

## What is glaucoma?

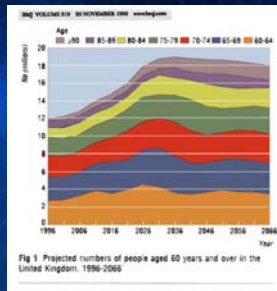
Rosalind Harrison FRCOphth

## What is glaucoma

- 3 million bilaterally blind from glaucoma worldwide
- Second most common cause of irreversible blindness in UK (11% registration for vision impairment)
- Commonest cause of blindness in people of African descent

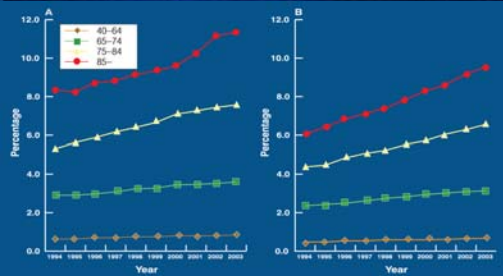
## Demographic change

- The number of cases of glaucoma in England and Wales will increase by a third by 2021, and then continue to rise at a similar pace to 2031.



## Glaucoma prevalence in the UK

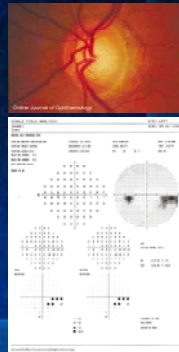
Percentage of individuals treated for glaucoma each year from 1994 to 2003  
A = men and B = women



Owen CG et al. Br J Ophthalmol 2006;90:861-868.

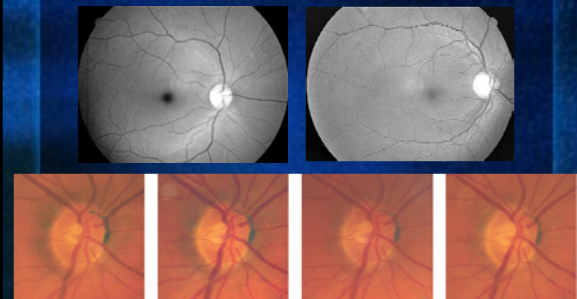
## What is glaucoma?

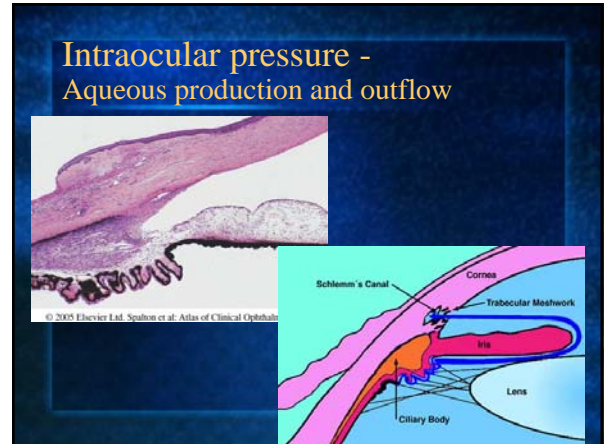
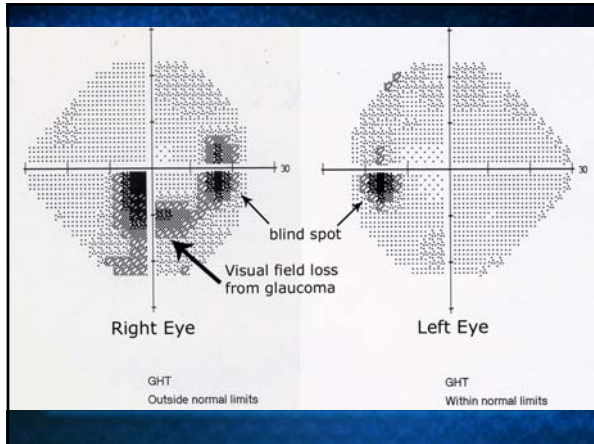
- Glaucoma is a generic name for a group of diseases causing characteristic optic neuropathy (disc cupping) and visual field loss
- Raised intraocular pressure (IOP) is usually but not always present
- Raised IOP and other factors such as optic nerve head perfusion are considered responsible for glaucomatous optic neuropathy



## Anatomy and Physiology

### Retinal nerve fibre layer





### Glaucoma classification -

- Primary / Secondary
- Congenital / Juvenile / Adult
- Open angle / Closed angle

Open angle      Closed angle

### Glaucoma classification - Primary glaucomas

- Primary congenital forms
- Primary open-angle glaucomas (POAG)
  - Ocular hypertension
  - Primary open-angle suspect
  - Primary juvenile glaucoma
  - POAG / high pressure glaucoma
  - POAG / normal pressure glaucoma
- Primary angle-closure (PAC)

### Glaucoma classification Congenital glaucoma

- Inheritance of congenital glaucoma is recessive
- The cornea and sclera in first 18 months of life will stretch in response to raised IOP
- Enlarged corneal diameter is characteristic feature of congenital glaucoma

Buphthalmos, congenital glaucoma

### Glaucoma classification Primary open-angle glaucomas (POAG)

- Ocular hypertension (*raised pressure, no damage*)
- Primary open-angle suspect (*incomplete glaucoma features*)
- Primary juvenile glaucoma (*onset teens - 30's/40's*)
- High pressure glaucoma
- Normal pressure glaucoma

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## Glaucoma classification

### Primary angle-closure glaucoma



- Can be acute, subacute or chronic
- Iris apposed to trabecular meshwork at anterior chamber angle
- Angle closure occurs when iris is pushed forward by pupil block
- Risk factors include hypermetropia, increasing age, female sex, chinese origin

## Glaucoma classification -

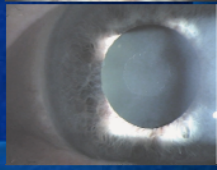
### Secondary glaucomas

- Secondary open-angle glaucomas
  - Secondary open-angle glaucomas caused by ocular disease
  - Iatrogenic secondary open-angle glaucomas (e.g. steroid induced)
- Secondary angle-closure
  - With pupillary block
  - Without pupillary block

## Secondary open-angle glaucomas -

### Pseudoexfoliation glaucoma

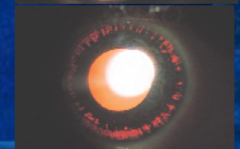
- Occurs in some, not all, people with pseudoexfoliation syndrome
- Greyish-white deposits of abnormal proteins on all surfaces irrigated by aqueous, including trabecular meshwork



## Secondary open-angle glaucomas -

### Pigment dispersion syndrome

- Occurs in some, not all, people with pigment dispersion syndrome
- Pigment from posterior iris surface circulates in aqueous and is deposited on posterior cornea (Krukenberg spindle) and trabecular meshwork
- Occurs in myopic eyes with deep AC and concave irises (thus contact between posterior iris and lens zonules)



## Glaucoma classification

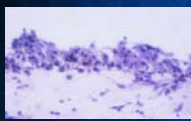
### Lens-induced (phacolytic) glaucoma



Phacolytic glaucoma



Phacomorphic malignant glaucoma



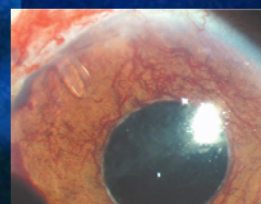
Phacolytic glaucoma, histology



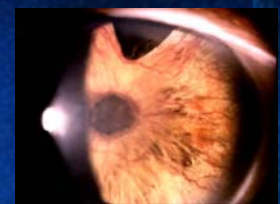
Phacolytic acute open-angle glaucoma

## Secondary open-angle glaucomas

### Neovascular secondary glaucoma



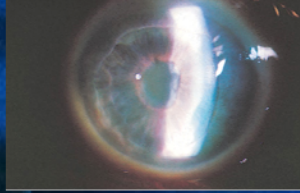
Neovascular secondary angle-closure glaucoma



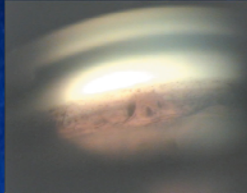
Florid iris neovascularisation

## Secondary open-angle glaucomas

### Uveitis secondary glaucoma



Pupil occluded by posterior synechiae



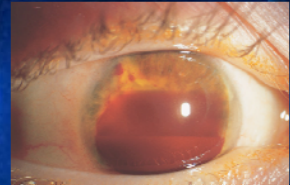
Peripheral anterior synechiae

## Secondary open-angle glaucomas

### Trauma and secondary glaucoma



Lens luxation with acute pupillary block glaucoma



Hyphema, secondary open-angle glaucoma

## RISK FACTORS FOR GLAUCOMA

## Risk factors for glaucoma

### Risk factors for open-angle glaucoma

#### Strong association

- Raised intraocular pressure
- Increasing age, particularly after 50 years
- African descent
- Positive family history of glaucoma (first-degree relative, particularly if sibling; relative risk 3.7 times higher than if no family history)

#### Moderate association

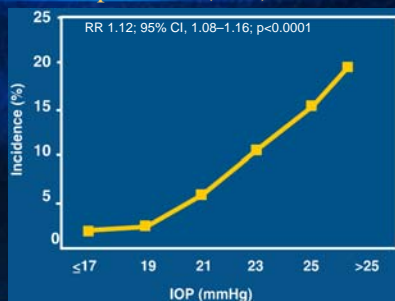
- Myopia
- Diabetes mellitus

#### Weak association

- Migraine (except normal tension glaucoma)
- Systemic hypertension
- Vasospasm

## Risk factors for glaucoma

### Intraocular pressure (IOP)



Nemesure B. Ophthalmology 2007;114:1810–1815.

## Risk factors for glaucoma

### Risk factors for angle-closure glaucoma

- Shallow anterior chamber depth, associated with<sup>1</sup>:
  - Female gender
  - Increasing age
  - Asian (particularly Chinese) origin
- Shorter globe axial length<sup>1</sup>
- Environmental factors<sup>1</sup>:
  - Seasonal variation
  - Extreme temperatures
  - Prolonged periods indoors in a dark environment

1. Foster PJ. Semin Ophthalmol 2002;17:50–58.

## EPIDEMIOLOGY OF GLAUCOMA IN THE UK

## Prevalence of glaucoma

### Primary open-angle glaucoma

(Baltimore study, 1990)

- Caucasian Americans
  - 0.9% in the 40 to 49 years
  - 2.2% in those older than 80 years
- African Americans
  - 1.2% for those in the 40 to 49 years
  - 11.3% for those older than 80 years

*50% people unaware they have glaucoma*

## Prevalence of glaucoma

### Prevalence of ocular hypertension

- 4 - 10% population over 40 years have raised IOP (>21 mm Hg) without evidence of glaucoma
- Over a 5-year period, incidence of new onset of glaucomatous damage in previously unaffected patients is about
  - 2.6 - 3% for IOPs 21-25 mm Hg,
  - 12 - 26% for IOPs 26-30 mm Hg,
- Risk halved if patient is treated to lower IOP
- Risk varies with corneal thickness

## Prevalence of glaucoma

### Primary narrow-angle glaucoma

- Prevalence 0.1% in white population > 40 years of age
- Narrow angle glaucoma is 10-15 times higher in Chinese than white populations