Work Stressors: Causes, Consequences and Cures. The case for hypertension?

A Social Epidemiologic Approach to the Workplace and Cardiovascular Disease

Peter L. Schnall MD, MPH
Professor of Medicine, U. of California at Irvine
Adjunct Professor of Public Health - UCLA

Partnership for a heart-healty stroke-free MASSACHUSETTS

January 30, 2009

CARDIOVASCULAR DISEASE (CVD): A WORLDWIDE EPIDEMIC

- **Number 1 cause of morbidity/mortality in developed countries**
- **In China, the cause of 38% of all deaths (2002)**
- **Globally, 29% of all deaths (2003)**
- **Will become #1 cause (36% of all deaths) between 2010-20**

Graziano J. Global burden of cardiovascular disease. In: Zipes D, Libby P, Bonow R, Braunwald E, editors. Heart disease. London: Elsevier; 2004. p. 1-19. Cardiovascular Disease. World Health Organization. Geneva, Switzerland, 2004.
Liu L. Cardiovascular diseases in China. Biochemistry and Cell Biology 2007;85:157-163.

CVD IN CHINA: AN "EPIDEMIOLOGIC CROSSROADS"

- CVD as cause of death = 12.1% (1957); ↑38% (2002)
  - Smoking: 61% of men, 7% of women (rates increasing)
  - Overweight: 33% of adults
  - Type II diabetes: prevalence ↗ 3 times (1980-1994)
    - estimate: ↗ 68% (1995-2025)
  - Hypertension: age 15+: 5.1% (1959), 7.7% (1980), 11.3% (1991)
    - age 18+: 18.8% (2002)
    - only 30% aware, 6% controlled

Liu L. Cardiovascular diseases in China. Biochemistry and Cell Biology 2007;85:157-163.
Greenberg H, Raymond SU, Leeder SR. Cardiovascular disease and global health: Threat and opportunity. *Health Affairs* DOI 10.1377/hlthaff.W5.31 ©2005.

The social nature of CVD risk factors

Traditional Risk factors are all recent phenomena (emerging in the past 150 years)

- Smoking ↑+/- –>> mass production of cigarettes begins at the end of the 19th Century
- Elevated Cholesterol ↑+/- –>> emerges with diets rich in meat & dairy at beginning 20th Century
- Obesity ↑++ –>> emerges in paralled with sedentary labor
- Hypertension ↑+ –>> with modern work & communities
- Diabetes ↑++ –>> a disease of obesity
- *Obesity + Hypertension + DM = Metabolic Syndrome*

Proximate Causes of CVD

These traditional risk factors represent relatively proximate causes of CVD, each with a complex set of determinants, many of which are work related or psychosocial in origin.

The Hypertension Epidemic

- **Leading cause of CVD worldwide**
- **More than one billion+ people with high blood pressure [1]**
- **49% of coronary heart disease attributable to SBP >115**

[1] Gaziano J. Global burden of cardiovascular disease. In: Zipes D, Libby P, Bonow R, Braunwald E, eds. Heart disease. London: Elsevier; 2004. p. 1-19. Hajjar I, Kotchen J, Kotchen T. Annual Review of Public Health 2006;27:465-490. Lawes CMM, Vander Hoorn L. Law MR, Elliott P, MacMahon S, Rodgers A. Blood pressure and the burden of coronary heart disease. In Marmot M, Elliott P (eds.) Coronary Heart Disease Epidemiology. Oxford, 2005.

Hypertension in rapidly Industrializing Countries

- Brazil
  - >1/3 now have hypertension (HTN)
- India
  - HTN prevalence increased from 1–3% in 1950 to 10–30% in 2000
- China
  - **Overall, in 2002, among > 100,000 surveyed, 27.2% of the Chinese adult population age 35 to 74 years had hypertension.**
  - **Hypertension virtually unknown in rural china**
  - **Hypertension: age 15+: 5.1% (1959), 7.7% (1980), 11.3% (1991)**
  -

What is hypertension?

- Hypertension, commonly referred to as "high blood pressure" or HTN, is a medical condition in which the blood pressure is chronically elevated.
- Hypertension can be classified as either essential (primary) or secondary. Secondary hypertension accounts for less than 5% of cases.
- Essential hypertension is a major risk factor not only for coronary heart disease, but also for left ventricular hypertrophy, stroke, renal disease, and many other major pathologic processes.
- The etiology of essential hypertension remains unknown.

THE TRADITIONAL MEDICAL-RESEARCH APPROACH

- **Focuses on**:

  risk behaviors (smoking, overeating, sedentary lifestyle, inter alia) and/or

  individual traits, especially genetic susceptibility

- Seen as playing the **primary role** in the etiology of hypertension

- Based on engineering models; Hypertension **seen as a disturbance in hydraulic (hemodynamic) and/or electrical (electrophysiological) function**.
  - There are a # of identified causes – renal, adrenal, etc abnormalities contributing to "2nd Hypertension"

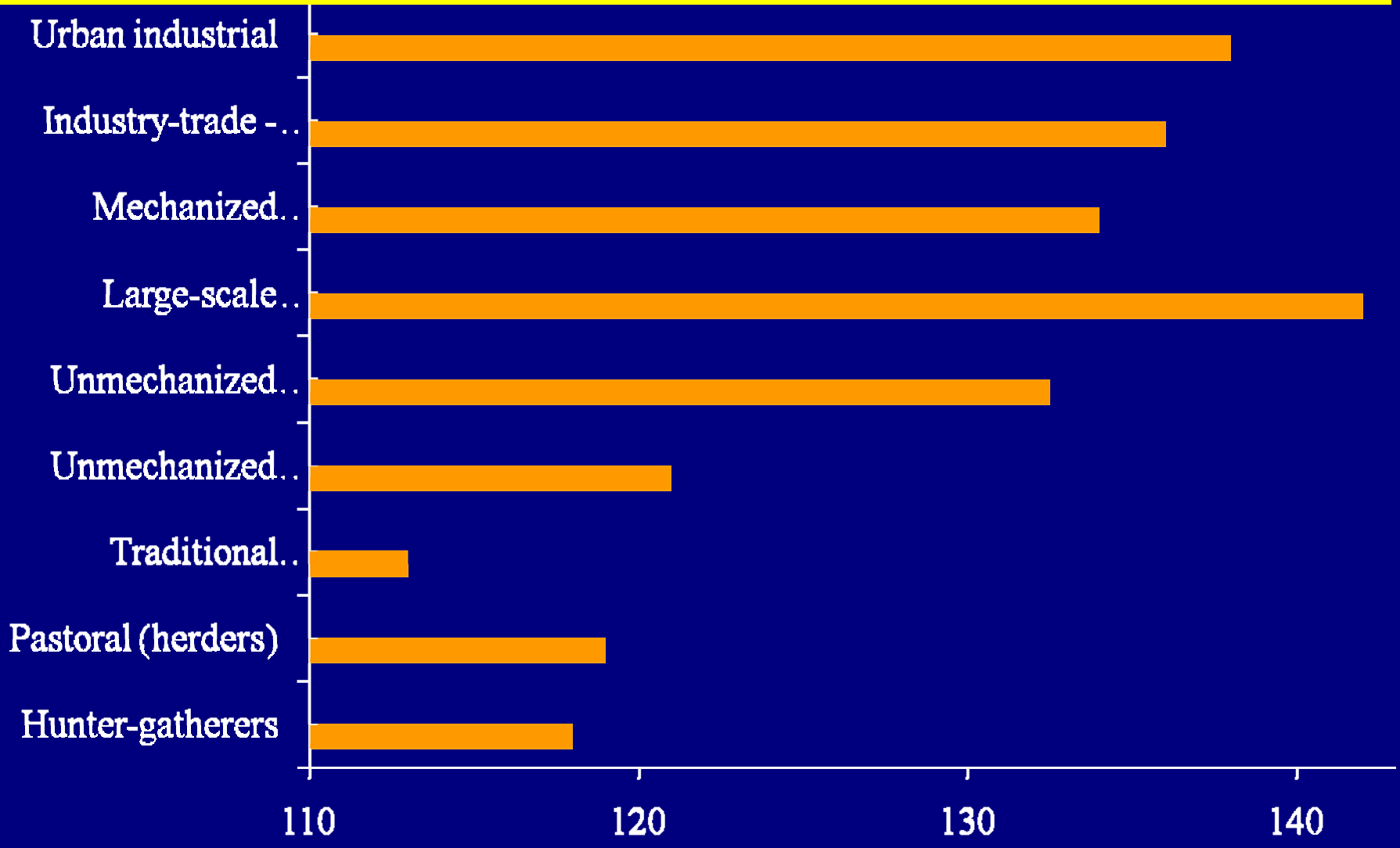
Schnall PL et al. Why the Workplace and Cardiovascular Disease. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

Hypertension: relationship of age to cultural characteristics

- Cross-cultural study of adult blood pressure
- 84 societies as units of analysis
- Ratings of cultural characteristics using anthropological data

Waldron I, Nowatarski M, Freimer M, Henry JP, Post N, Witten C. Cross-cultural variation in blood pressure: A qualitative analysis of the relationship of blood pressure to cultural characteristics, salt consumption and body weight. Social Science and Medicine 1982;16:419-430.

Avg. systolic BP (mm Hg), men aged 50-60



Waldron I, et al. Cross-cultural variation in blood pressure. Soc Sci Med 16:419-430, 1982

Slope of systolic BP with Age, men (mm Hg/yr)

Waldron I, et al. Cross-cultural variation in blood pressure. Soc Sci Med 16:419-430, 1982

Wanted: A ubiquitous risk factor

- Air
- Water
- Food/diet
- Social Class
- Community
- Family
- Work

HYPERTENSION: A CASE HISTORY OF A SOCIAL EPIDEMIOLOGICAL APPROACH

- **The identified risk factors (i.e., obesity, salt intake, genetics, age, alcohol intake) explain only a small part of the risk for developing hypertension.**

Schnall PL et al. Why the Workplace and Cardiovascular Disease. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

The Social Epidemiologic Approach (SEA)

- **SEA expands on traditional cardiovascular epidemiology by examining social factors, including social networks, social support and social class, as potentially either more distal causes or modifiers/moderators of disease processes (Rose, 1985; Link & Phelan, 1995; Susser & Susser; 1996; Diez-Roux 1998; Schwartz 1999).**
- **SEA has demonstrated a role for SES as an important risk factor for CVD [Marmot, 1991; Kaplan, 1993]. S**
- **Still a large amount of unexplained variance in CVD, as well as in essential hypertension.**
- **SEA can contribute to a better understand of the CVD epidemic by incorporating, in a much more prominent manner, a heretofore relatively neglected realm of social life – the workplace.**

Schnall PL et al. Why the Workplace and Cardiovascular Disease. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

An etiologic variable must meet following criteria:

- Pervasive
- Socially Patterned
  - By Social class
  - By Urban-rural
  - By Industrial vs non-industrial
- Chronic - as it takes decades for an individudal to develop HBP

Hypertension as a disease of industrialized society

- Minimal hypertension disease burden among hunter-gatherers, non-market agricultural communities & other non-industrialized societies. (Waldron, 1982)
- Industrial society: hypertension socially patterned by class, race, ethnicity, urbanicity & gender.

Hypertension as an epidemic seems likely to be of relatively recent historical origins

- Evidence implicates the "unidentified" causes of essential hypertension as including one or more ubiquitous exposures.
- There is a need to more closely examine lifestyle, work or community.
- An adequate explanatory risk factor needs to incorporate the above-mentioned social patterning of the disease.

Schnall PL et al. Why the Workplace and Cardiovascular Disease. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

WORK AND BLOOD PRESSURE

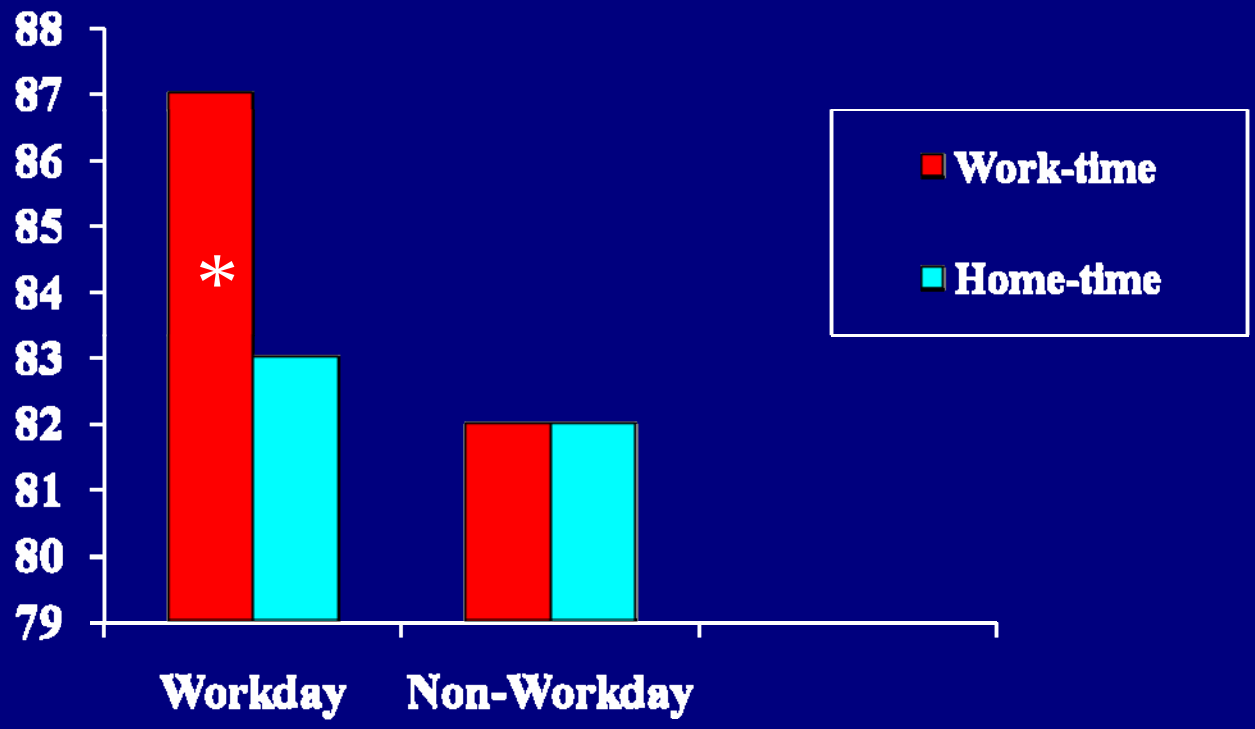
- The contemporary work environment is the locus in which adults now spend the majority of their waking hours.
- Work activities are increasingly characterized as demanding, constraining, and in other ways highly stressful.
- Blood pressure (BP) is elevated during working hours.
- Performing demanding, constraining and otherwise mentally stressful activity provokes sharp rises in BP.
- ?? Might specific features of work be implicated as important causes of hypertension, as well as CVD., e.g. Job strain

Schnall PL et al. Why the Workplace and Cardiovascular Disease. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

Comparison of Ambulatory Blood Pressure on a Workday and Non-Workday

(Pieper et al, 1992)

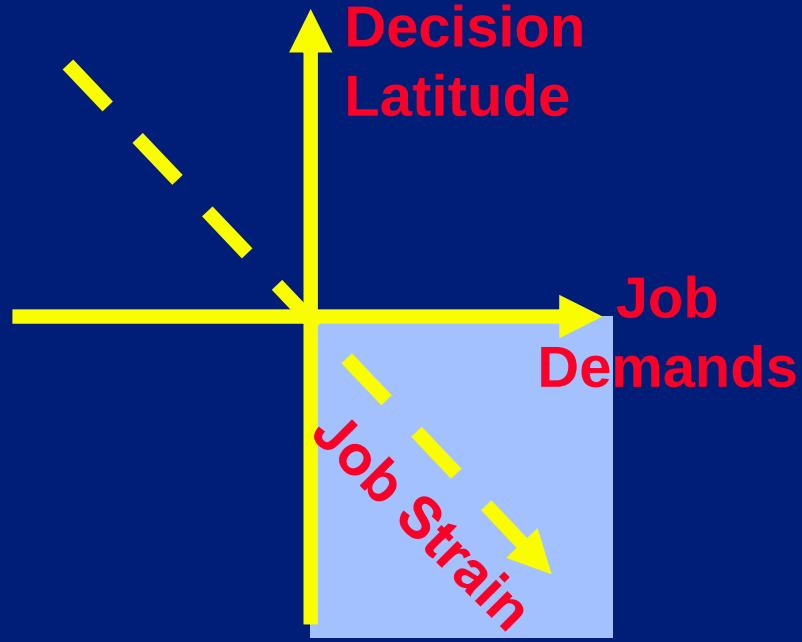
Ambulatory Diastolic Pressure (mm Hg)



* p<.05 From the New York City Worksite BP Study

Job Strain (Karasek)

Definition: The combination of HIGH Job Demands and LOW Decision Latitude



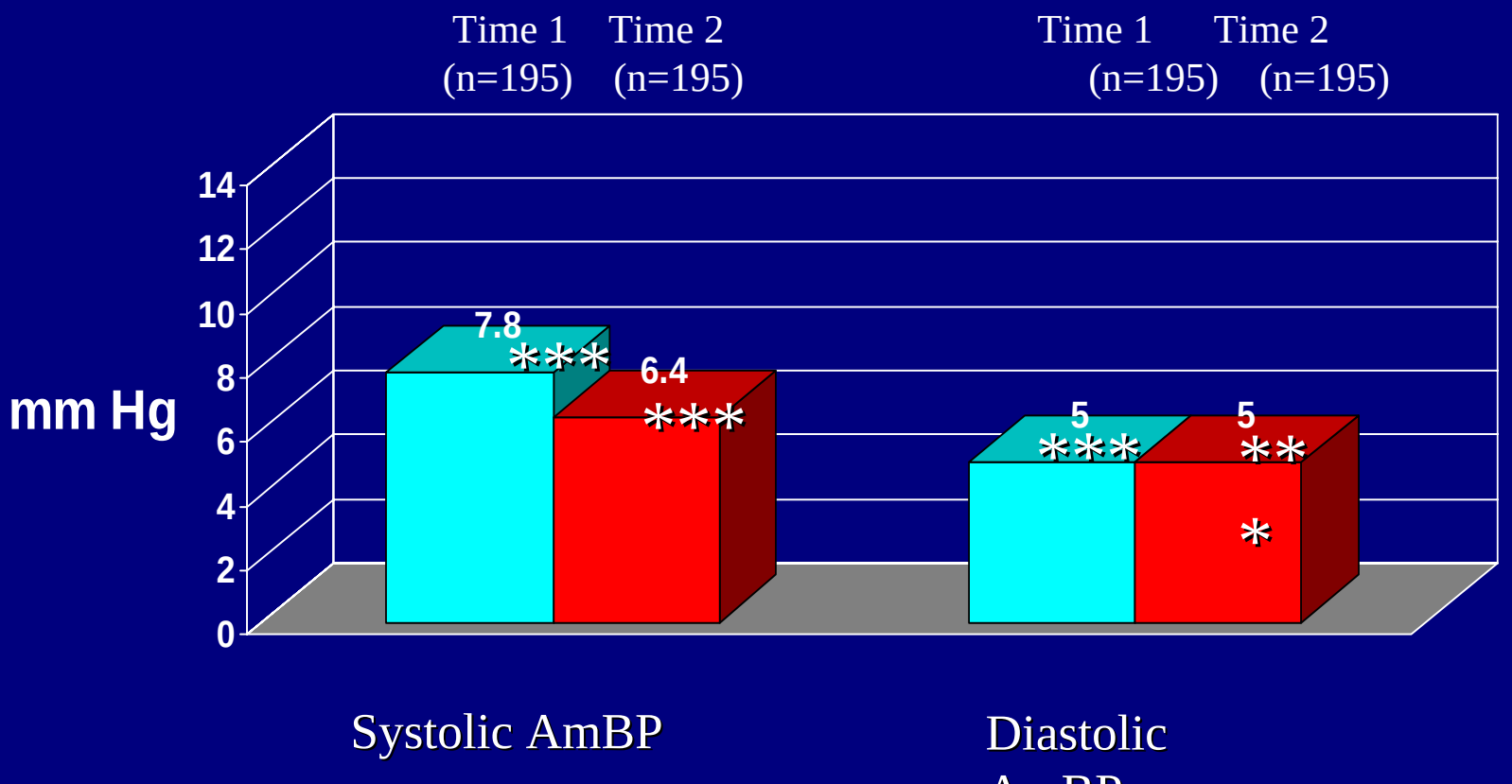
The New York City Work Site Blood Pressure (BP) Study

- Based at Weill Medical College of Cornell University-New York Hospital
- Began in 1985 as a case-control study
- 283 men initially enrolled at 8 large NYC work sites
- Funding became available (after studying 7 sites) to:
  - conduct a prospective study (evaluate Ss every 3-4 yrs)
  - enroll women
- Eventually , 472 subjects were enrolled at 10 sites (38% women) with a maximum of 4 evaluations & 10 years of follow-up
- Study ended in 2001

The New York City Work Site BP Study: Eligibility criteria

- aged 30-60 at recruitment
- full-time employee (30+ hours/wk)
- no second job requiring more than 15 hours/wk
- no evidence of CHD
- screening BPs less than 160/105 mm Hg
- able to read and speak English
- body mass index 32.5 kg/m² at screening
- at current worksit 3 yrs before recruitment and before Diagnosis high BP (only 1 yr at 8th site)

Job Strain and Work Ambulatory BP (men, Time 1 and Time 2)



controlling for age, education, body mass index, race, smoking, alcohol use, work site

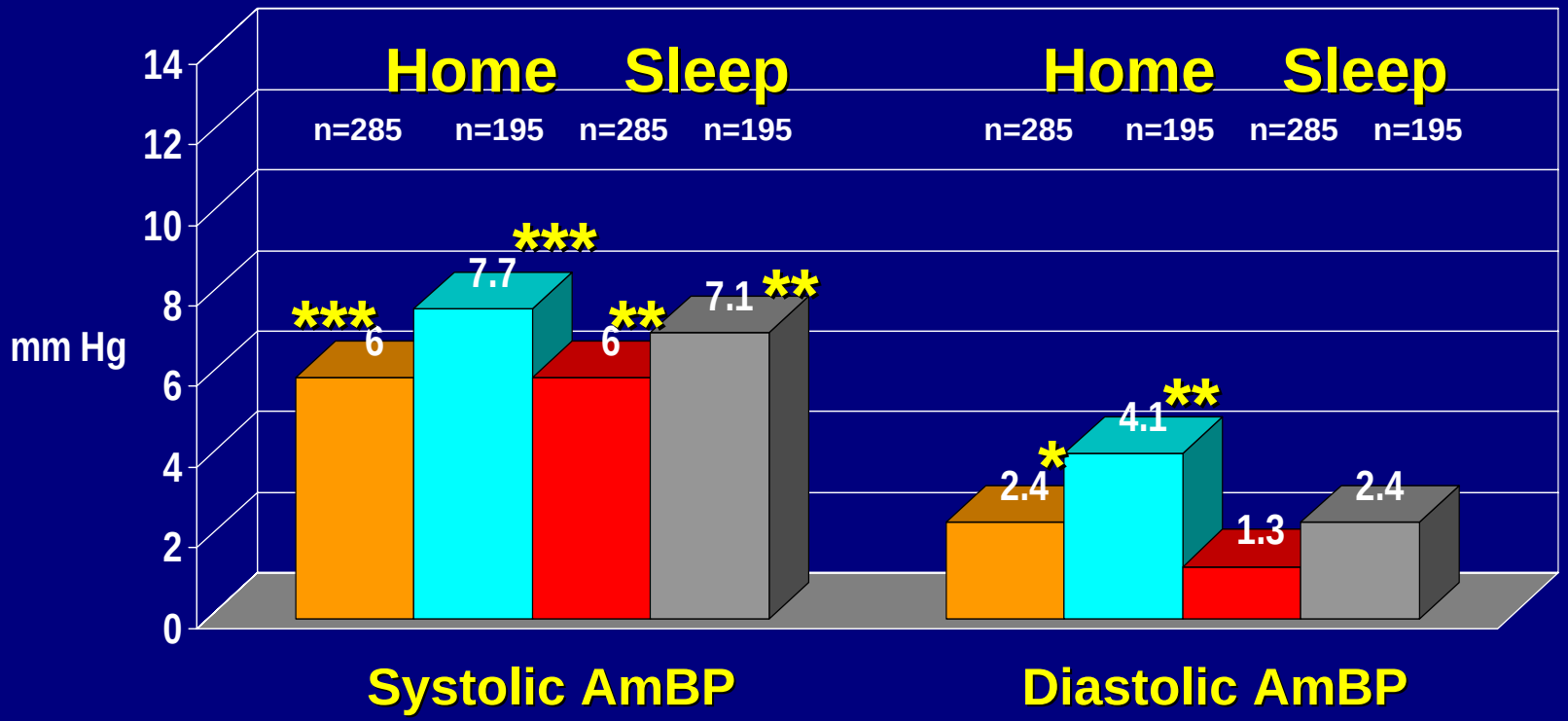
***p<.001

Schnall PL, Schwartz JE, Landsbergis PA, Warren K, Pickering TG. Psychosomatic Medicine 1998;60:697-706.

Clays et al. High job strain and ambulatory blood pressure in middle-aged men and women from the Belgian Job Stress Study. JOEM • Volume 49, Number 4, April 2007

Job Strain and Home and Sleep Ambulatory BP

(men, Time 1)

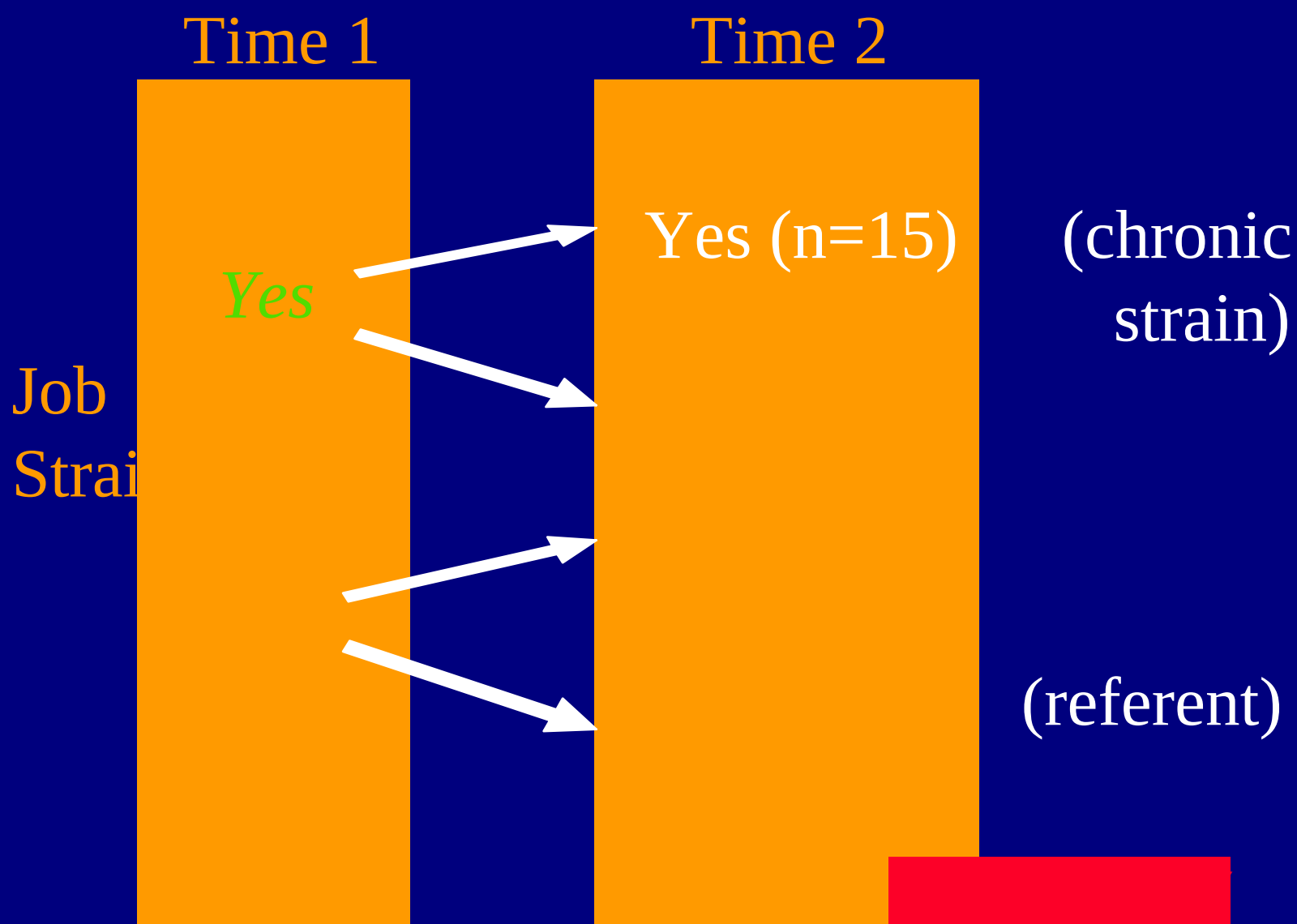


controlling for age, education, body mass index, race, smoking, alcohol use, work site

***p<.001 , **p<.01, *p<.05

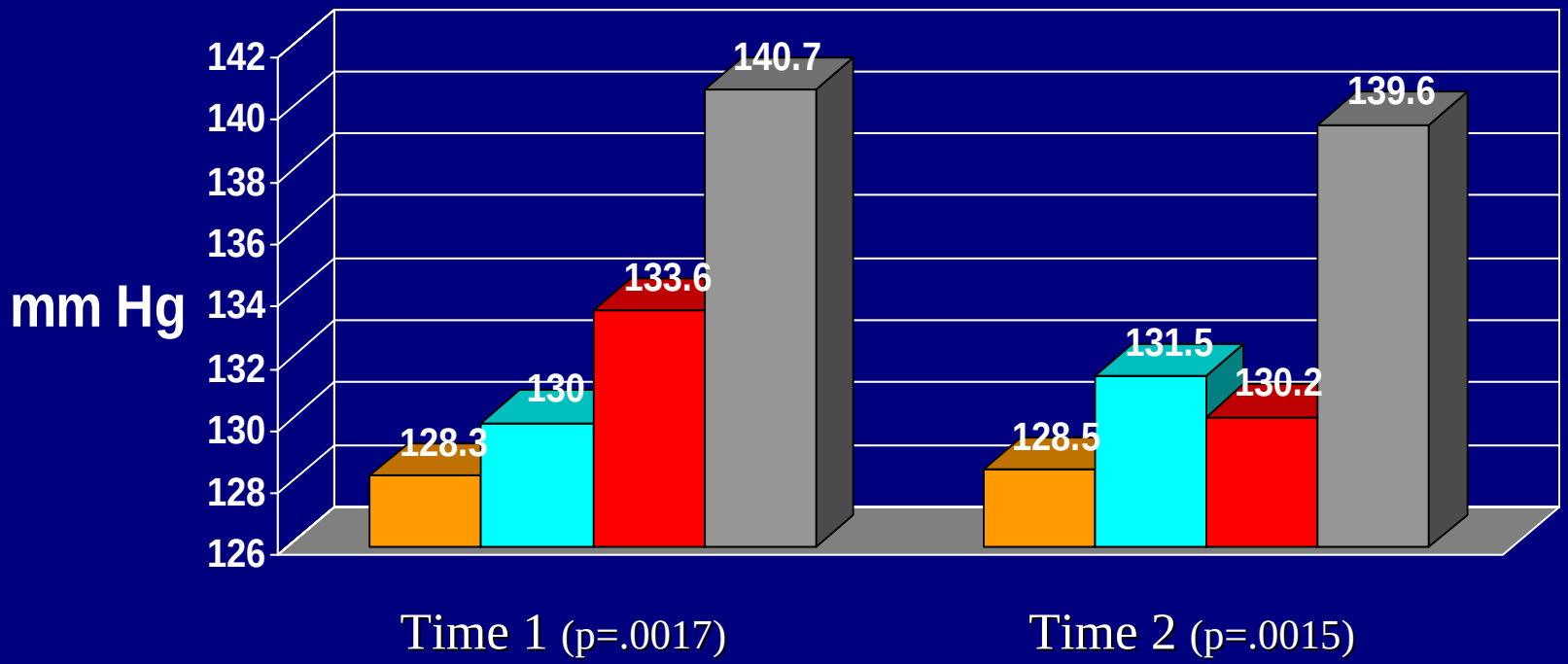
Schnall PL, Schwartz JE, Landsbergis PA, Warren K, Pickering TG. Psychosomatic Medicine

Job Strain Change Variable



Job Strain change and Work Systolic Ambulatory BP (n=195 men, Time 1 and 2)

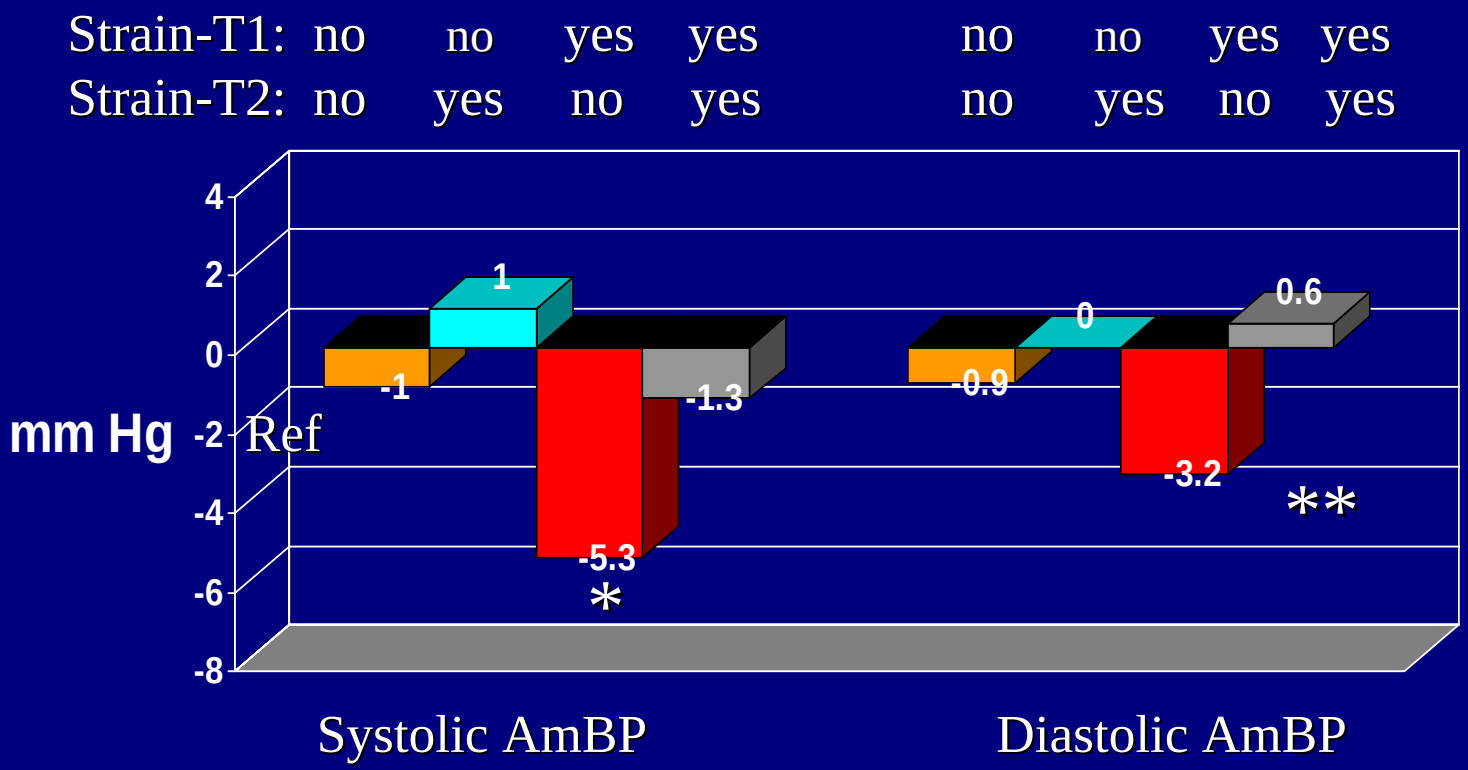
Strain-T1:	no	no	yes	yes		no	no	yes	yes
Strain-T2:	no	yes	no	yes		no	yes	no	yes



controlling for age, education, body mass index, race, smoking, alcohol use, work site

Schnall PL, Schwartz JE, Landsbergis PA, Warren K, Pickering TG. Psychosomatic Medicine 1998;60:697-706.

Job Strain change and 3-yr Work Ambulatory BP change (n=195 men, Time 1-2)

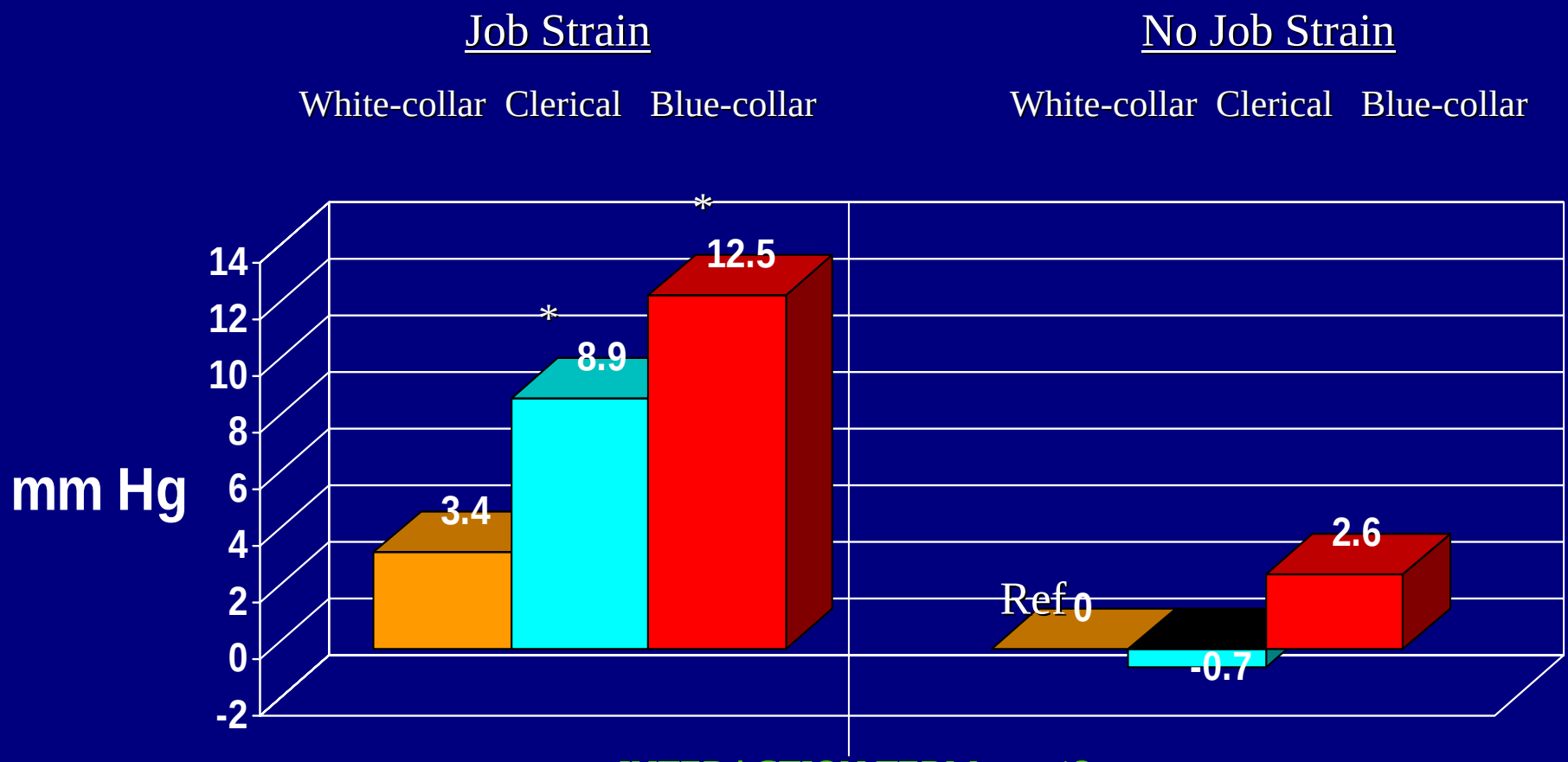


controlling for age, race, body mass index, smoking, alcohol use, work site

p<.05, **p<.01, (vs Ref group)

Schnall PL, Schwartz JE, Landsbergis PA, Warren K, Pickering TG. Psychosomatic Medicine 1998;60:697-706.

Job Strain and Work Ambulatory Systolic BP by Occupational Status (n=283 men, Time 1)



INTERACTION TERM: p=.13

controlling for age, body mass index, race, smoking, alcohol use and work site

#p<.10, *p<.05 (vs Ref group)

Landsbergis et al. In Adler, NE, Marmot M, McEwen BS, Stewart J (eds.) (pp. 414-6). New York: New York Academy of Sc

Work stressors vs “Stress”

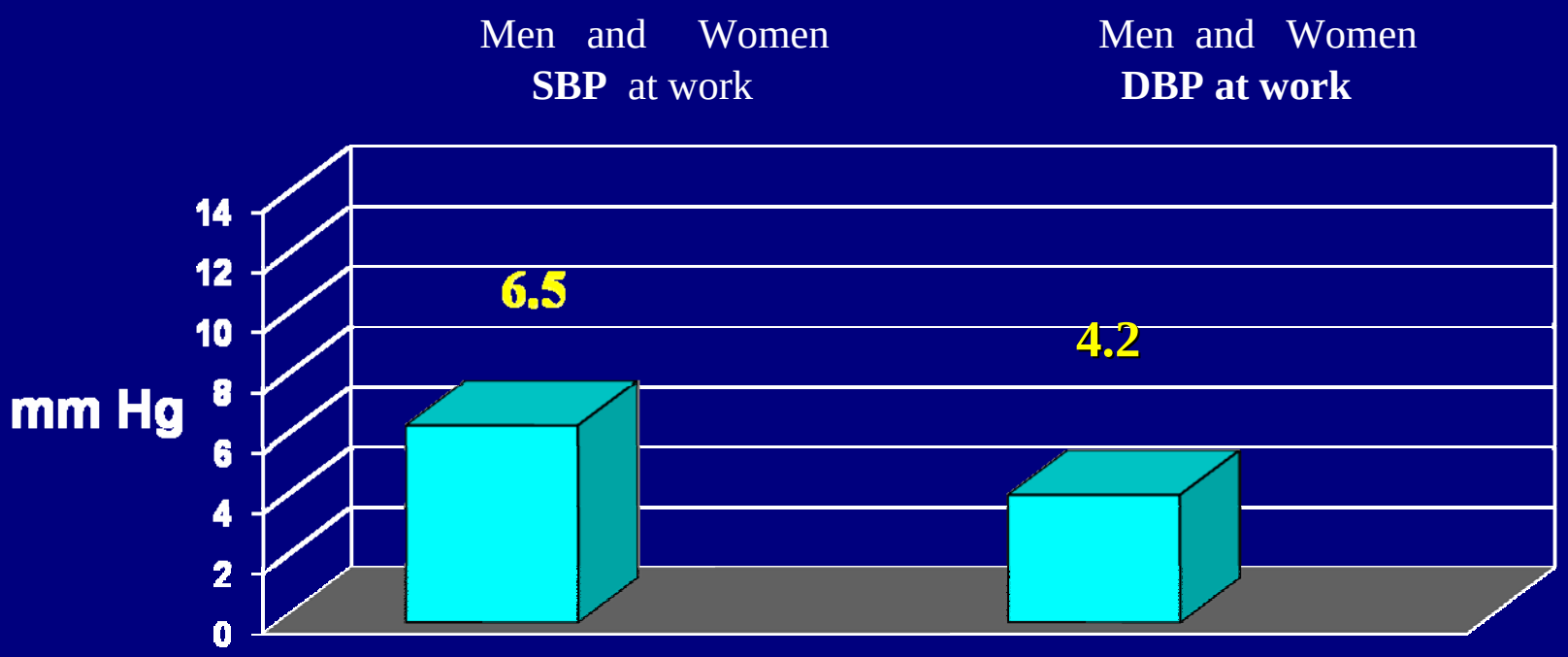
- Work stressors are aspects of work and the organization of work that contribute to various illnesses. These include long work hours, threat avoidant vigilance as well as psychosocial stressors such as job strain and ERI.
- Stress is the subjective response of the individual to work stressors.
- Unfortunately they are not identities as people with hypertension can report job strain and not report being “stressed”

The Importance of Psychosocial Factors in Hypertension: Findings from the Cornell U.M.C. Work Site Ambulatory Blood Pressure Project

- Case-Control Study – Job Strain and Hypertension – Odds Ratio = 2.7
- Cross-Sectional Study – Job Strain and Ambulatory SBP = + 6.6 mm Hg
- Job Strain and Ambulatory DBP = + 4.0 mm Hg
- Longitudinal Study – Repeated exposure Job Strain and AmSBP = +12 mm Hg
- Repeated exposure Job Strain and AmDBP = +9 mm Hg
- Retrospective 20 year exposure to Job Strain = +5 mm Hg
- Population Attributable Risk % = 27% [1]

- [1] Time 1 calculation based on OR of 2.7 and prevalence rate of Job strain of 20%

Job Strain and Work Ambulatory BP in men and women - The Belgian Job Stress Study (2007)



controlling for age, education, body mass index, race, smoking, alcohol use, work site

***p<.001

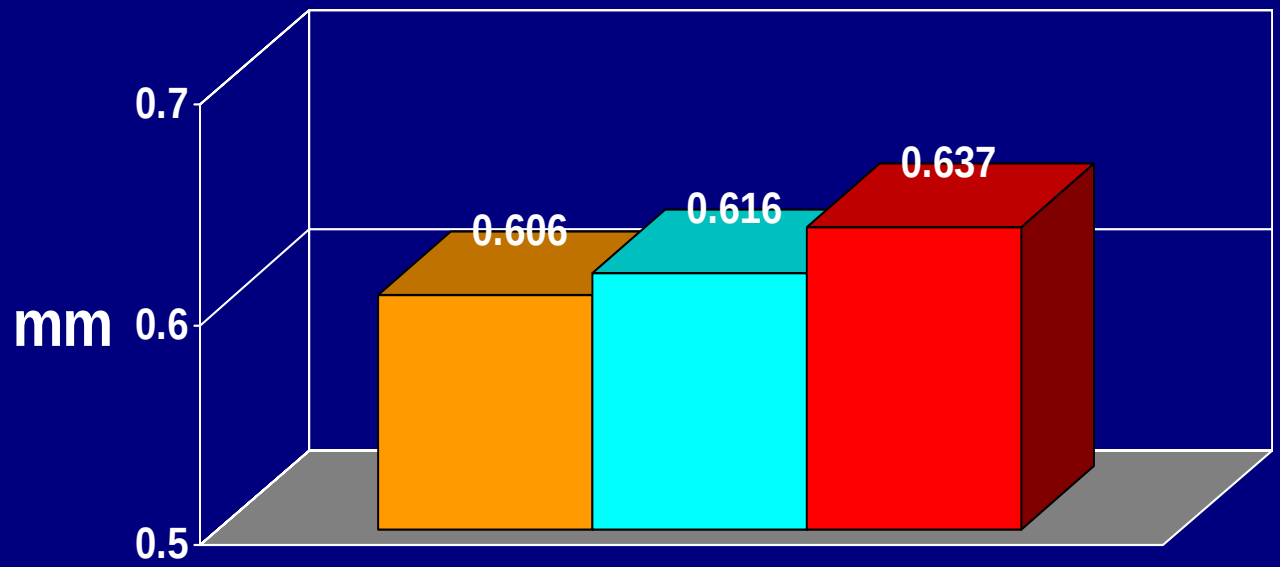
Clays et al. High job strain and ambulatory blood pressure in middle-aged men and women from the Belgian Job Stress Study. JOEM • Volume 49, Number 4, April 2007

Studies of Job Strain and Ambulatory Blood Pressure

	Significant positive	Mixed positive and null	Total # of
Ambulatory BP	5	8	15
men	6	4	13
women	2	3	7

Belkić K, Landsbergis P, Schnall P, Baker D, Theorell T, Siegrist J, Peter R, Karasek R. Psychosocial factors: Review of the empirical data among men. *Occupational Medicine: State of the Art Reviews* 2000;15(1):24-46.
Brisson C. Women, work, and CVD. *Occupational Medicine: State of the Art Reviews* 2000;15(1):49-57.

Job strain and carotid artery intima-media thickness (IMT), controlling for pre-employment risk factors, Finnish men, age 33-39



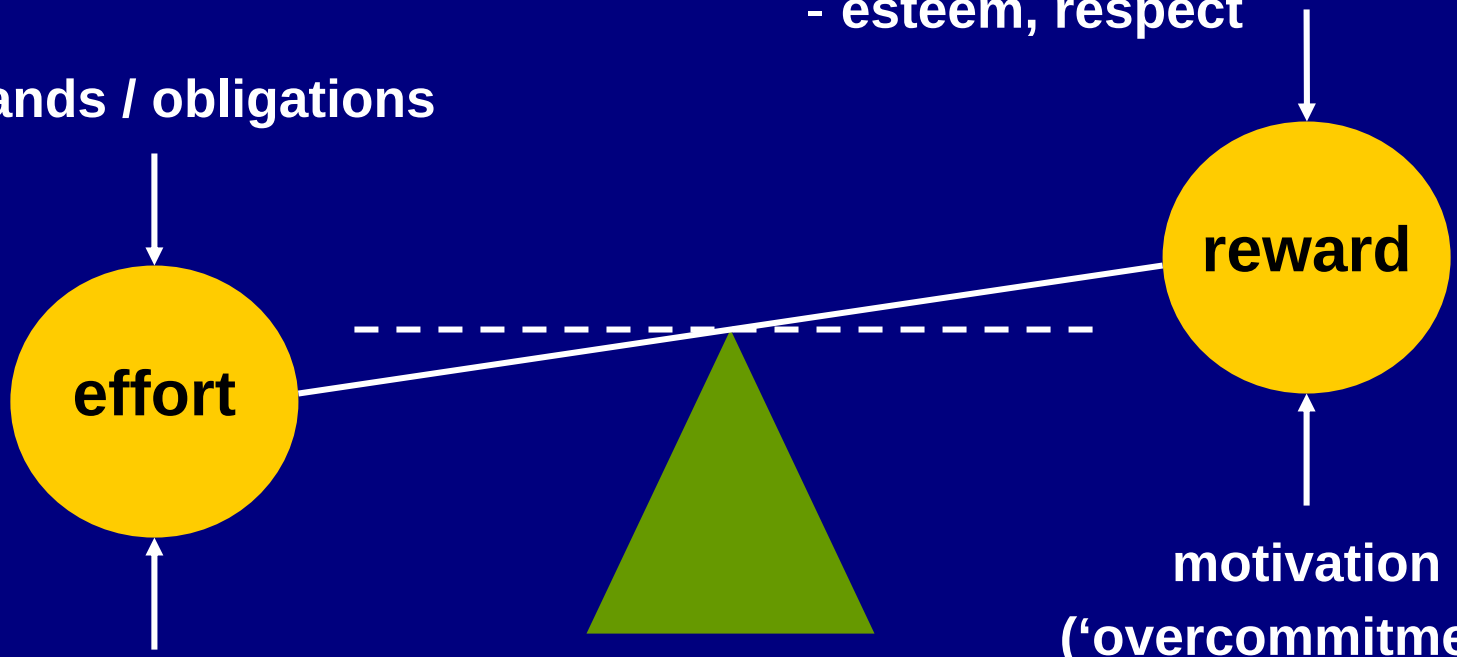
Controlling for age and risk factors assessed at age 12-18: BMI, HDL and LDL cholesterol, triglycerides, systolic BP, smoking, family history of CHD, parents occupational position

Kivimäki M, Hintsanen M, Keltikangas-Järvinen L, Elovainio M, Pulkki-Råback L, Vahtera J, Viikari JSA, Raitakari OT. Early risk factors, job strain, and atherosclerosis among men in their 30s: The Cardiovascular Risk in Young Finns Study. *American Journal of Public Health* 2007;97:450–452.

The model of effort-reward imbalance
(Johannes Siegrist, 1996)

Extrinsic components

- labour income
- career mobility / job security
- esteem, respect

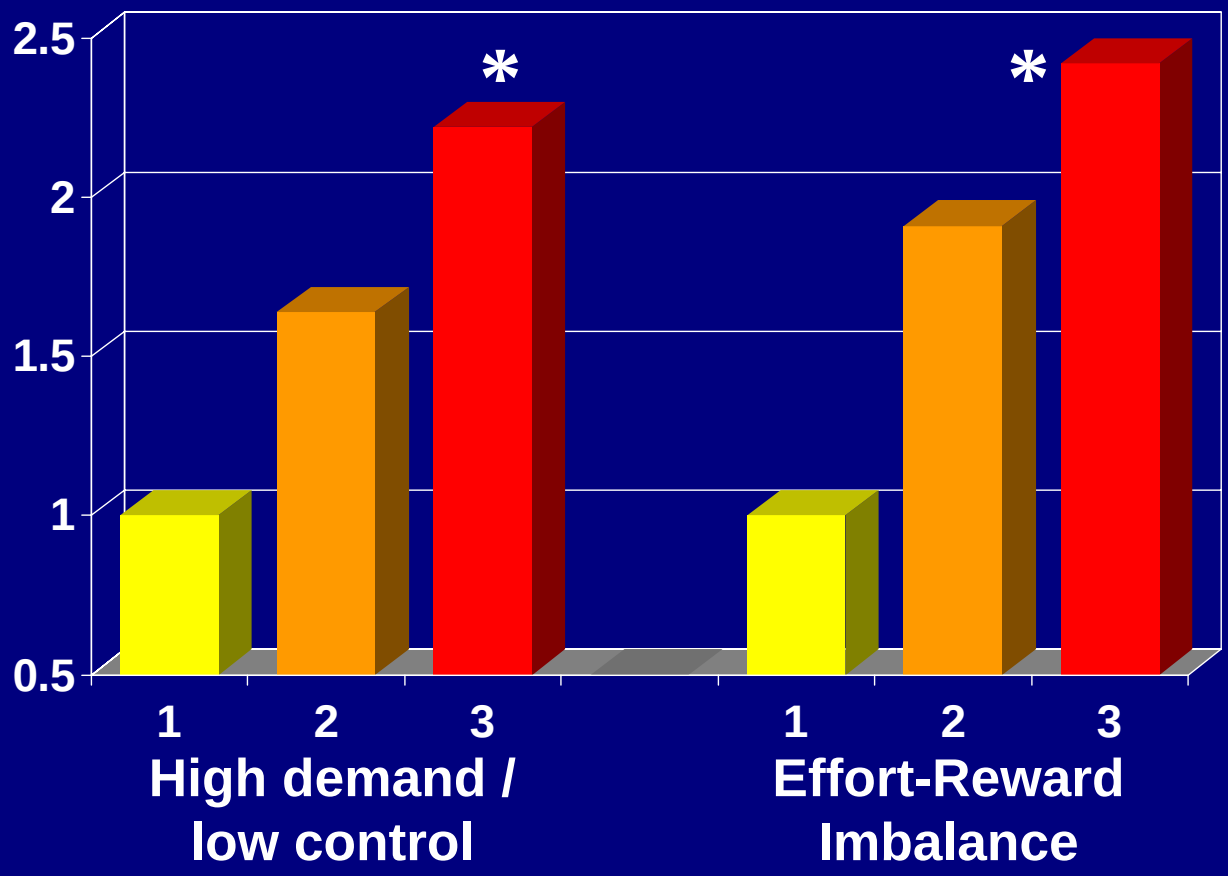


Intrinsic component

http://www.uni-duesseldorf.de/MedicalSociology/

Adjusted hazard ratios for cardiovascular mortality by levels of work stress#

Nmax=812 (73 deaths); mean follow-up 25.6 years



Tertiles
1 = low;
2 = intermediate;
3 = high

#adj. for age, sex, occupational group, smoking, physical activity, SBP, total chol., BMI

*** p < .05**

Source: M. Kivimäki et al. (2002), BMJ, 325: 857

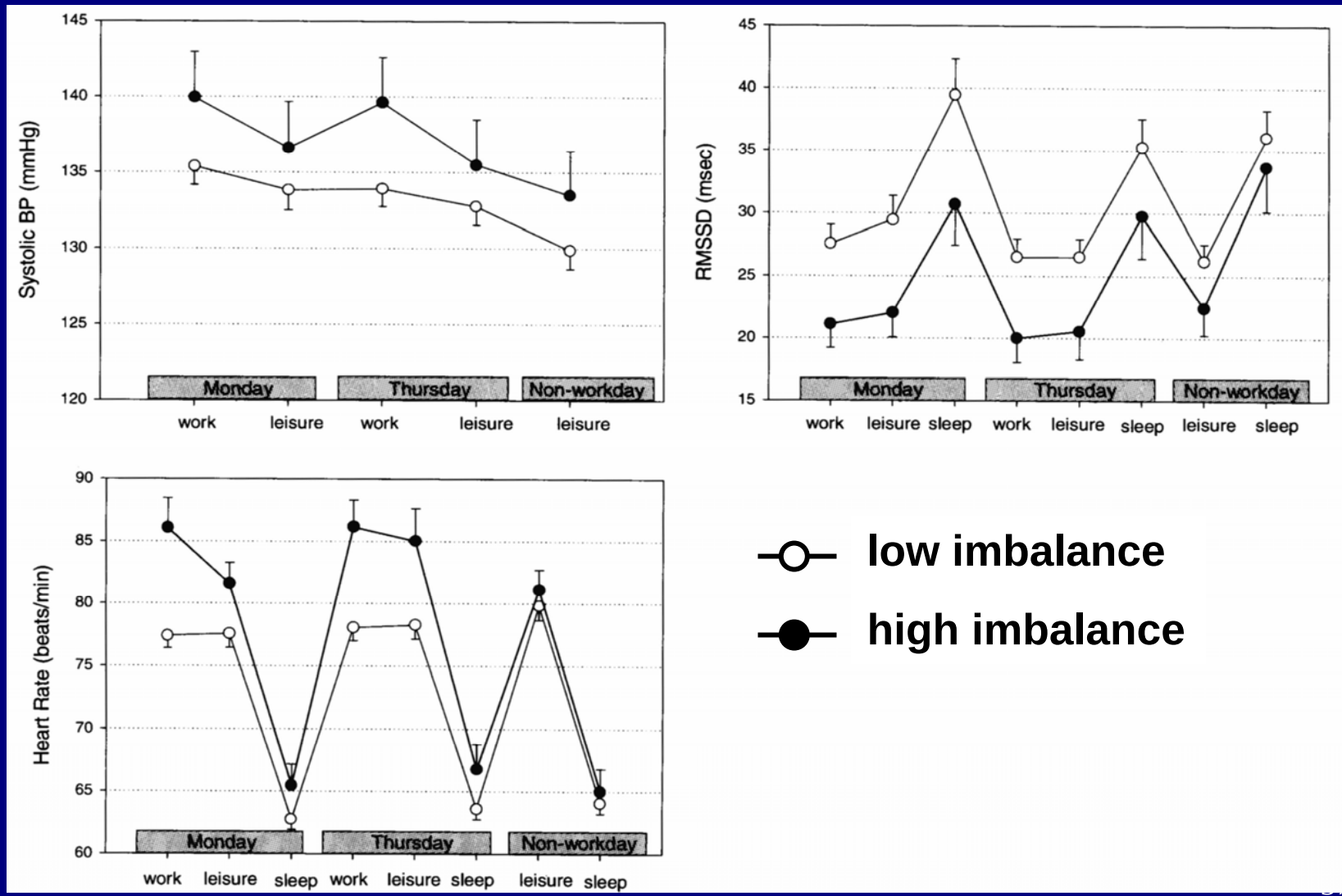
Heart rate variability (HRV):

In healthy populations, low HRV is a risk factor for all cause and cardiac mortality and new onset hypertension

Low HRV or low High Frequency Power also increases mortality risk in patients with heart disease

Changes in heart rate variability have been associated with effort-reward imbalance, “job strain” as well as threat avoidant vigilance.

Ambulatory BP, HR and HR variability and work stress (effort-reward imbalance)



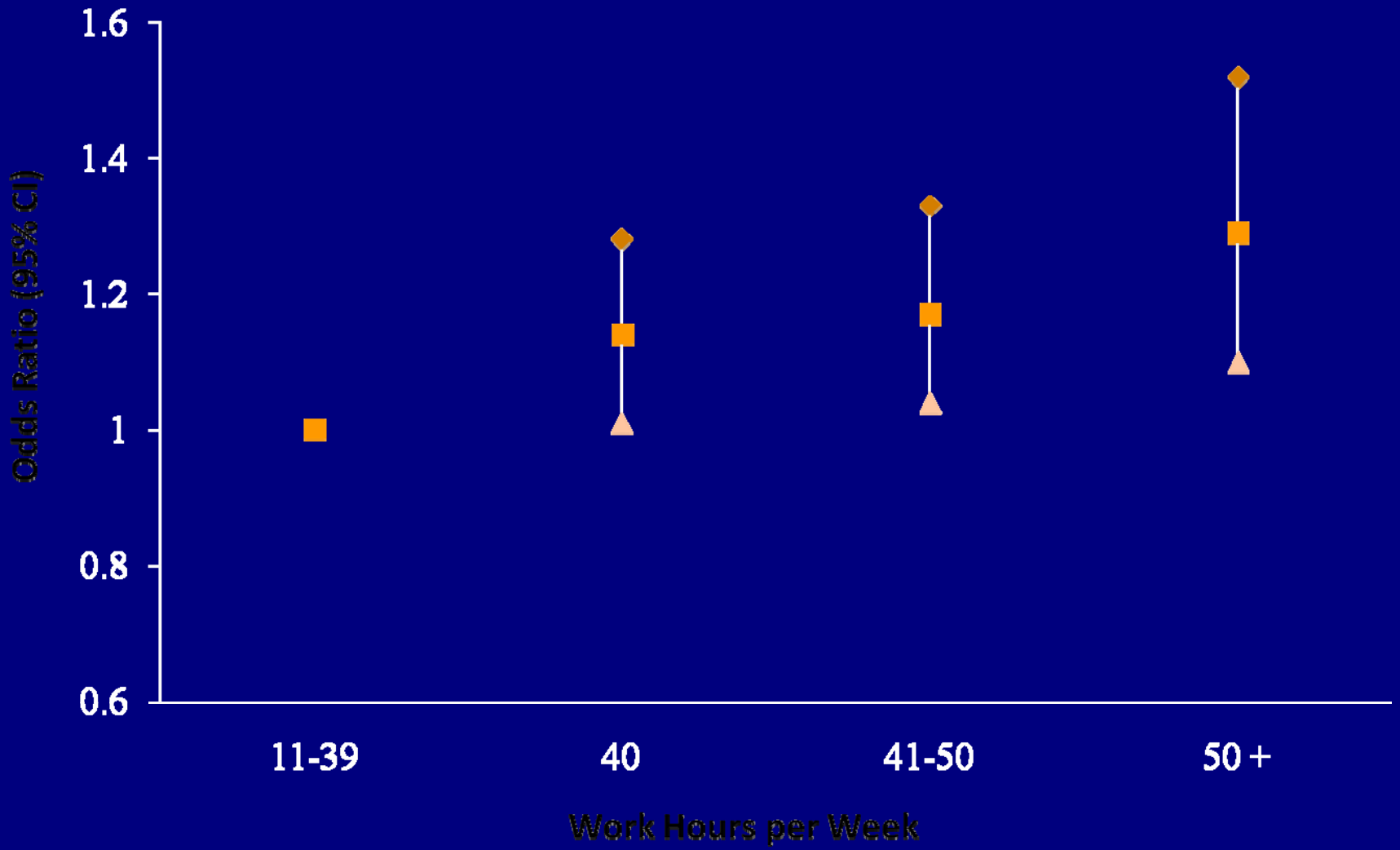
T.G.M. Vrijkotte et al. (2000), Hypertension, 35: 880

Work Hours and Self-Reported Hypertension Among Working People in California[1]

- **2001 California Health Interview Survey**
  - Included > 55,000 California households
  - Interviewer administered by telephone
  - Conducted in multiple languages
- **Public use data file**
- **Study population**
  - Working age population 18-64 years
  - Worked > 10 hours/week
  - Analysis based on 24,205 participants

- [1] Work Hours and Self-Reported Hypertension Among Working People in California Haiou Yang, Peter Schnall, etal *Hypertension* 2006; 48:1-7

Risk of Self-Reported Hypertension and Work Hours per Week



Controlling for biological and behavioral-related risk factors, occupation, and SES

Yang etal. Work hours and self-reported hypertension among working people in California, Hypertension 2006, 48:1-7

Identified Work related risk factors for HBP

- Job strain
  - –> evidence excellent
- ERI
  - – > evidence excellent
- Long work hours
  - --> good evidence
  - Fatigue, sleep also factors (? Related to long work hours)
- Occupations with threat avoidant vigilance (bus drivers, pilots, air traffic controllers, etc.)
  - –> evidence excellent

Other work factors playing a role include social support, role conflict, job insecurity, emotional labor inter alia

CHANGES IN THE ORGANIZATION OF WORK IN MODERN TIMES

- **With the development of industrial society, profound changes have occurred in the way in which work is organized during the past two hundred years.**
- **Craftwork was largely replaced by the industrial revolution.**
- **Skilled workers, who had exercised substantial control over their work processes, were replaced by lower - skilled labor in new machine-based production technologies (Karasek, 1990: pp19-20).**

Schnall PL et al. Why the Workplace and Cardiovascular Disease. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

CHANGES IN THE ORGANIZATION OF WORK IN MODERN TIMES cont:

- **At the beginning of the 20th century, Taylorism further reshaped the workplace with it's emphasis on narrow performance and efficiency using the technique of the assembly line, at the expense of employee collectivity and broader employee expertise and knowledge of the work process.**
- **Even lower-level white collar work, through office automation, has been shaped by the principles of the assembly line.**
- **More and more small businesses have been replaced by large centralized multinational organizations.**

LEAN PRODUCTION

- **Power to control the production process has been increasingly concentrated in the hands of management.**
- **The recent trend has been towards an acceleration of these changes in the workplace, an intensification of labor, characterized by a system of work organization know as “lean production”.**
- **“These dynamics include organization restructuring, mergers, acquisitions and downsizing, the frantic pace of work and life, the erosion of leisure time, and/or the blending of work and home time”.**
- **“Most of these developments are driven by economic and technological changes aiming at short-tern productivity and profit gain.”**

The Tokyo Declaration: J Tokyo Med Univ 56:760-767, 1998

CURRENT TRENDS IN WORKING CONDITIONS

*"As we embark upon the 21st Century in the United States, despite a booming economy, much prosperity and relatively low unemployment rates, there is a large and growing income disparity and working conditions are deteriorating for many."**

- Working men and women are putting in longer work weeks and are increasingly exposed to job conditions that can undermine CV health.
- In Europe, in 1996, 23% of those employed were working >45 hours per week (Walters, 1998).
- In the U.S., average weekly work hours increased by 3.5 to 47.1 hours from 1977 to 1997 (Bond, 1998).
- Workers in the U.S. have now surpassed Japanese workers in total number of hours worked per year, and work longer hours than in any other industrialized country (International Labor Office, 1999).

*Belkic K, Schnall P, Landsbergis P, Baker D. Conclusions and thoughts for a future agenda regarding the workplace and cardiovascular health. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

WORK AND BLOOD PRESSURE

- The contemporary work environment is the locus in which adults now spend the majority of their waking hours.
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- Performing demanding, constraining and otherwise mentally stressful activity provokes sharp rises in BP.
- Specific features of work are implicated as important causes of hypertension, as well as CVD., e.g. Job strain

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HYPERTENSION AS A DISEASE OF INDUSTRIALIZED SOCIETY

- **Recall our earlier suggested criteria for cause(s) of hypertension – that the risk factor be pervasive, socially patterned, and chronic.**
- **Work organizational factors (e.g., long work hours, etc.) and psychosocial factors meet all these criteria**

Schnall PL et al. Why the Workplace and Cardiovascular Disease. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

The End
Some resource materials

- Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).
- Schnall PL, Dobson M, etal. Unhealthy work: causes, costs and cures. In Press. Baywood Publisher. 2008. 500 pages
- Center for Social Epidemiology. Website Job Stress Network:

The End-Part 1!

Blood Pressure at Work: Some Clinical Implications

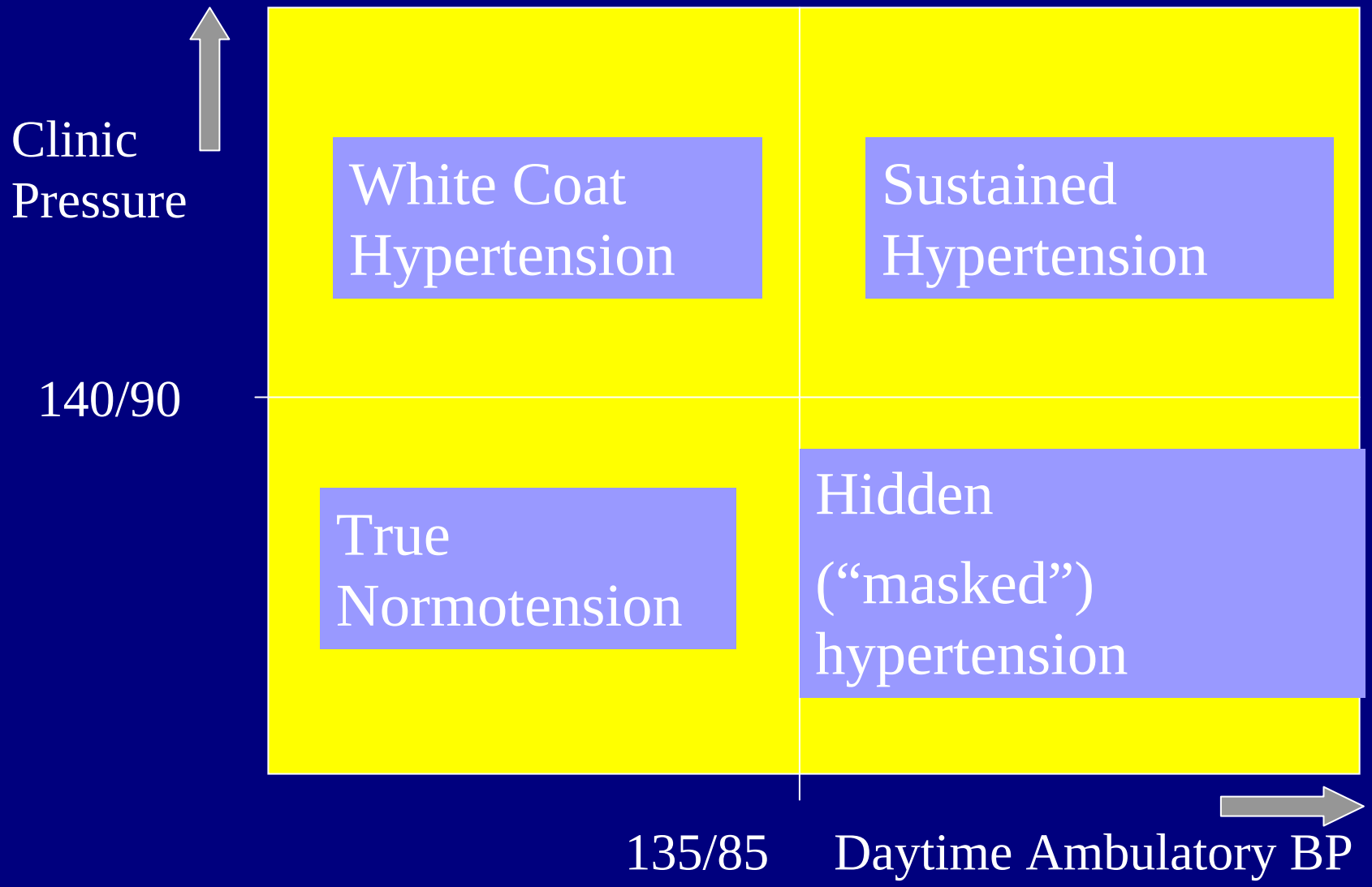
Peter L. Schnall MD, MPH
Professor of Medicine, UCI
and
Paul A. Landsbergis, PhD, MPH
Associate Professor Preventive Health, Mt. Sinai School of Medicine

September 25th 2007

Clinical Implications

1. Work Stressors lead to increased BP
2. BP elevated at work before elevated in doctor's office. Therefore BP in doctor's office may be unrepresentative and lower than BP at work

   →What we call occult (hidden) hypertension
3. Return to Work after an MI is riskier for those returning to a high stress work environment (RTW)
4. Need for Occupational Cardiology


Clinic Pressure
White Coat Hypertension
Sustained Hypertension
140/90
True Normotension
Hidden ("masked") hypertension
135/85
Daytime Ambulatory BP

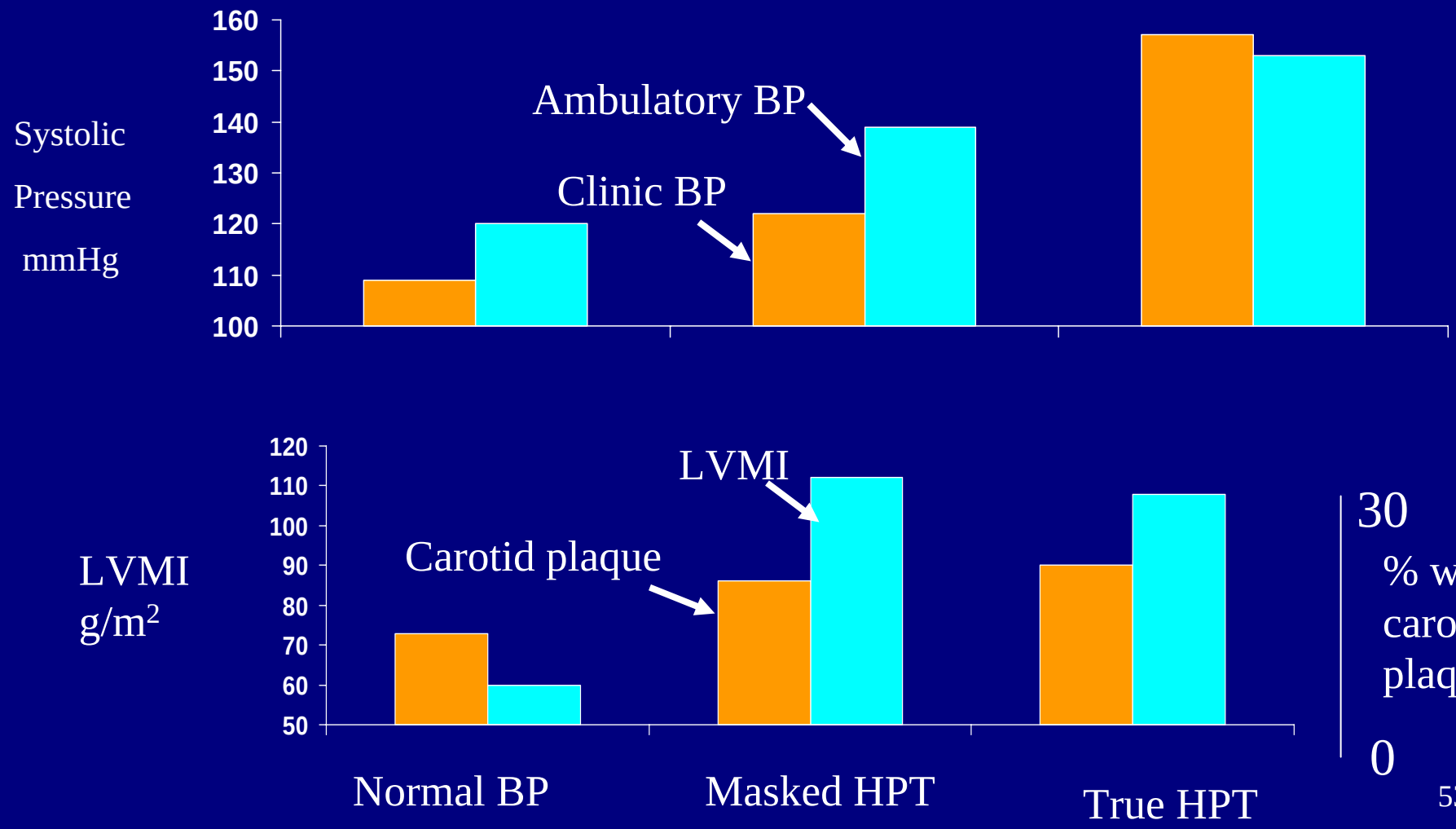
Occult/Hidden Workplace Hypertension in NYC Work Site BP Study: A public health epidemic?

	Work diastolic ambulatory pressure (mm Hg)		
	>85	≤85	Total
Clinic DBP (worksite)>85	55	24	79
Clinic DBP (worksite)≤85	36	139	175

false positives = 24/79 = 0.30 (White Coat Hypertension)
false negatives = 36/175 = 0.21 (Occult Workplace Hypertension)

Schnall PL, Belkic KL, Landsbergis PA, Schwartz JE, Gerber LM, Baker D, Pickering TG. Hypertension at the workplace - often an occult disease: The relevance and potential in Japan for work site surveillance? The Japanese Journal of Stress Sciences; 15(3), 2000.

Masked Hypertension is associated with higher LV Mass & more carotid plaque



Liu et al Ann Int Med 1999;131:564

Masked/Hidden hypertension

- NYC Work Site BP Study
  - Using criteria of <140/90 for clinic BP and >135/85 for daytime ABP
  - JOB STRAIN:
    - Adjusted OR=1.54 (0.61-3.91) at Time 1
    - Adjusted OR=5.74 (1.86-17.72) at Time 2
- ABP monitoring expensive ($6 billion/yr, U.S. if routine)
- Target high-risk groups (with normal clinic BP)
  - Diabetes, carotid plaque
  - Smoke, alcohol use
  - Job stress exposures

Landsbergis P, et al. Working conditions and occult hypertension. Scandinavian Journal of Work, Environment and Health (submitted)

How to measure BP at the worksite

- Casual BP measurements (point estimates)
- Ambulatory BP measurement
  - Automated arm reading (Spacelab device)
  - Automated wrist device (Omron, etc.)

Masked hypertension

- Requires:
  - Counseling
  - Treatment
  - Workplace stressor assessment
  - Workplace intervention
- However, patients do not often receive these because their office BP appears normal
- Need less expensive alternatives to ABP monitoring

SURVEILLANCE

"Surveillance at individual workplaces and monitoring at national and regional levels, in order to identify the extent of work related stress health problems and to provide baselines against which to evaluate efforts at amelioration."[1]

It is recommended that workplaces assess both workplace stressors and health outcomes known to result from such exposures (e.g., job strain and hypertension) on an annual basis.

[1] Shimomitsu T, Odagari Y. Legal and Legislative Issues: Current working life conditions and efforts towards creating a safe and healthy work environment in Japan. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

Belkic K, Schnall P, Landsbergis P, Baker D. Conclusions and thoughts for a future agenda regarding the workplace and cardiovascular health. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

The Solution

- These findings indicate a need for routine workplace-based BP surveillance to identify individuals with Occult (Hidden) Hypertension.

- Blood pressure needs to be taken on a working day, at the workplace while a person is working

- BP measurement:
  - **Inexpensive**
  - **Easy to take**
  - **Can be done at the workplace**

- Can collect either:
  - **casual BP while working – “point estimates”**
  - **wrist or arm readings with automated devices**

Return to Work

- Working people are at increased risk of a repeat MI if they return to work with a job characterized by having “job strain”

- Theorell, et al. 1993

RTW cont:

- A recent study published in JAMA found that people exposed to job strain at both interviews (chronic job strain) were more than twice as likely to have a second heart attack compared with people no job strain or job strain during only one of the measurement periods

- Aboa-Éboulé C, Brisson C, Maunsell E, Masse B, Bourbonnais R, Vezina M, et al. Job strain and risk of acute recurrent coronary heart disease events. JAMA 2007;298:1652-1660.(63)

Need For A New Discipline: Occupational Cardiology

Occupational Cardiology would link primary cardiologists and occupational health specialists to:

- Recognize the major role of the workplace in the etiology of hypertension and CVD
- Incorporate occupational history-taking into the standard cardiologic work-up
- Encourage the broadest possible application of ambulatory monitoring techniques

Belkic K, Schnall P, Landsbergis P, Baker D. Conclusions and thoughts for a future agenda regarding the workplace and cardiovascular health. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

Need For A New Discipline: Occupational Cardiology

- Develop and validate protocols for the diagnostic work-up of patients with cardionoxious jobs
- Provide guidelines for modification of cardionoxious workplaces, to protect individual cardiac patients – problem of RTW
- Define and implement a “heart healthy” work environment for all working people

Occupational Cardiology would link primary cardiologists and occupational health specialists to:

- Recognize the major role of work in the etiology of hypertension and CVD.
- Establish the concept of occupational and sentinal health events within the realm of cardiology (identification of clusters of work-place related hypertension and CVD).
- Incorporate occupational history-taking into the standard cardiologic work-up.
- Encourage the broadest possible application of ambulatory monitoring techniques.

Belkic K, Schnall P, Landsbergis P, Baker D. Conclusions and thoughts for a future agenda regarding the workplace and cardiovascular health. Occupational Medicine: State of the Art Reviews. 2000;15(1):307-321.

Occupational Cardiology would link primary cardiologists and occupational health specialists to continued:

- Develop and validate protocols for the diagnostic work-up of patients with cardionoxious jobs.
- Provide guidelines for modification of the cardionoxious workplace, to protect individual cardiac patients.
- Strive to define and implement a “heart healthy” work environment for all working people.

Reducing work stressors and preventing CVD

- Conduct work site screening/surveillance for:
  - Job stressors, CVD risk factors, high risk occupations
- Educate employers/unions/workers about healthy job design
- Educate cardiologists, psychologists, occupational MDs
- Integrate job stressor reduction into health promotion, ergonomics programs

Reducing work stressors and preventing CVD

- Promote (and evaluate) collective bargaining on reducing job stressors
- Promote (and evaluate) regulation, legislation (nationally, internationally) to:
  - Improve work environment
  - Reduce social inequality: increase unionization, reduce privatization, income & tax policies, investment in social and human infrastructure, health insurance (U.S.)

THE END