>
<th><strong>Chronic papilledema</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual function</td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td>Disc appearance</td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td>Shunt vessels present?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Refractile bodies present?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>VF loss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**The Optic Nerve**

### Acute vs Chronic Papilledema

<table>
<thead>
<tr>
<th>Visual Function</th>
<th>Largely Intact</th>
<th>Affected</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Disc Appearance</th>
<th>Hyperemic</th>
<th>Pale</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Shunt Vessels</th>
<th>Present?</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
</table>

| Refractile Bodies | Present? | No | Yes |

<table>
<thead>
<tr>
<th>VF Loss</th>
<th></th>
<th></th>
</tr>
</thead>
</table>

'**Refractile bodies'? Do you mean optic nerve drusen?**

- No
- Yes

**OK, what are refractile bodies as seen in chronic papilledema?**

- They are minute aggregations of lipid that leached into the optic disc interstitium.

**Where on (in?) the optic disc are they found?**

- On the surface, often near the margin.

**Do they resolve along with resolution of the papilledema?**

- Yes.
<table>
<thead>
<tr>
<th>Refractile bodies present?</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF loss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### The Optic Nerve

#### Acute papilledema
- Visual function: Largely intact
- Disc appearance: Hyperemic
- Shunt vessels: Present? No
- Refractile bodies: Present? No

#### Chronic papilledema
- Visual function: Affected
- Disc appearance: Pale
- Shunt vessels: Present? Yes
- Refractile bodies: Present? Yes
- VF loss: Yes

**‘Refractile bodies’? Do you mean optic nerve drusen?**
No, this is a completely different entity.

**OK, what are refractile bodies as seen in chronic papilledema?**
The Optic Nerve

Compare and contrast acute vs chronic papilledema

'Refractile bodies'? Do you mean optic nerve drusen?
No, this is a completely different entity

OK, what are refractile bodies as seen in chronic papilledema?
They are minute aggregations of lipid that leached into the optic disc interstitium

<table>
<thead>
<tr>
<th>Refractile bodies present?</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF loss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**The Optic Nerve**

<table>
<thead>
<tr>
<th>Question</th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual function</td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td>Disc appearance</td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td>Shunt vessels present?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Refractile bodies present?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>VF loss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

'Refractile bodies'? Do you mean optic nerve drusen?
No, this is a completely different entity

OK, what are refractile bodies as seen in chronic papilledema?
They are minute aggregations of lipid that leached into the optic disc interstitium

Where on (in?) the optic disc are they found?

| Refractile bodies present? | No | Yes |
Compare and contrast acute vs chronic papilledema.

'Refractile bodies'? Do you mean optic nerve drusen?
No, this is a completely different entity.

OK, what are refractile bodies as seen in chronic papilledema?
They are minute aggregations of lipid that leached into the optic disc interstitium.

Where on (in?) the optic disc are they found?
On the surface, often near the margin.

<table>
<thead>
<tr>
<th>Refractile bodies present?</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>VF loss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chronic papilledema: Refractile bodies (arrow)
### The Optic Nerve

**Comparison between acute and chronic papilledema**

<table>
<thead>
<tr>
<th>Question</th>
<th>Acute</th>
<th>Chronic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual function</td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td>Disc appearance</td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td>Shunt vessels present?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Refractile bodies present?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>VF loss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

'Refractile bodies'? Do you mean optic nerve drusen?  
No, this is a completely different entity

OK, what are refractile bodies as seen in chronic papilledema?  
They are minute aggregations of lipid that leached into the optic disc interstitium

Where on (in?) the optic disc are they found?  
On the surface, often near the margin

Do they resolve along with resolution of the papilledema?  
Yes
### The Optic Nerve

#### Acute vs Chronic Papilledema

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Acute</th>
<th>Chronic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual function</td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td>Disc appearance</td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td>Shunt vessels present?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Refractile bodies present?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>VF loss</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comparison of refractile bodies**

'Refractile bodies'? Do you mean optic nerve drusen?
No, this is a completely different entity

OK, *what are refractile bodies as seen in chronic papilledema*?
They are minute aggregations of lipid that leached into the optic disc interstitium

Where on (in?) the optic disc are they found?
On the surface, often near the margin

Do they resolve along with resolution of the papilledema?
Yes
### Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td><strong>Shunt vessels present?</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Refractile bodies present?</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>VF loss</strong></td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>
## The Optic Nerve

### Compare and contrast acute vs chronic papilledema

<table>
<thead>
<tr>
<th></th>
<th>Acute papilledema</th>
<th>Chronic papilledema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual function</strong></td>
<td>Largely intact</td>
<td>Affected</td>
</tr>
<tr>
<td><strong>Disc appearance</strong></td>
<td>Hyperemic</td>
<td>Pale</td>
</tr>
<tr>
<td><strong>Shunt vessels present?</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Refractile bodies present?</strong></td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>VF loss</strong></td>
<td>None, or enlarged blind spot</td>
<td>Varies, but often extensive</td>
</tr>
</tbody>
</table>