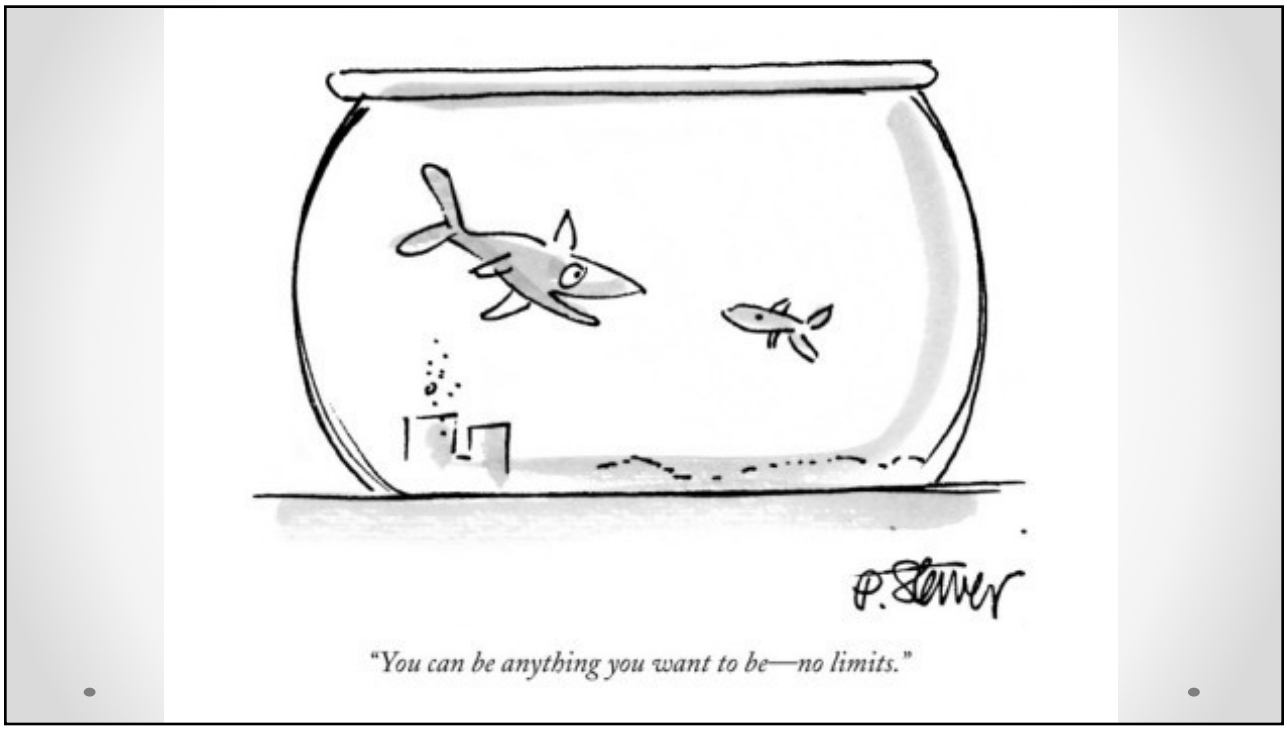


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PreventionForward Clinic
Cardiac Rehabilitation Program

Cardiovascular Wellness Program

SACRAMENTO STATE

# Road Map to Health: Modifications for the Reversal for Hypertension and Diabetes

Javier E. López, MD, MAS

California Department of PublicHealth

VA | U.S. Department of Veterans Affairs

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# Today's Objectives (as always)

- What is the evidence for the "blue" route to improve blood pressure, diabetes and life expectancy?
- What are the modifiable risk factors for cardiovascular health?

3

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# CDPH and CDC- Call to action

- How do we lower blood pressure and glucose in the blood?

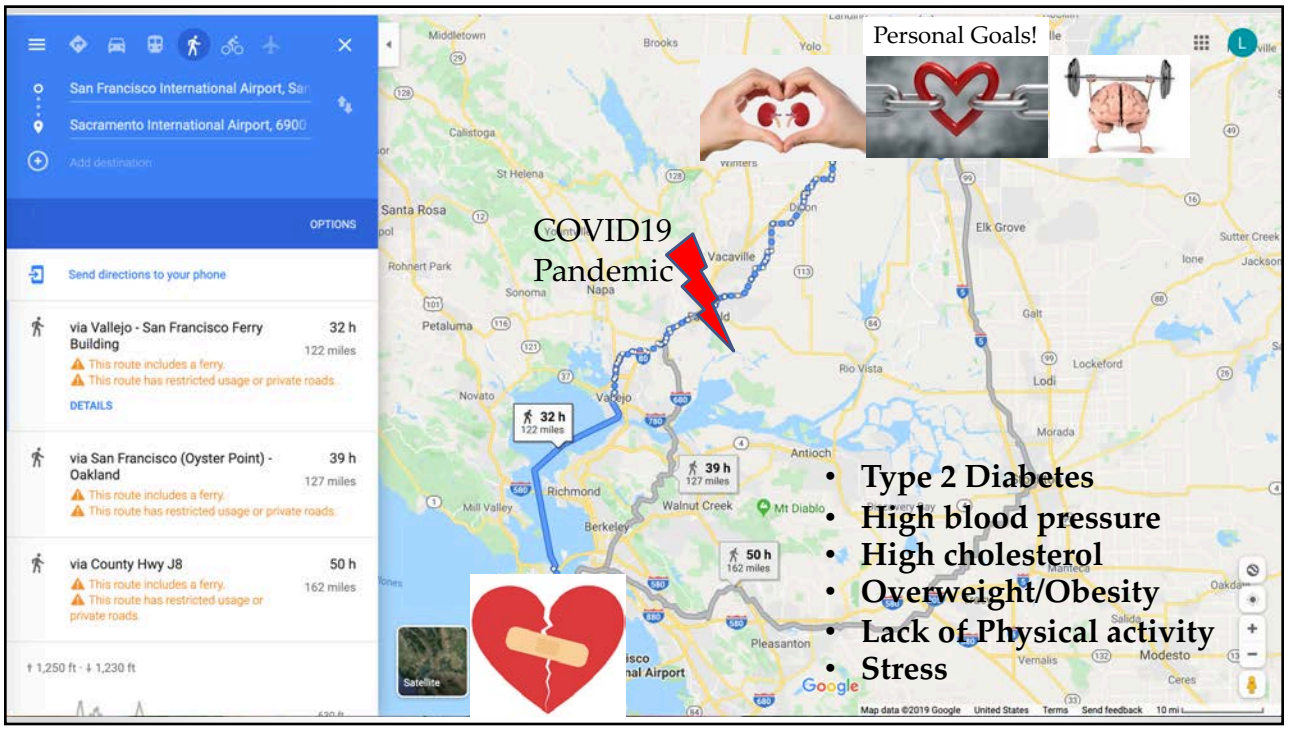
High blood pressure

High glucose

???

Heart attacks
Heart Failure, Strokes
Peripheral arterial disease
Amputations, erectile dysfunction
Dementia, Kidney failure
Premature Death

4

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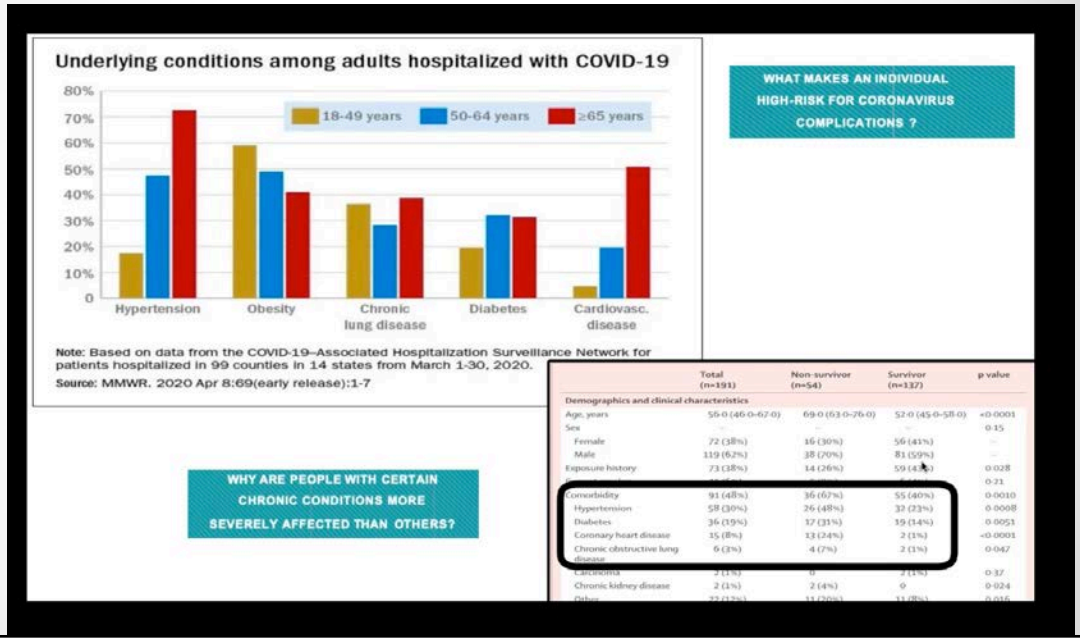


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## Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study

Salim Yusuf, Steven Hawken, Stephanie Ôunpuu, Tony Dans, Alvaro Avezum, Fernando Lanas, Matthew McQueen, Andrzej Budaj, Prem Pais, John Varigos, Liu Lisheng, on behalf of the INTERHEART Study Investigators*

Lancet 2004; 364: 937-52
Published online
September 3, 2004

This was a large, international, standardized, case-control study (15,152 AMI cases and 14,820 controls from 262 hospitals) designed to determine the strength of association between modifiable risk factors and heart attacks, and to ascertain if this association varies by geographic region.

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# Modifiable risk factors

1. History of high blood pressure
2. History of Diabetes- A vascular disease, responsive to lifestyle
3. Lack of exercise
4. Lack of fruits and vegetables, or plant-strong
5. Smoking
6. Elevated Cholesterol
7. Truncal Obesity or belly fat
8. Psychosocial stress
9. Alcohol use

CLINICAL CARDIOLOGY

Yusuf S, et al. *Lancet*. 2004;364:937-952.

theheart.org | Medscape EDUCATION

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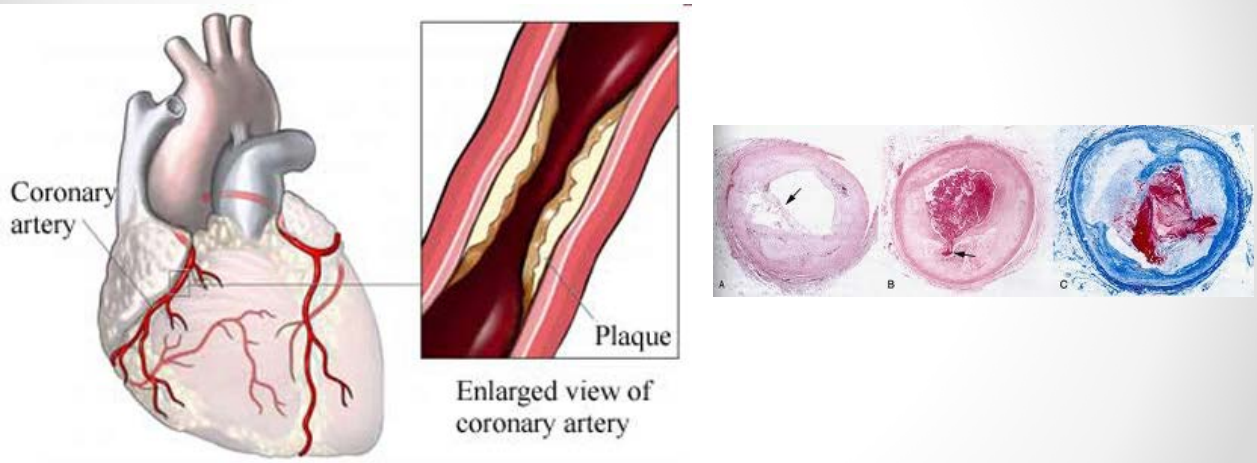
# Atherosclerosis is a Major Driver of Heart Attacks

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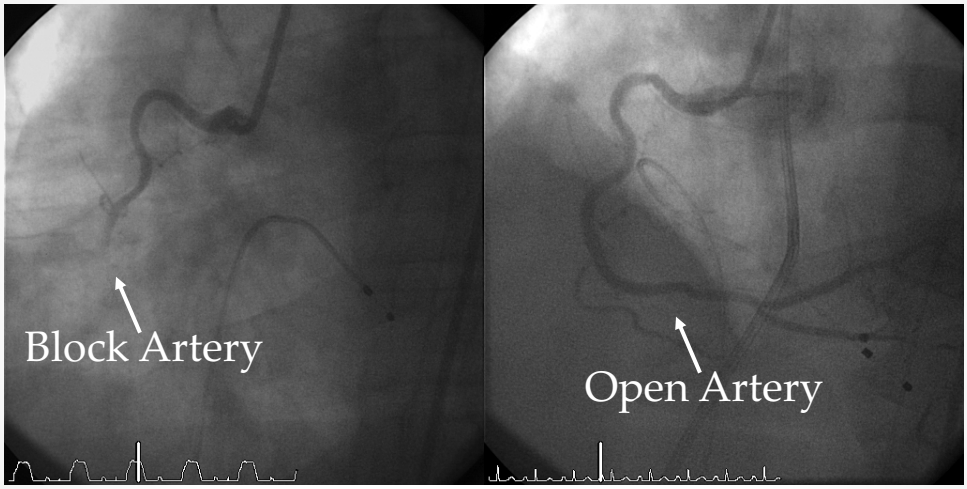


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SHARE

RESEARCH ARTICLE | ATHEROSCLEROSIS

# Insulin-induced vascular redox dysregulation in human atherosclerosis is ameliorated by dipeptidyl peptidase 4 inhibition

Ioannis Akoumianakis[1], Ileana Badi[1], Gillian Douglas[1], Surawee Chuaiphichai[1], Laura Herdman[1], Nadia Akawi[1], Marios Mar...
+ See all authors and affiliations

*Science Translational Medicine* 29 Apr 2020:
Vol. 12, Issue 541, eaav8824
DOI: 10.1126/scitranslmed.aav8824

Article | Figures & Data | Info & Metrics | eLetters | PDF

**From stress to sensitivity**

Poor glycemic control drives cardiovascular disease, but aggressive blood glucose lowering does not improve cardiovascular risk. To understand the underlying mechanisms, Akoumianakis *et al*. studied the relationship between the local redox state of blood vessels and cardiovascular outcomes of patients with coronary atherosclerosis. They found that diseased vessels were insulin resistant and had increased oxidative stress and reduced nitric oxide bioavailability, which could be reversed by treatment with an inhibitor of dipeptidyl peptidase 4 (DPP4). Vascular insulin sensitivity was also restored in mice with atherosclerosis upon treatment with an oral DPP4 inhibitor. Results uncover how DPP4 inhibition induces insulin sensitization in the vascular wall and suggest that cotreatment with insulin may be therapeutic for patients with cardiometabolic disease.

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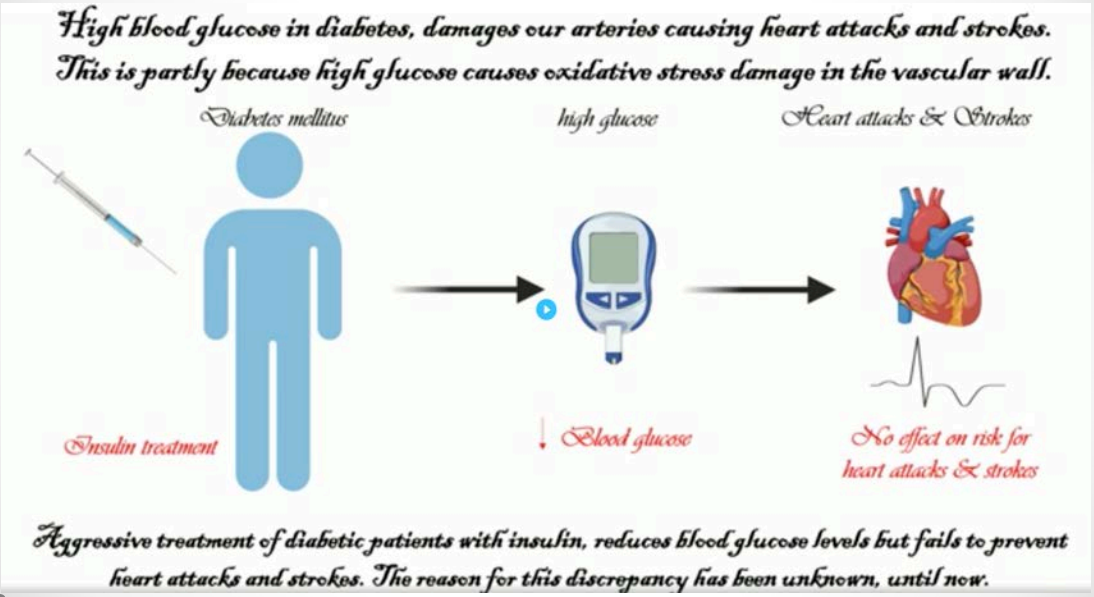
*High blood glucose in diabetes, damages our arteries causing heart attacks and strokes.*
*This is partly because high glucose causes oxidative stress damage in the vascular wall.*




*Aggressive treatment of diabetic patients with insulin, reduces blood glucose levels but fails to prevent heart attacks and strokes. The reason for this discrepancy has been unknown, until now.*

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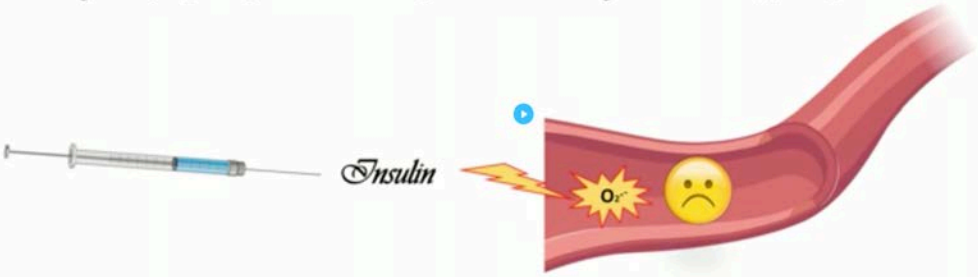
Researchers from the University of Oxford, UK, found that insulin has direct detrimental effects on the human arteries, increasing vascular oxidative stress!

Any benefit from glucose lowering is eliminated by this direct effect of insulin.




This explains why insulin does not reduce the risk for heart attacks or strokes

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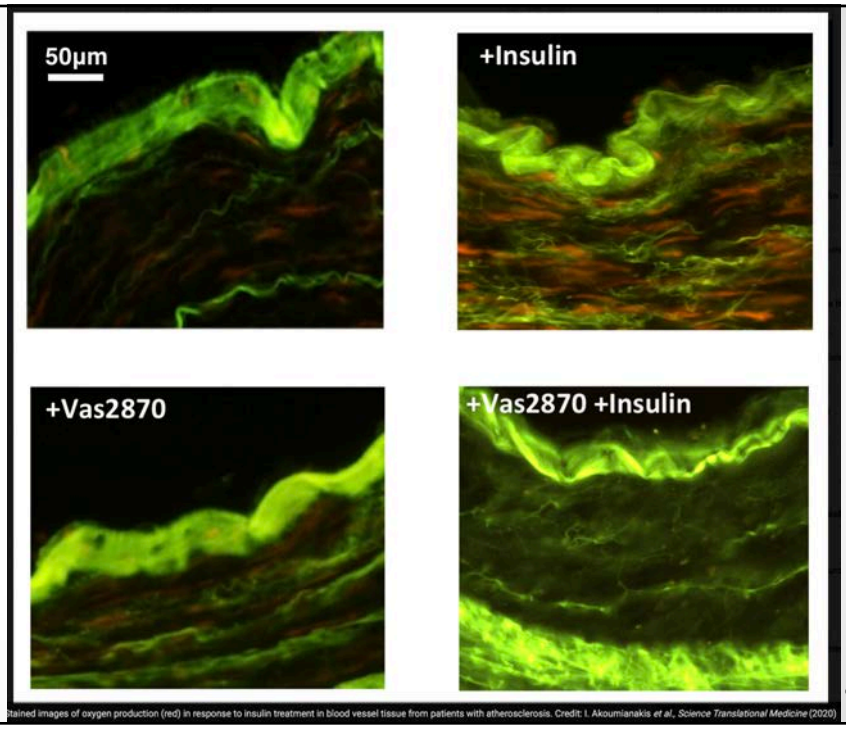
Red color is the marker for oxidative stress and sicker arteries




tained images of oxygen production (red) in response to insulin treatment in blood vessel tissue from patients with atherosclerosis. Credit: I. Akoumianakis *et al.*, *Science Translational Medicine* (2020)

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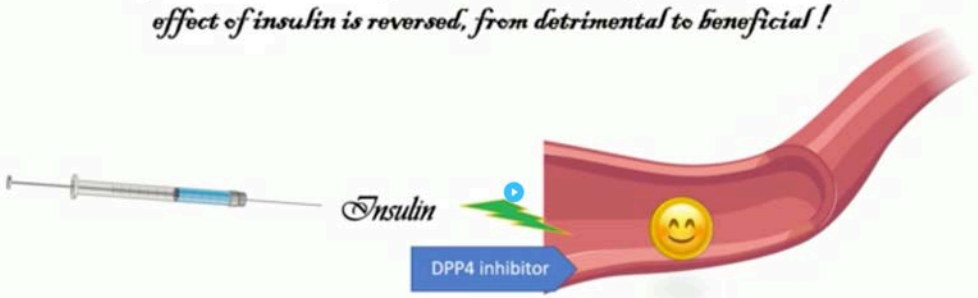
*The same researchers have also now found the solution to this problem:*

*When the patients receive a drug that inhibits an enzyme called DPP4, then the effect of insulin is reversed, from detrimental to beneficial!*




*This means that the combination of insulin with a DPP4-inhibitor, will most likely lead to significant reduction of the risk for heart attacks or strokes in diabetic patients.*

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Circulation

ACC/AHA CLINICAL PRACTICE GUIDELINE

# 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease

## A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

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*Endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation, the American Geriatrics Society, the American Society of Preventive Cardiology, and the Preventive Cardiovascular Nurses Association*

ACC/AHA Task Force Members, see page e623

**Key Words:** AHA Scientific Statements ■ guidelines ■ antihypertensive agents ■ aspirin ■ atherosclerosis ■ atherosclerotic cardiovascular disease ■ atrial fibrillation ■ behavior modification ■ behavior therapy ■ blood cholesterol ■ blood pressure ■ body mass index ■ cardiovascular team-based care ■ cardiovascular ■ cardiovascular disease ■ cholesterol ■ chronic kidney disease ■ coronary artery calcium score ■ coronary disease ■ coronary heart disease ■

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AHA/ACC Guidelines

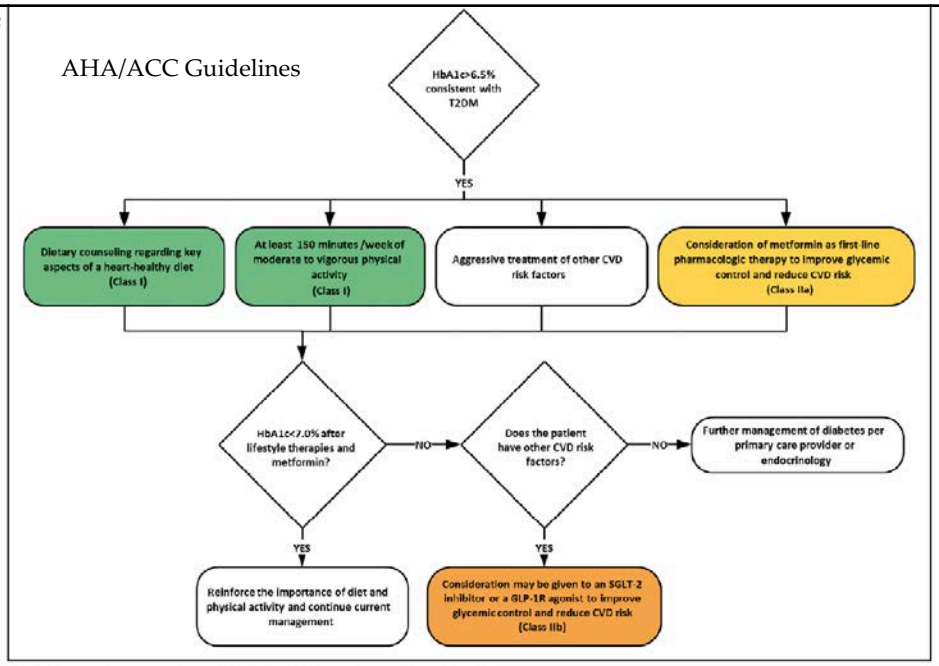


Figure 2. Treatment of T2DM for primary prevention of cardiovascular disease.
CVD indicates cardiovascular disease; GLP-1R, glucagon-like peptide-1 receptor; HbA1c, hemoglobin A1c; SGLT-2, sodium-glucose cotransporter 2; and T2DM, type 2 diabetes mellitus.

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# Every Little Change Counts

- **You decide** what is right for you
- Small-to-moderate lifestyle changes have a big impact
- Even if you can't change everything you want, **do what <u>you can</u> and re evaluate your blue route! <u>Medications *should be considered* when else fails.</u>**

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# Reflection

- **If you could *reverse* your diabetes (or hypertension), what would that mean to you?**
- **If you could just manage these conditions better, what would that feel like?**
- **If you could cut out your medications and remain well, what would you be willing to do?**

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# Just imagine!

- Can I lower my glucose in the blood?
- Can I take less medicine, less insulin and still be healthy?
- How much of what I do can contribute to these goals?

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ACCEPTED MANUSCRIPT

# Temporal trends in cardiovascular complications in people with or without type 2 diabetes: The Fremantle Diabetes Study

Wendy A Davis, Edward W Gregg, Timothy M E Davis

*The Journal of Clinical Endocrinology & Metabolism*, dgaa215,
https://doi.org/10.1210/clinem/dgaa215
**Published:** 30 April 2020 **Article history** ▾

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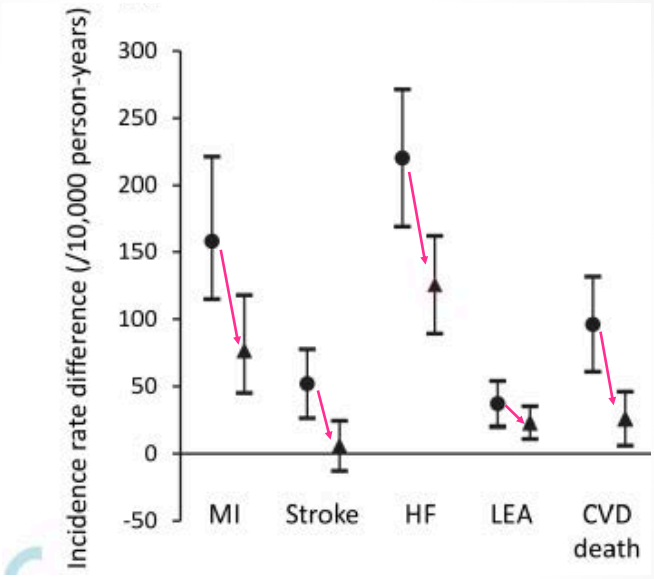


Participants with type 2 diabetes from the Fremantle Diabetes Study Phases I (FDS1; n=1291 recruited 1993-1996) and II (FDS2; n=1509 recruited 2008-2011) age-, sex- and zip code-matched 1:4 to people without diabetes.

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## 3.2. Exercise and Physical Activity

**Recommendations for Exercise and Physical Activity**
**Referenced studies that support recommendations are summarized in Online Data Supplements 6 and 7.**

| COR | LOE | Recommendations |
|---|---|---|
| I | B-R | 1. Adults should be routinely counseled in healthcare visits to optimize a physically active lifestyle.[S3.2-1,S3.2-2] |
| I | B-NR | 2. Adults should engage in at least 150 minutes per week of accumulated moderate-intensity or 75 minutes per week of vigorous-intensity aerobic physical activity (or an equivalent combination of moderate and vigorous activity) to reduce ASCVD risk.[S3.2-3–S3.2-8] |
| IIa | B-NR | 3. For adults unable to meet the minimum physical activity recommendations (at least 150 minutes per week of accumulated moderate-intensity or 75 minutes per week of vigorous-intensity aerobic physical activity), engaging in some moderate- or vigorous-intensity physical activity, even if less than this recommended amount, can be beneficial to reduce ASCVD risk.[S3.2-5,S3.2-6] |
| IIb | C-LD | 4. Decreasing sedentary behavior in adults may be reasonable to reduce ASCVD risk.[S3.2-3,S3.2-9–S3.2-11] |

**Table 4. Definitions and Examples of Different Intensities of Physical Activity**

| Intensity | METs | Examples |
|---|---|---|
| Sedentary behavior* | 1–1.5 | Sitting, reclining, or lying; watching television |
| Light | 1.6–2.9 | Walking slowly, cooking, light housework |
| Moderate | 3.0–5.9 | Brisk walking (2.4–4 mph), biking (5–9 mph), ballroom dancing, active yoga, recreational swimming |
| Vigorous | ≥6 | Jogging/running, biking (≥10 mph), singles tennis, swimming laps |

**Sedentary behavior* is defined as any waking behavior characterized by an energy expenditure ≤1.5 METs while in a sitting, reclining, or lying posture. Standing is a sedentary activity in that it involves ≤1.5 METs, but it is not considered a component of sedentary behavior.

MET indicates metabolic equivalent; and mph, miles per hour.

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ORIGINAL RESEARCH

American Heart Association | American Stroke Association

# Increased Physical Activity Post–Myocardial Infarction Is Related to Reduced Mortality: Results From the SWEDEHEART Registry

Orjan Ekblom, PhD; Amanda Ek, MSc, RPT; Åsa Cider, PhD, RPT; Kristina Hambraeus, MD, PhD; Mats Börjesson, MD, PhD

***Background***—With increasing survival rates among patients with myocardial infarction (MI), more demands are placed on secondary prevention. While physical activity (PA) efforts to obtain a sufficient PA level are part of secondary preventive recommendations, it is still underutilized. Importantly, the effect of changes in PA after MI is largely unknown. Therefore, we sought to investigate the effect on survival from changes in PA level, post-MI.

***Methods and Results***—Data from Swedish national registries were combined, totaling 22 227 patients with MI. PA level was self-reported at 6 to 10 weeks post-MI and 10 to 12 months post-MI. Patients were classified as constantly inactive, increased activity, reduced activity, and constantly active. Proportional hazard ratios were calculated. During 100 502 person-years of follow-up (mean follow-up time 4.2 years), a total of 1087 deaths were recorded. Controlling for important confounders (including left ventricular function, type of MI, medication, smoking, participation in cardiac rehabilitation program, quality of life, and estimated kidney function), we found lower mortality rates among constantly active (hazard ratio: 0.29, 95% confidence interval: 0.21–0.41), those with increased activity (0.41, 95% confidence interval: 0.31–0.55), and those with reduced activity (hazard ratio: 0.56, 95% confidence interval: 0.45–0.69) during the first year post-MI, compared with those being constantly inactive. Stratified analyses indicated strong effect of PA level among both sexes, across age, MI type, kidney function, medication, and smoking status.

***Conclusions***—The present article shows that increasing the PA level, compared with staying inactive the first year post-MI, was related to reduced mortality. (***J Am Heart Assoc.*** **2018;7:e010108. DOI: 10.1161/JAHA.118.010108.)**

**Key Words:** mortality • physical exercise • registry

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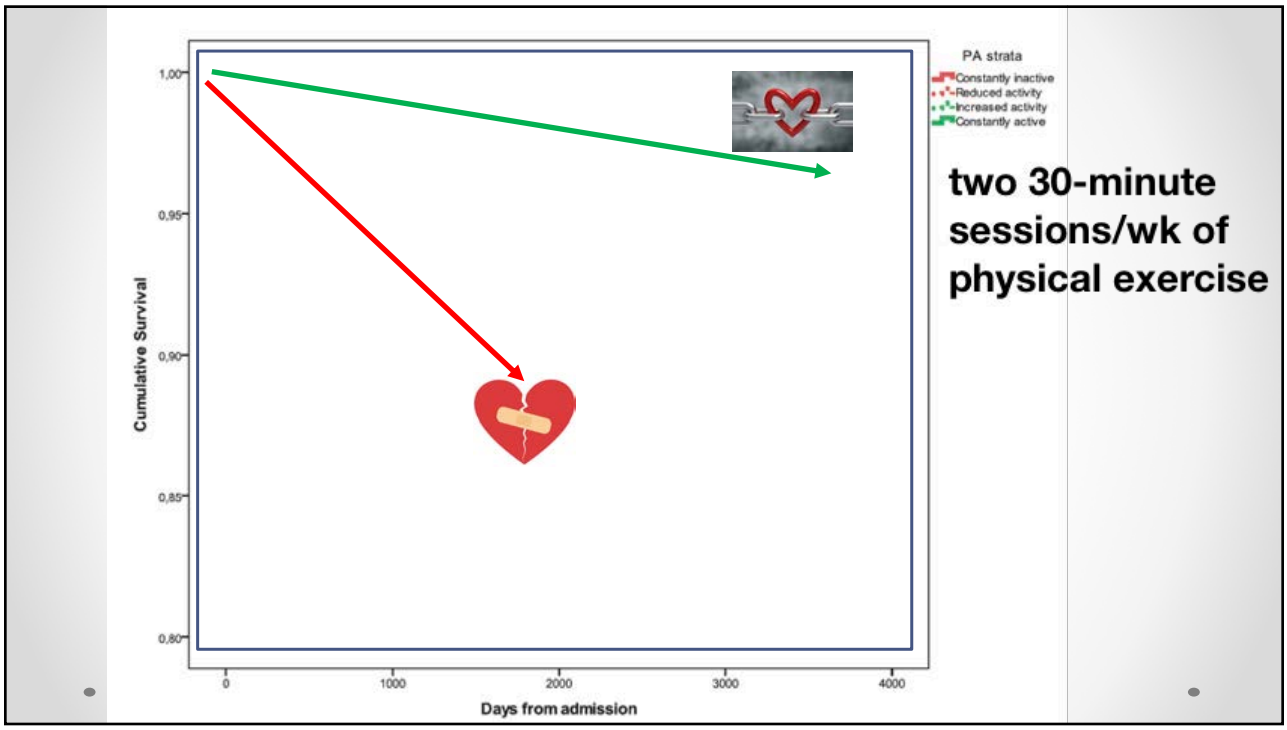


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Research

JAMA Internal Medicine | Original Investigation 2019

# Association of Step Volume and Intensity With All-Cause Mortality in Older Women

I-Min Lee, MBBS, ScD; Eric J. Shiroma, ScD; Masamitsu Kamada, PhD; David R. Bassett, PhD; Charles E. Matthews, PhD; Julie E. Buring, ScD

**IMPORTANCE** A goal of 10 000 steps/d is commonly believed by the public to be necessary for health, but this number has limited scientific basis. Additionally, it is unknown whether greater stepping intensity is associated with health benefits, independent of steps taken per day.

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## Key Points

**Question** Are increased numbers of steps per day associated with lower mortality rates among older women?

**Findings** In this cohort study of 16 741 women with a mean age of 72 years, steps per day were measured over 7 days. Women who averaged approximately 4400 steps/d had significantly lower mortality rates during a follow-up of 4.3 years compared with the least active women who took approximately 2700 steps/d; as more steps per day were accrued, mortality rates progressively decreased before leveling at approximately 7500 steps/d.

**Meaning** More steps taken per day are associated with lower mortality rates until approximately 7500 steps/d.

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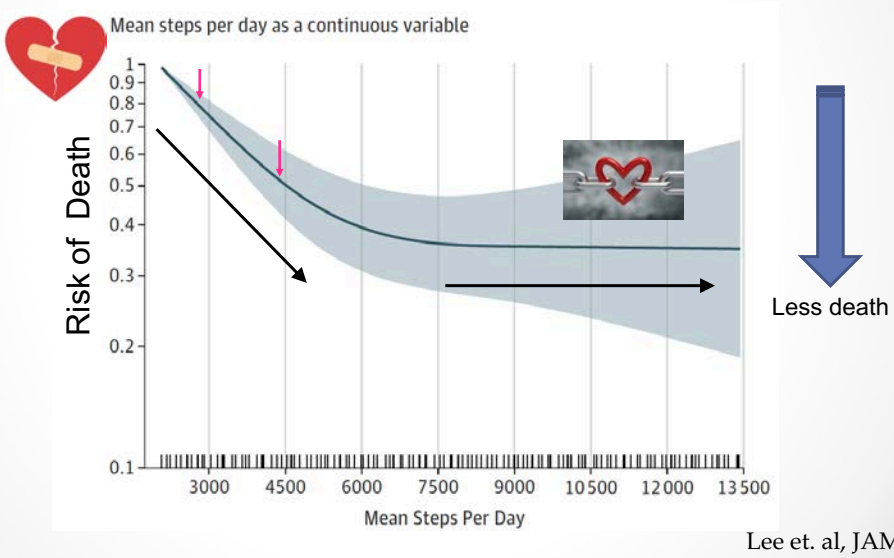
# Evidence-based Physical Activity (II)




Lee et. al, JAMA, 2019

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## 3. LIFESTYLE FACTORS AFFECTING CARDIOVASCULAR RISK

### 3.1. Nutrition and Diet

**Recommendations for Nutrition and Diet**
**Referenced studies that support recommendations are summarized in Online Data Supplements 4 and 5.**

| COR | LOE | Recommendations |
|---|---|---|
| I | B-R | 1. A diet emphasizing intake of vegetables, fruits, legumes, nuts, whole grains, and fish is recommended to decrease ASCVD risk factors.[S3.1-1–S3.1-11] |
| IIa | B-NR | 2. Replacement of saturated fat with dietary monounsaturated and polyunsaturated fats can be beneficial to reduce ASCVD risk.[S3.1-12,S3.1-13] |
| IIa | B-NR | 3. A diet containing reduced amounts of cholesterol and sodium can be beneficial to decrease ASCVD risk.[S3.1-9,S3.1-14–S3.1-16] |
| IIa | B-NR | 4. As a part of a healthy diet, it is reasonable to minimize the intake of processed meats, refined carbohydrates, and sweetened beverages to reduce ASCVD risk.[S3.1-17–S3.1-24] |
| III: Harm | B-NR | 5. As a part of a healthy diet, the intake of *trans* fats should be avoided to reduce ASCVD risk.[S3.1-12,S3.1-17,S3.1-25–S3.1-27] |

Whole-Foods Plant-Based

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# The "blue" Route to Modify Risk

- If the route you were on has left you with high blood pressure or diabetes, only about half of that is attributed to life-style, the rest is environment and/or genetics
- Is there another course or "route" for normalizing the glucose, blood pressure and/or reducing your need for medications without compromising your well-being?
- If you start with this goal but change your mind, you can adjust your route later.

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- At least- 2 x a week, 30 min of mod to vigorous intensity exercise + everyday healthy physical activity (PA)
- Everyday healthy PA would include at least 2,400 steps, and better if 4,700 steps per day (average).
- Together, this ought to give you the 150 minutes per week of PA recommended by the AHA/ACC


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