

# Achieving BP Targets



*IS IT A **SPRINT** OR A **STROLL**?*

***MICHAEL E. GRANT, MD FACP***

# Today's Focus



- “Essential” Hypertension? (*Primary or Idiopathic*)
- Natural History of *Primary Hypertension*
- BP Targets across the decades
- The rise and fall of the *JNCs*
- The ***SPRINT*** trial
- Taking aim and hitting individual BP Targets



# *Primary Hypertension is not “Essential”*



- 9 out of 10 pts
- One billion people worldwide
- Most common cause for an adult to see a Doc
- “*Essentielle Hypertonie*” Erich Frank 1911
- Subsequently listed as one of the “*Holy Seven*” Psychomatoses by Franz Alexander in 1950 (personality traits associated with diseases - asthma, IBD, neurodermatitis, hyperthyroidism, duodenal ulcer, RA)
- “*Essential*” became “*Americanized*” implication that there is a certain amount of blood pressure which is “*Essential*” to perfuse the organs – especially the brain

# *Natural History of Primary HTN*



- *FDR* – 32<sup>nd</sup> American President
  - 1937 (age 54): 162/98 – consistent with views of the times: No Treatment
  - 1940: 180/88
  - 1941: 188/105 – prescribed phenobarbital and massages
  - 1943 & 1944: Daughter asked Cardiologist Howard Bruen to see – evidence of CHF; LVH; pulmonary edema and proteinuria – Prescribed Kempner low salt rice diet – 150-200mg Na/Day - cut down etoh and cigarettes



# *Natural History of Primary HTN*



- Re-election 1944
  - Nov 1944: 200/100
  - Feb 1945: 260/150 at the Yalta Conf. ?prevented him from standing up to Stalin
  - April 12,1945: Warm Springs Georgia while sitting for a portrait suddenly complained of a headache and loss consciousness – examined by Dr Bruen: BP 300/190 – autopsy revealed cerebral hemorrhage



# *Expert Advice: BP Targets*



- Korotkov 1904 Auscultatory method for BP – people with higher BPs didn't seem to live as long as those without
- 1930's....*"The greatest danger to a man with high BP lies in it's discovery, because then some fool is certain to try to reduce it"* Hay, BMJ;2: 43-47; 1931
- 1940's....*"May not the elevation in systemic BP be a natural response to guarantee a more normal circulation to the heart brain and kidneys (concept of essential HTN). Overzealous attempts to lower the pressure may do no good and often do harm"* Scott : in Tice F (ed) Practice of Medicine 6: 93-114, 1946

# ***Bad Advice - Worse “Treatment” Options***



- Mercurial Diuretics
- Kempner Rice Diet (20 g protein; 5 g fat; less than 200mg salt – early study showed it improved BP in 64% of pts – unpalatable and not sustainable by most)
- Surgical Sympathectomy and Adrenalectomies – horrendous side-effects – couldn't stand up and e-lyte issues (salt wasting and high K)
- Kidney extract injections and pyrogen injections lowered BP transiently by causing sepsis
- 1950's: Hydralazine; hexamethonium; reserpine; chlorothiazide

# *The Game Changers*



- Veterans Administration Study – 1967
  - RCT in pts with DBP > 105mmHg using reserpine; hydralazine and diuretic
  - Significant reduction in stroke; CHF and renal damage
- Framingham Heart Study – began in 1949
  - Strong correlation between elevated BP and heart attacks; stroke and kidney damage
  - Still in progress – generated risk profile for SPRINT
- National High Blood Pressure Education Program – 1972 – enlightened healthcare professionals and the public of dangers of HTN and benefits of treatment



# *Rise and Fall of the JNCs*



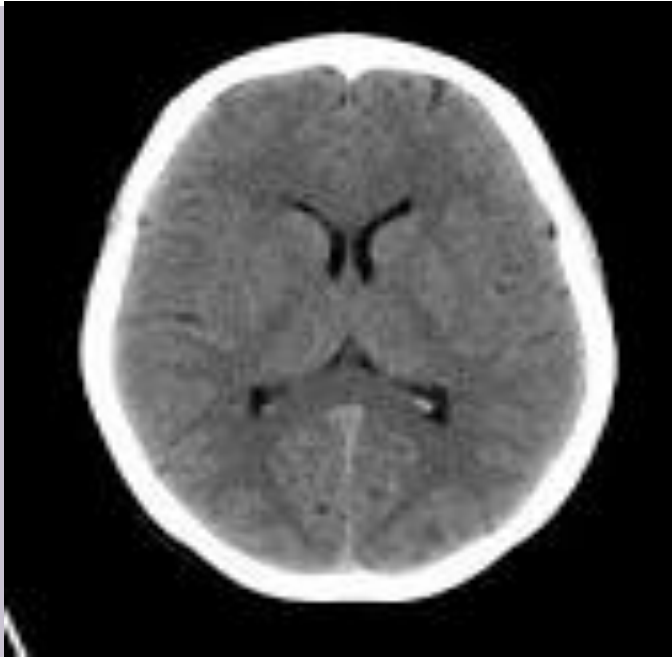
- Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC) – sponsor - NHBLI - 7 official publications 1977-2003
  - JNC 1-3: treatment recommendations based on DBP – no treatment unless DBP > 105mmHg
  - Data from earlier studies based on DBP – thought adding SBP would be too confusing
  - DBP was used by convention – thought to be more important than SBP
  - JNC 3 (1984) defined HTN as Mild (DBP 90-104mmHg); Moderate (DBP 105-114mmHg) and Severe (DBP > 115mmHg)
  - SBP < 140 mmHg (normal); 140-159mmHg (borderline); > 160mmHg (isolated systolic HTN)

# ***SBP vs DBP as Treatment Target***

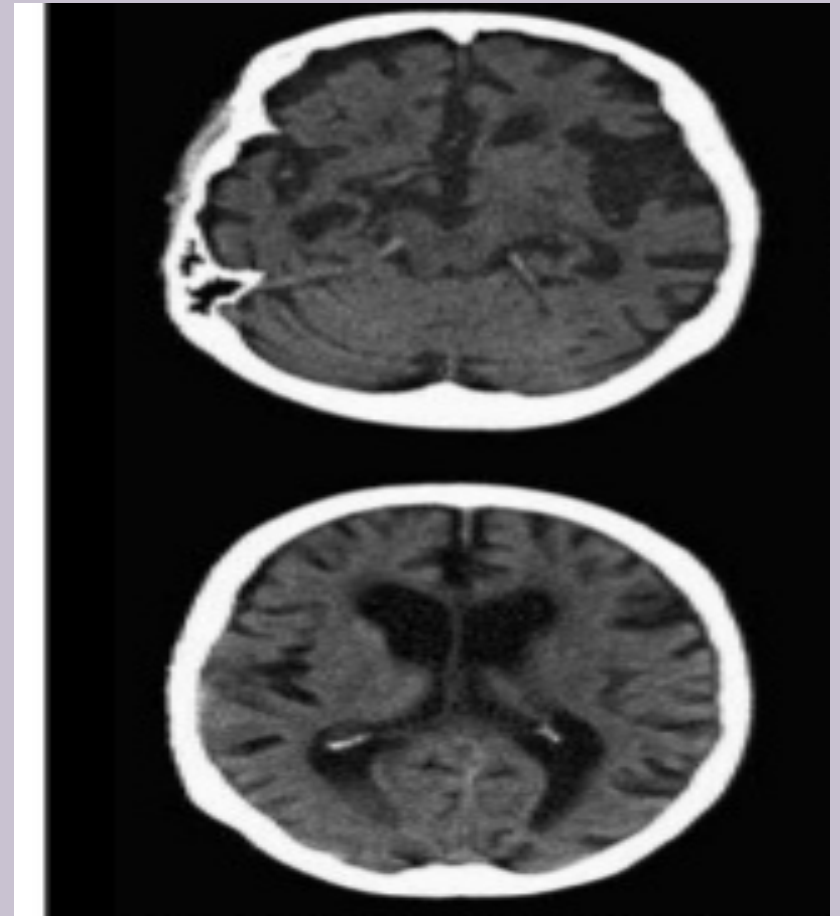


- SBP is more important in adults over 50
  - DBP decreases as we age – pulse pressure widens; aorta and resistance vessels lose elasticity
  - CV risk increases as SBP increases over 115mmHg
  - “Isolated” Systolic HTN not treated because DBP was in the “target” range (normal <85mmHg)
  - SBP was not treated – “essential” for brain and organ perfusion
  - Target BP – “100 plus your age” – 70 -> 170mmHg; 80 -> 180mmHg etc
  - Undertreatment lead to “Binzwangers” or “Multi-infarct” now “Vascular” Dementia

# *Which 80 year old Brain do you want?*



*Normal*



*Vascular – “Multi-infarct” Dementia*

# ***Systolic Wins!***



- Systolic Hypertension in the Elderly Program (SHEP, 1991) and the Hypertension in the Very elderly Trial (HYVET, 2008) both showed that treatment showed benefit without harm with SBP targets of 140-145mmHg in the elderly
- JNC 7 (2003) changed the definition of ISH which was SBP above 160 and DBP below 90 to SBP of 140 and a DBP of below 90 – thus 140mmHg was the upper limit for systolic target

# ***JNC 7 – The Last was Best?***



- 47 page report in 2003 in JAMA
- HTN Stage 1 (140-159/90-99) or Stage 2 (>160/100)
- “Prehypertension” -120 -139/80-89 – pursue health-promoting lifestyle changes
- Allowed combination therapy as first step in pts with Stage 2 HTN
- Set lower targets for Compelling Indications such as ischemic heart disease; CHF; CKD and Diabetes: 130/80 or less and rec specific drug classes (B-Blockers; CCBs; ACE; ARBs; aldo blockers; diuretics) for specific indications
- “Crown Jewel” of BP recommendations and still looked at as the correct guidelines by many authorities

# *The Fall of the JNCs – JNC “8”*



- “JNC Late”; JNC “Ain’t”
- Originally impaneled 48 members in 2008 – most eventually left – 17 published the eventual report in JAMA in Dec 2013
- Lofty Goals: “Evidence based Medicine” – only RCTs >100 pts; followed for > one year; adults > 18 with “Hard” endpoints – death; stroke; MI; ACS; ESRD; requirement for revascularization - >6,000 papers reviewed (0.65% were considered to offer “good” evidence)
- Didn’t seem to be good evidence for lower goals of JNC 7 – led to significant conflict in the panel
- June of 2013 NHLBI announced disbanding of guideline development
- Vote for the higher BP target in pts over 60 - was 12 for 5 against – barely passed (req 2/3 majority)

# JNC “8”



- Evidence supported:
  - Pt's > 60: Initiate meds to lower BP if SBP > 150 or DBP > 90; if on meds and tolerating with lower BPs OK to continue
  - PT's < 60: Target BP is 140/90 or less
  - Pt's with diabetes or CKD: Target 140/90 or less
    - ✓ Non-black with no diabetes: ACE; ARB; Thiazide; CCB
    - ✓ Blacks with or without diabetes: Thiazide or CCB
  - CKD: initial agent or add on should include an ACE or an ARB but not both

# ***JNC “8”***



- 5 panel members who voted against the higher target of 150mmHg in pt 's 60 or older published their own rebuttal in Annals online 1/13/14
- They pointed to SHEP and VYHET both showing benefit without harm with SBP target 140-145
- JNC “8” used to larger Japanese trials to support their elderly targets (not representative of American pts)
- Agreed that in frail pt's; those above 80 that target SBP is 150mmHg
- Target SBP 140 or less in pts less than 80 in line with rec of European, Candian, ACC, AHA, ASH/ISH guidelines



## ***Precursor to SPRINT – ACCORD (2010)***



- Results included in JNC “8”
- 4733 Diabetic pts followed 4.7 years
- Standard Treatment (140 SBP target) vs Intensive Treatment (120 SBP target)
- “Hard” endpoints – nonfatal MI; CVA or death from a CV cause
- No benefit from achieving a lower SBP target
- Slight increase in adverse effects in the Intensive treatment group including a rise in creatinine

# ***SPRINT Trial***



- 9361 pt's SBP 130mmHg or higher; over 50; no diabetes; increased CV Risk
- Increased CV Risk Criteria – one or more:
  - History of CV disease other than stroke
  - CKD (eGFR 20-60)
  - 10 year risk of CV disease 15% or greater by the Framingham Risk Score
  - Average age 75 or older

# ***SPRINT Trial***



- “Hard” outcomes: MI; other ACS; stroke; CHF; or death from CV cause
- Does targeting SBP of 120mmHg vs 140mmHg reduce CV morbidity and mortality?
- Achieved Targets - 121.4 mmHg for Intensive arm vs 136.2 mmHg for Standard arm
- Stopped early at 3.26 years due to significant lowering of CV composite outcomes
- Relative risk of death from CV causes was 43% lower in Intensive BP lowering group
  - **38% lower risk of heart failure**
  - **27% lower risk of death from any cause**

# ***SPRINT Trial***

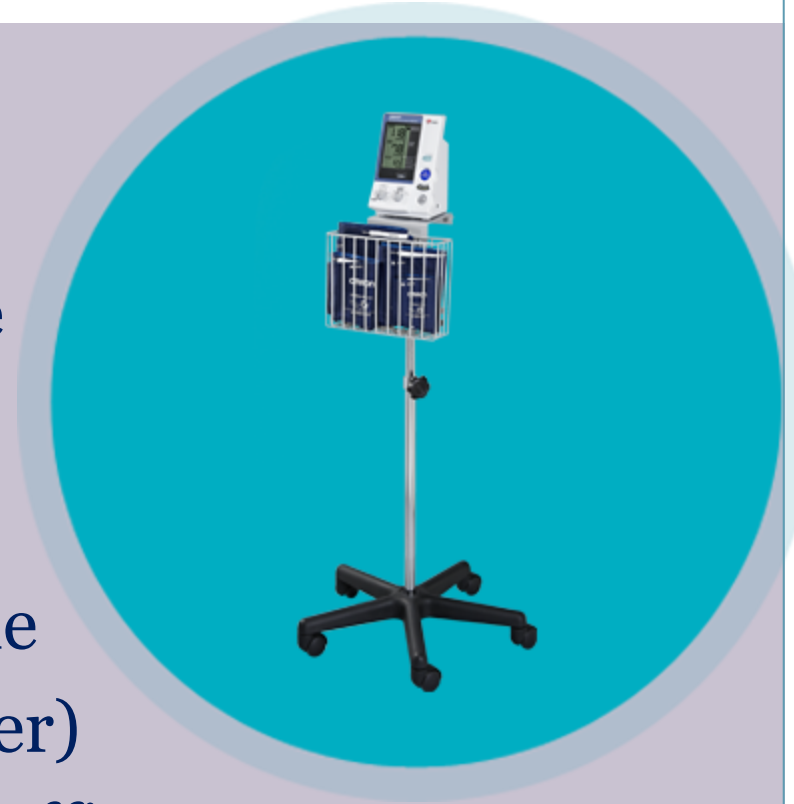


- Serious adverse effects more common in the Intensive BP lowering group: Hypotension; syncope; E-lyte disturbances (Hyponatremia; Hypokalemia); AKI (>30% decline in eGfr). But *NOT* falls orthostasis or bradycardia
- CKD pt's did *NOT* have a greater risk of needing dialysis; ESRD or transplant
- *NO* change in incident albuminuria

# ***SPRINT Trial - Caveats***



- Automated BP measurements (AOBP)- unobserved sitting in a quiet room for 5 min average of 3 readings
- AOBP readings 5-10mmHg lower than Std office BPs (some studies up to 16-20mmHg lower)
- Apply SPRINT results to your office
- Lower target 125-130mmHg



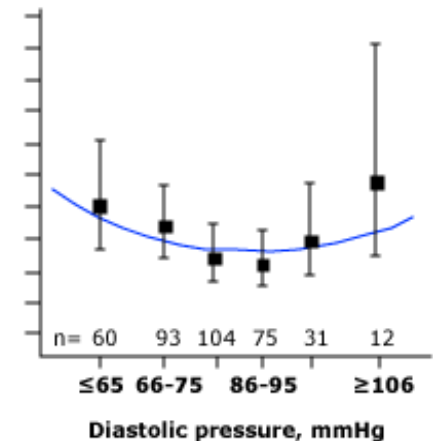
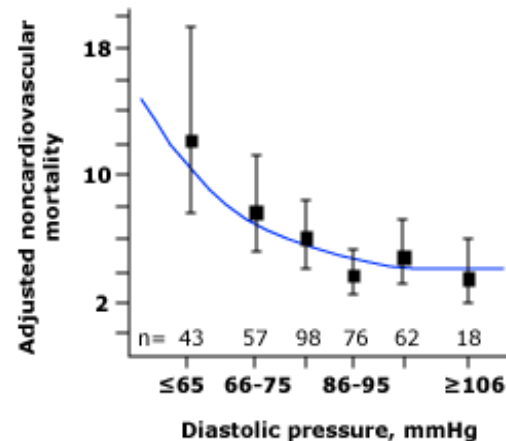
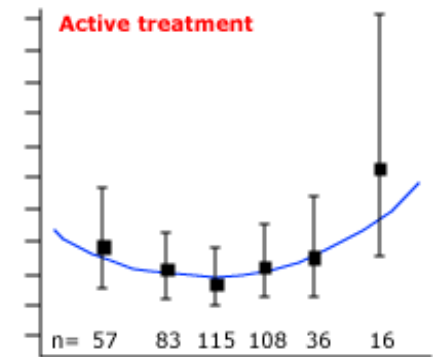
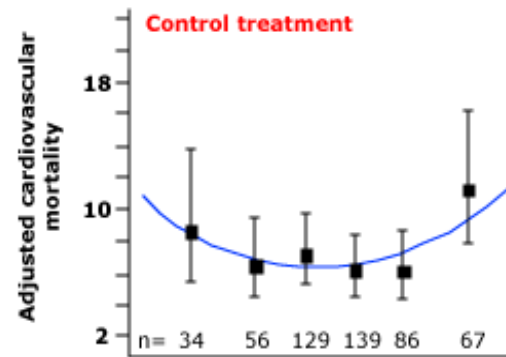
# ***SPRINT Trial – More Caveats***



- Why not treat everybody this way?
- HOPE-3 trial (2016) done in pts with moderate risk risk for CV events who were non-hypertensives did not benefit from antihypertensive therapy
- Ortiz and James Feb 2016 Annals editorial (JNC “8” authors)
  - 25% risk reduction ratio in primary composite outcomes
  - Decrease event rate 6.8 to 5.2% over 3.2 years with an absolute risk reduction of 1.6%
  - 1000 persons treated for over 3.2 years to a goal SBP of 120
    - ✓ 16 persons will benefit; 22 will be harmed
    - ✓ 962 persons will experience no benefit or harm

# Other Aggressive BP Lowering Caveats

- The J-Curve
  - Better defined for DPB as opposed to SBP
  - Similar curves without active BP treatment suggesting comorbid illnesses playing a role as opposed to BP treatment



# ***BP Targets – Real World***



- 82 y/o pt – Assisted living; long Hx HTN; can walk 15 feet in 20 seconds; BP 148/72 on amlodipine 5 mg/D; no orthostasis; asymptomatic; feels well

As her Doctor you decide to:

- A. Add HCTZ for SBP target of 140 or less
- B. Increase amlodipine dosage by 50%
- C. Continue current Rx
- D. Add hydralazine for SBP of 140mmHg or less





# *Is Your Pt Frail?*



- “Frail” Scale

F – **Fatigue** “Are you fatigued?”

R – **Resistance** “Can you climb a flight of stairs?”

A- **Ambulation** – “Can you walk one block?”

I – **Illnesses:** (>5)

L – **Loss of wt:** (>5%)

“Frail” – yes to 3 out 5; “Pre” Frail yes to 2 out of 5

Target SBP 150mmHg (or greater with orthostasis)

# *I'm Nervous*



- 70 year old anxious man

Calls you with a list of ten BPs

from this am – 148/70 – 180/104

Having headaches – can feel his BP

Going up – thinks he will have a stroke; has multiple BP drug intolerances – mainly dizziness; fatigue



Best advice for this pt to achieve BP target:

- A. Go to the ER when you feel like this
- B. Take clonidine 0.1mg if systolic is greater than 160mmHg
- C. Take an extra BP med now
- D. Arrange for a 24 hr ambulatory BP study

# *CKD and me*



- 54 year old male; diabetic nephropathy; proteinuria (5 grams/24hr); CKD Stage 4 – Cr 2.6 (eGFR 26); K 5 – BP 148/70 on amlodipine 10mg; lisinopril 40mg; metoprolol 50mg bid; HCTZ 25mg per day

To Achieve your BP target of 130/80 or less:

- A. No intervention needed – target BP achieved
- B. Add losartan 50mg daily – will reduce BP and proteinuria
- C. Add SPS – Kayexalate 30 gm daily to lower K and thus lower BP
- D. Change HCTZ to furosemide 80mg bid

# *BP Can be a “Big” Problem*



- 55 year old male; BMI 43;  
DM 2; Wife sleeps down the  
hall due to pt snoring;  
BP 150/70 despite amlodipine;  
losartan; HCTZ



Achieving BP target in this pt requires:

- A. Using proper sized cuff (thigh cuff) for arm BP measurements
- B. Weight loss
- C. Decreased alcohol consumption
- D. Diagnosis and treatment of obstructive sleep apnea
- E. All of the above

# *Achieving BP Targets*



- Neither a SPRINT or a Stroll
- “Guided Tour”
  - Individualized based on unique conditions of pt
  - In pts that fit the SPRINT profile (nondiabetic; FRH score > 15%; age over 50) – office BP target 125-130/80
  - Pre-existing CAD; CHF; CKD with proteinuria – 130/80 or less
  - Diabetes and CKD: 130-140/80-90
  - Pts over 60 unless frail 140/90 or less
  - Be willing to change your target as the needs of your pt changes – do not over-react or change meds or doses based upon a few readings – effective BP management is best trended and managed for the long haul