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Life-style Medicine for Healthy Artery: Evidence and Pitfall?

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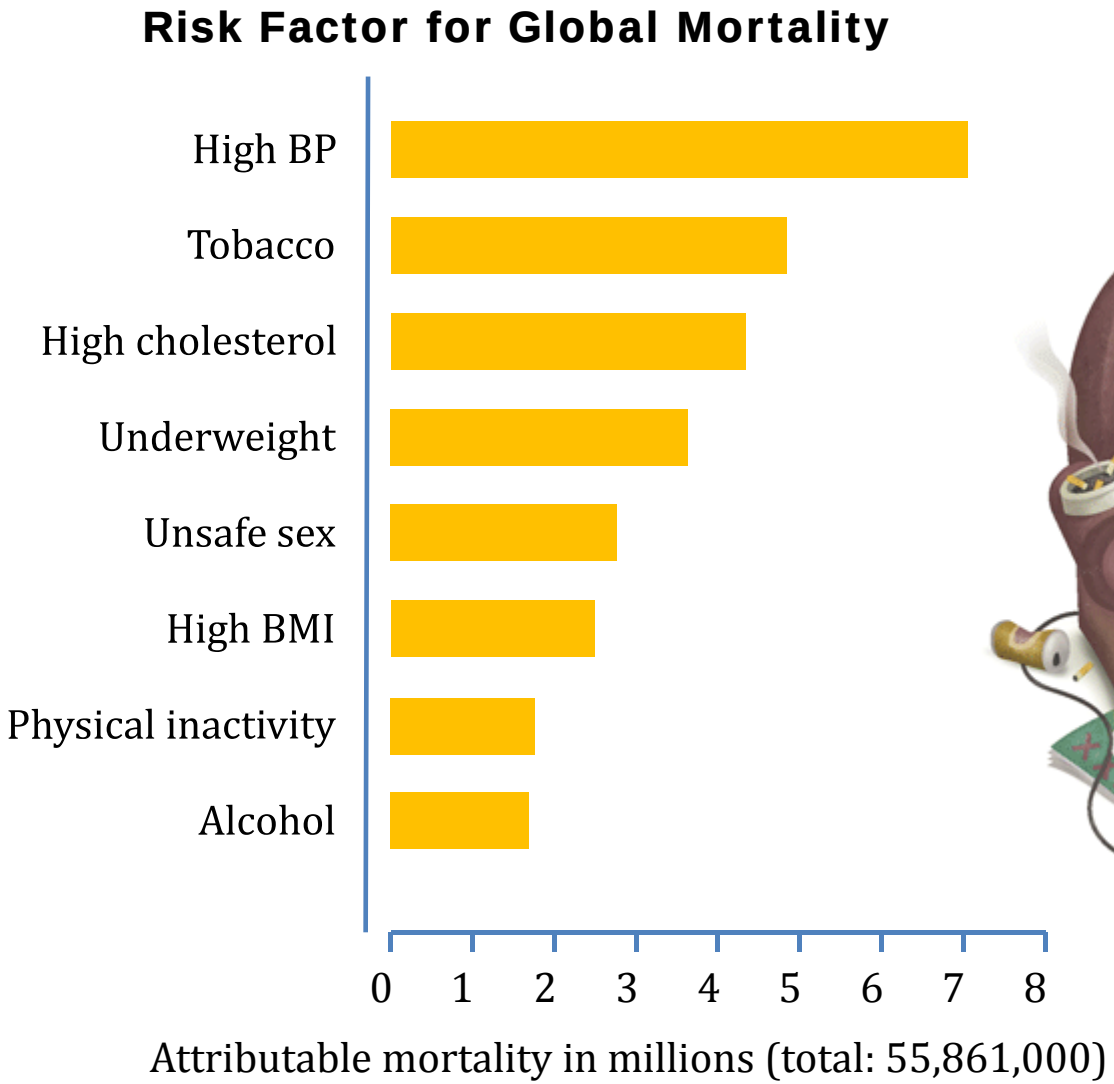
Life-style medicine ?

- Lifestyle Medicine is the use of lifestyle interventions in the treatment and management of disease. Such interventions include **diet (nutrition), exercise, stress management, smoking cessation**

- Lifestyle intervention is an essential component in the treatment of chronic disease that can be as effective as medication, but without the risks and unwanted side-effects.

- Lifestyle Medicine is becoming the preferred modality for not only the prevention but the treatment of most chronic diseases, including**: type-2 diabetes, coronary heart disease, hypertension, obesity, insulin resistance syndrome, osteoporosis**

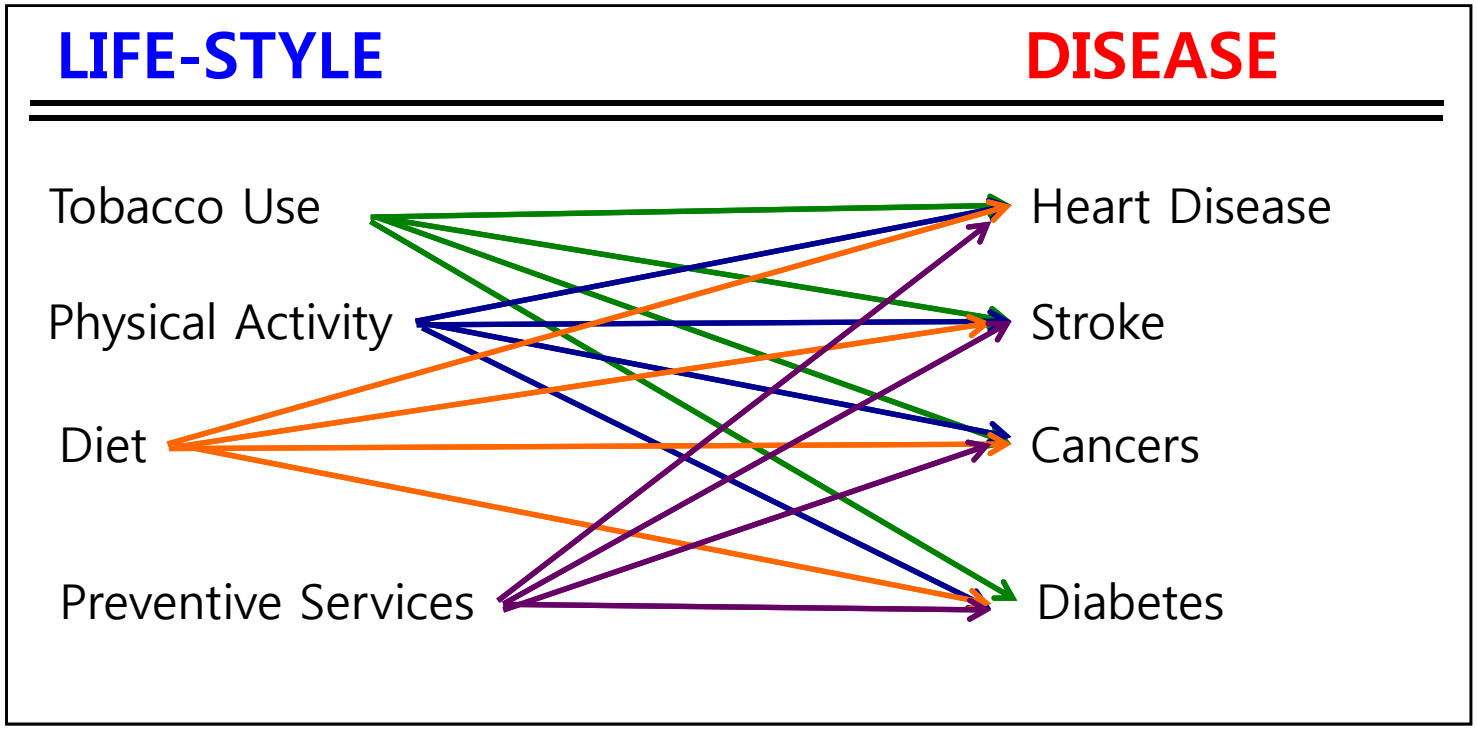
Epidemic of Life-style Diseases



Ezzati et al. Lancet 2002;360:1347-60

Life-style modification has great potential to reduce the risk

- Virtually ALL of the top 10 leading causes of death are **MODERATELY TO STRONGLY** influenced by lifestyle patters and behavioral factors



USPSTF Recommendations

Behavior	Recommendation for Screening and Behavioral Counseling
Tobacco Use	A
Physical Activity	I
Healthy Diet	B (for at-risk patients)
Alcohol Misuse	B

I- still need further studies in this area

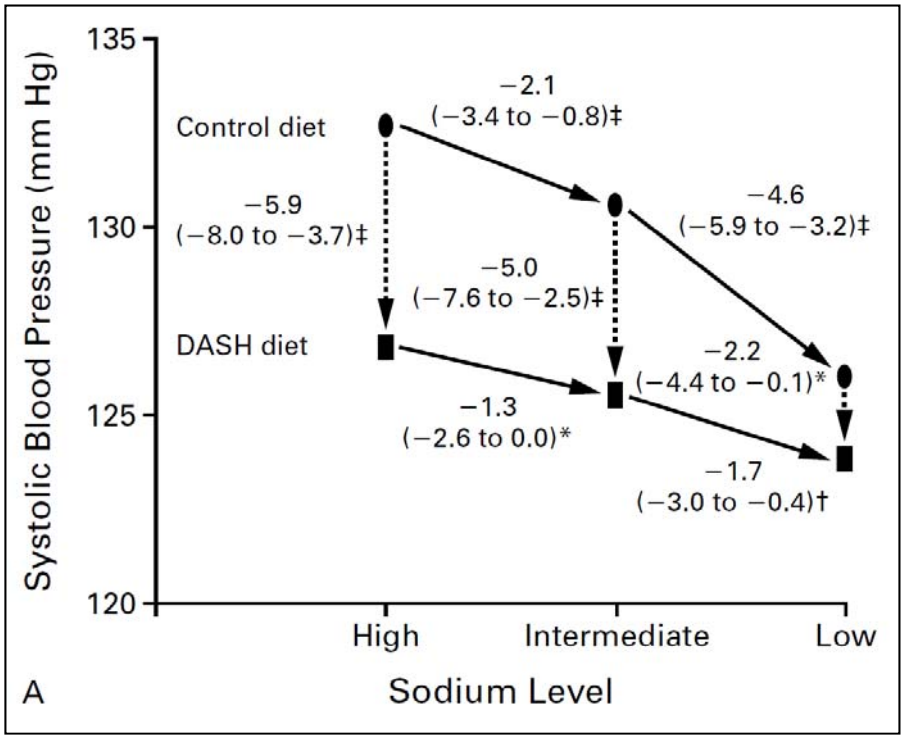

왜 자꾸 숨차고
얼굴 붓나요?
적게 먹고 운동하
시고 살 빼세요...

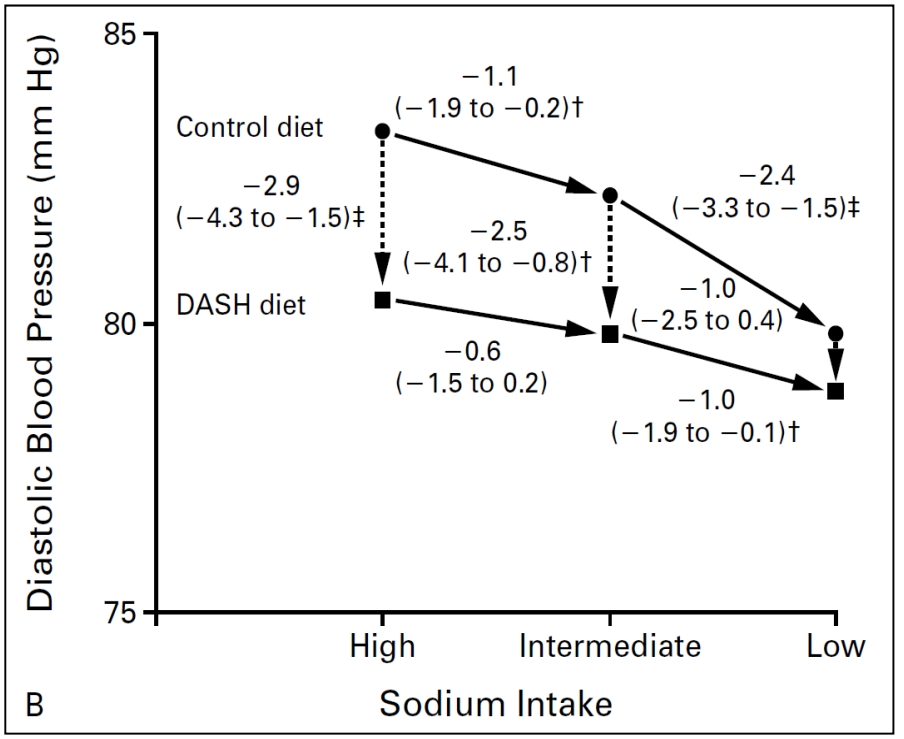
Physician Barriers to Counseling

- Lack of time
- Reimbursement issues
- Insufficient confidence
- Insufficient knowledge
- Insufficient skills
- Others?

1. Diet

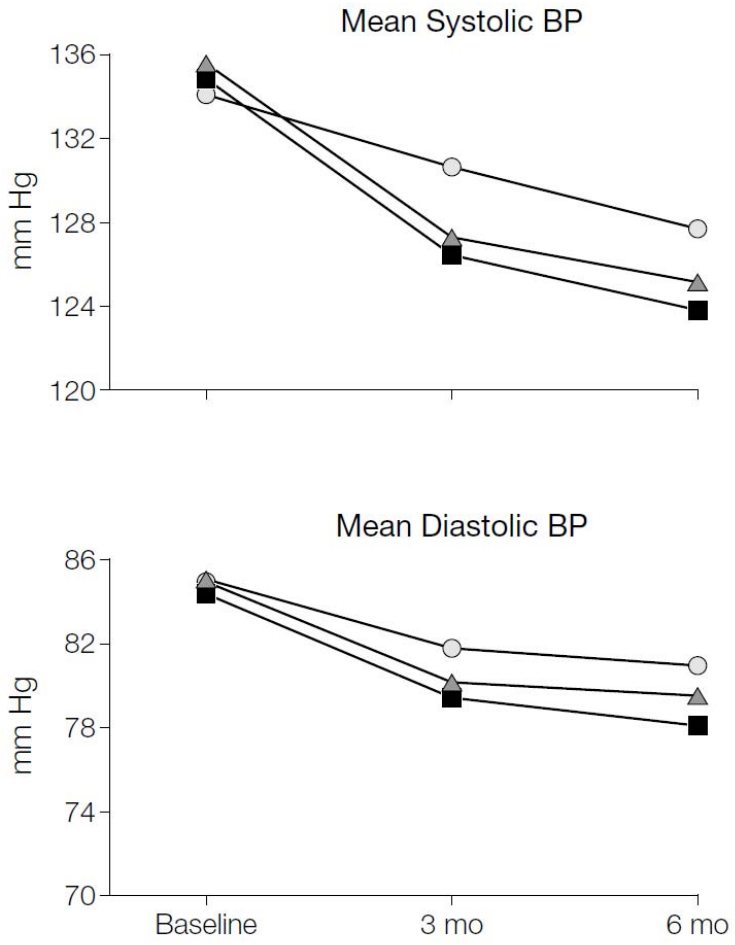
The Effect on Blood Pressure of Reduced Sodium Intake & DASH Diet



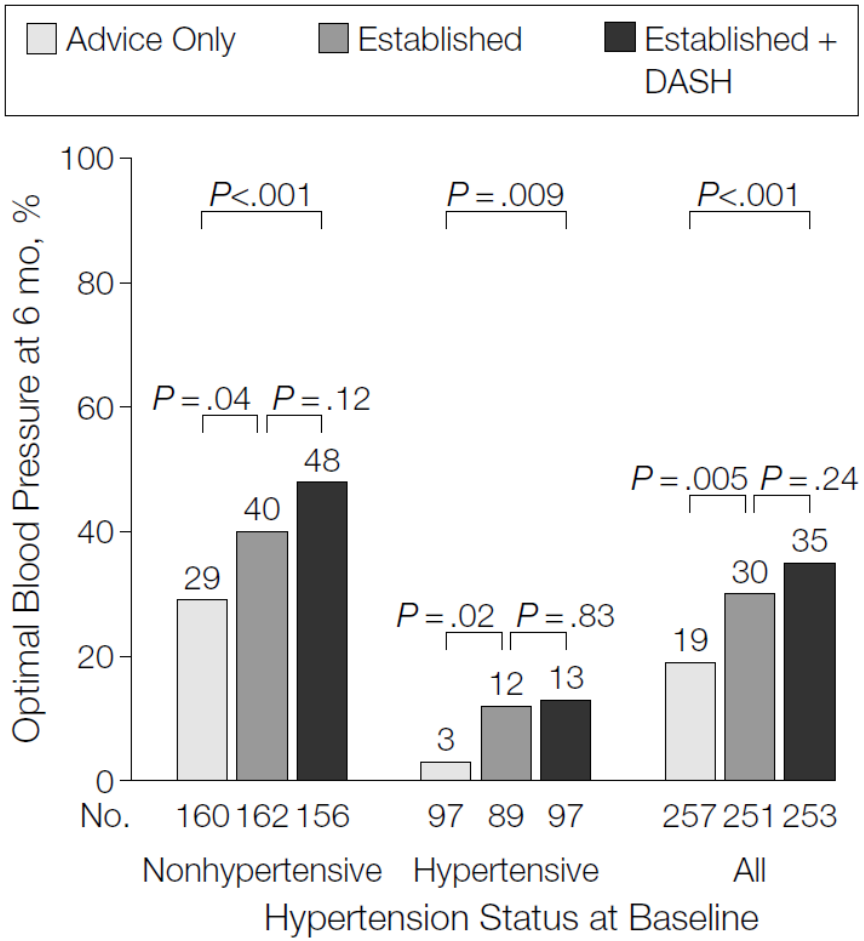


Sacks et al, NEJM 2001

Effects of lifestyle modification on blood pressure control

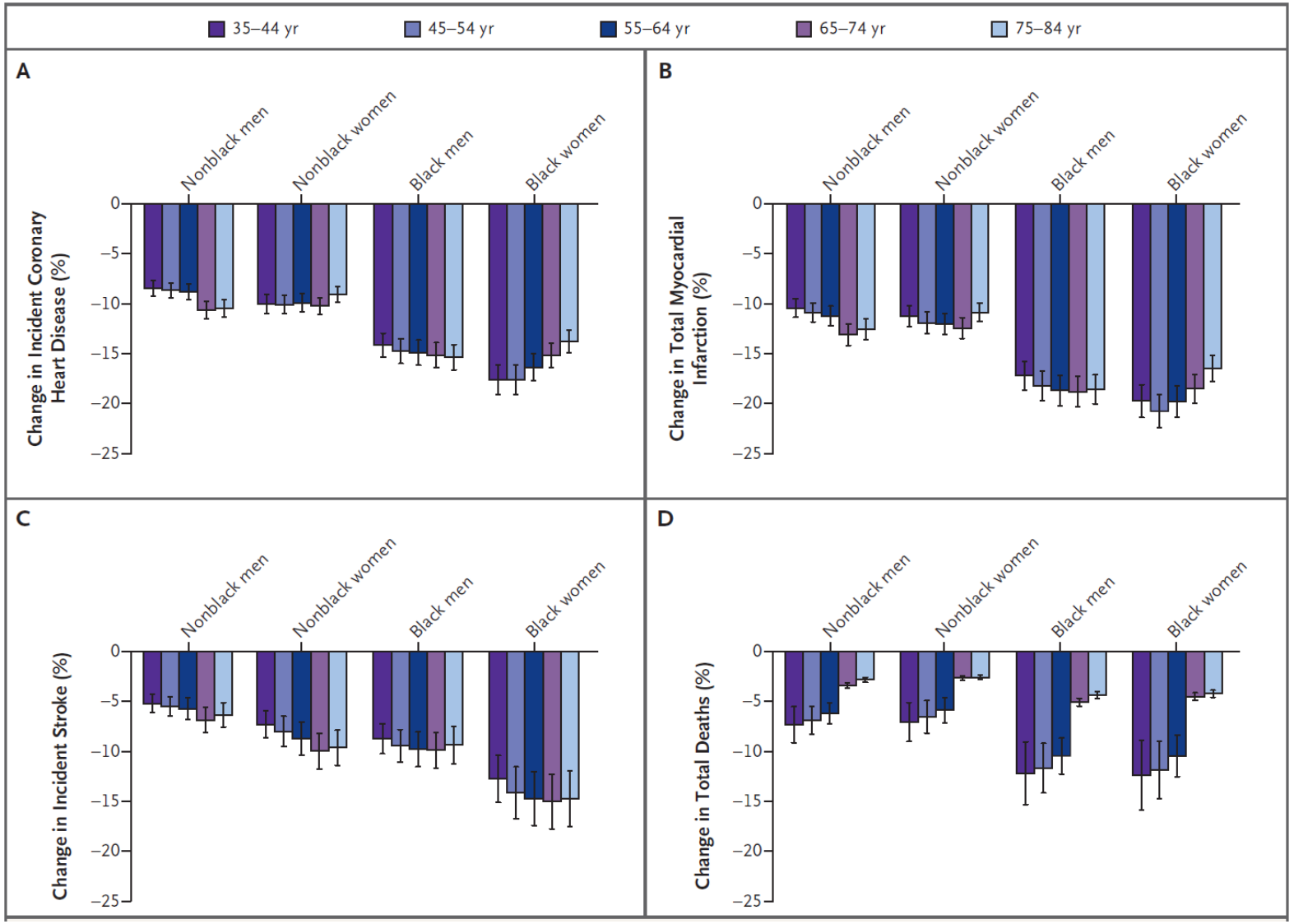


Percentage of Participants With Optimal Blood Pressure at 6 Months



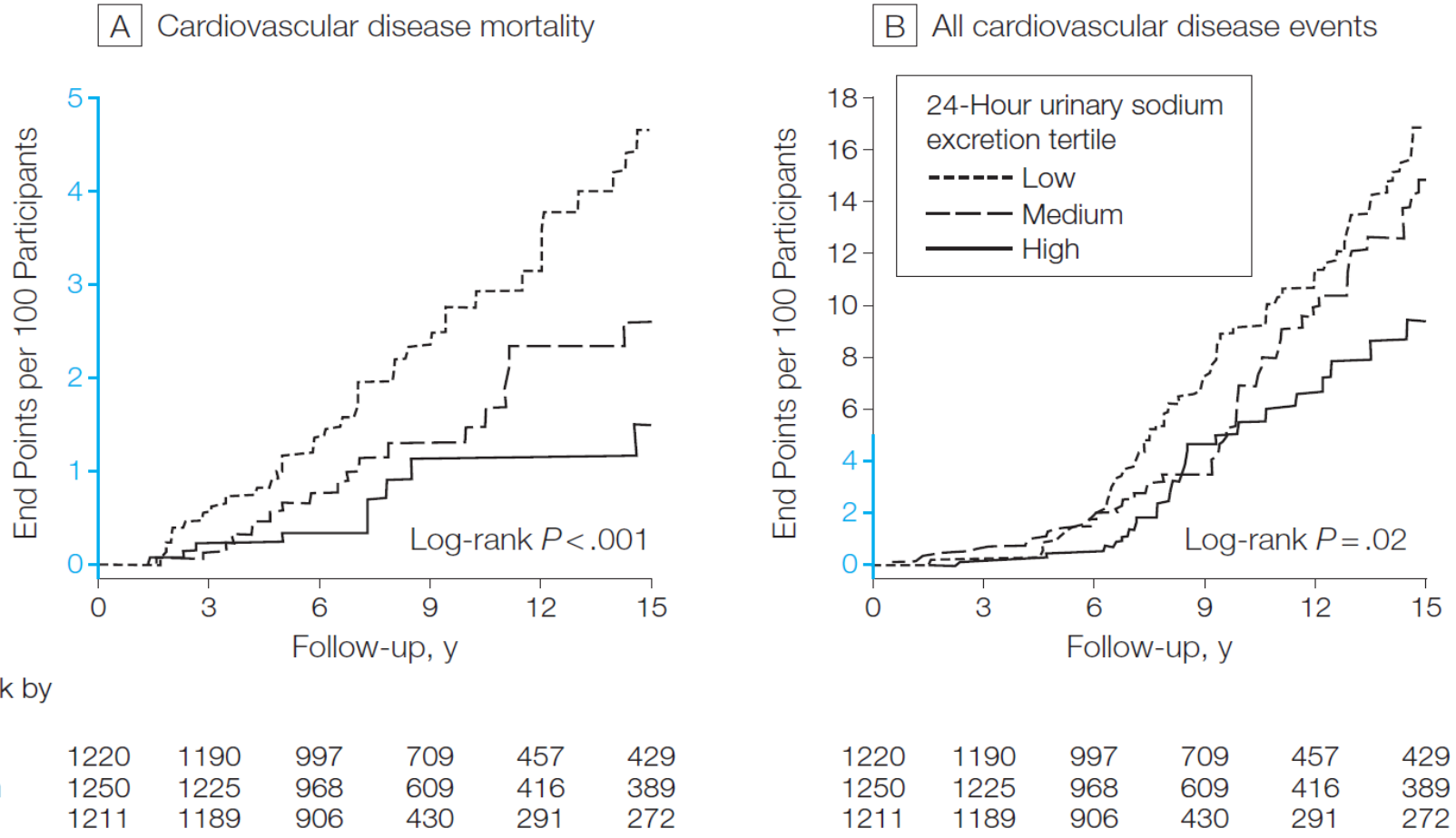
PREMIER Clinical Trial, JAMA 2003

Projected Annual Reductions in CV Events (Dietary Salt: 3 g per day)



Bibbins-Domingo et al, NEJM 2010

Low sodium intake increases cardiovascular risk ??



No. at risk by Tertile

Low	1220	1190	997	709	457	429
Medium	1250	1225	968	609	416	389
High	1211	1189	906	430	291	272

1220	1190	997	709	457	429
1250	1225	968	609	416	389
1211	1189	906	430	291	272

Conclusion: Lower sodium excretion was associated with higher CVD mortality

EPOGH Investigators, JAMA 2011

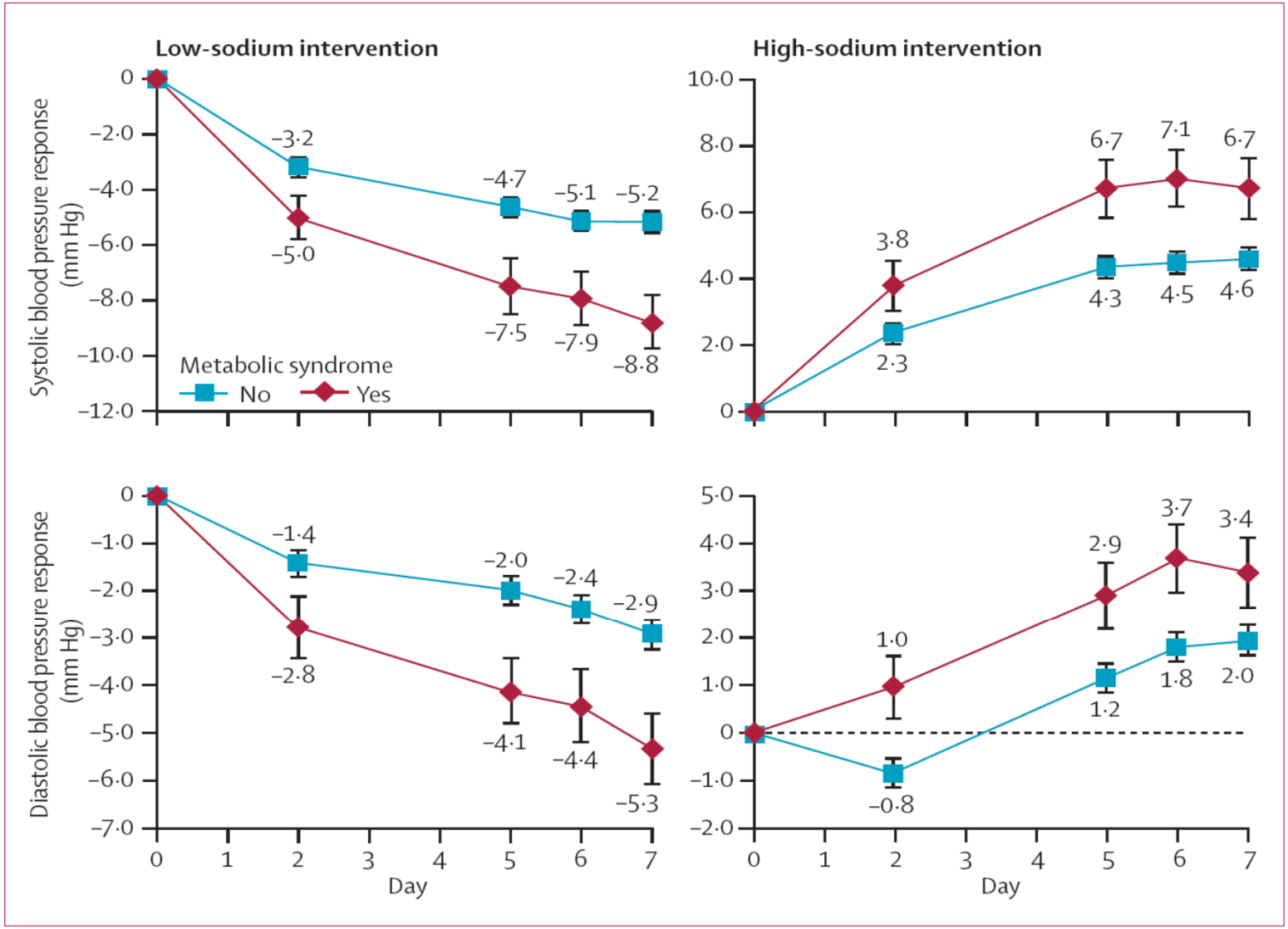
Features of salt-sensitive hypertension

- **Epidemiologic features**
  - Black race
  - Obesity
  - Advanced age
  - Diabetes
  - Renal dysfunction
  - Use of cyclosporine

- **Clinical features**
  - Microalbuminuria
  - Absence of normal nocturnal decrease in blood pressure
  - Absence of modulation of renal blood flow with sodium loading

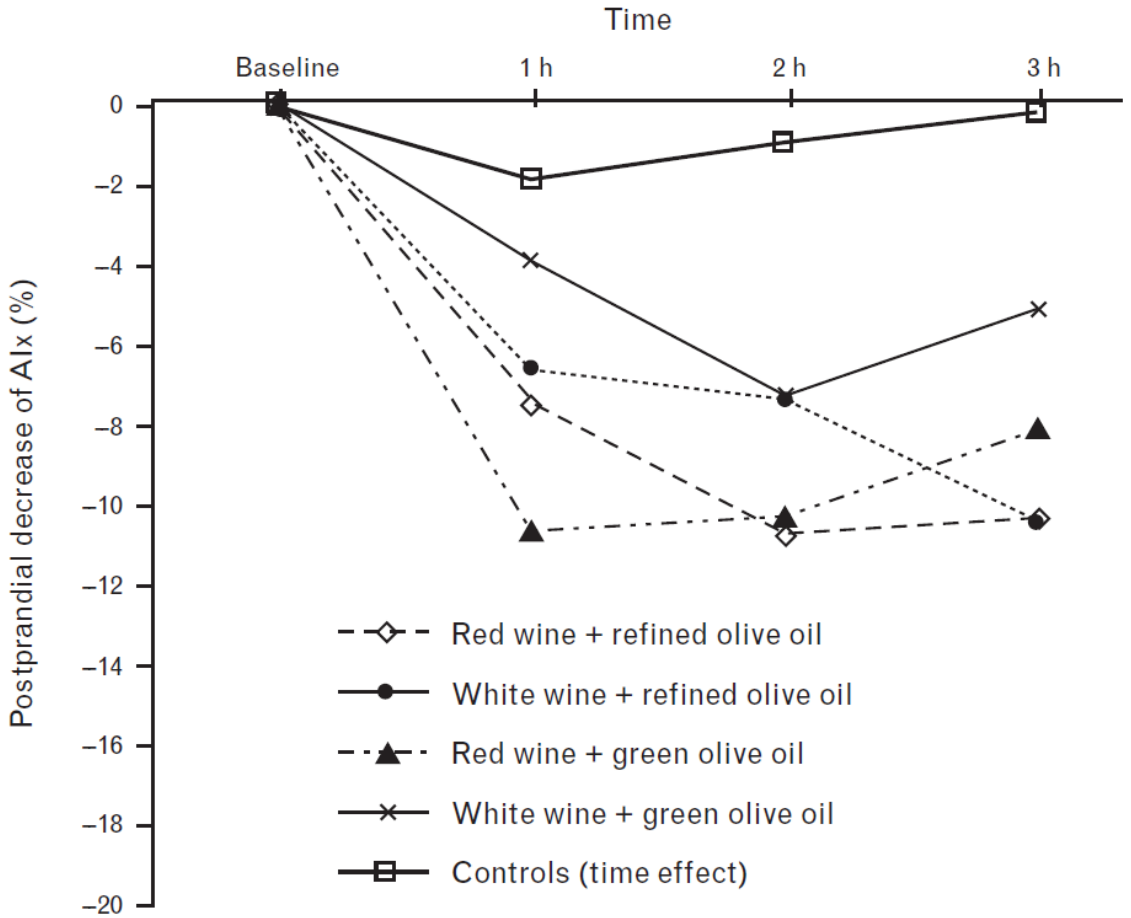
Johnson et al, NEJM 2002

BP responses to low-& high-sodium intervention (Gensalt Result)



Jing Chen et al, Lancet 2009

Combined effects of olive oil and wine on pressure wave reflections



Papamichael et al, J HT 2008

Effects of Dietary Factors on blood pressure : A Summary of the Evidence

	Hypothesized Effect	Evidence
Weight	Direct	++
Sodium chloride (salt)	Direct	++
Potassium	Inverse	++
Magnesium	Inverse	+/−
Calcium	Inverse	+/−
Alcohol	Direct	++
Fat		
Saturated fat	Direct	+/−
Omega-3 polyunsaturated fat	Inverse	++
Omega-6 polyunsaturated fat	Inverse	+/−
Monounsaturated fat	Inverse	+
Protein		
Total protein	Uncertain	+
Vegetable protein	Inverse	+
Animal protein	Uncertain	+/−
Carbohydrate	Direct	+
Fiber	Inverse	+
Cholesterol	Direct	+/−
Dietary patterns		
Vegetarian diets	Inverse	++
DASH-type dietary patterns	Inverse	++

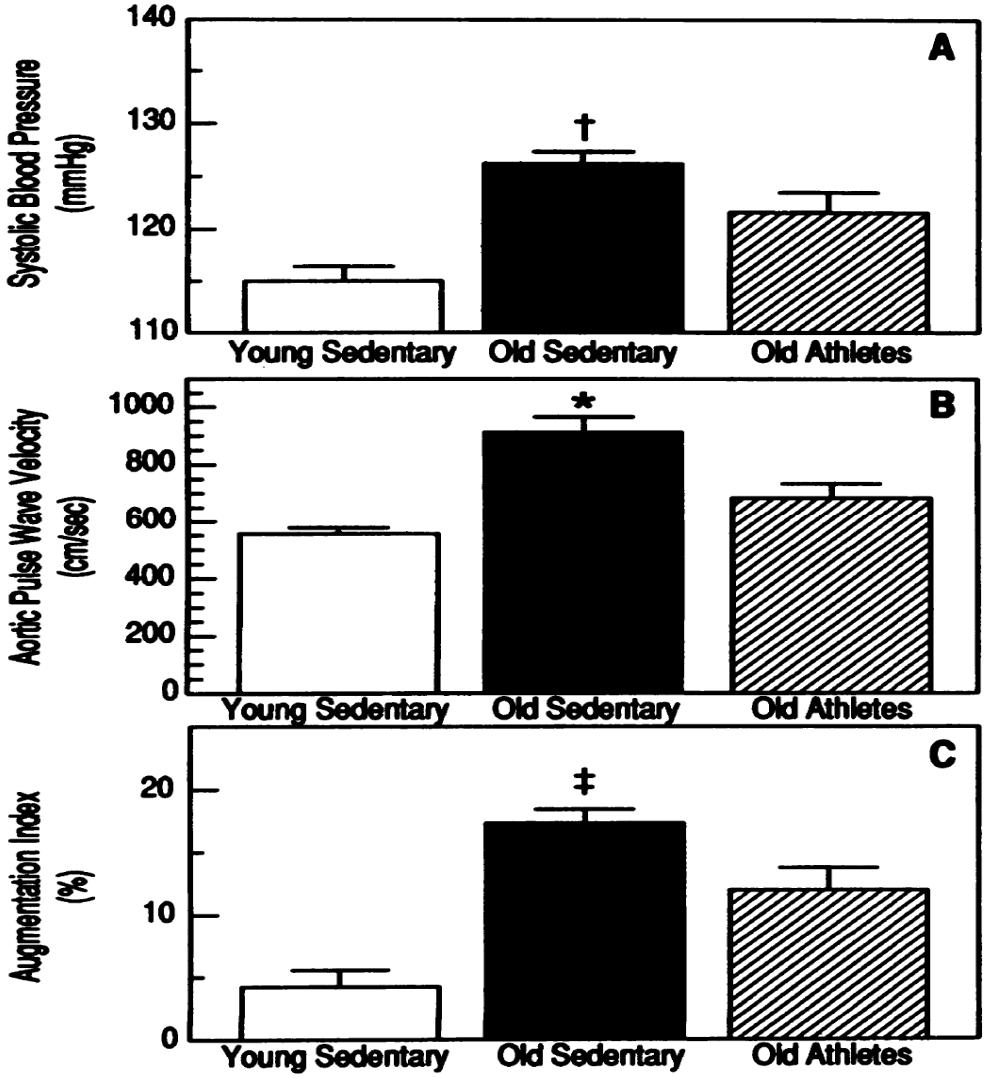
2. Exercise

Effect of Exercise Training on Cardiac Risk Factors

Risk Factor	Effects
Diabetes mellitus	Meta-analysis of exercise programs in diabetic patients demonstrates mean decrease in hemoglobin A1C of 0.8%
Dyslipidemia	Meta-analysis of exercise programs demonstrated a mean increase in high-density lipoprotein of 2.5 mg/dL
Hypertension	Meta-analysis of exercise programs demonstrated a reduction in blood pressure of 3.4/2.4 mm Hg
Cigarette smoking	An exercise program resulted in higher levels of abstinence from smoking at 3 and 12 months
Obesity	Lifestyle modification including exercise resulted in a mean 6.7-kg weight loss at 1 year
Psychosocial health	A program of cardiac rehabilitation resulted in significant decreases in depression, anxiety, hostility, somatization, and psychosocial stress

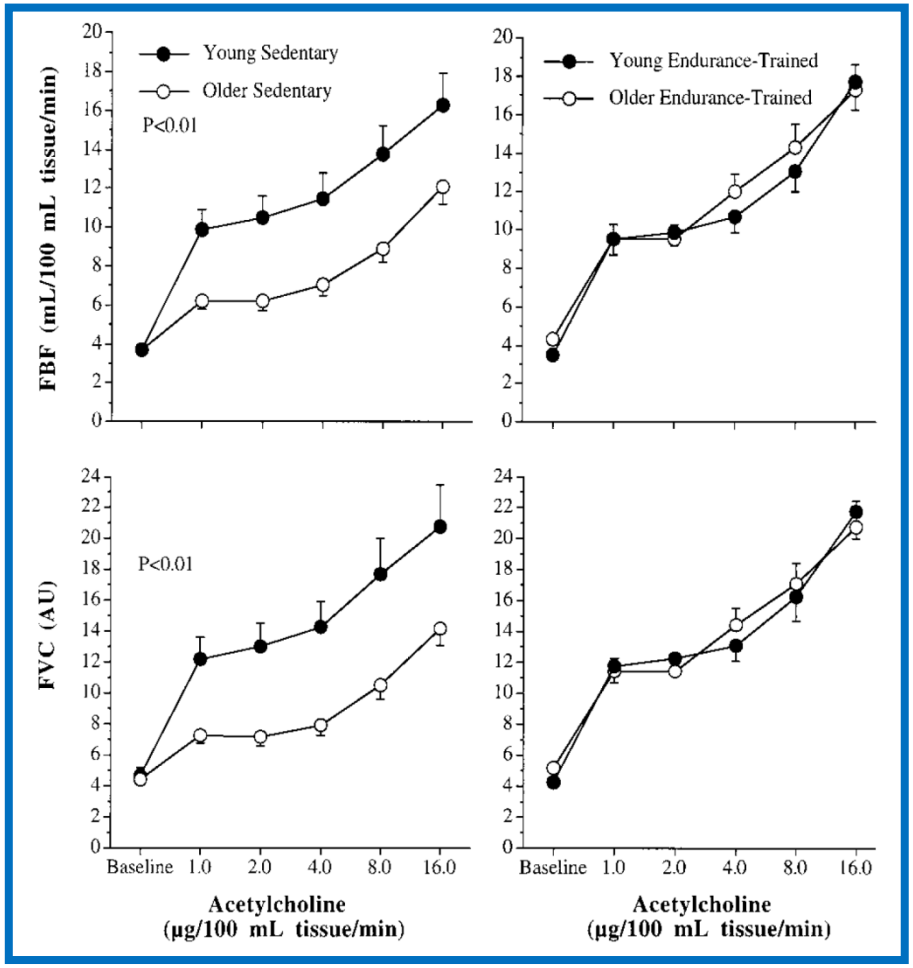
Metkus et al, Circulation 2010

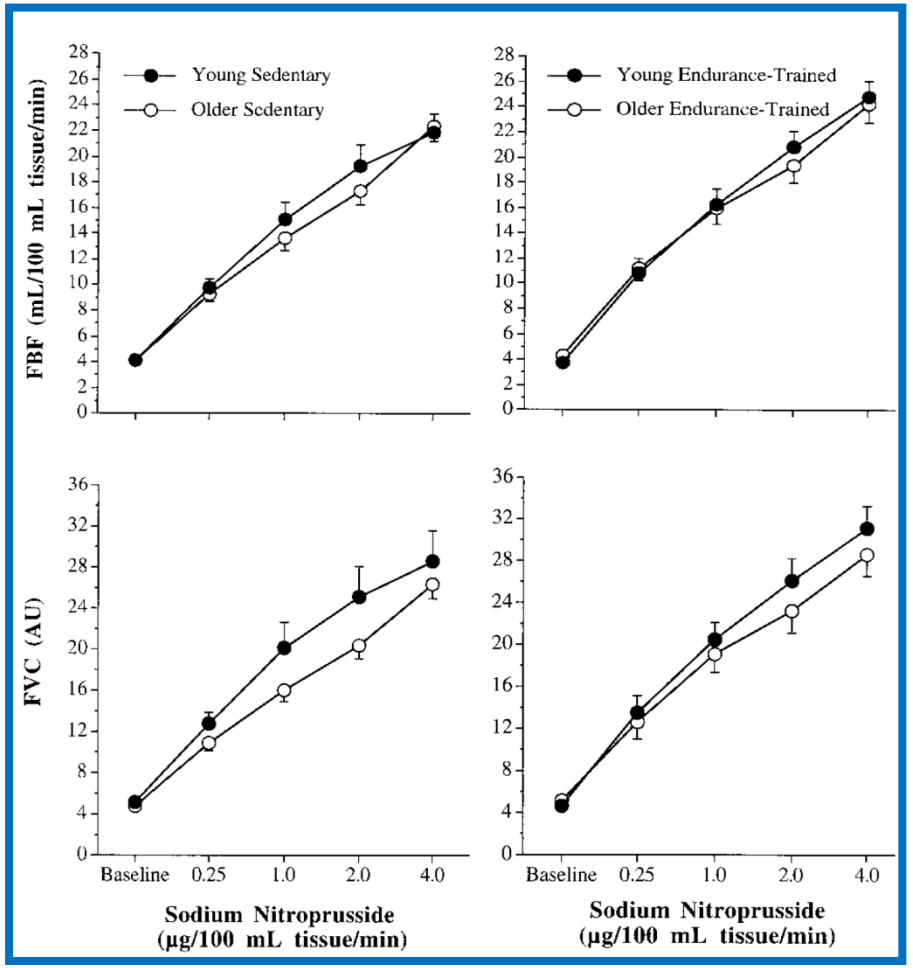
Effects of aerobic capacity on arterial stiffness in healthy adults



Vaitkevicius et al, Circulation 1993

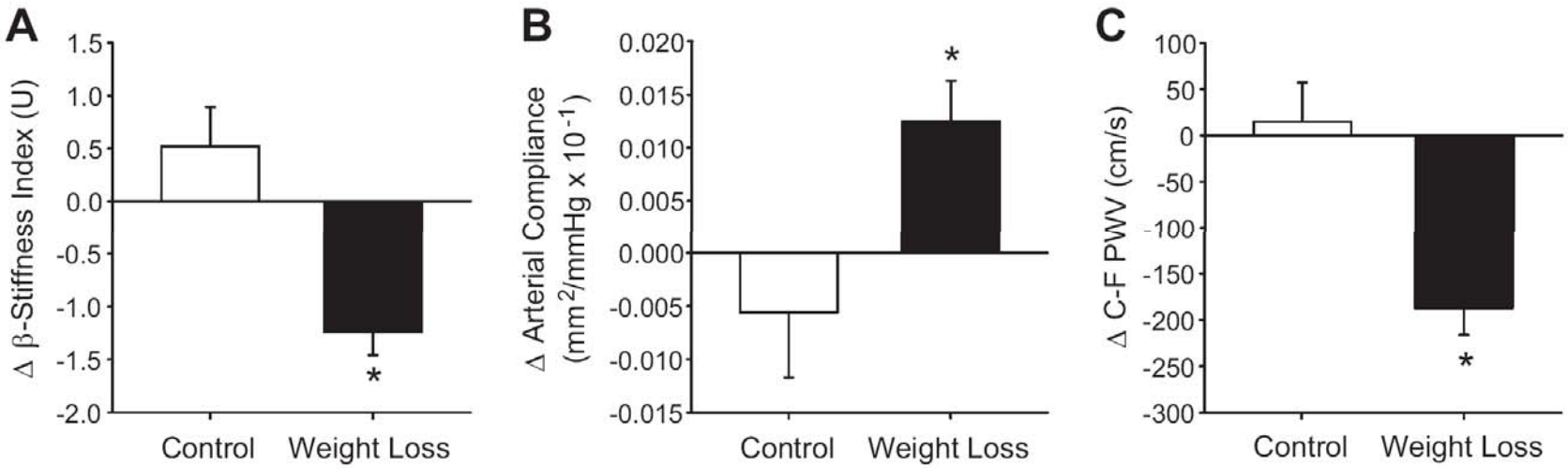
Regular Aerobic Exercise Restores Age-Related Declines in Endothelium-Dependent Vasodilation

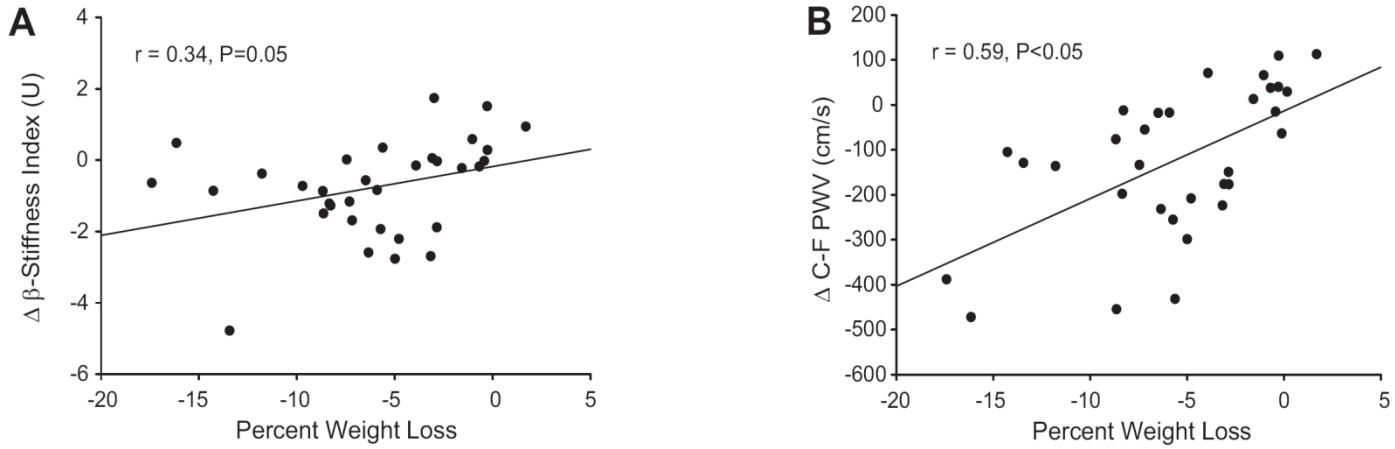




DeSouza et al, Circulation 2000

Arterial Destiffening With Weight Loss in Overweight & Obese Older Adults





Dengo et al, Hypertension 2010

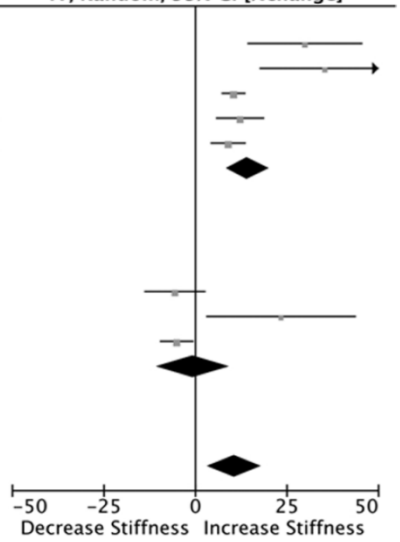
Comparison between Aerobic & Resistance Exercise

Variable	Aerobic Exercise	Resistance Exercise
Body composition		
Bone mineral density	↑ ↑	↑ ↑
Percent body fat	↓ ↓	↓
Lean body mass	0	↑ ↑
Muscle strength	0 ↑	↑ ↑ ↑
Glucose metabolism		
Insulin response to glucose challenge	↓ ↓	↓ ↓
Basal insulin levels	↓	↓
Insulin sensitivity	↑ ↑	↑ ↑
Plasma lipids and lipoproteins		
HDL cholesterol	↑ 0	↑ 0
LDL cholesterol	↓ 0	↓ 0
Triglycerides	↓ ↓	↓ 0
Cardiovascular dynamics		
Resting heart rate	↓ ↓	0
Stroke volume, resting and maximal	↑ ↑	0
Cardiac output, rest	0	0
Cardiac output, maximal	↑ ↑	0
SBP at rest	↓ 0	0
DBP at rest	↓ 0	0
$\dot{V}O_2$max	↑ ↑ ↑	↑ 0
Submaximal and maximal endurance time	↑ ↑ ↑	↑ ↑
Submaximal exercise rate-pressure product	↓ ↓ ↓	↓ ↓
Basal metabolic rate	↑ 0	↑
Health-related quality of life	↑ 0	↑ 0

Williams et al, Circulation 2008

Effects of resistance exercise on arterial stiffness

Study or Subgroup	Resistance Training Mean [%change]	SD [%change]	Total	Control Mean [%change]	SD [%change]	Total	Weight	Mean Difference IV, Random, 95% CI [%change]	Year
1.2.1 Young (<40 yrs)									
Miyachi 2004	25.8	18	14	-4.08	24	14	9.4%	29.88 [14.17, 45.59]	2004
Kawano 2006	31.2	23.5	12	-4.13	24.3	16	8.3%	35.33 [17.48, 53.18]	2006
Okamoto 2006	10.7	4.45	10	0.3	2.73	9	16.0%	10.40 [7.12, 13.68]	2006
Okamoto 2009-2	12.8	7.53	10	0.62	7.53	10	14.6%	12.18 [5.58, 18.78]	2009
Okamoto 2009-1	9.77	5.65	10	0.85	5.35	10	15.4%	8.92 [4.10, 13.74]	2009
Subtotal (95% CI)			**56**			**59**	**63.7%**	**14.29 [8.53, 20.05]**	
Heterogeneity: $Tau^2 = 25.16$; $Chi^2 = 13.62$, df = 4 (P = 0.009); $I^2 = 71\%$									
Test for overall effect: Z = 4.86 (P < 0.00001)									
1.2.2 Middle-aged (≥40 yrs)									
Cortez-Cooper 2008	-5.44	12.31	12	0.187	8.528	13	13.6%	-5.63 [-13.99, 2.74]	2008
Collier 2008	14.7	30.22	15	-8.66	26.84	15	7.2%	23.36 [2.91, 43.81]	2008
Yoshizawa 2009	-2.4	6.36	12	2.74	4.87	11	15.5%	-5.14 [-9.75, -0.53]	2009
Subtotal (95% CI)			**39**			**39**	**36.3%**	**-0.60 [-10.76, 9.56]**	
Heterogeneity: $Tau^2 = 53.13$; $Chi^2 = 7.25$, df = 2 (P = 0.03); $I^2 = 72\%$									
Test for overall effect: Z = 0.12 (P = 0.91)									
Total (95% CI)			**95**			**98**	**100.0%**	**10.69 [3.36, 18.03]**	
Heterogeneity: $Tau^2 = 84.84$; $Chi^2 = 62.78$, df = 7 (P < 0.00001); $I^2 = 89\%$									
Test for overall effect: Z = 2.86 (P = 0.004)									
Test for subgroup differences: $Chi^2 = 6.24$, df = 1 (P = 0.01), $I^2 = 84.0\%$									



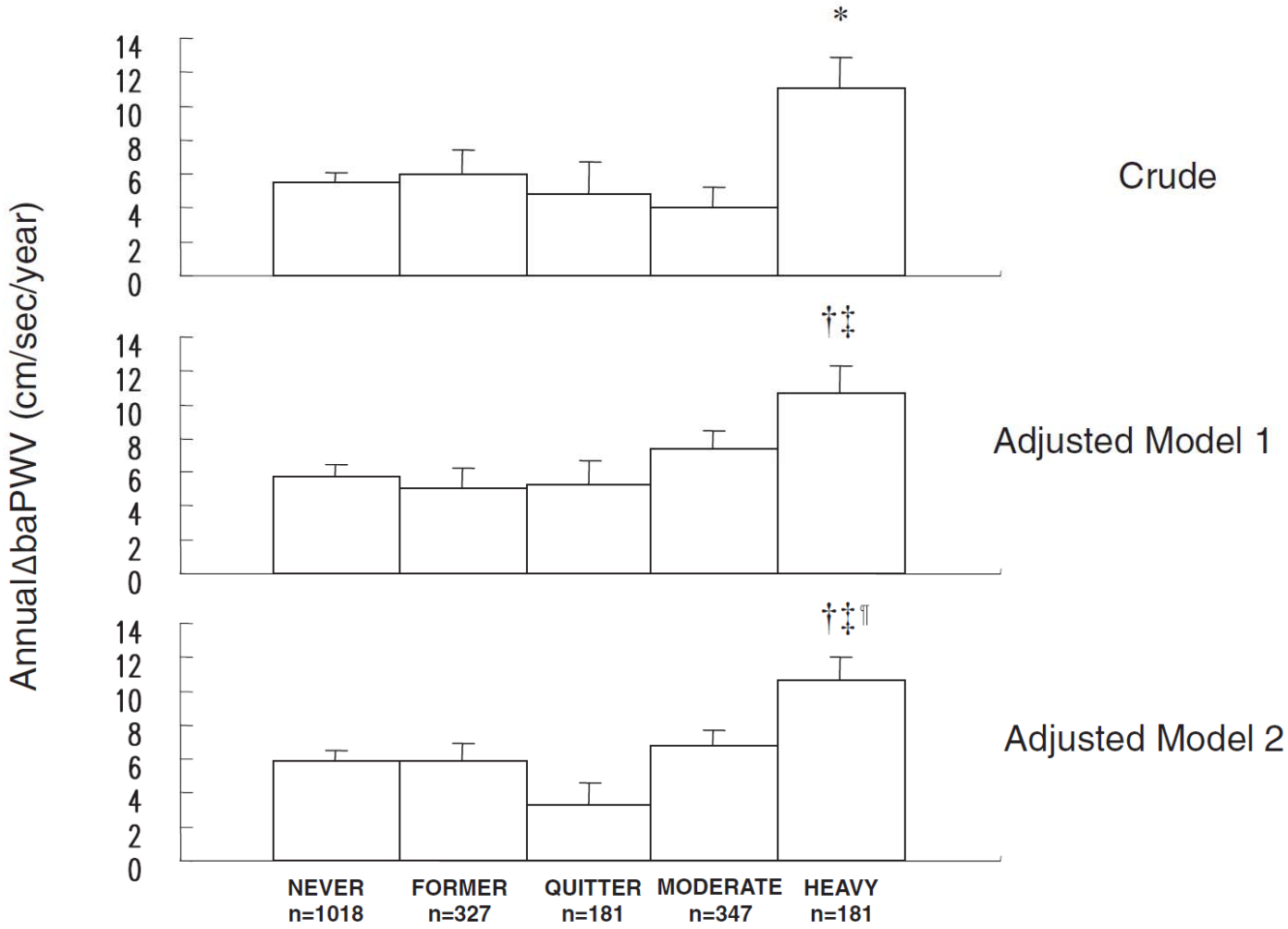
Conclusion

- This meta-analysis indicates that resistance training is associated with an increase of ~11% in arterial stiffness.
- Although high-intensity resistance training is associated with increased arterial stiffness in young with low baseline levels of arterial stiffness, moderate-intensity resistance training in middle-aged was not.

Miyachi, BJSM 2012

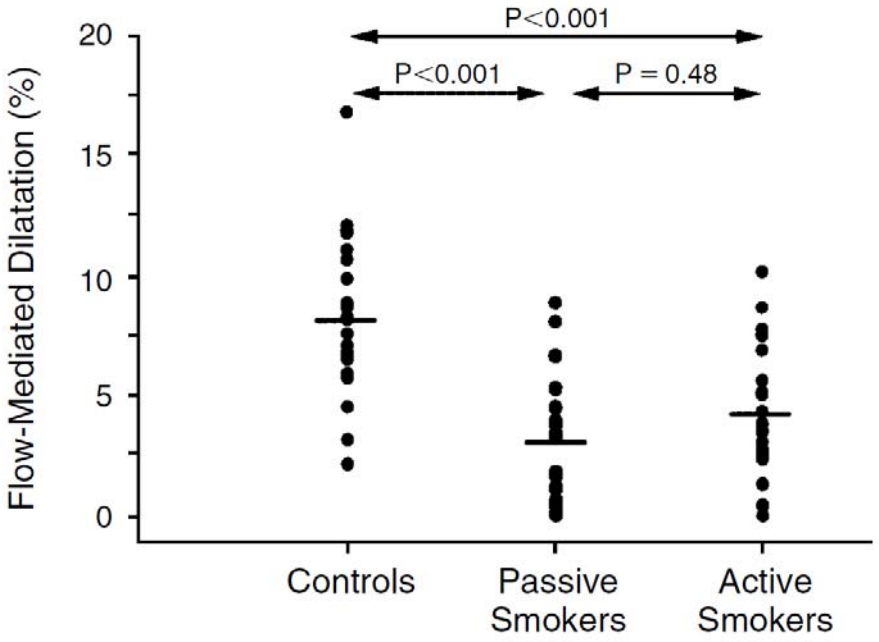
3. Smoking

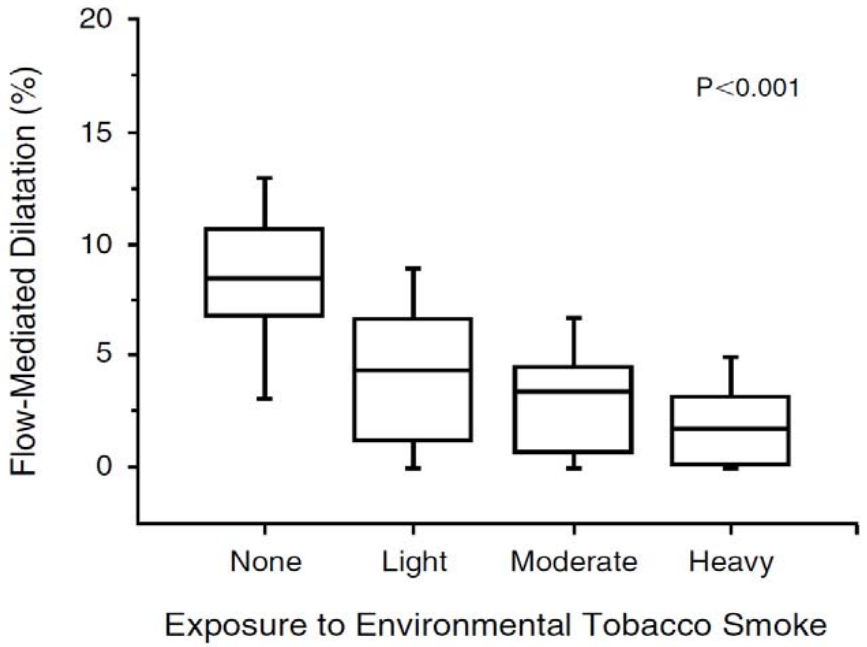
Continuous Smoking & Progression of Arterial Stiffening



Tomiyama et al, JACC 2010

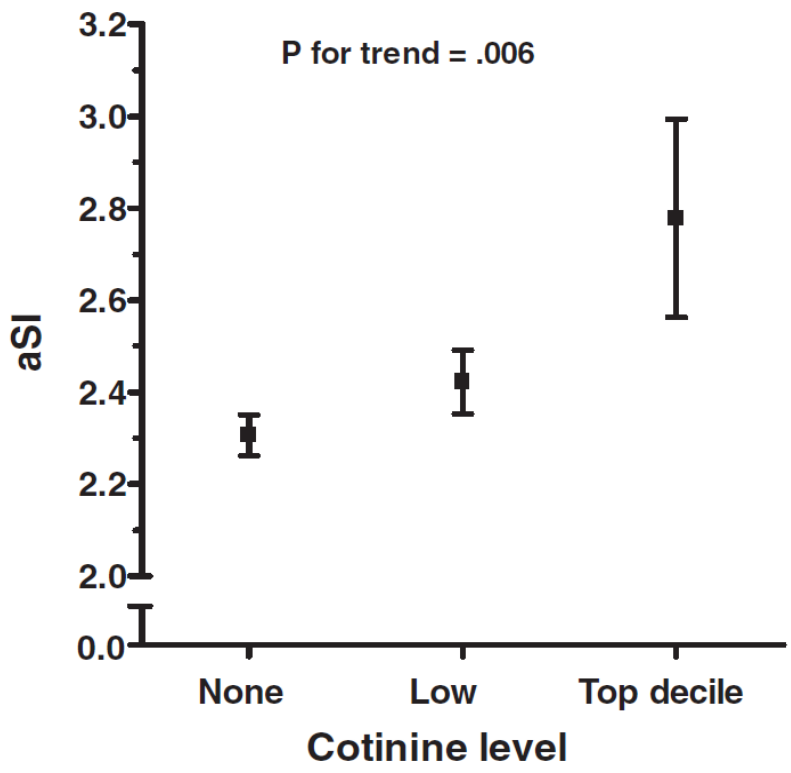
Passive Smoking Impaired Endothelium-dependent Arterial Dilatation In Healthy Young Adults

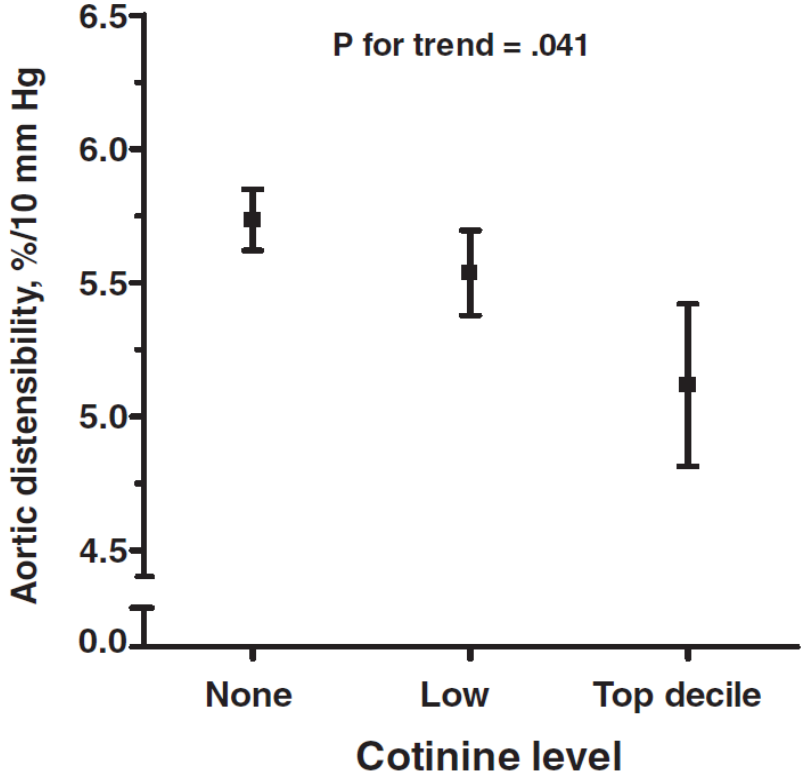




Celermajer et al, NEJM 1996

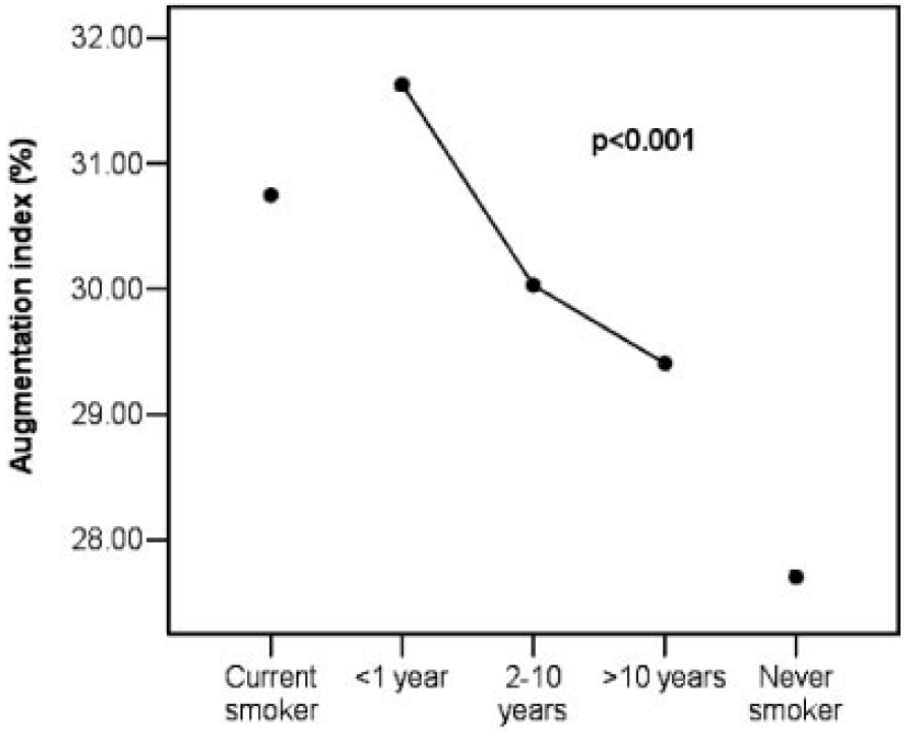
Decreased Aortic Elasticity in Healthy Children Exposed to Tobacco Smoke

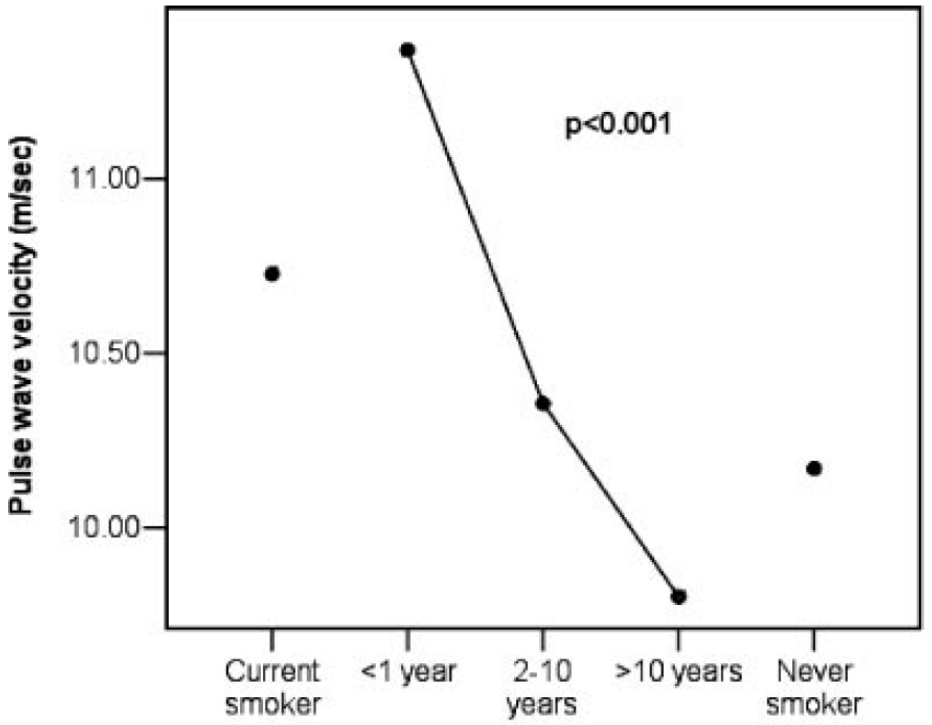




Kallio et al, Pediatrics 2009

Impact of Smoking Cessation on Arterial Stiffness

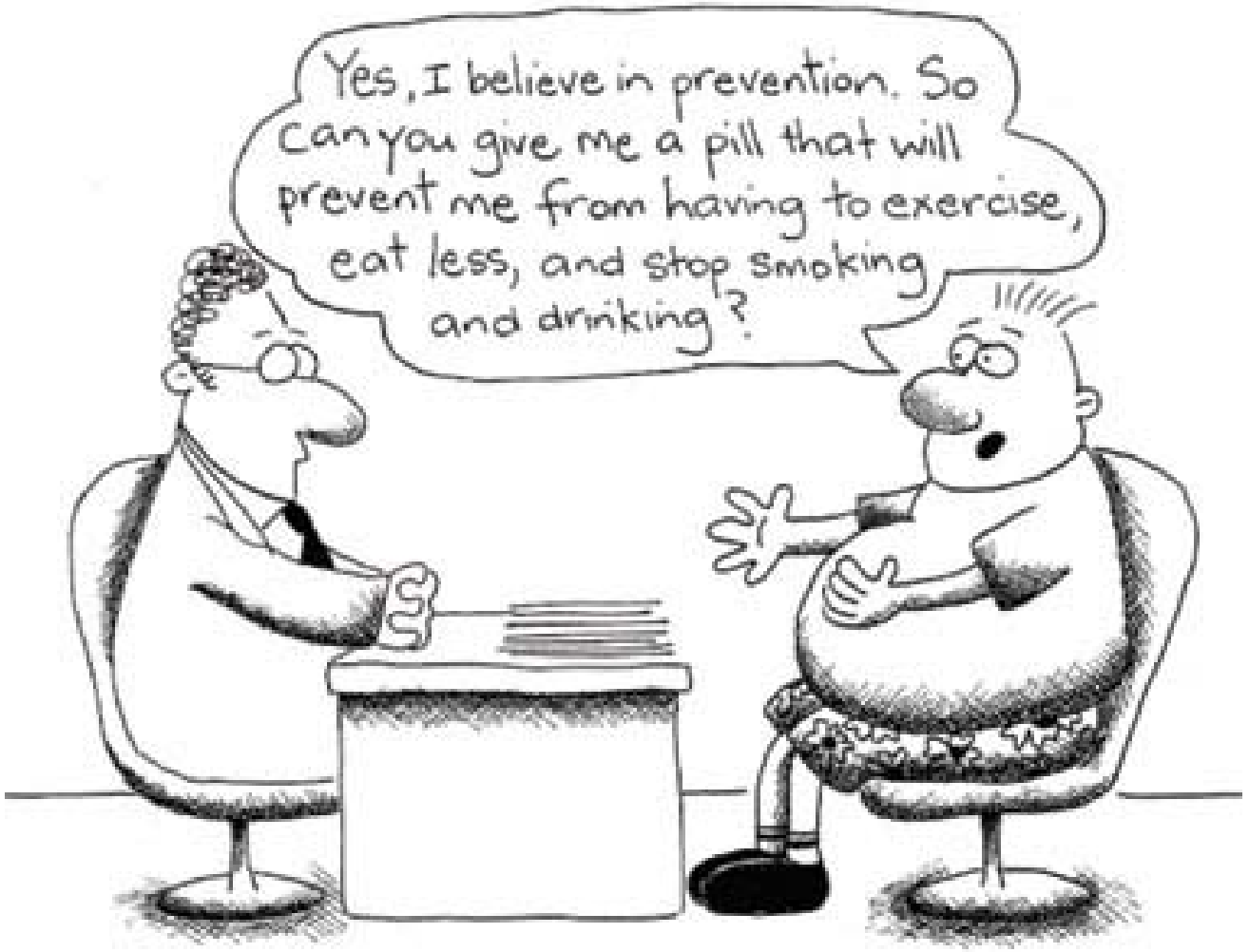




Jatoi et al, Hypertension 2007

Lifestyle Medicine Competencies

- Perform comprehensive lifestyle assessments
  - Risk assessments
  - Patient's readiness to change modifiable risk factors
- Establish effective relationships and use national guidelines
- Use team approach
- Make referrals
- Use medical information technology to maximize lifestyle medicine care
- Promote healthy behaviors as foundation of health promotion and medical care
- Physician should personally practice a healthy lifestyle


Yes, I believe in prevention. So can you give me a pill that will prevent me from having to exercise, eat less, and stop smoking and drinking?