Prevention of Heart Disease: What you (and your Doctor) can do to Minimize Risk

Carlin S Long, MD
Professor of Medicine and Cardiology
Director, Center for the Prevention of Heart and Vascular Disease
University of California, San Francisco

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Outline

1) Introduction to “Prevention”
2) AHA’s “Life’s Essential 8”
3) Modifiable versus non-modifiable risk factors
   1) **Health Behaviors**
   2) **Health Factors**
4) Dissecting the Essential 8 with some Historical Perspective (Framingham)
5) Comments on Diet and Exercise from colleagues

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Disclosures

None

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Disclaimers

- What I am presenting tonight is my approach to the subject of prevention which I have developed through my review of the medical literature, discussions with colleagues, and my own professional experience
- Reasonable people can “agree to disagree”
- I am a statin “believer” and, for the most part, think statins should “be in the water”
  - Am Heart J 2014;168:6-15. meta-analysis: percentage of muscle problems tended to be higher with statin treatment (12.7%) than with placebo group (12.4%, P = .06)
  - N of 1 clinical trials show placebo causes myalgias in trial participants withdrawals because of intolerable muscle symptoms were 9% during a statin period and 7% during a placebo period NEJM 2020 383;22, BMJ 2021;372:n135

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First, what do you **not** have to do

5

6

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Who's Events are we trying to prevent?

Primary Prevention Strategies

Secondary Prevention Strategies

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Primary prevention aims to deliver advice and guidance to prevent the onset of disease or illness; preventing the first "event"

Secondary prevention programs aim to detect and treat a disease process to prevent it from progressing to a more serious illness and a second "event".

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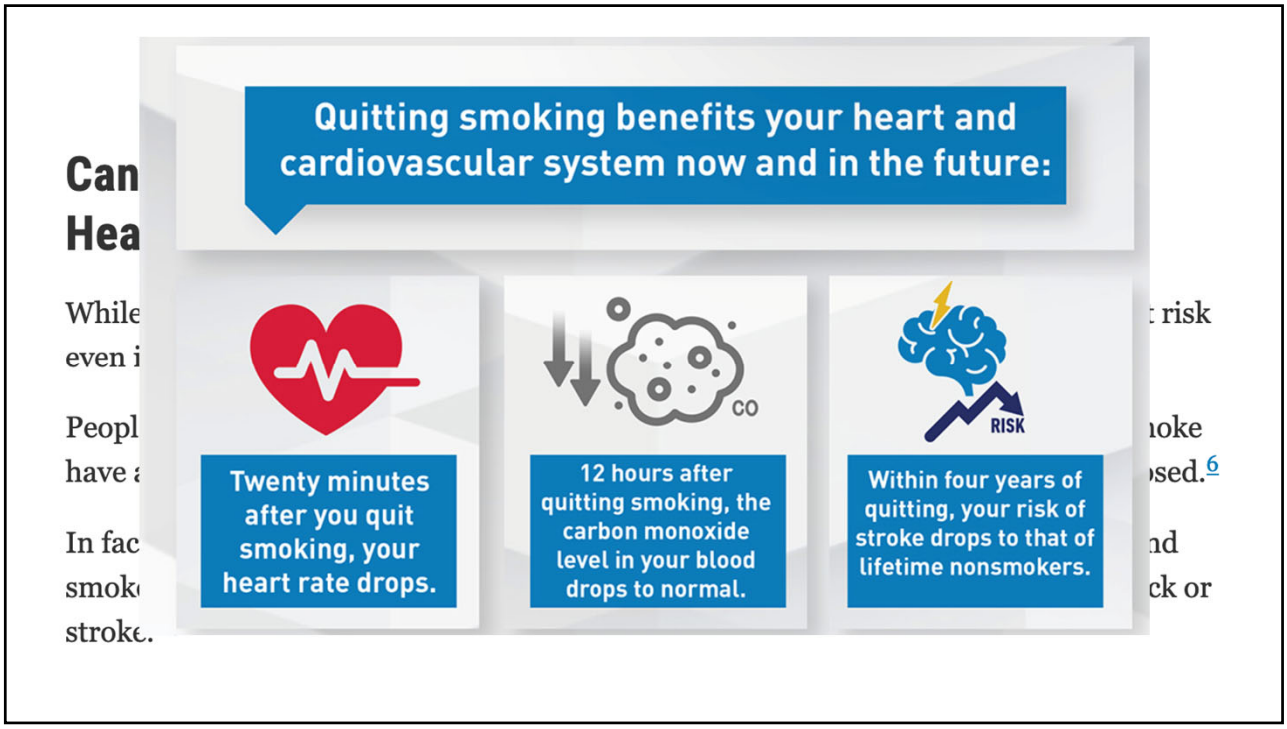
Life's
Essential 8™
LIPIDS

11


Quitting smoking benefits your heart and cardiovascular system now and in the future:
Twenty minutes after you quit smoking, your heart rate drops.
CO
12 hours after quitting smoking, the carbon monoxide level in your blood drops to normal.
RISK
Within four years of quitting, your risk of stroke drops to that of lifetime nonsmokers.

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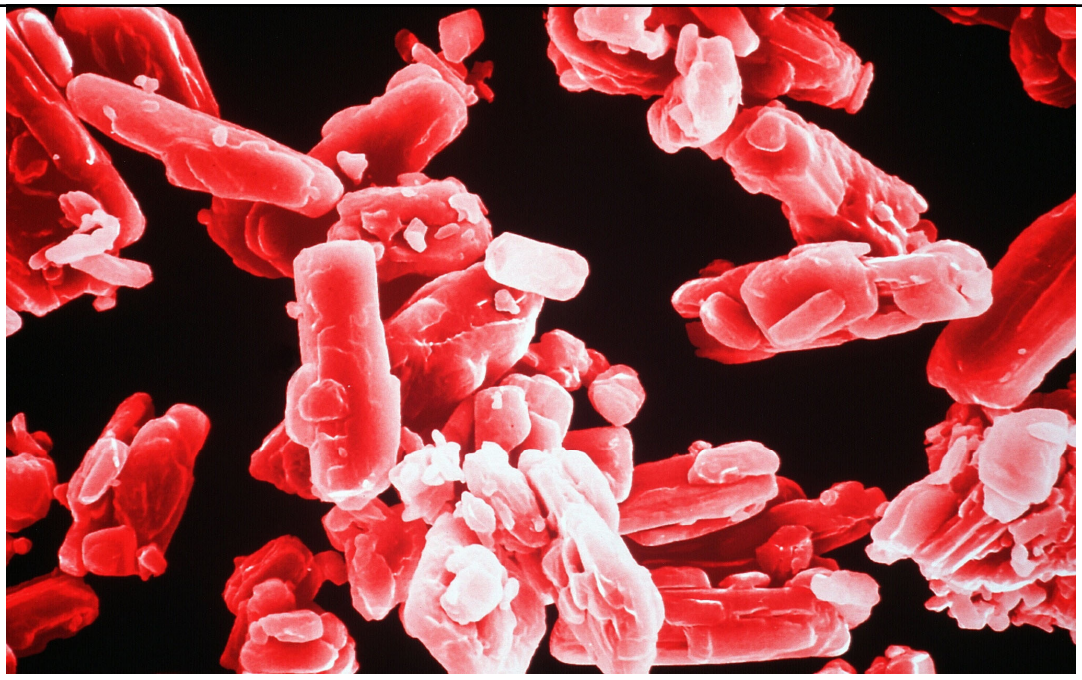

A colored scanning electron micrograph of cholesterol.

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Epidemiological Approaches to Heart Disease: The Framingham Study*

THOMAS R. DAWBER, M.D., GILCIN F. MEADORS, M.D., M.P.H., AND FELIX E. MOORE, JR.

National Heart Institute, National Institutes of Health, Public Health Service, Federal Security Agency, Washington, D. C.

American J Public Health Nations Health 1951

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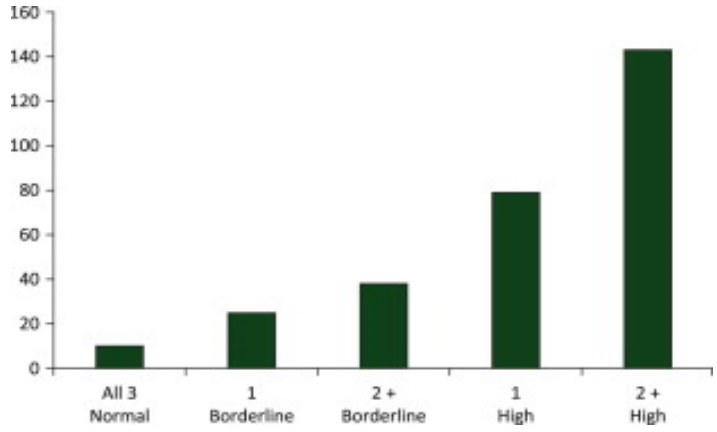

Incidence of atherosclerotic heart disease (ASHD) (per 1000) from four-year follow-up according to presence and **severity of combinations of blood pressure, relative weight, and cholesterol levels**.

Am J Public Health Nations Health. 1957. 47:4-24

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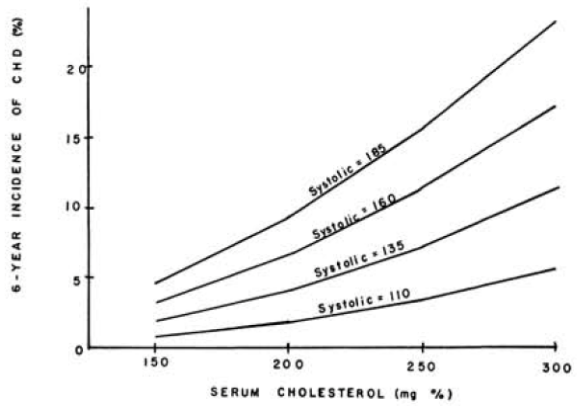
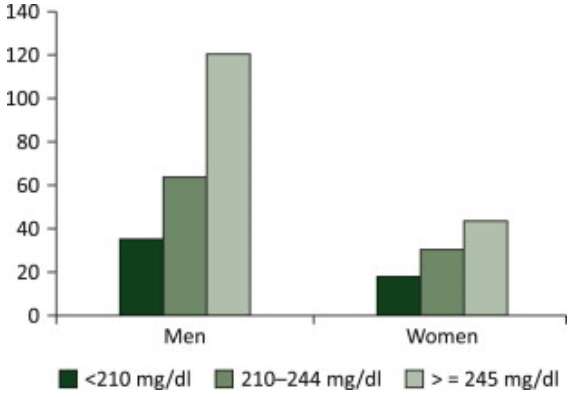


Six year incidence of coronary heart disease according to serum cholesterol levels at specified systolic blood pressures



Six-year incidence of coronary heart disease per 1,000 according to **initial serum cholesterol level: ages 40 to 59 years.**

Ann Intern Med. 1961. 55:33-50

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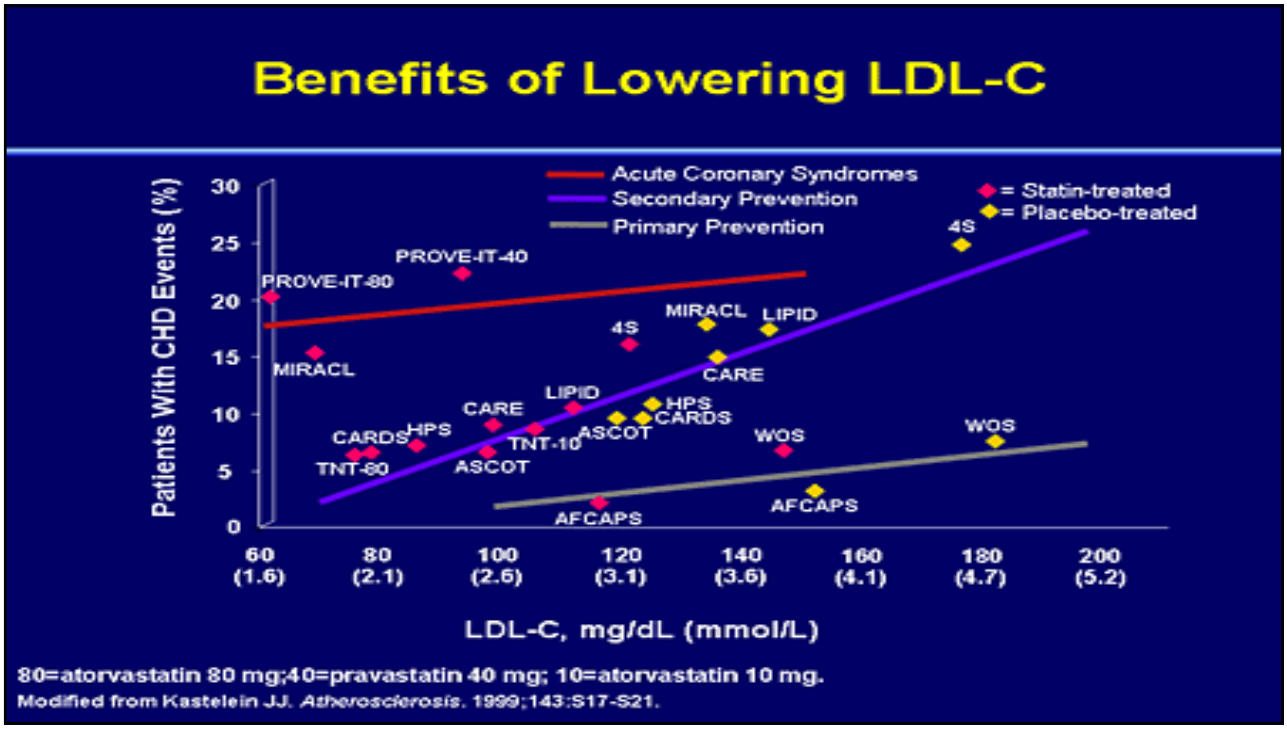

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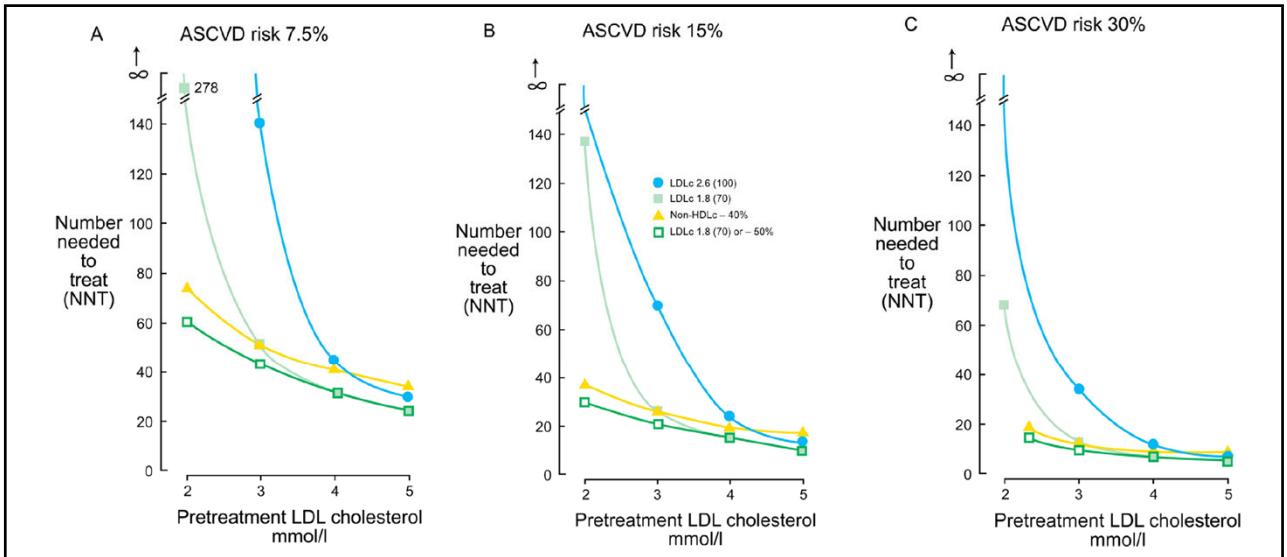

Figure 1 The number needed to treat for 10 years to prevent one ASCVD event over the next 10 years as a function of the pretreatment LDL cholesterol concentration with different recommended treatment goals (A) when pretreatment ASCVD risk is 7.5%, (B) when pretreatment ASCVD risk is 15% and (C) when pretreatment ASCVD risk is 30%. The therapeutic targets are LDL cholesterol 2.6 mmol/L (100 mg/dL, blue), LDL cholesterol 1.8 mmol/L (70 mg/dL, grey), non-HDL cholesterol decreased by 40% (yellow) and LDL cholesterol 1.8 mmol/L (70 mg/dL) or decreased by 50%, whichever is lower (green). ASCVD, atherosclerotic cardiovascular disease; LDL, low-density lipoprotein.

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Systematic Review

Effect of Statins on All-Cause Mortality in Adults: A Systematic Review and Meta-Analysis of Propensity Score-Matched Studies

J. Clin. Med. 2022

This meta-analysis investigated the association between statin use and mortality in different chronic conditions. Eligible studies were real-world studies that compared all-cause mortality over at least 12 months between propensity score-matched statin users and non-users.

The pooled estimate showed that statin use was associated with a significant reduction in all-cause mortality (HR = 0.72; 95% CI, 0.68–0.76), but there was significant heterogeneity

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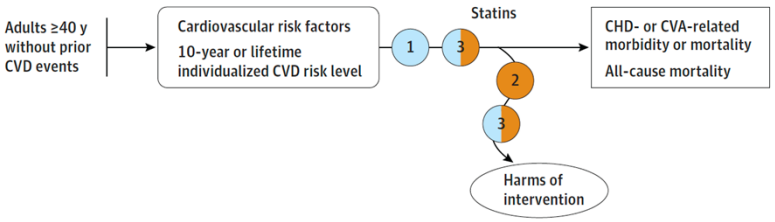
JAMA | US Preventive Services Task Force | EVIDENCE REPORT

Statins for Prevention of Cardiovascular Disease in Adults

Evidence F
for the US

Figure 1. Analytic Framework and Key Questions



Key questions

1 a. What are the benefits of statins in reducing the incidence of CVD-related morbidity or mortality or all-cause mortality in asymptomatic adults 40 years and older without prior CVD events?

b. What are the benefits of statin treatment to achieve target LDL-C levels vs other treatment strategies?

c. Do the benefits vary in subgroups defined by demographic or clinical characteristics?

2 What are the harms of statin treatment?

3 How do benefits and harms vary according to statin treatment potency?

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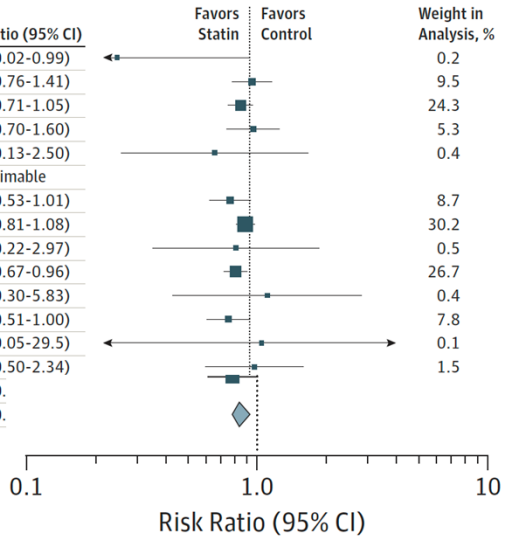
A All-cause mortality

Study	Follow-up, y	Statins: Patients With Events, No./Total (%)	Control: Patients With Events, No./Total (%)	Risk Ratio (95% CI)	Weight in Analysis, %
ACAPS,[18] 1994	3	1/460 (0.22)	8/459 (1.7)	0.12 (0.02-0.99)	0.2
AFCAPS/TexCAPS,[19] 1998	5	80/3304 (2.4)	77/3301 (2.3)	1.04 (0.76-1.41)	9.5
ASCOT-LLA,[20] 2003	3	185/5168 (3.6)	212/5137 (4.1)	0.87 (0.71-1.05)	24.3
ASPEN,[21] 2006	4	44/959 (4.6)	41/946 (4.3)	1.06 (0.70-1.60)	5.3
Beishuizen et al,[23] 2004	2	3/103 (2.9)	4/79 (5.1)	0.58 (0.13-2.50)	0.4
Bone et al,[24] 2007	1	0/485 (0)	0/119 (0)	Not estimable	
CARDS,[26] 2004	4	61/1428 (4.3)	82/1410 (5.8)	0.73 (0.53-1.01)	8.7
HOPE-3,[14] 2016	6	334/6361 (5.3)	357/6344 (5.6)	0.93 (0.81-1.08)	30.2
HYRIM,[28] 2005	4	4/283 (1.4)	5/285 (1.8)	0.81 (0.22-2.97)	0.5
JUPITER,[29] 2008	2	198/8901 (2.2)	247/8901 (2.8)	0.80 (0.67-0.96)	26.7
KAPS,[30] 1995	3	4/214 (1.9)	3/212 (1.4)	1.32 (0.30-5.83)	0.4
MEGA,[31] 2006	5	55/3866 (1.4)	79/3966 (2.0)	0.71 (0.51-1.00)	7.8
METEOR,[32] 2007	2	1/700 (0.14)	0/281 (0)	1.21 (0.05-29.5)	0.1
Prevend-IT,[34] 2004	4	13/433 (3.0)	12/431 (2.8)	1.08 (0.50-2.34)	1.5
WOSCOPS,[35] 1995	5	106/3302 (3.2)	135/3293 (4.1)	0.78 (0.	
Total (95% CI)		1089/35 967 (3.0)	1262/35 164 (3.6)	0.86 (0.	

Heterogeneity: $\tau^2 = 0.00$; $\chi^2_{13} = 11.07$ ($P = .60$); $I^2 = 0\%$
Test for overall effect: $z = 3.63$ ($P < .003$)



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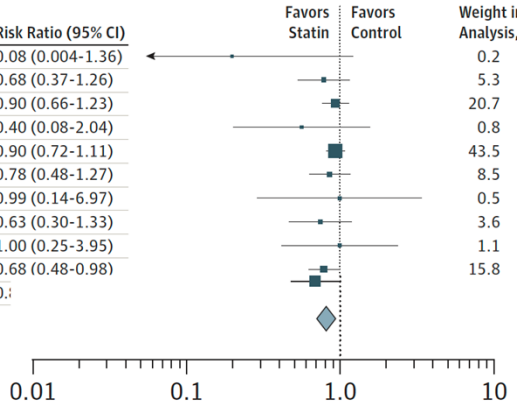
B Cardiovascular mortality

Study	Follow-up, y	Statins: Patients With Events, No./Total (%)	Control: Patients With Events, No./Total (%)	Risk Ratio (95% CI)	Weight in Analysis, %
ACAPS,[18] 1994	3	0/460 (0)	6/459 (1.3)	0.08 (0.004-1.36)	0.2
AFCAPS/TexCAPS,[19] 1998	5	17/3304 (0.51)	25/3301 (0.76)	0.68 (0.37-1.26)	5.3
ASCOT-LLA,[20] 2003	3	74/5168 (1.4)	82/5137 (1.6)	0.90 (0.66-1.23)	20.7
ASTRONOMER,[22] 2010	4	2/134 (1.5)	5/135 (3.7)	0.40 (0.08-2.04)	0.8
HOPE-3,[14] 2016	6	154/6361 (2.4)	171/6344 (2.7)	0.90 (0.72-1.11)	43.5
JUPITER,[29] 2008	2	29/8901 (0.33)	37/8901 (0.42)	0.78 (0.48-1.27)	8.5
KAPS,[30] 1995	3	2/214 (0.93)	2/212 (0.94)	0.99 (0.14-6.97)	0.5
MEGA,[31] 2006	5	11/3866 (0.28)	18/3966 (0.45)	0.63 (0.30-1.33)	3.6
Prevend-IT,[34] 2004	4	4/433 (0.92)	4/431 (0.93)	1.00 (0.25-3.95)	1.1
WOSCOPS,[35] 1995	5	50/3302 (1.5)	73/3293 (2.2)	0.68 (0.48-0.98)	15.8
Total (95% CI)		343/32 143 (1.1)	423/32 179 (1.3)	0.	

Heterogeneity: $\tau^2 = 0.00$; $\chi^2_9 = 6.38$ ($P = .70$); $I^2 = 0\%$
Test for overall effect: $z = 2.78$ ($P = .005$)



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JAMA | US Preventive Services Task Force | RECOMMENDATION STATEMENT

Statin Use for the Primary Prevention of Cardiovascular Disease in Adults
US Preventive Services Task Force Recommendation Statement

US Preventive Services Task Force

2022 Update

RECOMMENDATION The USPSTF recommends that ***clinicians prescribe a statin for the primary prevention of CVD for adults aged 40 to 75 years who have 1 or more CVD risk factors (ie, dyslipidemia, diabetes, hypertension, or smoking) and an estimated 10-year CVD risk of 10% or greater.*** *(B recommendation) The USPSTF recommends that* ***clinicians selectively offer a statin for the primary prevention of CVD for adults aged 40 to 75 years who have 1 or more of these CVD risk factors and an estimated 10-year CVD risk of 7.5%to less than 10%.*** *The likelihood of benefit is smaller in this group than in persons with a 10-year risk of 10% or greater. (C recommendation) The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of initiating a statin for the primary prevention of CVD events and mortality in adults 76 years or older. (I statement)*

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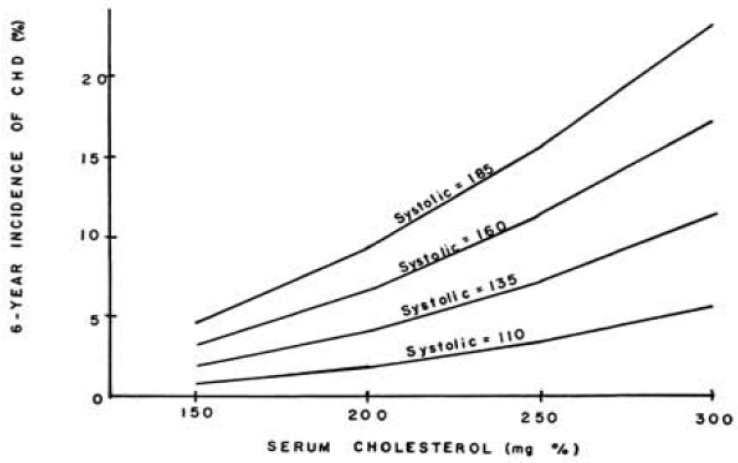

Six year incidence of coronary heart disease according to serum cholesterol levels at specified systolic blood pressures

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High Blood Pressure and Cardiovascular Disease

Flávio D. Fuchs, Paul K. Whelton Hypertension. 2020

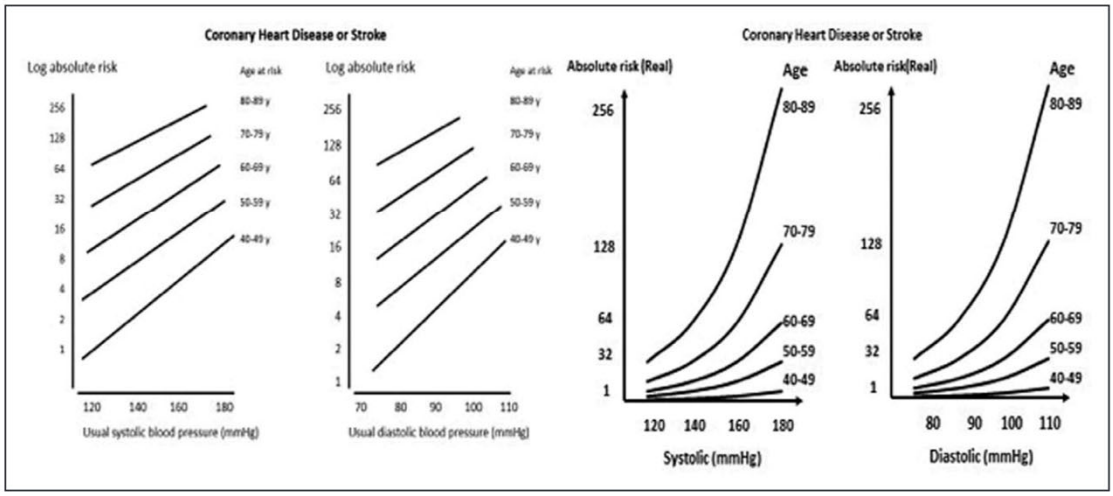

Figure 3. Log transformed (**left**) and untransformed (**right**) absolute risk of coronary heart disease or stroke in adults, by systolic and diastolic blood pressure, stratified by age. Reprinted from *The Lancet* (Lewington et al[18]) with permission, copyright © 2002 Elsevier; and reprinted from Fuchs[19] with permission, copyright © 2018, Springer International Publishing.

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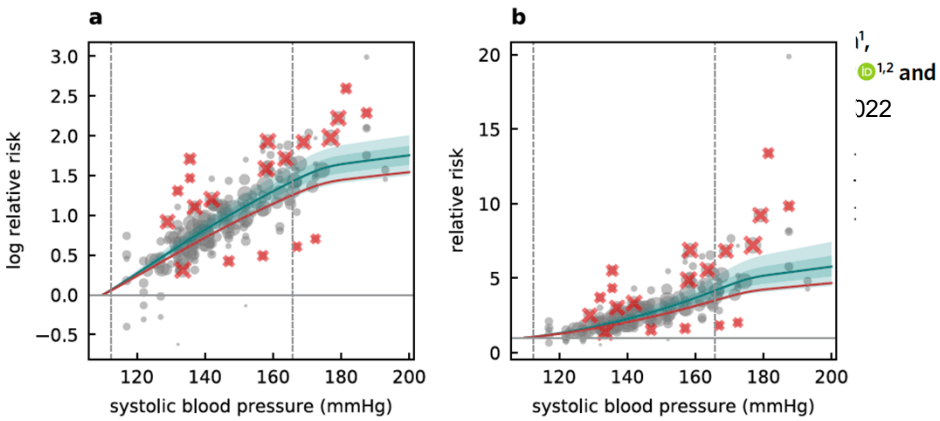
Effects of elevated systolic blood pressure on ischemic heart disease: a Burden of Proof study

Chri
Vinc
Jiaw
Greg



Relative risk of ischemic heart disease for different values of systolic blood pressure in mm Hg, starting at systolic blood pressure levels of 110 mm Hg

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Review

Hypertension and cardiovascular risk: General aspects

Sverre E. Kjeldsen [1]

Other risk factors (RF), asymptomatic organ damage (OD) or disease	Blood Pressure (mmHg)			
	High normal SBP 130-139 or DBP 85-89	Grade 1 HT SBP 140-159 or DBP 90-99	Grade 2 HT SBP 160-179 or DBP 100-109	Grade 3 HT SBP ≥ 180 or DBP ≥ 110
No other RF		Low risk	Moderate risk	High risk
1-2 RF	Low risk	Moderate risk	Moderate to high risk	High risk
≥ 3 RF	Low to moderate risk	Moderate to high risk	High risk	High risk
OD, CKD stage 3 or diabetes	Moderate to high risk	High risk	High risk	High to very high risk
Symptomatic CVD, CKD stage ≥4 or diabetes with OD/ RFs	Very high risk	Very high risk	Very high risk	Very high risk

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BLOOD PRESSURE CATEGORY	SYSTOLIC MM HG (UPPER #)		DIASTOLIC MM HG (LOWER #)
Normal	Lower than 120	*and*	Lower than 80
Elevated Blood Pressure	120 –129	*and*	80
High Blood Pressure (Hypertension) Stage 1	130 –139	*or*	80 –89
High Blood Pressure (Hypertension) Stage 2	140 or higher	*or*	90 or higher
Hypertensive Crisis (Consult your doctor immediately)	Higher than 180	*and/ or*	Higher than 120

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Impact of Impaired Fasting Glucose on Cardiovascular Disease

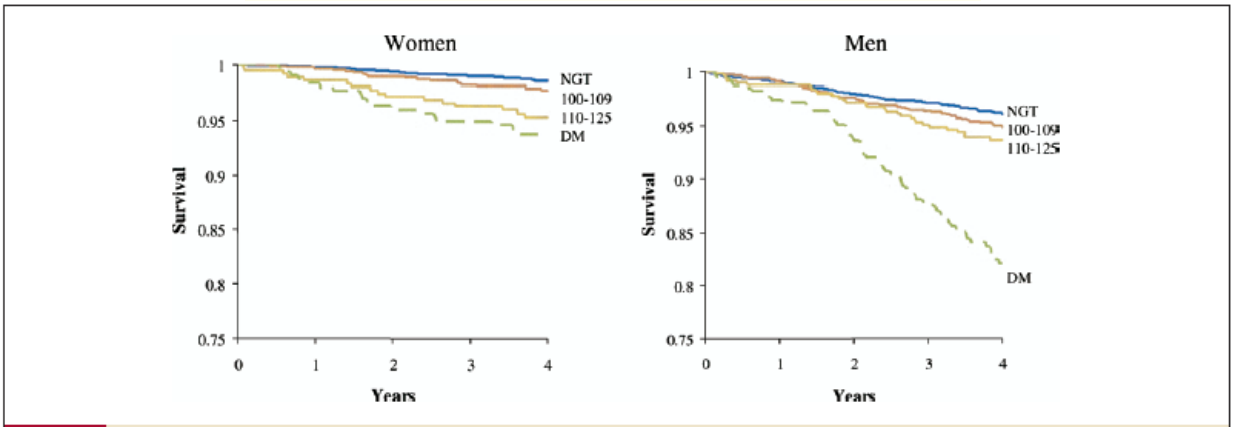

Figure 1 Kaplain-Meier Plots of CVD-Free Survival by Glycemic Category

CVD = cardiovascular disease; DM = diabetes mellitus; NGT = normal glucose tolerance; 100–109 = 100 to 109 mg/dl; 110–125 = 110 to 125 mg/dl.

J Am Coll Cardiol 2008;51:264–70

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Association of Impaired Fasting Glucose With

The Journal of Clinical Endocrinology & Metabolism, 2021, Vol. XX, No. XX

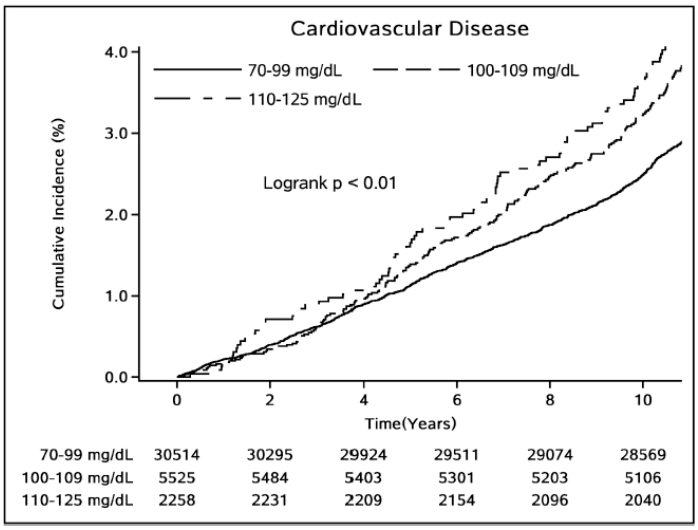

Figure 1. Cumulative incidence of cardiovascular disease by different fasting plasma glucose categories.

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Health Consequences of OSA

- Increased risk for cardiovascular disease (OR 3.1, 95% CI 1.2– 8.3)
  - Heart failure, arrhythmias (2–4 fold increase), hypertension (10-fold increase), and stroke (OR 4.33, 95% CI 1.32–14.24)
- Independently linked (OR 9.1, 95% CI, 2.6 –31.2) to the development of metabolic syndrome
- Increased risk (HR 1.97, CI 95%, 1.12–3.48) of stroke or death from any cause.

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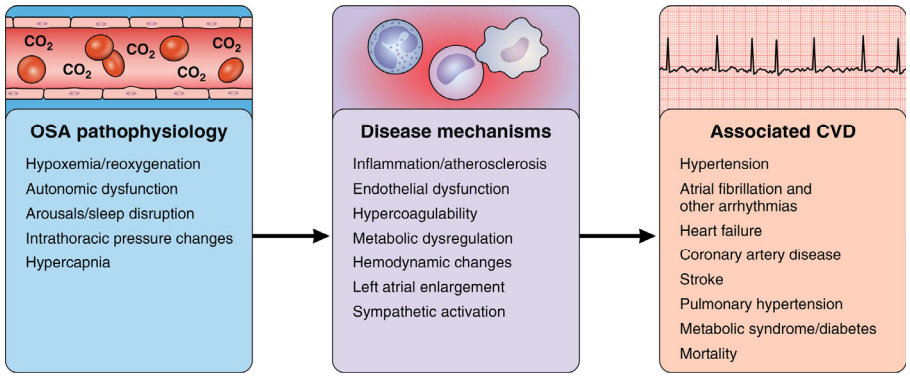

Yeghiazarians et al., Circulation. 2021

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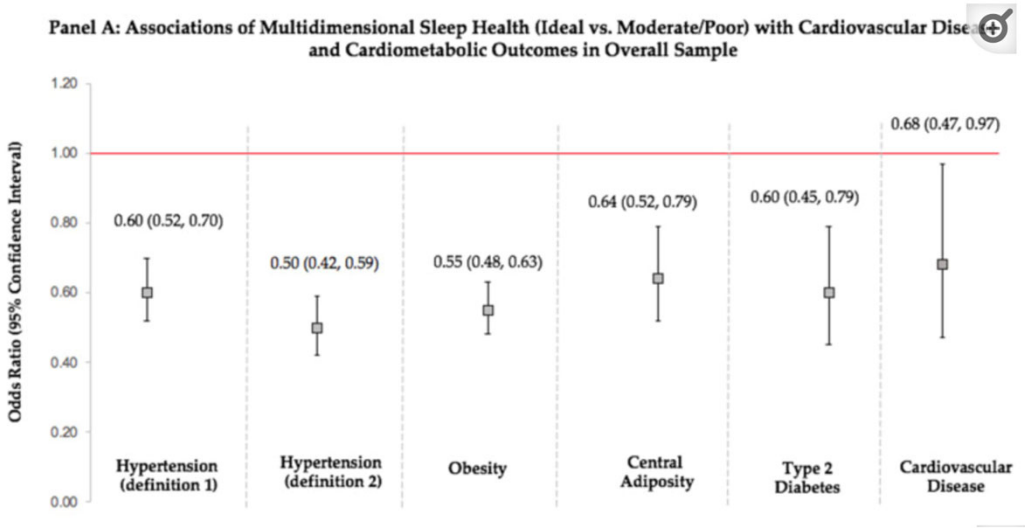
Panel A: Associations of Multidimensional Sleep Health (Ideal vs. Moderate/Poor) with Cardiovascular Dise
and Cardiometabolic Outcomes in Overall Sample
Odds Ratio (95% Confidence Interval)
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.60 (0.52, 0.70)
0.50 (0.42, 0.59)
0.55 (0.48, 0.63)
0.64 (0.52, 0.79)
0.60 (0.45, 0.79)
0.68 (0.47, 0.97)
Hypertension (definition 1)
Hypertension (definition 2)
Obesity
Central Adiposity
Type 2 Diabetes
Cardiovascular Disease

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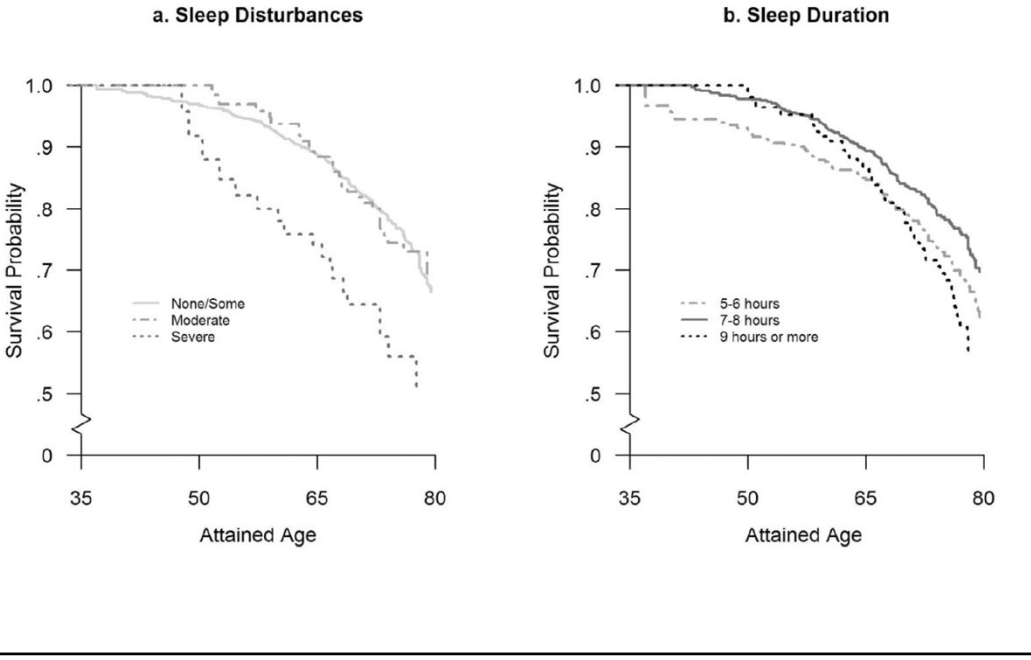
a. Sleep Disturbances
b. Sleep Duration
Survival Probability
1.0
.9
.8
.7
.6
.5
0
None/Some
Moderate
Severe
5-6 hours
7-8 hours
9 hours or more
35
50
65
80
Attained Age

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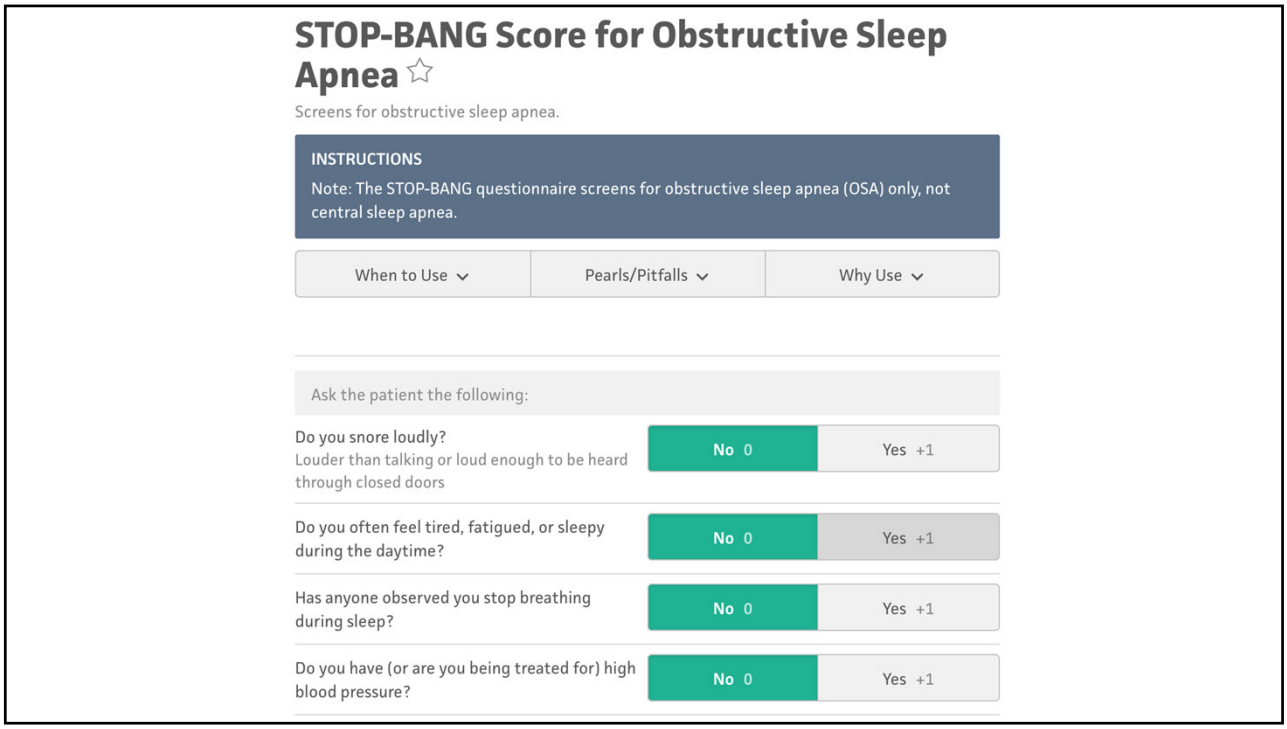

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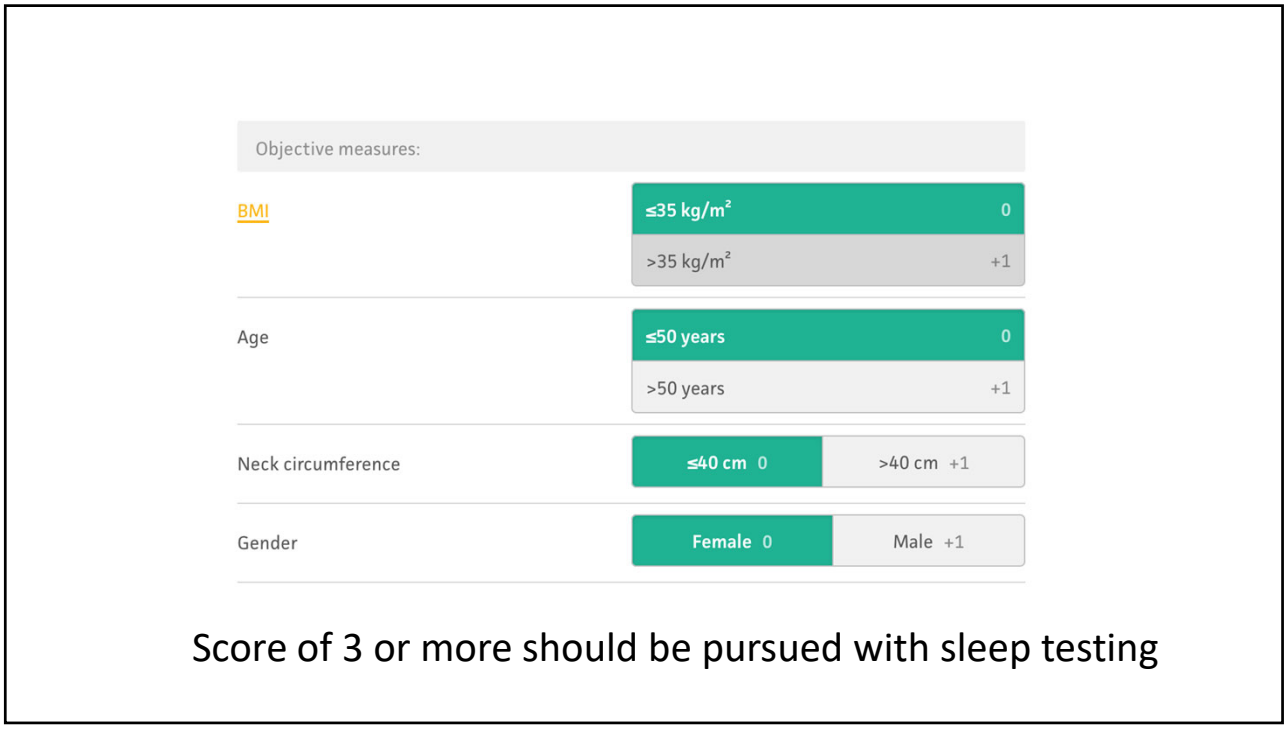

Score of 3 or more should be pursued with sleep testing

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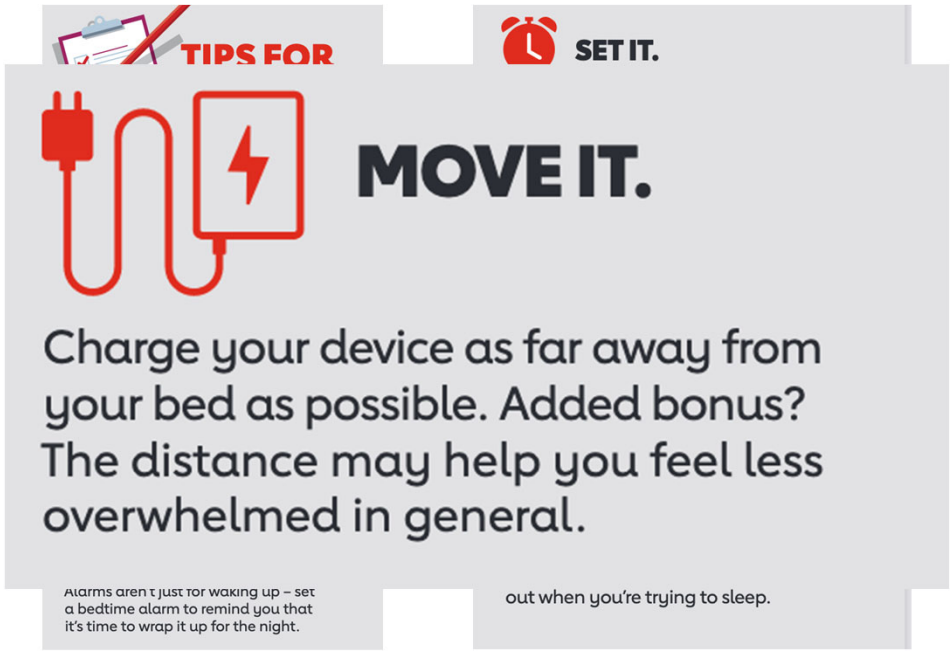

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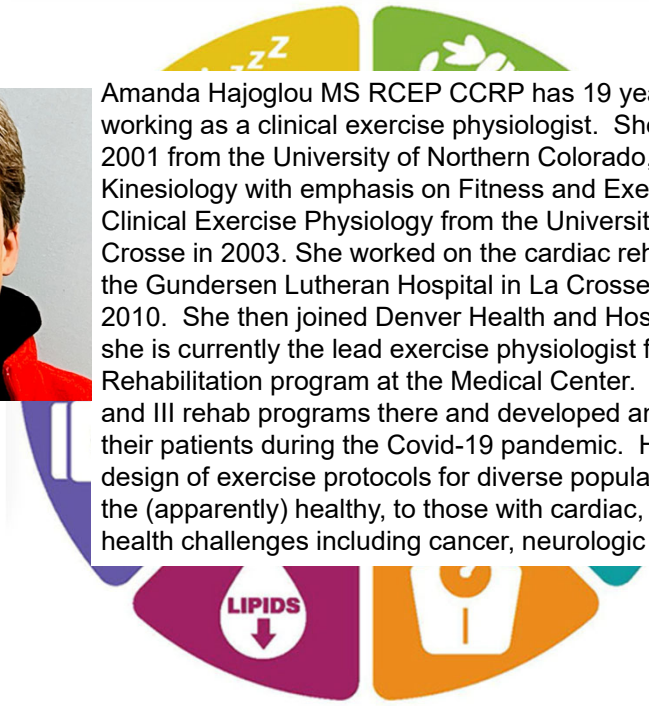
Amanda Hajoglou MS RCEP CCRP has 19 years of experience working as a clinical exercise physiologist. She received her BA in 2001 from the University of Northern Colorado, with a Major in Kinesiology with emphasis on Fitness and Exercise and a Masters in Clinical Exercise Physiology from the University of Wisconsin La Crosse in 2003. She worked on the cardiac rehabilitation programs at the Gundersen Lutheran Hospital in La Crosse, Wisconsin from 2003-2010. She then joined Denver Health and Hospitals in 2010 where she is currently the lead exercise physiologist for the Cardiac Rehabilitation program at the Medical Center. She directs phase I, II and III rehab programs there and developed an outdoor program for their patients during the Covid-19 pandemic. Her passion is in the design of exercise protocols for diverse populations of people, from the (apparently) healthy, to those with cardiac, pulmonary, and other health challenges including cancer, neurologic illnesses, and others.



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Angela Fong, RD, CNSC

Ms. Fong has a passion for helping individuals feel their best by optimizing health through simple and sustainable nutrition and lifestyle changes. She is a native of Northern California, where she earned her bachelor's degree in dietetics from San Francisco State University and completed dietetic training at UCSF.

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Summary

- Assessing risk in the secondary prevention world (I have **had** a vascular "event" defined as heart attack, angina with stenting, stroke/TIA (absence of atrial fibrillation), or diagnosis of peripheral arterial disease (abdominal aortic aneurysm or arterial insufficiency to the lower legs-claudication with stenting) is easy and the number needed to treat (NNT) is low
- Assessing risk in the primary prevention world is nuanced and requires a very good understanding of the degree of risk (scoring algorithms, etc) as well as the tolerance for accepting risk (glass of water example) in both treatment and avoidance strategies and the NNT is higher (NNH?)
- Modifying behaviors is the "low hanging fruit" but often the most difficult for patients to internalize- substance use/abuse, diet, and exercise
  - If the modification isn't sustainable its value is limited

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- Treatment of genetic and pre-clinical risk is also well-defined (understanding that the "target" can move which is frustrating for us all) and associated with fairly well-defined risk:benefit ratios
  - If the treatment isn't sustainable its value is limited
- Having honest and frank discussions with your provider are crucial to coming up with individual approaches to mitigating risk

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- **Stop Smoking**
  - **Smoking ANYTHING, INCLUDES VAPING**
- **Get Active**
  - **Anything is better than nothing**
- **Eat Better**
  - **Mediterranean or DASH**
- **Lose Weight**
- **Improve Sleep Quality**
  - **Dx and treat sleep disordered breathing**
- **Manage Blood Pressure**
  - **120s/70s or better 75% of the time**
- **Control Cholesterol**
  - **PP LDL 100/NonHDL 130**
  - **SP LDL<70/NonHDL<100**
- **Reduce Blood Sugar**
  - **A1c <7.5**

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So, What Do I do?

- Gather data
  - Comprehensive history (personal past medical, surgical, and family along with behaviors) and physical exam
- Gather more data
  - Basic labs (CBC, complete metabolic panel, simple lipid panel + Lp(a) and +/- Apo b; thyroid, and HbA1c, inflammatory marker(s)
- Gather even more data
  - Any prior imaging for review of vascular disease (calcium), maybe Coronary Artery Calcium (CAC)
- Treat behaviors and disease whenever it is identified and appropriate
  - Frank discussion RE: individual risk and risk-tolerance

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Questions?

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