

Racial Differences in Central Blood Pressure

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Agenda

- ✓ Consequences of elevated blood pressure
- ✓ What is central blood pressure?
- ✓ Racial differences in central blood pressure
- ✓ Central blood pressure and CVD disparities

Racial Differences in CVD

In 2003, underlying death rate from high BP was 14.9% in white males.

In 2003, underlying death rate from high BP was 49.7% in black males.

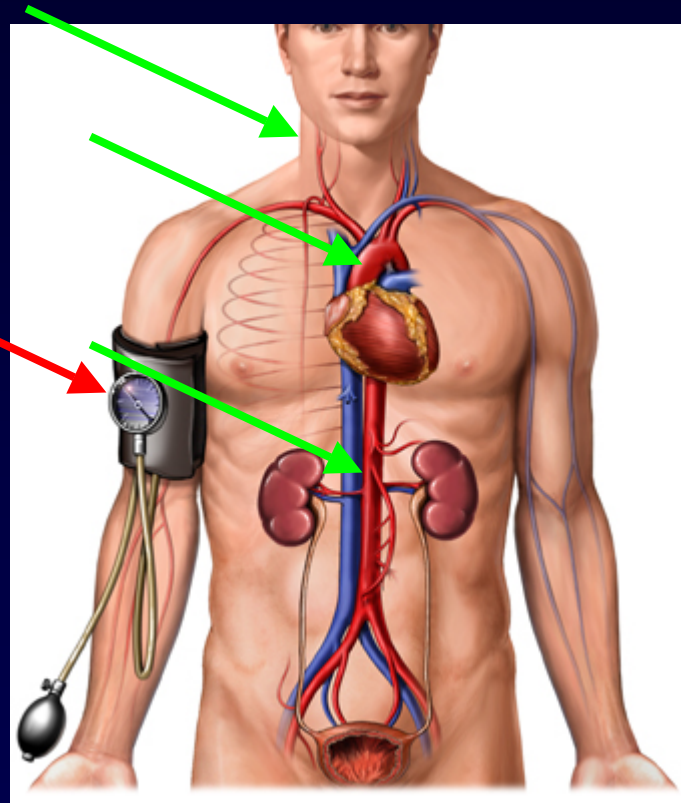
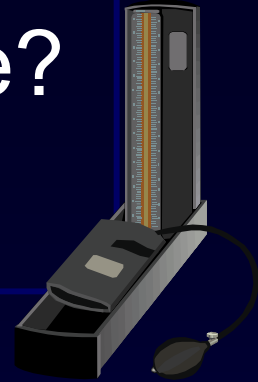
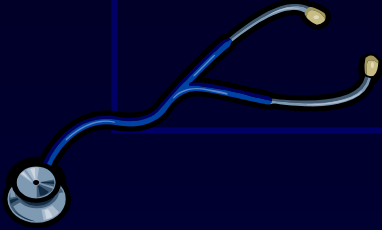
Consequences of Hypertension in African Americans

- Target Organ Damage
 - Left Ventricular Hypertrophy
 - Heart Failure
 - Vascular damage
 - Cerebral
 - Retinal
 - Renal
 - Central and peripheral
 - Endothelial dysfunction

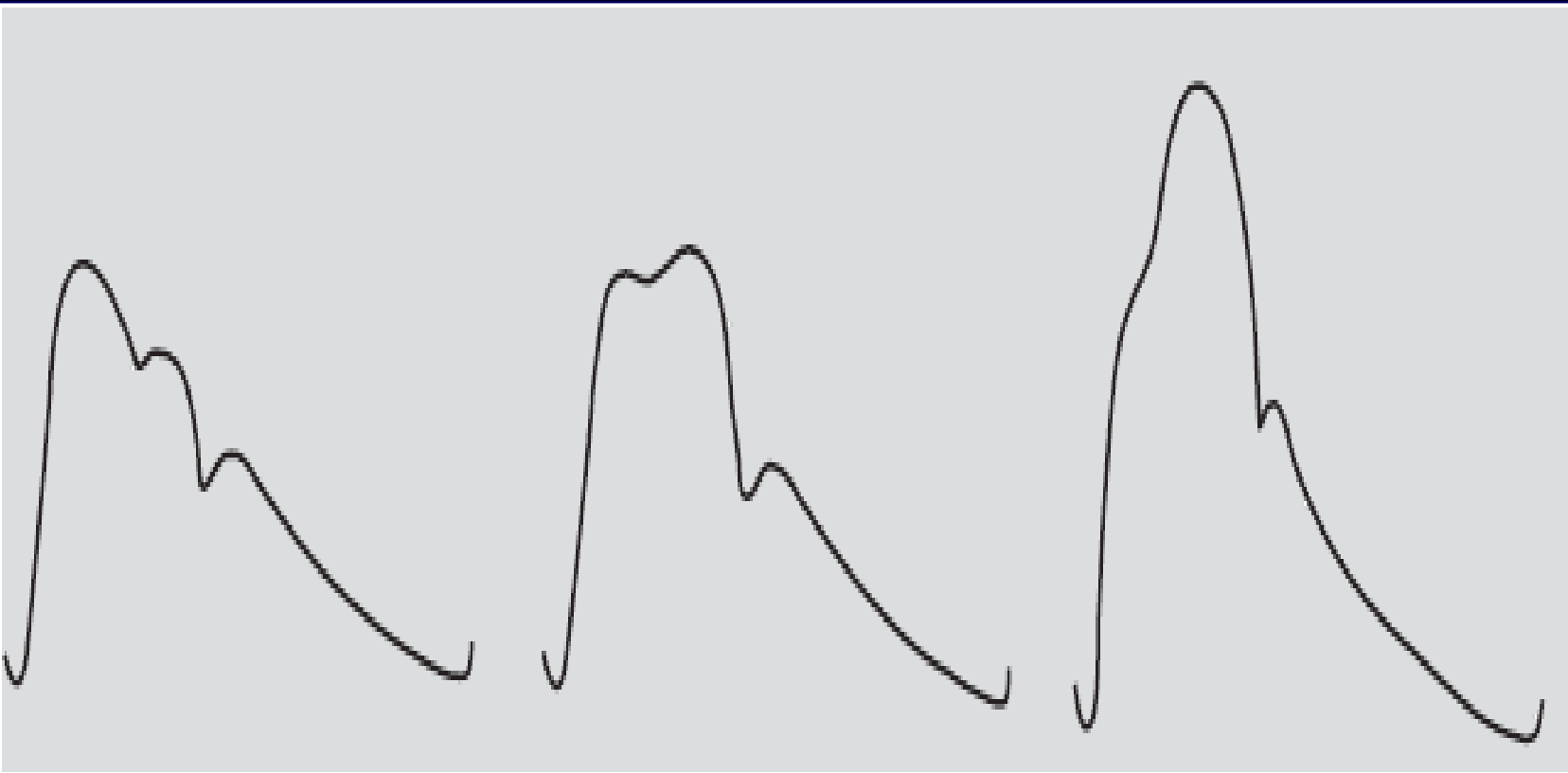
Case Study

< 1% risk of developing CVD in the
next 10 years

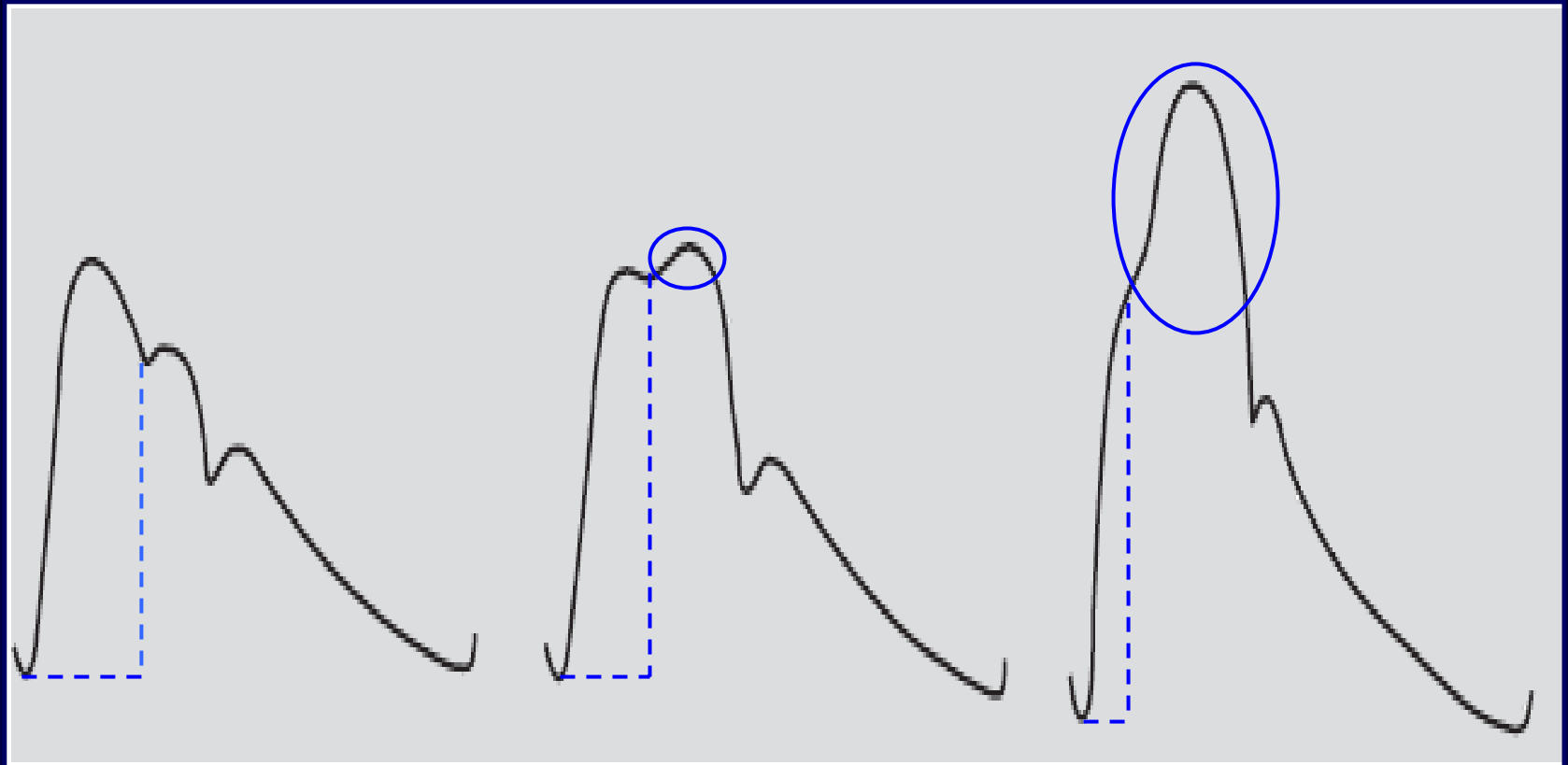
Are we measuring the right pressure?



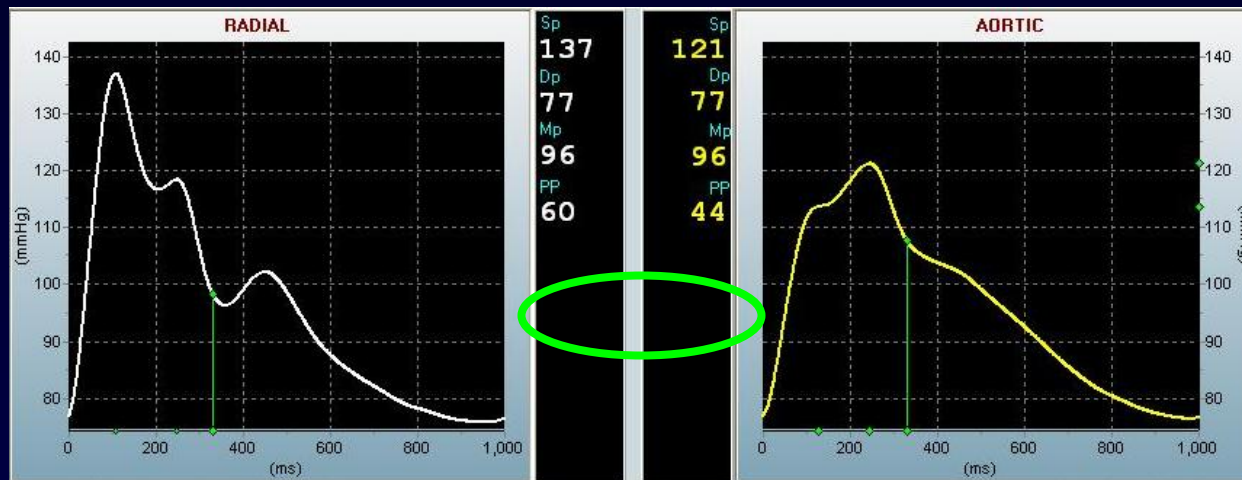
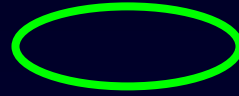
Pressure Wave Reflection



Pressure Wave Reflection



Peripheral Versus Central BP



Due to changes in arterial stiffness and wave reflection
brachial BP \neq central BP

Central Blood Pressure

- ❑ In end-stage renal disease, central BP is a stronger predictor of all-cause mortality than brachial BP.
- ❑ Central BP is more strongly related to vascular hypertrophy and atherosclerosis than brachial BP.
- ❑ Central BP is a better predictor of coronary artery disease severity and adverse CV/renal events than brachial BP.
- ❑ Central BP holds greater prognostic value than conventional brachial BP
 - ❑ Central pressure more aptly reflects the load encountered by the heart and brain.

Purpose

Are we measuring the right pressure?

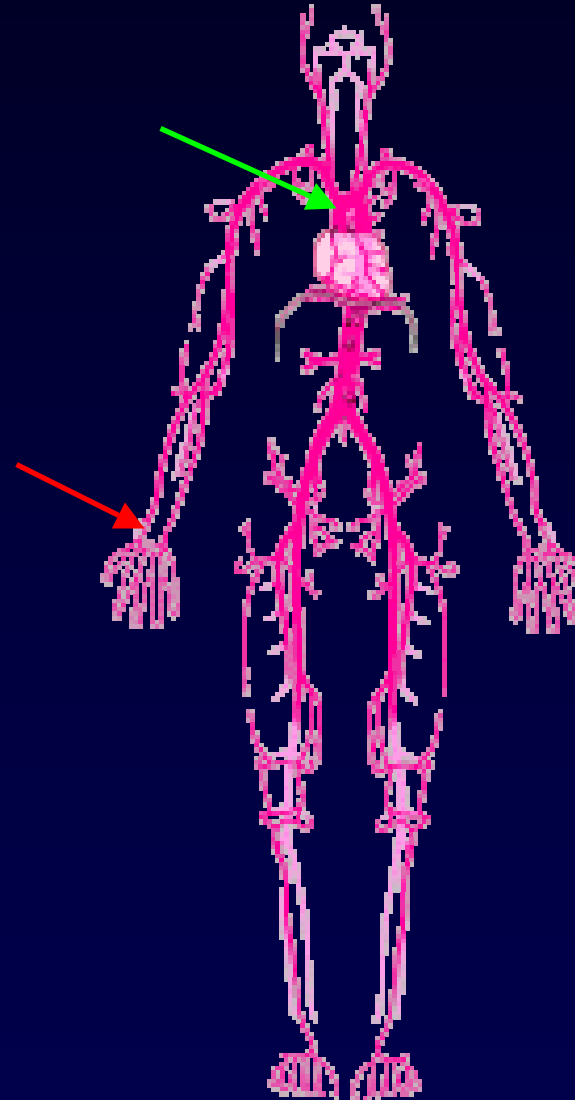
Methods

Measurements of Vascular

Structure/Function Ancillary Measures

- Carotid Artery Thickness
- Fasting Blood Draws
 - Carotid Artery Stiffness
- Peak Oxygen Uptake
 - Arterial Compliance
- Body Composition
 - Arterial Elastance
- Aortic Stiffness
- Aortic Pressure Wave Reflection
- Forearm Blood Flow Following Brief Ischemia

Central Blood Pressure



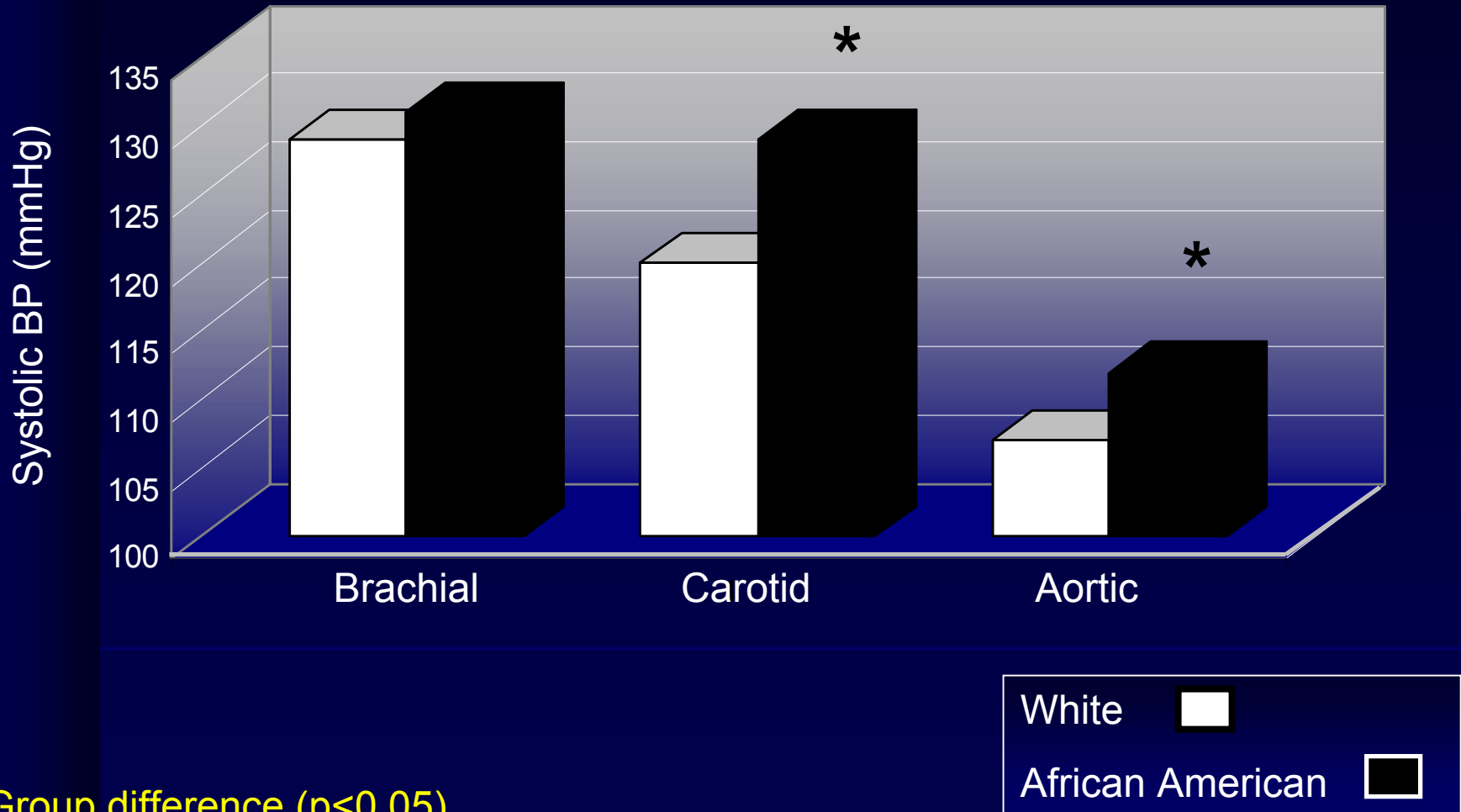
<i>Variable</i>	White	African American
Age	23.6 ± 0.7*	21.7 ± 0.4
BMI	25.9 ± 0.8	27.8 ± 1.0
Body Fat	21.1 ± 1.8	17.3 ± 2.4
Total Cholesterol	167.3 ± 6.2	160.7 ± 3.7
HDL	41.5 ± 2.5	43.0 ± 2.0
LDL	104.5 ± 5.2	100.7 ± 3.8
Triglycerides	92.0 ± 8.4	85.3 ± 7.6
WBC	6.2 ± 0.2	5.6 ± 0.3
Glucose	91.0 ± 1.4	87.3 ± 1.6
GFR	96.0 ± 2.6	102.5 ± 3.3
Cr Clearance	132.7 ± 5.9	126.9 ± 7.1
Peak O ₂ Uptake	31.4 ± 0.8	32.1 ± 1.3
Family history diabetes %	47	47
Family history hypertension %	57	60

Vascular Function/Damage

<i>Variable</i>	White	African American
Carotid IMT	0.45 ± 0.01	0.50 ± 0.02*
Carotid Stiffness	3.8 ± 0.1	4.4 ± 0.2*
Aortic Stiffness	6.0 ± 0.02	7.3 ± 0.03 *
Aortic Elastance	0.90 ± 0.03	1.02 ± 0.04*
Arterial Compliance	4.1 ± 0.3	2.6 ± 0.7*
SV/PP ratio	3.3 ± 0.1	2.9 ± 0.1*
AIx	-9.0 ± 1.3	0.5 ± 2.4*
FBF-RH	84.7 ± 4.9	66.8 ± 5.3*
Brachial Pulsatility	5.2 ± 0.3	6.1 ± 0.3

* Group difference (p<0.05)

Peripheral and Central BP



* Group difference ($p < 0.05$)

Peripheral and Central BP

- ❑ In African American men, there was no association between brachial BP and measures of vascular damage, renal function and LV morphology).
- ❑ However, there were associations between central BP and measures of vascular damage:
 - ❑ Carotid BP associated with carotid stiffness and IMT
 - ❑ Aortic BP associated with endothelial function and renal function (i.e. creatinine clearance and BUN)
- ❑ Central BP was also associated with ECG measures of LV morphology in young African American men.

Summary

- ❑ In young men with similar BMI, body fat, fitness, renal function, blood lipid and glucose levels, family Hx of CVD:
 - ❑ young African-American men have greater central BP yet comparable brachial BP compared with young white men
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- ❑ There was diffuse vascular dysfunction in young African American men (manifesting as increased arterial stiffness, intima-medial thickening, and endothelial dysfunction):
 - ❑ measurement of brachial BP did not reflect this vascular burden

Implications

- ❑ Current professional guidelines acknowledge the clinical utility of central BP and support measurement of target organ damage for optimal management of hypertension
- ❑ Reduction of central BP is more closely linked to clinical outcome than change in brachial BP
- ❑ There are well established racial differences in the response to anti-hypertensive therapies

Can measurement of central BP help guide anti-hypertensive therapy?

Case Study

Risk of developing CVD in the next 10 years is 3 times higher in the young African American man

Future Directions & Conclusions

- ❑ Can this be used in a clinical/community setting for better CVD detection, risk stratification and treatment?
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- ❑ Alterations in central blood pressure may precede alterations in brachial blood pressure in young African American men.
- ✓ Measurement of central BP and vascular aging (i.e. stiffness or IMT) may fill a crucial void in the current detection and management of hypertension and its related sequelae in African-Americans.

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