SAWA UNIVERSITY

HYPERTENSION PATHOPHYSIOLOGY & HYPERTENSIVE EYE DISEASE

جامعة ساوة

كلية التقنيات الصحية والطبية

قسم تقنيات البصريات

المرحلة

اسم المحاضر: د. هدى ناهي

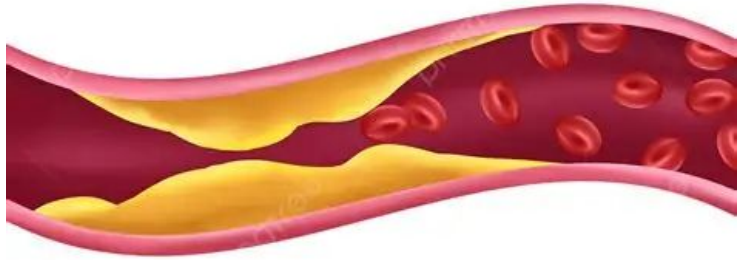
رقم المحاضرة: 4

Definition of Hypertension

- Hypertension: persistent elevation of arterial blood pressure above normal range.
  - Normal: <120/80 mmHg
  - Hypertension: ≥140/90 mmHg

Pathophysiology of Hypertension

- ↑ Peripheral vascular resistance (vasoconstriction)
- ↑ Cardiac output (sympathetic overactivity)
- Arteriolar remodeling → thickening of vessel wall
- Endothelial dysfunction → ↓ nitric oxide, ↑ oxidative stress
- Leads to: Target organ damage (heart, kidney, brain, eyes)



Hypertensive Target Organ Damage

- Heart → Left ventricular hypertrophy
- Kidney → Nephrosclerosis
- Brain → Stroke
- **Eye → Hypertensive Retinopathy**

Hypertensive Eye Disease (Definition)

- Spectrum of retinal & optic nerve changes caused by elevated systemic BP.

- Reflects the severity and duration of hypertension.

- Can indicate systemic vascular damage.

Pathophysiology in the Eye

1. Vasoconstriction of retinal arterioles (early & reversible).

2. Sclerosis (thickening) of vessel walls with chronic HTN.

3. Breakdown of blood-retinal barrier → hemorrhage & exudate.

4. Optic disc edema in severe malignant hypertension.

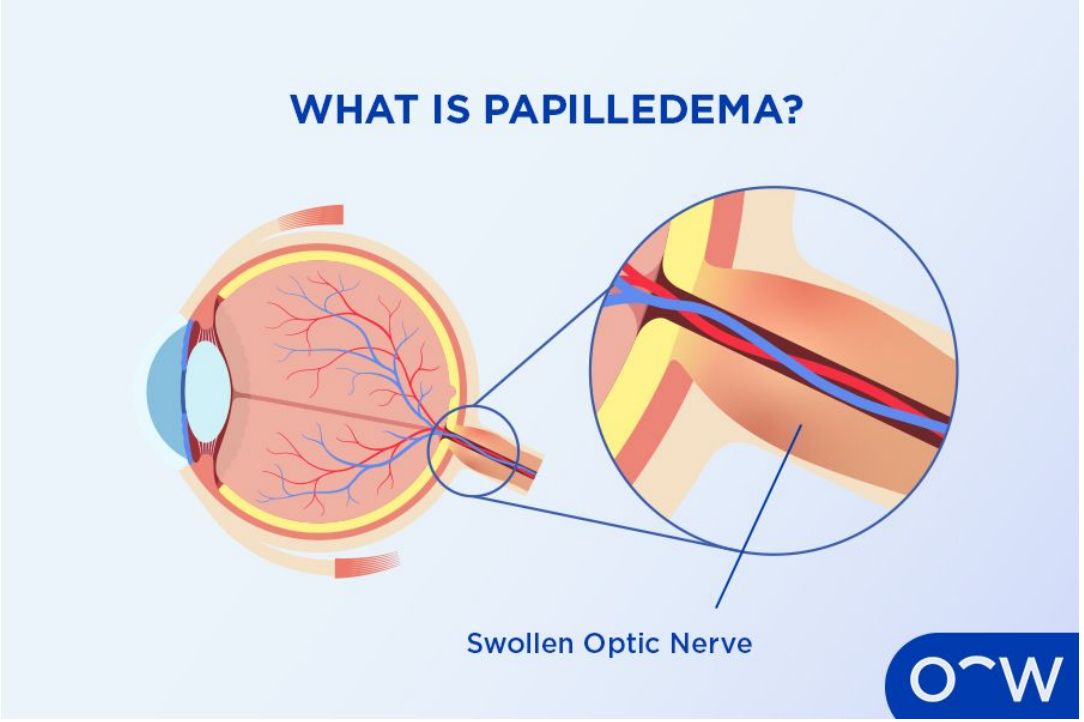
Retinal Changes – Stages (Keith–Wagener–Barker Classification)

Grade	Findings	Description
I	Mild arteriolar narrowing	Copper wiring" appearance
II	AV nicking	Arteriovenous crossing changes
III	Hemorrhages, cotton-wool spots, hard exudates	Retinal ischemia
IV	Papilledema	Malignant hypertension, emergency

Clinical Features

- Often asymptomatic initially
- Later: blurred vision, visual field defects.
- Fundus exam shows:

1) Arteriolar narrowing
2) Hemorrhages
3) Cotton-wool spots
4) Macular star
5) Papilledema (severe)



Fundus Findings Summary

Early:

- Generalized/focal arteriolar narrowing
- AV nicking

Moderate:

- Retinal hemorrhages
- Cotton-wool spots
- Hard exudates

Severe:

- Papilledema
- Macular star formation

Differential Diagnosis:

- Diabetic retinopathy
- Retinal vein occlusion
- Anemia or blood dyscrasias
- Radiation retinopathy

Management

- Control systemic blood pressure
- Lifestyle: diet, exercise, reduce salt
- Medications: ACE inhibitors, ARBs, β-blockers, diuretics
- Ophthalmic follow-up
- Fundus examination every 6–12 months
- Treat complications: macular edema, optic neuropathy

Key Points for Optometry Students

- Always measure BP in patients with retinal changes
- Fundus findings reflect systemic vascular health
- Sudden vision changes → suspect malignant HTN
- Eye is a “window to systemic circulation”

Summary

- **Hypertension = ↑ vascular resistance**
- **Causes structural & functional changes in retinal vessels**

- **Classification (I–IV) helps estimate systemic risk**

- **Early detection by optometrists can prevent vision & life-threatening complications**

References

- Vaughan & Asbury's General Ophthalmology
- Kanski's Clinical Ophthalmology
- Guyton & Hall Textbook of Medical Physiology
- American Heart Association (AHA) Guideline


Thank
you!