I coined the term *oculopathy* because, for reasons that will soon be apparent, a term broader in scope than ‘HTNive retinopathy’ was needed, Stay tuned.
1) Hypertensive retinopathy
   - Most common sign in chronic HTN: arteriolar constriction

2) Hypertensive choroidopathy
   - Occurs typically in young patients with acute HTN:
     - Preeclampsia/eclampsia
     - Pheochromocytoma
     - Renal disease
   - Signs:
     - Hyperpigmented spots with hypopigmented rim = Elschnig spots
     - Linear areas of hyperpigmentation overlying choroidal arteries = Siegrist streaks

3) Hypertensive optic neuropathy
   - Presentation depends upon degree and chronicity of HTN
     - Severe HTN → flame hemorrhages at disc margin + disc edema

HTNive Oculopathy
1) Hypertensive \textbf{retinopathy}

2) Hypertensive \textbf{choroidopathy}

3) Hypertensive \textbf{optic neuropathy}
1) Hypertensive retinopathy
   - Most common sign in chronic HTN:
2) Hypertensive choroidopathy
3) Hypertensive optic neuropathy
1) Hypertensive 

    retinopathy

    - Most common sign in chronic HTN: arteriolar constriction

2) Hypertensive choroidopathy

3) Hypertensive optic neuropathy
1) Hypertensive **retinopathy**
   - Most common sign in chronic HTN: arteriolar constriction

2) Hypertensive **choroidopathy**
   - Occurs typically in young patients with acute HTN:
     - common cause of acute HTN in young female
     - rare cause of acute HTN in young person
     - not rare cause of acute HTN in young person

3) Hypertensive **optic neuropathy**
1) Hypertensive *retinopathy*
   - Most common sign in chronic HTN: arteriolar constriction

2) Hypertensive *choroidopathy*
   - Occurs typically in young patients with acute HTN:
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3) Hypertensive **optic neuropathy**
   - Presentation depends upon [ ] and [ ] of HTN
1) Hypertensive retinopathy
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3) Hypertensive **optic neuropathy**
   - Presentation depends upon degree and chronicity of HTN
   - Severe HTN → flame hemorrhages at disc margin + disc edema
1) Hypertensive \textit{retinopathy} \hfill \hfill \\
\begin{itemize}
\item Most common sign in chronic HTN: arteriolar constriction
\end{itemize}

2) Hypertensive \textit{choroidopathy} \hfill \hfill \\
\begin{itemize}
\item Occurs typically in young patients with acute HTN:
  \begin{itemize}
  \item Preeclampsia/eclampsia
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  \end{itemize}
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  \end{itemize}
\end{itemize}

3) Hypertensive \textit{optic neuropathy} \hfill \hfill \\
\begin{itemize}
\item Presentation depends upon degree and chronicity of HTN
\item Severe HTN $\rightarrow$ flame hemorrhages at disc margin + disc edema
\end{itemize}
Next we will look at the same topic but from a different perspective....
HTNive Oculopathy

A non-anatomic way to think about HTN and the eye

?  ?
HTNive Oculopathy

A non-anatomic way to think about HTN and the eye

Chronic

Acute
What process mediates damage caused by chronic HTN?
What process mediates damage caused by chronic HTN?
What process mediates damage caused by chronic HTN?

Briefly, what is the pathophysiology of arteriosclerosis?
What process mediates damage caused by chronic HTN?

Briefly, what is the pathophysiology of arteriosclerosis?
Chronic HTN leads to endothelial damage in the retinal arteriole bed.
What process mediates damage caused by chronic HTN?

Briefly, what is the pathophysiology of arteriosclerosis?
Chronic HTN leads to endothelial-cell damage in the retinal arteriole bed.
What process mediates damage caused by chronic HTN?

Briefly, what is the pathophysiology of arteriosclerosis? Chronic HTN leads to endothelial-cell damage in the retinal arteriole bed. Endothelial damage allows plasma to leach into the vessel wall, where it clots. Clotting within the wall leads to ‘stiffening’ of the vessel, as well as to narrowing of its lumen.
What process mediates damage caused by chronic HTN?

Arteriosclerosis

What pathology typically results?
What process mediates damage caused by chronic HTN?

Arteriosclerosis

What pathology typically results?

Retinopathy
What process mediates damage caused by chronic HTN?

Arteriosclerosis

What pathology typically results?

Retinopathy

Briefly, what is the pathophysiology of arteriosclerosis?

Chronic HTN leads to endothelial-cell damage in the retinal arteriole bed. Endothelial damage allows plasma to leach into the vessel wall, where it clots. Clotting within the wall leads to ‘stiffening’ of the vessel, as well as to narrowing of its lumen.

How does arteriosclerosis lead to retinopathy?
HTNive Oculopathy

Chronic

What process mediates damage caused by chronic HTN?

Arteriosclerosis

What pathology typically results?

Retinopathy

Briefly, what is the pathophysiology of arteriosclerosis?
Chronic HTN leads to endothelial-cell damage in the retinal arteriole bed. Endothelial damage allows plasma to leach into the vessel wall, where it clots. Clotting within the wall leads to 'stiffening' of the vessel as well as to narrowing of its lumen.

How does arteriosclerosis lead to retinopathy?
‘Stiff’ vessels are prone to breaking/leaking, and…
What process mediates damage caused by **chronic** HTN?

**Arteriosclerosis**

What pathology typically results?

**Retinopathy**

**Briefly, what is the pathophysiology of arteriosclerosis?**

Chronic HTN leads to endothelial-cell damage in the retinal arteriole bed. Endothelial damage allows plasma to leach into the vessel wall, where it clots. Clotting within the wall leads to ‘stiffening’ of the vessel, as well as to narrowing of its lumen.

**How does arteriosclerosis lead to retinopathy?**

‘Stiff’ vessels are prone to breaking/leaking, and narrowed vessel lumens lead to nonperfusion in the tissue bed.
What process mediates damage caused by chronic HTN?

Arteriosclerosis

What pathology typically results?

Retinopathy

What are the common manifestations of HTNive retinopathy?
HTNive Oculopathy

**Chronic**

What process mediates damage caused by chronic HTN?

Arteriosclerosis

What pathology typically results?

Retinopathy

- Arteriolar narrowing
- Retinal hemorrhages
- Microaneurysms

What are the common manifestations of HTNive retinopathy?

- A-V nicking
- Cotton-wool spots
- Neovascularization

**Acute**
HTNive Oculopathy

**Chronic**
- What process mediates damage caused by chronic HTN?
- Arteriosclerosis
- What pathology typically results?
- Retinopathy
  - Arteriolar narrowing
  - Retinal hemorrhages
  - Microaneurysms
  - A-V nicking
  - Cotton-wool spots
  - Neovascularization

**Acute**
- What process mediates damage caused by acute HTN?
- ?
HTNive Oculopathy

**Chronic**
- What process mediates damage caused by chronic HTN?
- Arteriosclerosis
- What pathology typically results?
  - Retinopathy
    - Arteriolar narrowing
    - Retinal hemorrhages
    - Microaneurysms
  - A-V nicking
  - Cotton-wool spots
  - Neovascularization

**Acute**
- What process mediates damage caused by acute HTN?
- Vasospasm
HTNive Oculopathy

**Chronic**

*What process mediates damage caused by chronic HTN?*

- Arteriosclerosis

*What pathology typically results?*

- Retinopathy
  - Arteriolar narrowing
  - Retinal hemorrhages
  - Microaneurysms
  - A-V nicking
  - Cotton-wool spots
  - Neovascularization

**Acute**

*What process mediates damage caused by acute HTN?*

- Vasospasm

*What pathologies (2) typically result?*

- ? & ?
A

HTNive Oculopathy

**Chronic**
- What process mediates damage caused by **chronic** HTN?
  - Arteriosclerosis
    - What pathology typically results?
      - Retinopathy
        - Arteriolar narrowing
        - Retinal hemorrhages
        - Microaneurysms
        - A-V nicking
        - Cotton-wool spots
        - Neovascularization

**Acute**
- What process mediates damage caused by **acute** HTN?
  - Vasospasm
    - What pathologies (2) typically result?
      - Choroidopathy & Optic Neuropathy
What process mediates damage caused by chronic HTN?

Arteriosclerosis

What pathology typically results?

Retinopathy

Arteriolar narrowing
Retinal hemorrhages Microaneurysms

What pathology typically results?

A-V nicking Cotton-wool spots Neovascularization

Briefly, what is the pathophysiology of HTNive choroidopathy?
HTNive Oculopathy

**Chronic**
- What process mediates damage caused by chronic HTN?
  - Arteriosclerosis
    - What pathology typically results?
      - Retinopathy
        - Arteriolar narrowing
        - Retinal hemorrhages
        - Microaneurysms
        - Neovascularization

**Acute**
- What process mediates damage caused by acute HTN?
  - Vasospasm
    - What pathologies (2) typically result?
      - Choroidopathy & Optic Neuropathy
        - A-V nicking
        - Cotton-wool spots

Briefly, what is the pathophysiology of HTNive choroidopathy?
- Vasospasm leads to lobular nonperfusion of the choriocapillaris.
A

**HTNive Oculopathy**

**Chronic**
- What process mediates damage caused by **chronic HTN**?
  - Arteriosclerosis
    - What pathology typically results?
      - Retinopathy
        - Arteriolar narrowing
        - Retinal hemorrhages
        - Microaneurysms
      - A-V nicking
      - Retinal hemorrhages
      - Microaneurysms
      - Neovascularization

**Acute**
- What process mediates damage caused by **acute HTN**?
  - Vasospasm
    - What pathologies (2) typically result?
      - **Choroidopathy** & Optic Neuropathy
      - Briefly, what is the pathophysiology of HTNive choroidopathy?
        - Vasospasm leads to lobular nonperfusion of the choriocapillaris.
What process mediates damage caused by chronic HTN?
- Arteriosclerosis
  - What pathology typically results?
    - Retinopathy
      - Arteriolar narrowing
      - Retinal hemorrhages
      - Microaneurysms
      - Neovascularization
- A-V nicking
- Cotton-wool spots

Briefly, what is the pathophysiology of HTNive choroidopathy?
Vasospasm leads to lobular nonperfusion of the choriocapillaris. Acutely, these nonperfused lobulations (spots) are hypopigmented; but with time they become hyperpigmented.

What process mediates damage caused by acute HTN?
- Vasospasm
  - What pathologies (2) typically result?
    - Choroidopathy & Optic Neuropathy
What process mediates damage caused by **chronic** HTN?

- **Arteriosclerosis**
  - **Retinopathy**
    - Retinal hemorrhages
    - Microaneurysms
    - Neovascularization
    - Arteriolar narrowing
    - A-V nicking
    - Cotton-wool spots

What pathology typically results?

What process mediates damage caused by **acute** HTN?

- **Vasospasm**
  - **Choroidopathy** & Optic Neuropathy
    - Briefly, what is the pathophysiology of HTNive choroidopathy?
      - Vasospasm leads to lobular nonperfusion of the choriocapillaris. Acutely, these nonperfused lobulations (spots) are hypopigmented; but with time they become hyperpigmented.

**Elschnig spots**

What pathologies (2) typically result?
Q/A

**HTNive Oculopathy**

**Chronic**

- What process mediates damage caused by chronic HTN?
- Arteriosclerosis
  - What pathology typically results?
  - Retinopathy

**Acute**

- What process mediates damage caused by acute HTN?
- Vasospasm
  - What pathologies (2) typically result?
  - Choroidopathy & Optic Neuropathy

**Briefly, what is the pathophysiology of HTNive choroidopathy?**

Vasospasm leads to lobular nonperfusion of the choriocapillaris. Acutely, these nonperfused lobulations (spots) are hypopigmented; but with time they become **hyperpigmented**.

**What is the eponymous name of these hyperpigmented spots?**

**Elschnig spots**
HTNive Oculopathy

**Chronic**
- What process mediates damage caused by *chronic* HTN?
  - Arteriosclerosis
  - What pathology typically results?
    - Retinopathy
- Arteriolar narrowing
- Retinal hemorrhages
- Microaneurysms
- Neovascularization

**Acute**
- What process mediates damage caused by *acute* HTN?
  - Vasospasm
  - What pathologies (2) typically result?
    - Choroidopathy & Optic Neuropathy
- A-V nicking
- Cotton-wool spots

Briefly, what is the pathophysiology of HTNive choroidopathy?
Vasospasm leads to lobular nonperfusion of the choriocapillaris. Acutely, these nonperfused lobulations (spots) are hypopigmented; but with time they become hyperpigmented.

What is the eponymous name of these hyperpigmented spots?
Elschnig spots
HTNive Oculopathy

Chronic

What process mediates damage caused by chronic HTN?

Arteriosclerosis

What pathology typically results?

Retinopathy

Acute

What process mediates damage caused by acute HTN?

Vasospasm

What pathologies (2) typically result?

Choroidopathy & Optic Neuropathy

HTNive choroidopathy is associated with another hyperpigmented lesion, but one with a linear rather than lobular shape. What is its eponymous name? Elschnig spots

What is the eponymous name of these hyperpigmented spots? Elschnig spots

Vasospasm leads to lobular nonperfusion of the choriocapillaris. Acutely, these nonperfused lobulations (spots) are hypopigmented; but with time they become hyperpigmented.

Arteriolar narrowing
Retinal hemorrhages
Microaneurysms
Cotton-wool spots
Neovascularization
Q/A

HTNive Oculopathy

Chronic

What process mediates damage caused by chronic HTN?

Arteriosclerosis

What pathology typically results?

Retinopathy

Acute

What process mediates damage caused by acute HTN?

Vasospasm

What pathologies (2) typically result?

Choroidopathy & Optic Neuropathy

HTNive choroidopathy is associated with another hyperpigmented lesion, but one with a linear rather than lobular shape. What is its eponymous name?

Streaks

Phytophysicsology of HTNive choroidopathy?

Arteriolar narrowing

Retinal hemorrhages

Microaneurysms

Neovascularization

Cotton-wool spots

What is the eponymous name of these hyperpigmented spots?

Elschnig spots
HTNive Oculopathy

**Chronic**
- What process mediates damage caused by **chronic** HTN?
  - Arteriosclerosis
- What pathology typically results?
  - Retinopathy

**Acute**
- What process mediates damage caused by **acute** HTN?
  - Vasospasm
- What pathologies (2) typically result?
  - Choroidopathy & Optic Neuropathy

**HTNive choroidopathy** is associated with another hyperpigmented lesion, but one with a linear rather than lobular shape. What is its eponymous name? **Siegrist streaks**

What is the eponymous name of these hyperpigmented spots? **Elschnig spots**
HTNive Oculopathy

**Chronic**

What process mediates damage caused by *chronic* HTN?

Arteriosclerosis

What pathology typically results?

Retinopathy

**Acute**

What process mediates damage caused by *acute* HTN?

Vasospasm

What pathologies (2) typically result?

Choroidopathy & Optic Neuropathy

HTNive choroidopathy is classically associated with four conditions— what are they?

- Elschnig spots
- Siegrist streaks
- Neovascularization
- Retinal hemorrhages
- Microaneurysms
- Arteriolar narrowing
- HTNive choroidopathy is hyperpigmented; choroidopathy is hypopigmented;
HTNive Oculopathy

**Chronic**
- What process mediates damage caused by **chronic** HTN?
  - Arteriosclerosis
    - What pathology typically results?
      - Retinopathy
      - Choroidopathy & Optic Neuropathy

**Acute**
- What process mediates damage caused by **acute** HTN?
  - Vasospasm
    - What pathologies (2) typically result?
      - Retinal hemorrhages
      - Neovascularization

---

HTNive choroidopathy is classically associated with four conditions—what are they?
- Pre-eclampsia
- Eclampsia
- Pheochromocytoma
- Acute renal failure

Elschnig spots
What process mediates damage caused by chronic HTN?

Arteriosclerosis

What pathology typically results?

Retinopathy

HTNive choroidopathy is a hyperpigmented condition typically associated with:

- Pre-eclampsia
- Eclampsia
- Pheochromocytoma
- Acute renal failure

All four are associated with another, as-yet-unmentioned manifestation of severe HTNive choroidopathy. What is it?

What process mediates damage caused by acute HTN?

Vasospasm

What pathologies (2) typically result?

Choroidopathy & Optic Neuropathy
**HTNive Oculopathy**

### Chronic
- What process mediates damage caused by **chronic HTN**?
  - Arteriosclerosis
- What pathology typically results?
  - Retinopathy

### Acute
- What process mediates damage caused by **acute HTN**?
  - Vasospasm
- What pathologies (2) typically result?
  - Choroidopathy & Optic Neuropathy

---

**HTNive choroidopathy** is a hyperpigmented lesion with lobular rather than lobulated shapes. What are they?
- Pre-eclampsia
- Eclampsia
- Pheochromocytoma
- Acute renal failure

**All four are associated with another, as-yet-unmentioned manifestation of severe HTNive choroidopathy. What is it?**
Exudative retinal detachment (ERD)

---

**Time for a break!**

**Contextual note:**
- Arteriolar narrowing
- Retinal hemorrhages
- Microaneurysms
- Neovascularization
HTNive Oculopathy

Chronic

What process mediates damage caused by chronic HTN?

Arteriosclerosis

What pathology typically results?

Retinopathy

Acute

What process mediates damage caused by acute HTN?

Vasospasm

What pathologies (2) typically result?

Choroidopathy & Optic Neuropathy

HTNive choroidopathy is hyperpigmented; what are they?

- Pre-eclampsia
- Eclampsia
- Pheochromocytoma
- Acute renal failure

Elschnig spots

Siegrist streaks

HTNive choroidopathy is associated with another hyperpigmented lesion, but one with a linear rather than lobular shape. What is its eponymous name?

Exudative retinal detachment (ERD)

What are the two most common causes of ERD? (HTNive choroidopathy ain’t one of them.)

All four are associated with another, as-yet-unmentioned manifestation of severe HTNive choroidopathy. What is it? Exudative retinal detachment (ERD)
HTNive Oculopathy

**Chronic**
- What process mediates damage caused by **chronic** HTN?
  - Arteriosclerosis

**Acute**
- What process mediates damage caused by **acute** HTN?
  - Vasospasm

What pathology typically results?
- **Retinopathy**
- **Choroidopathy** & Optic Neuropathy

**HTNive choroidopathy** is what are they?
- Pre-eclampsia
- Eclampsia
- Pheochromocytoma
- Acute renal failure

All four are associated with another, as-yet-unmentioned manifestation of severe HTNive choroidopathy. What is it? Exudative retinal detachment (ERD)

What are the two most common causes of ERD? (HTNive choroidopathy ain’t one of them.) Neoplasia (often metastatic), and inflammatory processes
**HTNive Oculopathy**

**Chronic**
- What process mediates damage caused by chronic HTN?
  - Arteriosclerosis
  - What pathology typically results?
    - Retinopathy

**Acute**
- What process mediates damage caused by acute HTN?
  - Vasospasm
  - What pathologies (2) typically result?
    - Choroidopathy & **Optic Neuropathy**

**What are the ophthalmoscopic findings in HTNive optic neuropathy?**
- --
- --
- --
A HTNive Oculopathy

Chronic

What process mediates damage caused by chronic HTN?

Arteriosclerosis

What pathology typically results?

Retinopathy

Acute

What process mediates damage caused by acute HTN?

Vasospasm

What pathologies (2) typically result?

Choroidopathy & Optic Neuropathy

**What are the ophthalmoscopic findings in HTNive optic neuropathy?**

--Peripapillary hemorrhages
--Blurring of the disc margin
--Disc edema
--Macular exudate (possibly in a 'star' configuration)
What process mediates damage caused by chronic HTN?

- Arteriosclerosis

What pathology typically results?

- Retinopathy

What process mediates damage caused by acute HTN?

- Vasospasm

What pathologies (2) typically result?

- Choroidopathy & Optic Neuropathy

‘Disc edema with a macular star’ is the definition of what condition?

- Neuroretinitis

What are the ophthalmoscopic findings in HTNive optic neuropathy?

- Peripapillary hemorrhages
- Blurring of the disc margin
- Disc edema
- Macular exudate (possibly in a ‘star’ configuration)

#1 cause of neuroretinitis:

- Cat-scratch disease (CSD)
What process mediates damage caused by chronic HTN?
- Arteriosclerosis
  - What pathology typically results?
    - Retinopathy
      - Arteriolar narrowing
      - Microaneurysms
      - Neovascularization

What pathology typically results?
- Retinal hemorrhages
- Neovascularization

What process mediates damage caused by acute HTN?
- Vasospasm
  - What pathologies (2) typically result?
    - Choroidopathy & Optic Neuropathy
      - Disc edema
      - Macular exudate (possibly in a ‘star’ configuration)

'Disc edema with a macular star’ is the definition of what condition?
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What are the ophthalmoscopic findings in HTNive optic neuropathy?
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  - What pathology typically results?
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What process mediates damage caused by acute HTN?
- Vasospasm
  - What pathologies (2) typically result?
    - Choroidopathy & Optic Neuropathy

What are the ophthalmoscopic findings in HTNive optic neuropathy?
- Peripapillary hemorrhages
- Blurring of the disc margin
- Disc edema
- Macular exudate (possibly in a ‘star’ configuration)

‘Disc edema with a macular star’ is the definition of what condition?
- Neuroretinitis

What is the #1 cause of neuroretinitis?
- Cat-scratch disease (CSD)
HTNive Oculopathy

**Chronic**
- What process mediates damage caused by chronic HTN?
  - Arteriosclerosis
- What pathology typically results?
  - Retinopathy

**Acute**
- What process mediates damage caused by acute HTN?
  - Vasospasm
- What pathologies (2) typically result?
  - Choroidopathy & **Optic Neuropathy**

---

What are the ophthalmoscopic findings in HTNive optic neuropathy?
- Peripapillary hemorrhages
- Blurring of the disc margin
- Disc edema
- Macular exudate (possibly in a 'star' configuration)

---

'Disc edema with a macular star' is the definition of what condition?
**Neuroretinitis**

What is the #1 cause of neuroretinitis?
Cat-scratch disease (CSD)

---

Microaneurysms
Neovascularization
HTNive Oculopathy

**Chronic**

What process mediates damage caused by **chronic** HTN?

- Arteriosclerosis
  
  What pathology typically results?
  
  - Retinopathy

**Acute**

What process mediates damage caused by **acute** HTN?

- Vasospasm
  
  What pathologies (2) typically result?
  
  - Choroidopathy & **Optic Neuropathy**

---

**What are the ophthalmoscopic findings in HTNive optic neuropathy?**

- Peripapillary hemorrhages
- Blurring of the disc margin
- **Disc edema**
- **Macular exudate (possibly in a ‘star’ configuration)**

---

**What is the causative organism in CSD?**

- **Bartonella henselae**

---

**Cat-scratch disease (CSD)**

- Disc edema with a macular star is the definition of what condition?
- Neuroretinitis
HTNive Oculopathy

### Chronic

- What process mediates damage caused by **chronic** HTN?
- Arteriosclerosis
- What pathology typically results?
  - Retinopathy
  - Choroidopathy & **Optic Neuropathy**

### Acute

- What process mediates damage caused by **acute** HTN?
- Vasospasm
- What pathologies (2) typically result?
  - Retinal hemorrhages
  - Neovascularization

**Cat-scratch disease (CSD)**

- What are the ophthalmoscopic findings in HTNive optic neuropathy?
  - Peripapillary hemorrhages
  - Blurring of the disc margin
  - Disc edema
  - Macular exudate (possibly in a ‘star’ configuration)

- What is the causative organism in CSD? **Bartonella henselae**

- What is the #1 cause of neuroretinitis? **Cat-scratch disease (CSD)**

- What is the #1 cause of neuroretinitis? **Cat-scratch disease (CSD)**
What process mediates damage caused by **chronic** HTN?

* Arteriosclerosis
  * What pathology typically results?
    * Retinopathy

- Arteriolar narrowing
- Retinal hemorrhages
- Microaneurysms
- A-V nicking
- Cotton-wool spots
- Neovascularization

What process mediates damage caused by **acute** HTN?

* Vasospasm
  * What pathologies (2) typically result?
    * Choroidopathy & Optic Neuropathy

**HTN is a risk factor for several retinal vascular events that convey significant ocular morbidity—what are they?**

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HTNive Oculopathy

Chronic

What process mediates damage caused by chronic HTN?

Arteriosclerosis

What pathology typically results?

Retinopathy

Acute

What process mediates damage caused by acute HTN?

Vasospasm

What pathologies (2) typically result?

Choroidopathy & Optic Neuropathy

HTN is a risk factor for several retinal vascular events that convey significant ocular morbidity—what are they?

--Retinal arterial occlusions (branch and central)
--Retinal venous occlusions (ditto)
--Retinal macroaneurysms