Primary Care Optometrist

- Primary care optometrists have a significant role in the multidisciplinary approach to the management of hypertensive patients
- Serve as the sole primary eye care provider in more than 3,500 communities

Hypertension (HTN)

- Approximately 65 million people in the US
- 29% of all adults
- 2% of kids (<18yo)
- 7.1 million deaths per year
  - “Silent Killer”
  - Stroke, MI, End-Stage Renal Disease

BP Control Rates

<table>
<thead>
<tr>
<th>National Health and Nutrition Examination Survey, %</th>
</tr>
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<tbody>
<tr>
<td>---</td>
</tr>
<tr>
<td>Awareness</td>
</tr>
<tr>
<td>Treatment</td>
</tr>
<tr>
<td>Control</td>
</tr>
</tbody>
</table>

JNC 8 – When?

Status Update:
Expected Availability for Public Review and Comment: “2012”
Expected Release Date: “2012”

Last Updated June 2013
Last accessed website 8.12.2013

JNC -8
What will it add??

› Much more evidence based then JNC 7 or 6
› May address:
  ◦ Combo therapy 1st v. diuretic only????
  ◦ BP goals in the elderly: raise it up to 150/80 with compelling factors
  ◦ 135/85 for diabetics WITH hypertension*

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3737145/

Is BP measurement part of your daily routine in patient care?

› 250 OD/250 OMD were surveyed
› Of those responding:
  ◦ 85 % of OD and 87 % of OMD reported that they did routinely question their patients about BP
  ◦ Of those owning BP measuring equipment, approximately 20% of both professions reported measuring BP → not routinely

History, History, and more History

› Medical and family histories for CV risk factors
› Medications, compliance and current/previous BP control
› Social history such as OTC and recreational drugs
› Lifestyle questioning such as diet (eating habits) and exercise
  ◦ Do you taste your food before you add salt?
  ◦ How often do you eat salty foods?
  ◦ Do you read labels for sodium content?
› Home monitoring of BP?????

Home BP Monitoring (HBPM)?

› There is convincing evidence accumulated in the last decade on the clinical usefulness of HBPM for the initial diagnosis and long-term follow-up of treated HTN

› **Daytime BP <140/90 will have less risk of cardiac complications**

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2842225/


Review of Systems

- A complete review of systems in order to assess the patient for symptoms related to end organ damage
  - TIA
  - Amourosis fugax
  - **Chronic kidney infections
  - Polyuria
  - Dyspnea
  - Peripheral edema

Target Organ Damage

- Renal System: End Stage Renal Disease
- Cardiovascular System: Coronary Artery Disease, Congestive Heart Failure, LVH
- CNS: Brain and Eyes

Peripheral Vascular Resistance

- RAAS is the major regulator of renal salt reabsorption
  - Highly influenced by the interaction of sodium intake and decrease renal sodium excretion by the kidney

RAAS

- RENIN
- ANGIOTENSIN
- ANGIOTENSIN II
- ALDOSTERONE

Diuretics First Line Therapy

Diuretics

- Thiazide
- Loop

Medical Management of HTN

- Decrease BP by inducing immunity against targets in RAAS
- Lowered daytime by 9/4mmHg v. placebo and early morning by 25/13mmHg
- Still in the early phase (phase IIa)
  - Is it better than the current oral RAAS blockade agents?
  - What is the long-term safety profile?

There’s a shot for that?

CYT006-AngQb

- Based on 30 years of morbidity trial experience w/HTN meds, JNC-7 concluded that lowering BP with above agents will be most effective at reducing complications of HTN

References:

Du TH et al. Vaccines in the management of hypertension Expert Opin Biol Ther 2010;10(7):1077-87
## Ocular Diseases Secondary to Hypertension

- **Hypertensive Retinopathy**
- Retinal Vein Occlusions
- Retinal Artery Occlusions
- Cranial Nerve Palsies
  - CN III, CN IV, CN VI
- Macroaneurysm
- Sub-Conjunctival Hemorrhages
- AION
- Hypertensive Choroidopathy
  - Elschnig Spots
  - Siegrist Streaks
  - Choroidal Effusion or detachment

## Historical Hypertensive Retinopathy Classification System

<table>
<thead>
<tr>
<th>Grade</th>
<th>Retinal Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mild increased ALR, mild arteriole narrowing</td>
</tr>
<tr>
<td>2</td>
<td>More pronounced arteriole narrowing, AV ratio (AVR) changes, focal constriction, AV crossing changes</td>
</tr>
<tr>
<td>3</td>
<td>Grade 2 +CWS, hemes, exudates</td>
</tr>
<tr>
<td>4</td>
<td>Grade 3 + papilledema</td>
</tr>
</tbody>
</table>

Keith-Wagener-Barker (1939) Classification combined with modified Sheie (1953)

## 2004 Classification of Hypertensive Retinopathy

<table>
<thead>
<tr>
<th>Grade</th>
<th>Retinal Findings</th>
<th>Diastolic BP mmHg*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Increased ALR, AV ratio changes, AV crossing changes, focal narrowing</td>
<td>&gt;90 and &lt;110</td>
</tr>
<tr>
<td>Moderate</td>
<td>CWS, hemes, hard exudates, aneurysms</td>
<td>≥ 110 to 120</td>
</tr>
<tr>
<td>Severe aka “Malignant”</td>
<td>Moderate findings in addition to ON swelling</td>
<td>≥120</td>
</tr>
</tbody>
</table>

*DBP provided as a guideline of expectations


## Retinal Vasculature Response Chronic Phase

- **Vasoconstrictive stage**: Initial response to increase BP is vasoconstriction
  - Generalized narrowing of the retinal arterioles
  - Decrease in the AVR, just noticeable
  - Normal is ½ the size of artery to vein

- **Sclerotic stage**: Persistently elevated BP cause hyperplasia and thickening of the arteriole wall
  - Increase in the arterial light reflex (ALR)
  - Normal is ⅔ the width of the artery
  - AV crossing changes
    - Compression, deflection, nicking, banking
    - Humping of the overlying vein

Exudative stage: DBP >110
- When autoregulation fails, the high BP is transmitted directly to the capillaries
  - Hemorrhages (flame>blots), CWS, hard yellow exudates
  - Optic nerve swelling

**Indicative of the severity of HTN and most strongly associated with increased stroke risks**

**HTN Retinopathy and Cardiovascular Risks**

- **ARIC study** showed that generalized arteriolar narrowing and AV nicking have been associated with increase of stroke and heart disease
- 2-3x greater incidence of stroke over 3yr period when HTN retinopathy included CWS, hemes, or exudates

**HTN Retinopathy and Cardiovascular Risks**

- Blue Mountain Eye Study found a prevalence of retinopathy in 9.8% of nondiabetic, normotensive patients
- Aprox 55% of study patients with arteriolar narrowing and AV nicking did not have HTN...keeping in mind this **study was published in 1994**!

**Arteriolosclerosis or HTN retinopathy?**

- Abnormalities of the retinal vasculature demonstrating the "mild" form of HTN retinopathy may reflect microvascular damage due to hypertension or arteriolosclerosis or both

**Perform Routine BP!!**

**Diabetic and Hypertensive**

- Hypothesized that HTN causes increase in VGEF → accelerate DR
- Studies have found that control BP can minimize DR
- Activation of RAAS in DM →HTN (2011)
**Hypertensive Choroidopathy**

- Associated with Moderate and Severe HTN retinopathy
- Indicates choroidal vascular sclerosis and ischemia affecting the RPE
- Most often seen in younger patients with accelerated BP
  > >220/120mmHg

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**Siegrist streaks:** linear hyperpigmented areas over choroidal vessels
- "Typically seen near the equator"

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**Elschnig spots:**
- Changes in the RPE from nonperfused areas of the choriocapillaris.
- "moth-eaten appearance"

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**Follow-up Recommendations**

<table>
<thead>
<tr>
<th>Retinopathy</th>
<th>B/P</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>&lt;120/&lt;80</td>
<td>RTC x 1-2 yrs</td>
</tr>
<tr>
<td></td>
<td>120-139/80-89</td>
<td>RTC x 1 yr</td>
</tr>
<tr>
<td>Moderate</td>
<td>140-159/90-99</td>
<td>RTC x 3-6 mos</td>
</tr>
<tr>
<td></td>
<td>160-179/100-109</td>
<td>MD in 2-4wks</td>
</tr>
</tbody>
</table>

The scheduling of follow-up should be modified by clinical findings, reliable information about past BP, and other cardiovascular risk factors.

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**Case 1**

58yo WF, chief complaint of near blur
- PMHx: +HTN x 3yrs, last PCP visit 2yrs, stopped taking meds a yr ago.
- No secondary complaints of headaches, dizziness, chest pains, or shortness of breath.
  >>+Smoker, increased BMI

- POHx: Unremarkable, LEE was 3yrs ago
- PFHx: +HTN, +DM
- Entering DVA 20/20 both eyes
- Entering BP: 220/130mmHg LAS@9:05am
- BP at LEE (4yrs prior) was recorded as 140/90mmHg

**Case 1 Clinical Findings**

- Pupils, EOM, IOP, VF screening normal
- Best corrected acuities 20/20 OD, OS
- Refractive change in spectacles, increase bifocal
- Slit lamp: Arcus 360, grad 1+ NS OU
- Retinal exam: AVR: ½, increased ALR, +AV changes
- BP: 210/126mmHg LAS@11:05am
**Case 1: Assessment and Plan**

- **Assessment**
  - Mild Hypertensive Retinopathy *(ICD9-362.11)*
  - Hypertensive Crises - **Urgent** *(ICD9-401.9)*

- **Plan**
  - Patient Education and phone consultation with PCP
  - Appointment made within 48hrs
  - Fax exam report to PCP
  - **RTC x 4mos**
    - Patient BP was stable at 130/80mmHg
    - Medically managed with **2 meds**, no change in fundus

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**Management of HTN Crises**

- For HTN crises most practitioners will immediately send the patient to the emergency department (ED)
  *This is not always the most appropriate management of these cases*

- Effective management will reduce over-referrals to the ED, thus decreasing health care costs without detriment to patient care.

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**Hypertensive Urgency >180/120mmHg**

- Typically seen in chronic HTN patients who are inadequately controlled or noncompliant
- HTN urgencies are characterized by:
  1. Severe BP
  2. May have headaches
  3. No **progressive** TOD
  4. **HTN retinopathy (moderate)** with NO papilledema

---

**HTN Crises**

- Historically, crises have been in the markedly high levels of BP (>220/120 mmHg)
- **The JNC-7** includes HTN crises in the upper level of stage II, thus >180/120mmHg
- Current guidelines have been set to recognize crises based on acute TOD in the presence of severely elevated BP

  → **IS the crisis URGENT or EMERGENT??**

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**Hypertensive Crises**

- The estimated cost for the treatment and complications of HTN in the US is $37 billion/yr
- Patients presenting with severe HTN may account for as many as 25% of urban ED visits
- The 2006 national data suggest that 10% of ED visits related to HTN will result in admission to the hospital

  **Thus, it may be inferred** that a large number of ED visits were not true HTN emergencies**

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**Hypertensive Emergency**

- Occurs in up to 1% of the HTN population of all ages
- Accelerated HTN in the presence of target organ damage (TOD)
- The 1-year survival rate was only 20% to 30% before 1950, and since 1985, the 1-year survival rate exceeds 90%.

  **“Not so rare when they are in your chair”**
Hypertensive Emergency

> 180/120 mmHg

- No longer referred to as “Malignant” HTN
- Characterized by evidence of life-threatening or progressive TOD
  1. Headaches (often severe)
  2. Shortness of breath
  3. Dizziness
  4. HTN retinopathy (moderate) along with papilledema

Case 2

44 BM, presents with decrease distance and near vision OU, gradual onset, ? if OS worse over past week, headaches x 2mos, ? if needs stronger reading glasses, “arms aren’t long enough”. No secondary complaints of dizziness, chest pains, or shortness of breath

- PMHx: HTN, -DM, told borderline HTN at last PCP visit a “few” years ago. No Rx meds and no OTC meds (+1.50), -rec drugs, non-smoker, +alcohol socially
- POHx: unremarkable, LEE: none, tried OTC readers
- PFHx: +HTN, -DM

Case 2: Assessment

- Assessment
  - Severe (Malignant) Hypertensive Retinopathy (362.11)
  - Decrease VA due to macular edema (362.83)
  - Hypertensive Emergency (401.0)

Case 2 Clinical Findings

DVA sc OD: 20/40- NIPH Near VA 20/80 OU
DVA sc OS: 20/40- NIPH
- Pupils, EOM, IOP, VF screening normal
- Amsler Grid: + metamorphopsia OD > OS
- No improvement in VA with refraction, SLEx +Arcus 360
- DFE: +HTN retinopathy with papilledema and macular stars
- BP: 250/140 mmHg RAS@4:30pm
- BP: 240/130mmHg LAS@5:00pm (new clinic patient, no records to compare)
- CN II - XII intact with no upper extremity weakness or problems with gait

Coding and Billing for HTN
ICD-9 Codes

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertensive Retinopathy</td>
<td>362.11</td>
</tr>
<tr>
<td>Hypertension (Benign/Primary)</td>
<td>401.1</td>
</tr>
<tr>
<td>Hypertensive Crisis – Urgent</td>
<td>401.9</td>
</tr>
<tr>
<td>Hypertensive Crisis – Emergent</td>
<td>401.0</td>
</tr>
</tbody>
</table>
**Case 2**

**Hypertensive Emergency**

- The retinal circulation shares anatomical, physiological, and embryonic features with the cerebral circulation.
- Upper limit of retinal and cerebral vessel’s autoregulation is breeched, DBP >120
  - Vasodilation – hyperperfusion – edema – retinopathy and/or encephalopathy

**Plan: 911 or ER?**

- 911 → Severe papilledema with headaches AND:
  - confusion = SSx of Hypertensive encephalopathy
  - shortness of breath and/or chest pains
  - extremity swelling
- Send to ER → Papilledema, headaches

**Case 2 Plan**

- Send to ER !!!
  - Patient education!!!
  - Called ER to coordinate care
  - RTC x 4-6wks after release from hospital
- Patient was admitted to hospital for 8 days
  - Decrease BP by 15 – 25% within first 2 hours on IV meds, goal at discharge is 160/100 on oral meds
  - Diagnosed HTN with kidney impairment

**Case 2 Follow up**

- 3 months later, no more HA, VA much better
- VA 20/25 - OD/OS
- BP: 150/98mmHg RA seated @ 11:00am
- DFE: resolved hemes, slowly resolving CWS, mild residual macular edema, mild residual disc edema, no change in vasculature
- +2.00 reading Rx given
- Patient ed on compliance with meds and to keep MD appointments, control salt intake, 30mins exercise/day/5xweek

**Racial Differences in the Prevalence of Hypertensive Retinopathy**

- Hypertensive retinopathy is 2x as frequent and more severe in AA vs. Caucasians
  - Comparing both groups without DM
  - Associated with severity of hypertension
  - Retinopathy is a diagnostic indicator initiating hypertensive therapy in persons with BP <140/90mmHg regardless of race

**Hypertensive Crisis: Urgent v. Emergent Approach**

- Accelerated BP >180/120mmHg
  - **Urgent:**
    - No acute TOD +Mild HTN retinopathy
    - BP control within 3-7 days
  - **Urgent:**
    - +Evidence of TOD +mod HTN retinopathy
    - BP control within 24 – 72 hrs
  - **Emergent:**
    - +Evidence of TOD +HTN retinopathy + Papilledema
    - BP control within minutes to hours

*Wong et al; Racial differences in the prevalence of HTN retinopathy, Hypertension.2003;41(5):1086-91*
**Hypertensive Crisis Management**

- **Accelerated BP >180/120mmHg**

  - **Urgent:**
    - No acute TOD
    - Oral Medications (Outpatient)
    - OD Follow UP 1 to 3 months

  - **Emergent:**
    - +evidence of TOD
    - Rapid onset oral med
    - Outpatient per PCP
    - ED or Call 911
    - IV meds
    - OD Follow Up 1 month after release from hospital

**Urgent v. Emergent**

- The likelihood of progression from HTN urgency to emergency has not been determined
- Average stay of HTN urgency cases in the ED was 5 hrs costing an average of $1500 (2004 dollars)
- More cost effective to manage HTN urgencies with in-office or outpatient care by PCP with appropriate follow-up and BP control

**Risk Management**

- “The optometrist should recommend a specific practitioner, and should ensure that an appointment is scheduled with this practitioner before the patient has left the office.”

**Summary**

The public health challenge by eye care providers is not only to identify patients with chronic or acute HTN and modifiable risk factors, but to provide the point of entry to the appropriate healthcare.

In cases of HTN crises, the decision to send to the PCP, to the ER or call 911 is dependent on the ocular condition that is easily assessed with a comprehensive dilated eye exam.

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Meetz RE, Harris TA. The optometrist’s role in the management of hypertensive crises. Optometry 2011, 82(2);108-116

American Academy of Optometry

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