

# Glaucoma: You Don't See it If You Don't Look For It

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No financial disclosures

4 main types of glaucoma



What type is the most common?

90% - open angle glaucoma

Glaucoma used to be triad of...

- Increased IOP
- ONH damage
- Visual field defects

Now...

- 
- ONH damage
-

## What causes glaucoma?

### Better way to define glaucoma

The pressure inside the eye rises to a level higher than what is healthy for the eye causing progressive damage to the optic nerve

- Ischemia theory
- Mechanical theory

### Pathology of Glaucoma

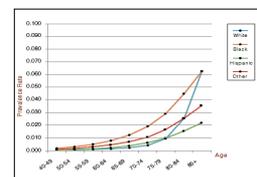
- The patient's rate of axonal loss exceeds the normal age-related rate of loss

Glaucoma is the second leading cause of blindness in the world

- Estimated that 2-3 million in US have glaucoma but it is probably more than that

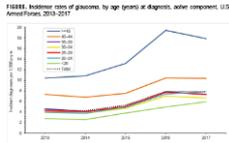
Step Two: Identify the risks for developing glaucoma

### Age



## Age

- Incidence of 0.25% at 20 years
- Incidence of 15% at 70-75 years



## Race

### LALES

- Population-based cross-sectional study involving 6,357 subjects 40 and older
- Designed to measure the prevalence of eye disease in Latinos
- Latino population has incidence of glaucoma slightly less than African Americans, but greater than the average person

### ADAGES

- African Americans have a 4X higher incidence of glaucoma
- Glaucoma progresses faster
- More severe damage and loss of visual function

## Diabetes

## Hypertension

- Perfusion Pressure =  
Diastolic Pressure – IOP

Normal BP = 120/80

Normal max IOP = 20/21

## Perfusion Pressure

- Perfusion Pressure =  
Diastolic Pressure – IOP

Normal:  $80 - 20 = 60$

Once it gets below 40, it is a problem

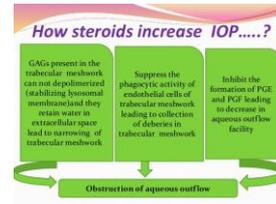
## Myopia and glaucoma

- At what Diopter do you call Myopia a risk factor?

	Cataracts	Glaucoma	Retinal Detachment	Myopic Maculopathy
-1D to -3D	2 x	4 x	3 x	2 x
-3D to -6D	3 x	4 x	9 x	10 x
> 6D	5 x	14 x	22 x	41 x

## Chronic steroid use

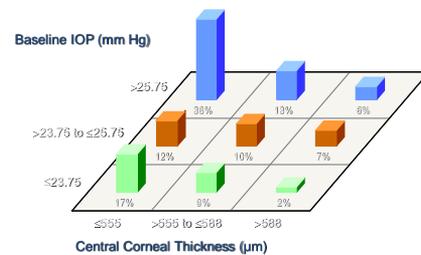
- Eye drops
- Inhalers
- Pills
- Creams



## Thin Corneas

When is a cornea thin?

## Central Corneal Thickness and IOP

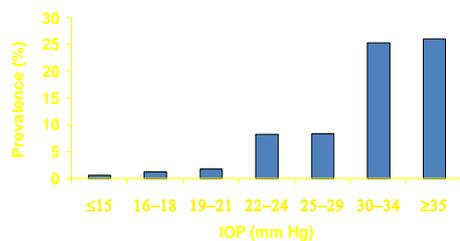


## How do we define normal IOP?

normal intraocular pressure is that pressure which does not lead to glaucomatous damage of the optic nerve head. It is the pressure at which the patient would not suffer from any optic atrophy at all over the course of time.

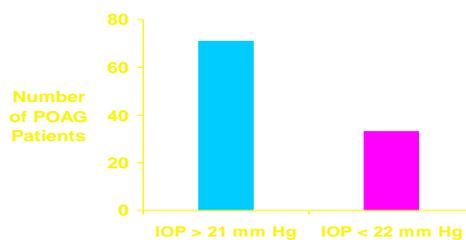
## Where does the 10 to 21 range come from?

### High IOP Increases the Risk of Glaucoma



Baltimore Eye Study (N = 4926)

### Almost One Third of Glaucoma Patients Have IOP in the Normal Range



Baltimore Eye Study (N = 4926)

For most people, IOP is highest at nighttime

### IOP fluctuation

- Anything from 2 to 4 mm Hg is normal
- Above that is suspicious for glaucoma

## How do we find this?

- Schedule patient appointments during different times of the day
- Serial tonometry

## Serial tonometry

- At least 3 IOP readings during different time periods of the same day
- Option 1: Patient comes in at 8am, 9am, 10am, 11am, etc
- Option 2: Patient comes in at 8am, 11am, 2pm, 5pm, etc

## Serial tonometry (CPT code: 92100)

- CPT code 92100
- ICD 10 codes: Any of the glaucoma suspect, OHTN, glaucoma codes
- Reimbursement roughly \$90-\$100
- Should do yearly

## Things you will need

- IOP measuring device
- Gonioscope
- OCT
- VF
- Pachymetry
- OCT

## Standard Glaucoma Suspect work up protocol

- Visit 1: Dilated exam, gonio, pach, photos
- Visit 2: IOP check and OCT
- Visit 3: IOP check and VF

## Standard Glaucoma Suspect work up protocol

- Timing of visits:
  - Option 1: 3 visits 1 month apart and then patient done for 9 months
  - Option 2: 3 visits spaced out ever 3-4 months

## Many ODs do this....

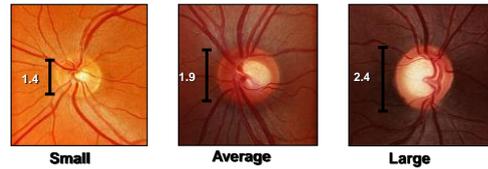
- Visit 1: Dilated exam, gonio, pach, photos
- Visit 2: IOP check, OCT and VF

## Revised protocol

- You save your patient one office visit
- You lose:
  - One billable intermediate exam
  - One IOP measurement
  - 20% reimbursement on one of the procedures

## The Optic Nerve

- Composed of 1.2 million axons
- Roughly 30 mm long



Small discs: avg vertical diameter <1.5 mm  
Large discs: avg vertical diameter >2.2 mm

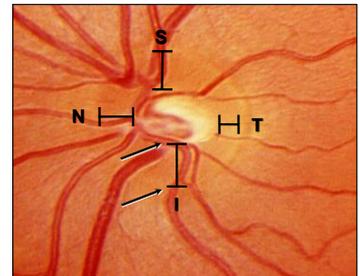
## Optic Disc

Size discs can have small cups in glaucomatous eyes  
Large discs have large cups in healthy eyes

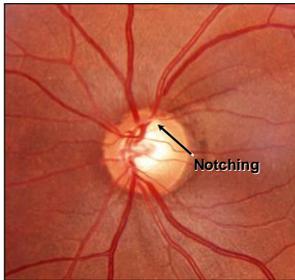
## ISNT RULE

Rim width  
Distance between border of disc and position of blood vessel bending

ISNT rule  
Inferior >  
Superior >  
Nasal >  
Temporal



### Localized Rim Thinning/Notching



### What is normal C/D ratio?

- .30
- 95% of the normal population falls between 0.2 to 0.4

Only 5% of the normal population has a C/D of .50 and greater

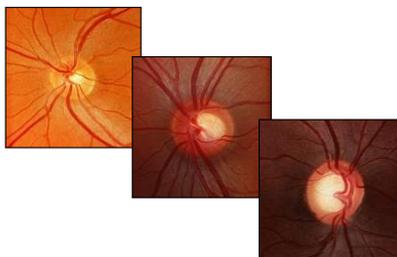
This is the cutoff for what I suggested should be worked up

### Stereoscopic Optic Disc Photographs

- Side-by-side evaluation
  - Assess for
    - Diffuse neuroretinal rim narrowing

### Glaucomatous ONH Changes

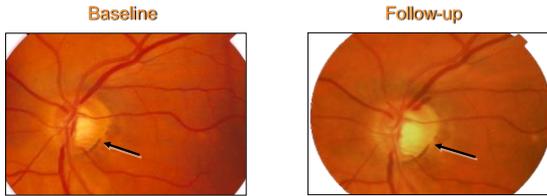
Generalized, concentric loss of rim tissue



### Stereoscopic Optic Disc Photographs

- Side-by-side evaluation
  - Assess for
    - Diffuse neuroretinal rim narrowing
    - Focal neuroretinal rim narrowing

## Focal Neuroretinal Rim Narrowing



## Stereoscopic Optic Disc Photographs

- Side-by-side evaluation
  - Assess for
    - Diffuse neuroretinal rim narrowing
    - Focal neuroretinal rim narrowing
    - Change in vessel position (relationship to the neuroretinal rim)

## Stereo Photography

- ➡ Let's you examine the optic nerve on your time when you can pay more attention to detail and subtle changes
- ➡ Gives you an objective image of the nerve which is independent on how long it was done and what brand was used

## Why take Fundus Photos?

- Show patient
- Establish a baseline
- Because it is the standard of care
- You get paid to do it

## Fundus Photos: Billing

- CPT code: 92250
- Average reimbursement: \$78

## Fundus Photography

- How often can you do it?
- Documentation:
  - Order testing
  - Interpretation and report

## Gonioscopy: Why do it?

Identify the type of glaucoma

It is standard of care for work ups

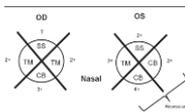
You get paid for it!!!

## Gonioscopy Billing

- CPT code: 92020
- ICD 10 codes: Any OHTN, Glaucoma suspect, or glaucoma
- Average reimbursement: \$22

## Gonioscopy

- How often can you do it?
- Documentation:
  - A note in the chart is usually sufficient



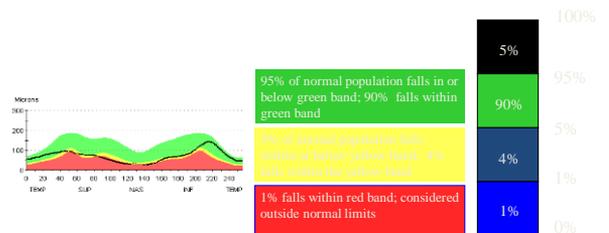
## Ocular Hypertension Treatment Study

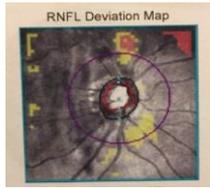
- Patients with thin corneas were three times greater risk for developing glaucoma
- Influence of corneal thickness 3.5 X greater than could be accounted for by adjusting IOP
- Each 40 microns = 1.71 greater risk of progression

## Pachymetry: Billing

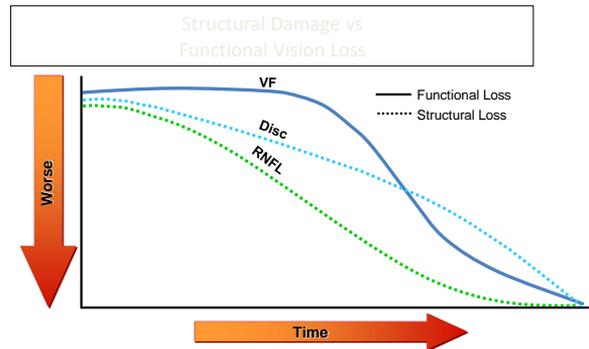
- CPT code: 76514
- Reimbursable once in patient's lifetime
- Average reimbursement: \$14

## RNFL Thickness





If this patient has a normal OCT, do we still do a VF?



Weinreb. Presented at: The AGS Subspecialty Day Lecture: Getting Closer to Glaucomatous Optic Neuropathy, October 19, 2002, Orlando, Fla.

## Set Your Baseline Early

- Use patient as own control
- Look for progression
- Negates the effect of normative databases

## OCT: Billing

- CPT code: 92133
- Average reimbursement: \$45

## OCT

- How often can you do it?
  - Can do once a year on stable patients
  - Can do twice a year on progressive patients
  - Can't do at all on advanced glaucoma
- Documentation:
  - Order testing
  - Interpretation and report

## Visual Field analysis



### Reliability

#### False Positive Rate (FP)

Percentage of time the patient responded in the absence of a stimulus

FIXATION LOSSES: 4/15
FALSE POS ERRORS: 2 X
FALSE NEG ERRORS: 8 X

>25% – use caution

>33% FP rate – unreliable

Ideal rate is <10%

**How do elevated FPs impact the appearance of the field**

Will cause you to miss cases of glaucoma

### Reliability

#### False Negative Rate (FN)

Percentage of time the patient failed to respond to a stimulus that should have been seen, based on past responses

FIXATION LOSSES: 4/15
FALSE POS ERRORS: 2 X
FALSE NEG ERRORS: 8 X

>25% FN rate – use caution

>33% FN rate – unreliable

**How does a high false negative rate impact the VF results**

Will cause you to over treat

## Reliability

### Fixation Losses (FL)

Percentage of times the patient responded to a stimulus presented at the plotted blind spot

FL increases if:

The patient does not maintain fixation

The blind spot was incorrectly located

The patient's head moves

FIXATION LOSSES: 4-15
FALSE POS ERRORS: 2 %
FALSE NEG ERRORS: 8 %

## Never make decisions on just one VF

Repeat test if needed in 2-3 weeks

In most cases waiting that long is not going to change the clinical outcome

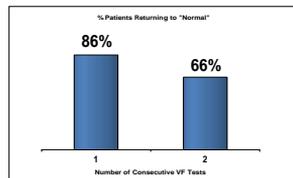
## VF are Highly Variable

- After one abnormal visual field test:

- 86% of patients test within normal limits on next exam

- After two consecutive abnormal test results:

- 66% of patient test within normal limits on next exam<sup>3</sup>



## Their conclusion:

You need three consecutive, reliable tests before making any decisions

## VF: Billing

- 92081: limited examination (e.g., tangent screen, or single stimulus level automated test)
- 92082: intermediate examination (e.g., at least 2 isopters on Goldmann, or automated suprathreshold)
- 92083: extended examination (e.g., automated threshold perimetry, Octopus program G-1, 32 or 42, Humphrey VF analyzer full threshold programs 30-2, 24-2, or 30/60-2).

## VF: Billing

- CPT code: 92083
- Average reimbursement: \$59

## Visual Field testing

- How often can you do it?
  - Can do once a year on stable patients
  - Can do twice a year on progressive patients or high risk patients
- Documentation:
  - Order testing
  - Interpretation and report

## What's your job in diagnosing glaucoma?

- Identify risk factors for glaucoma and recommend work up for appropriate patients

## What's your job in diagnosing glaucoma?

- Establish a baseline
- Track changes over time

## Most common 2 reasons why glaucoma goes undiagnosed

- Patients don't come for regular eye exams
- Doctor fails to work up a patient who has sufficient risk factors

## What's your job in diagnosing glaucoma?

- Make sure your patient does not have glaucoma at the time of visit
- Global risk assessment: estimate those at high risk to converting to glaucoma and treating prophylactically

## When does patient convert from suspect to glaucoma?

- When patient has any or all of these:
  - Repeatable visual field defect
  - Progressive deterioration of the optic nerve
  - Progressive damage seen on OCT testing