Cultivating Resilience: Why Lifestyle is the BEST Medicine

Meagan L. Grega, MD, FACLM, DipABLM
Co-Founder, Chief Medical Officer - Kellyn Foundation
Family Medicine and Internal Medicine Residency Faculty – St. Luke's University Health Network, Anderson Campus
Clinical Assistant Professor - Lewis Katz School of Medicine Temple University, Department of Family and Community Medicine

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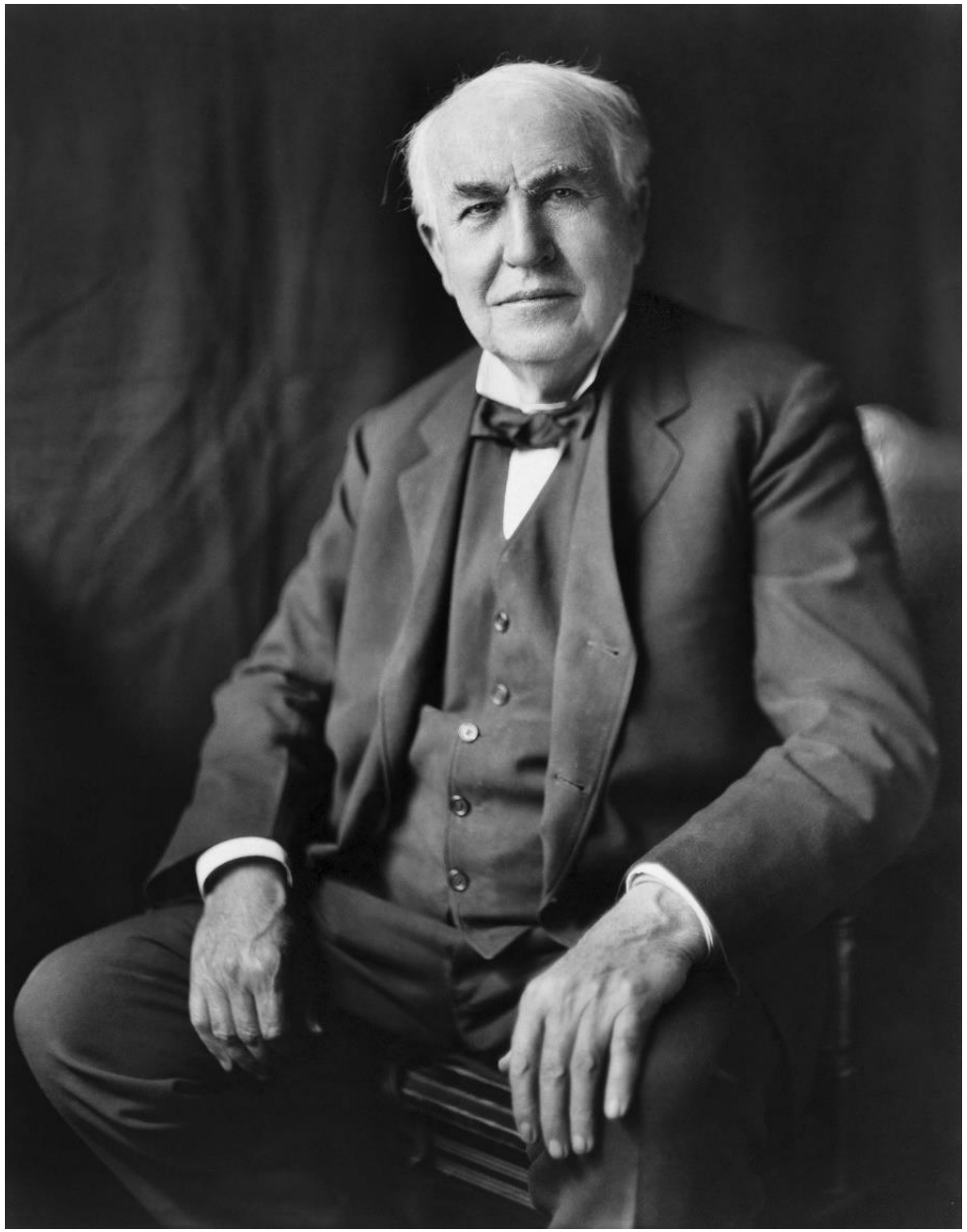
Learning Objectives

- Describe the relationship between lifestyle choices and chronic disease
- Summarize research regarding common characteristics of communities with higher than average percentage of octogenarian and older inhabitants

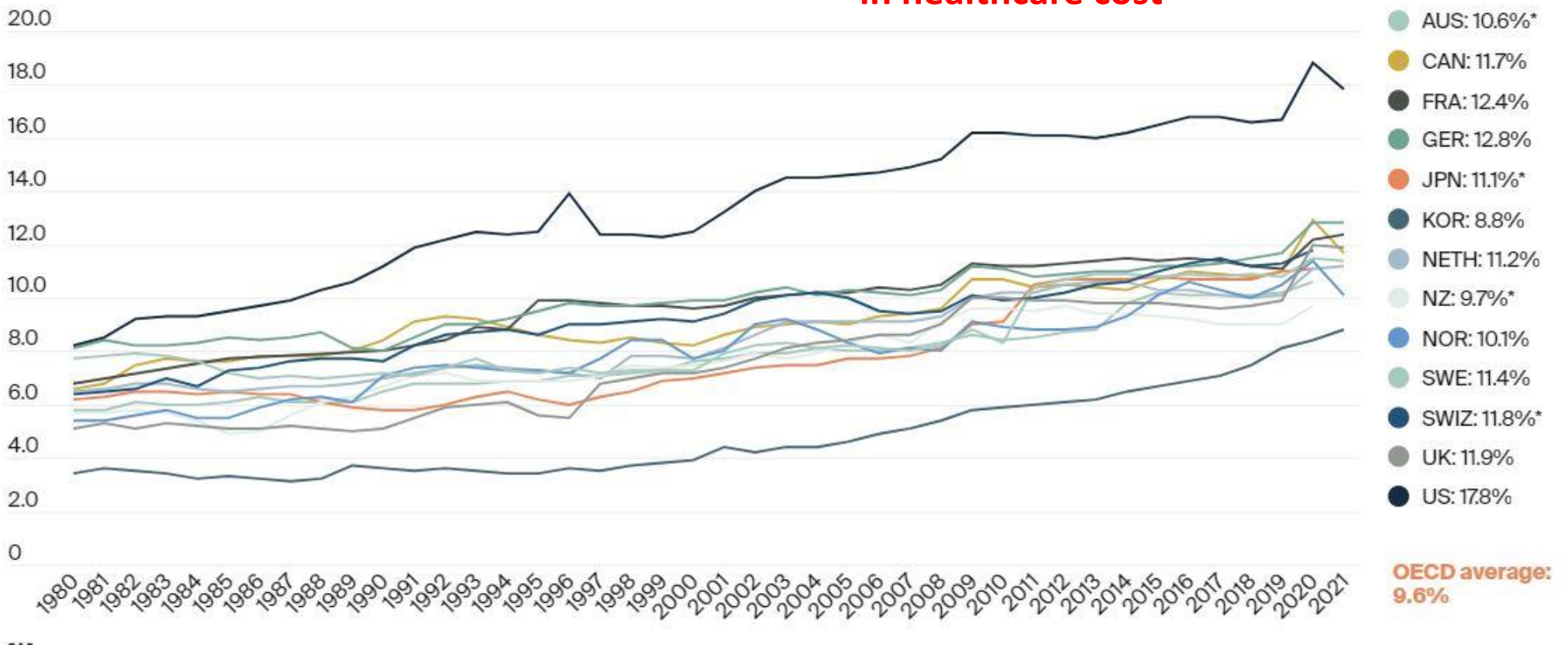


“The doctor of the future will give no medication but will interest his patients in the care of the human frame, diet and in the cause and prevention of disease”

-Thomas A. Edison

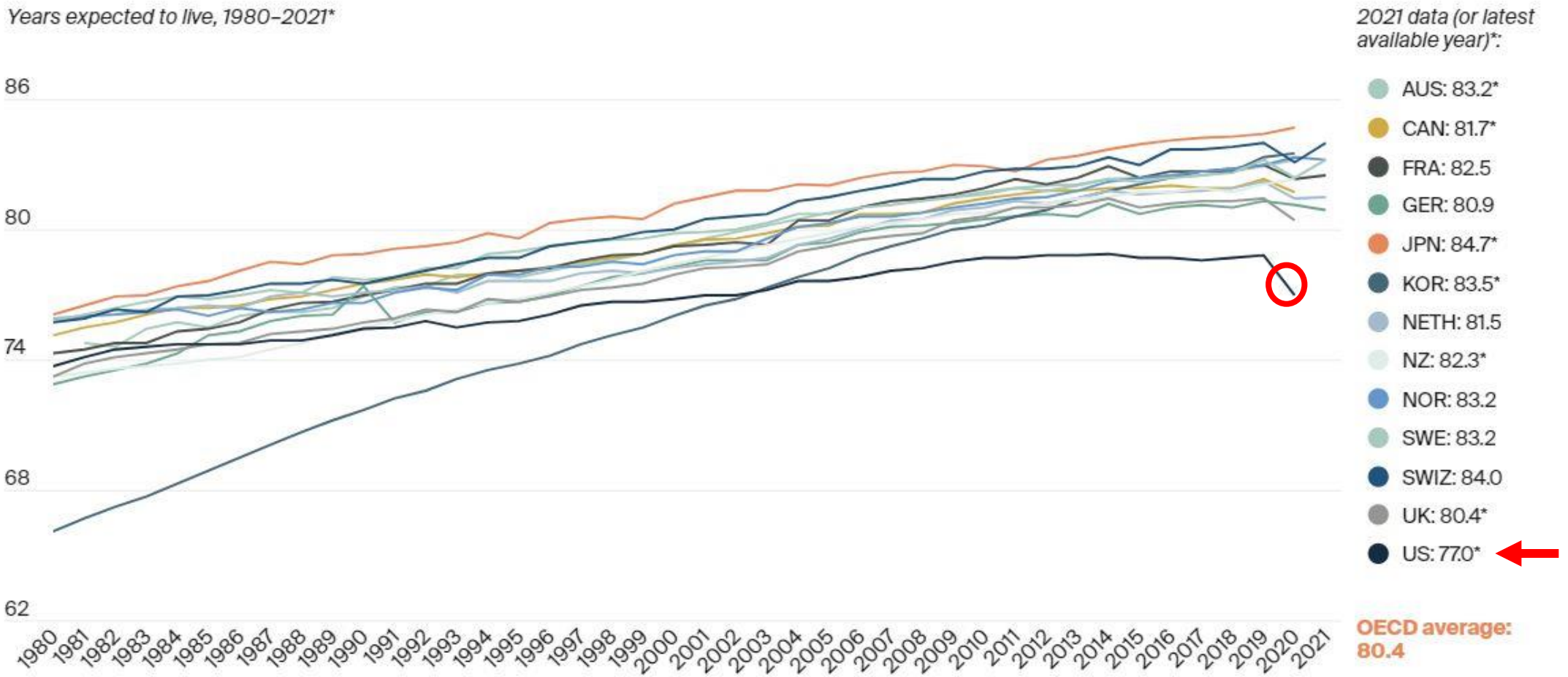
The U.S. is a world outlier when it comes to health care spending.

US 2021: $12,914 per person in healthcare cost



Source: Munira Z. Gunja, Evan D. Gumas, and Reginald D. Williams II, *U.S. Health Care from a Global Perspective, 2022: Accelerating Spending, Worsening Outcomes* (Commonwealth Fund, Jan. 2023). https://doi.org/10.26099/8ejy-yc74

U.S. life expectancy at birth is three years lower than the OECD average.



Source: Munira Z. Gunja, Evan D. Gumas, and Reginald D. Williams II, *U.S. Health Care from a Global Perspective, 2022: Accelerating Spending, Worsening Outcomes* (Commonwealth Fund, Jan. 2023). https://doi.org/10.26099/8ejy-yc74

Clinical Review & Education

JAMA | Special Communication

Life Expectancy and Mortality Rates in the United States, 1959-2017

Steven H. Woolf, MD, MPH; Heidi Schoomaker, MAEd

IMPORTANCE US life expectancy has not kept pace with that of other wealthy countries and is now decreasing.

CONCLUSIONS AND RELEVANCE US life expectancy increased for most of the past 60 years, but the rate of increase slowed over time and life expectancy decreased after 2014. A major contributor has been an increase in mortality from specific causes (eg, drug overdoses, suicides, organ system diseases) among young and middle-aged adults of all racial groups, with an onset as early as the 1990s and with the largest relative increases occurring in the Ohio Valley and New England. The implications for public health and the economy are substantial, making it vital to understand the underlying causes.

Woolf SH, Schoomaker H. Life Expectancy and Mortality Rates in the United States, 1959-2017. *JAMA.* 2019;322(20):1996–2016. doi:10.1001/jama.2019.16932

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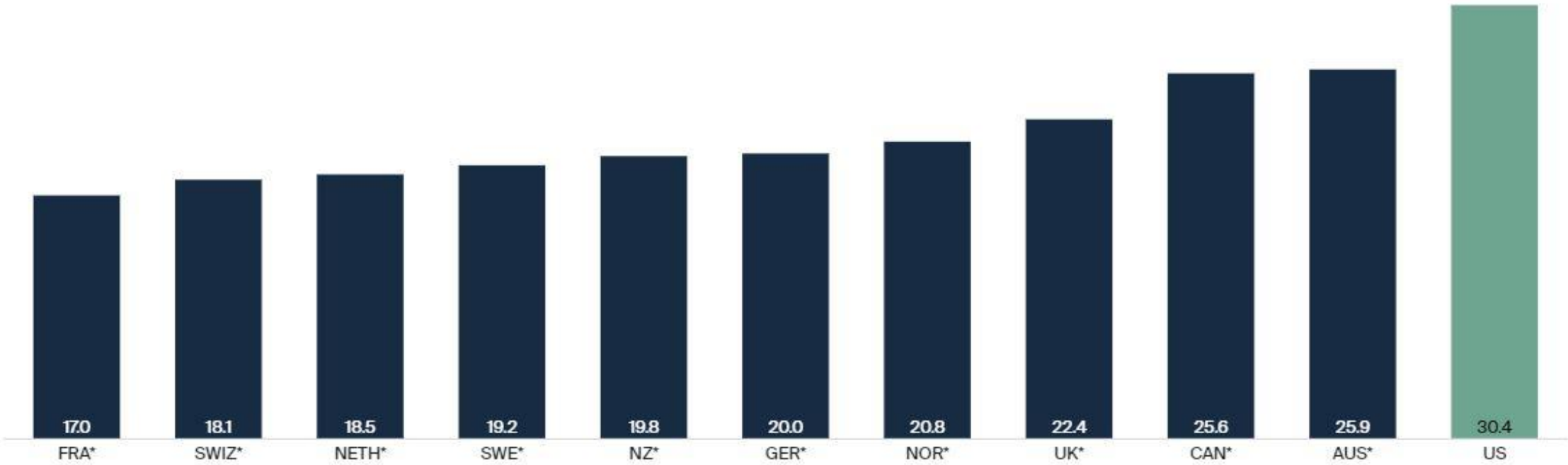
Adults in the U.S. are the most likely to have multiple chronic conditions.

Percent of adults age 18 and older who have multiple chronic conditions



Source: Munira Z. Gunja, Evan D. Gumas, and Reginald D. Williams II, *U.S. Health Care from a Global Perspective, 2022: Accelerating Spending, Worsening Outcomes* (Commonwealth Fund, Jan. 2023). https://doi.org/10.26099/8ejy-yc74

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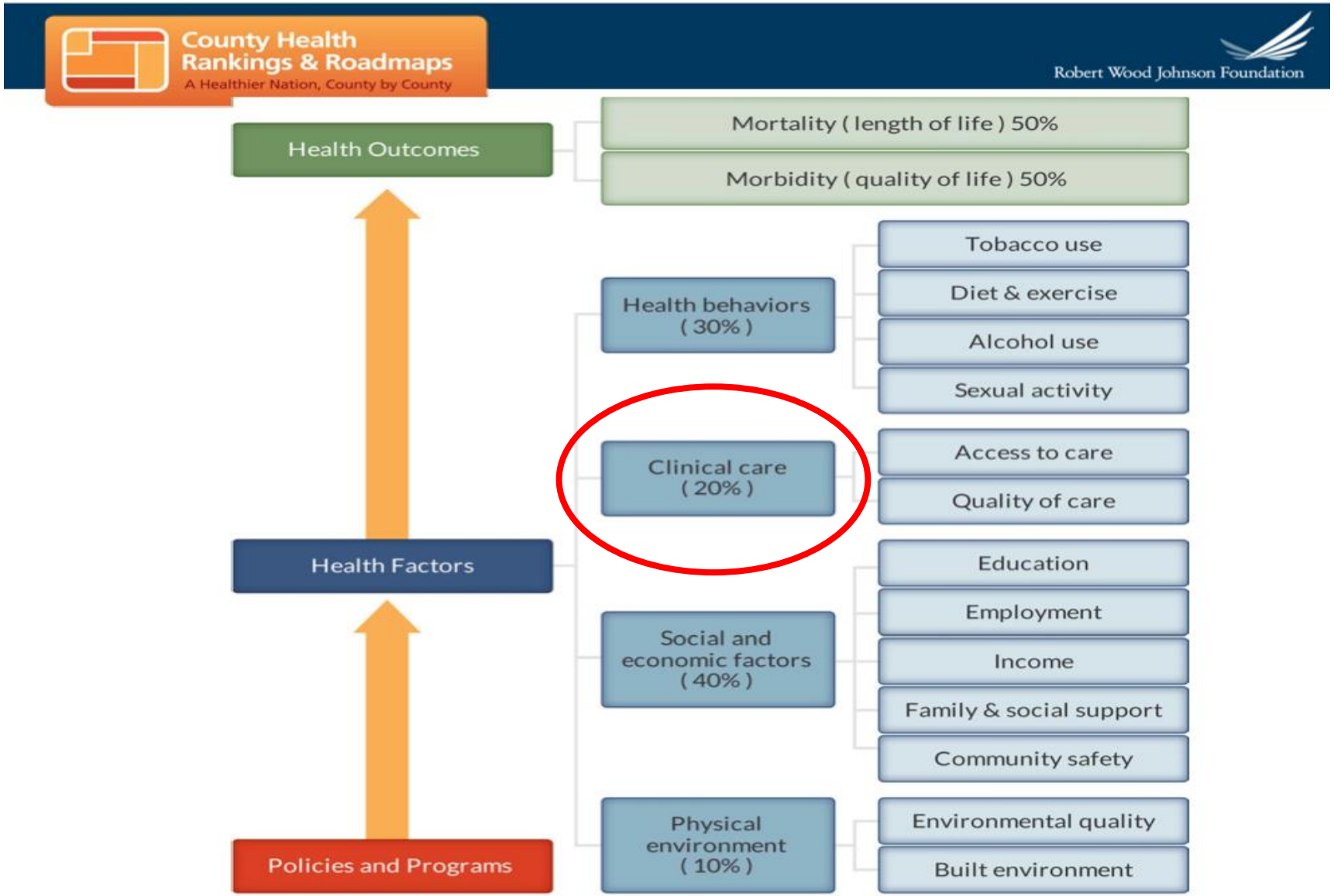

Top Ten Causes of Mortality 2021

- **Heart Disease**
- **Cancer**
- COVID 19
- Accidents
- **Stroke**
- **Chronic lower respiratory dx**
- **Alzheimer's Dx**
- **Diabetes**
- **Chronic liver disease**
- **Kidney Disease**

https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm

Only **20-35%** of the variation in human lifespan is thought to be determined by fixed genetic factors – the majority is due to lifestyle behaviors and exposures

Shadyab A.H., LaCroix A.Z., (2015). Genetic factors associated with longevity: a review of recent findings. *Ageing Research Reviews*, 19, 1–7. doi: 10.1016/j.arr.2014.10.005

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What is Lifestyle Medicine?

Lifestyle medicine is the **evidence-based** practice of helping **individuals and communities** with comprehensive **lifestyle changes** (including nutrition, physical activity, stress management, social support, restorative sleep and toxic exposures) to help **prevent, treat, and even reverse** the progression of chronic diseases by addressing **underlying causes**.

Sanger, M., Katz, D., Egger, G., Lianov, L., Schulz, K. H., Braman, M., … & Ornish, D. (2014). Lifestyle medicine potential for reversing a world of chronic disease epidemics: from cell to community. *International Journal of Clinical Practice*, *68*(11), 1289–1292.

AMERICAN COLLEGE OF Lifestyle Medicine

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The Six Pillars

Healthful eating

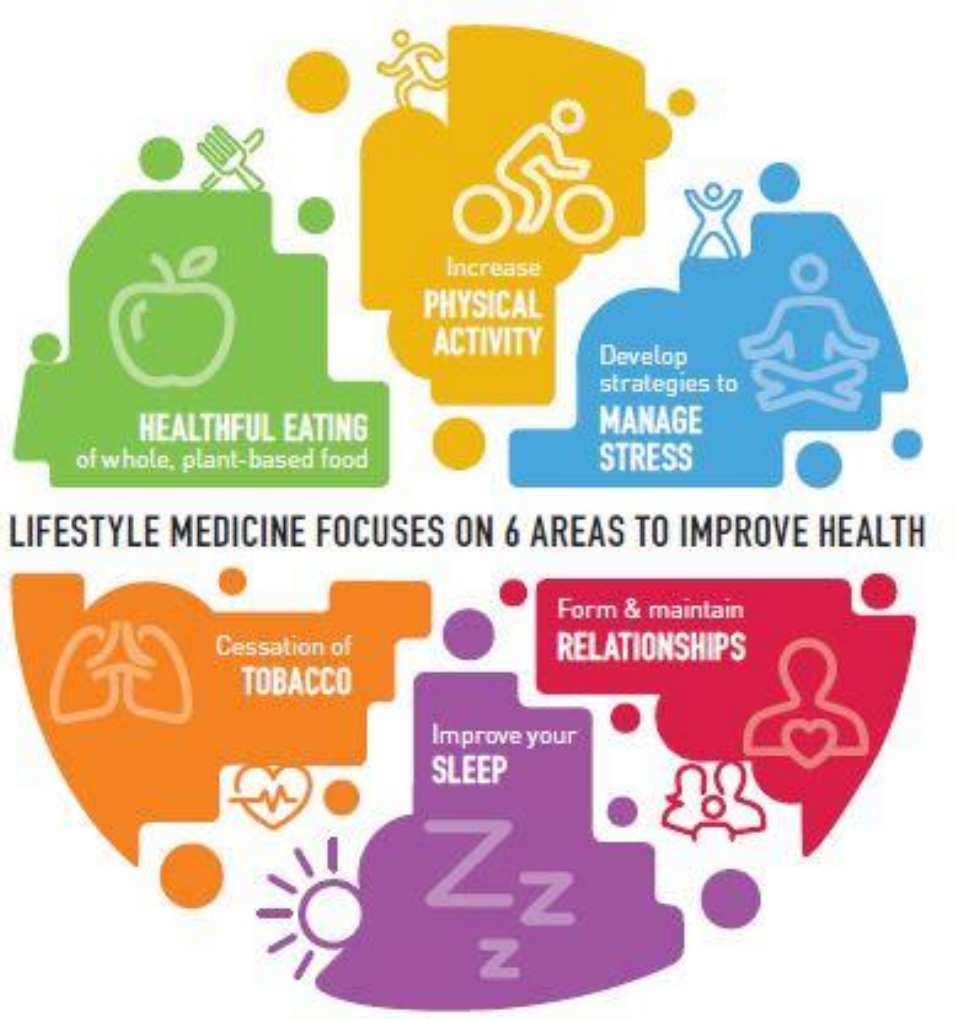
Physical activity

Stress management

Relationships

Sleep

Tobacco cessation



https://www.bluezones.com/exploration#section-1

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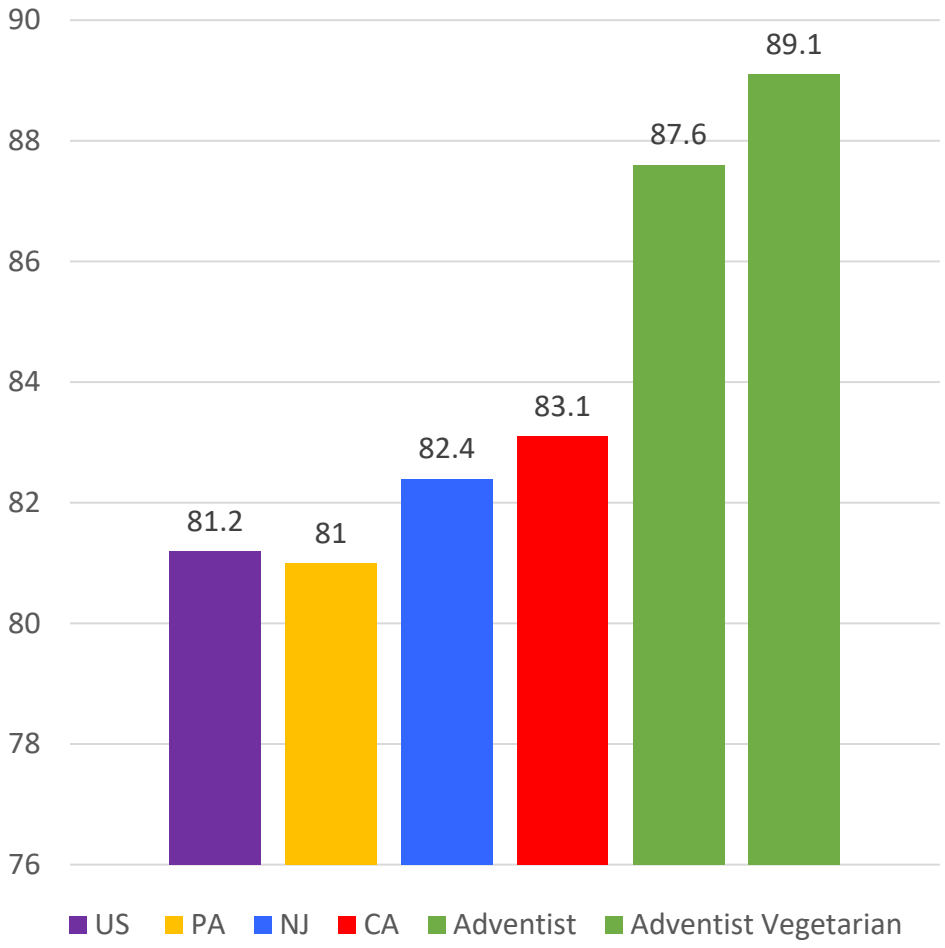
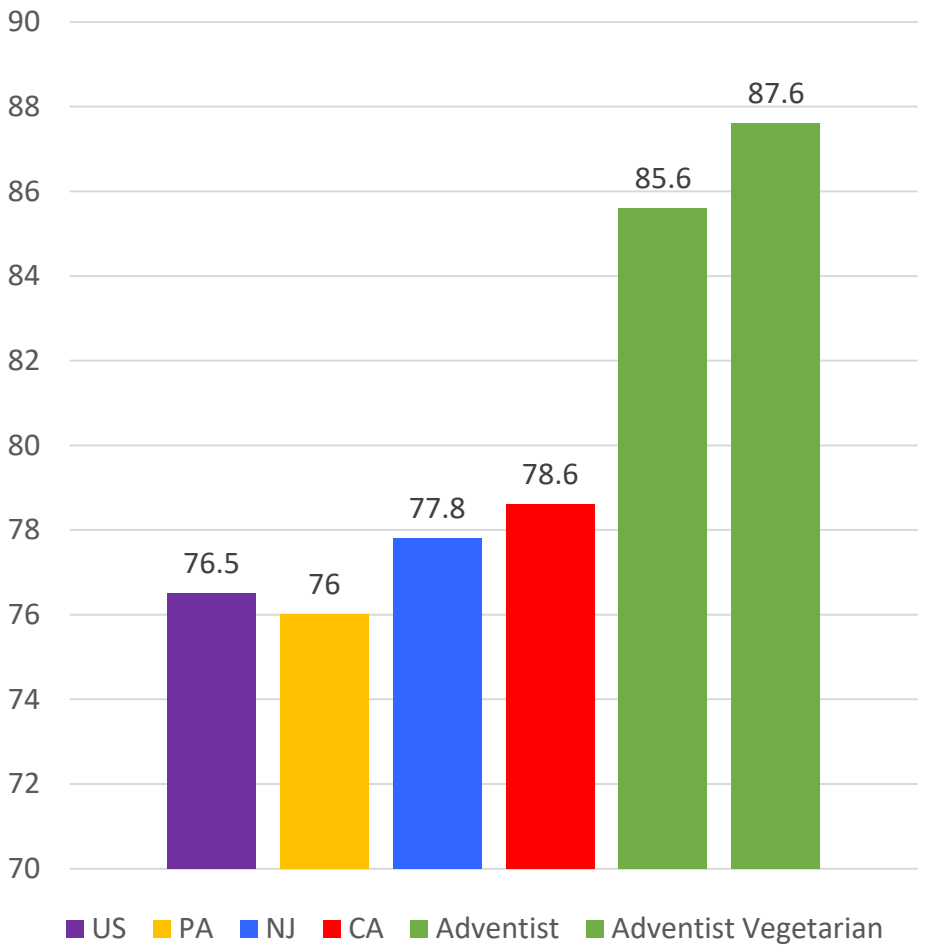
Female

Years of Life Expectancy



Male

Years of Life Expectancy



The US Burden of Disease Collaborators. The State of US Health, 1990-2016: Burden of Diseases, Injuries, and Risk Factors Among US States. *JAMA.* 2018;319(14):1444–1472. doi:10.1001/jama.2018.0158





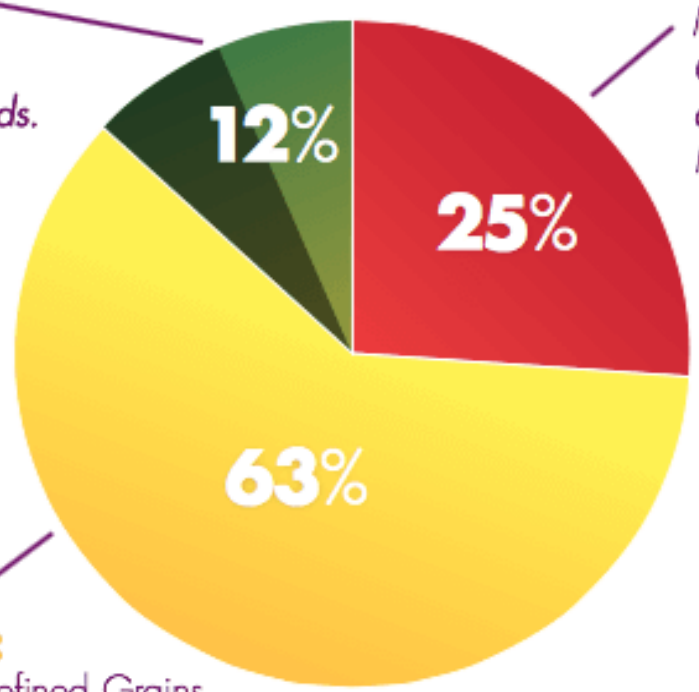


REAL COLA
CREAM SODA
ROOT BEER
IZZE
BREW

U.S. FOOD CONSUMPTION
AS A % OF CALORIES

PLANT FOOD:
Vegetables, Fruits, Legumes,
Nuts & Seeds, Whole Grains
***Fiber** is only found in plant foods.*

NOTE: Up to half of this category may be processed, for example almonds in candy bars, apples in apple pies or spinach in frozen spinach soufflé, and of course these would not be healthy choices. The focus should be on whole unprocessed vegetables, fruits, legumes, nuts and seeds and whole grains.



PROCESSED FOOD:
Added Fats & Oils, Sugars, Refined Grains

ANIMAL FOOD:
Meat, Dairy, Eggs, Fish, Seafood
***Cholesterol** is only found in animal foods. Animal foods are the PRIMARY source of saturated fat.*

GUIDE TO HEALTHY EATING:
Much easier to understand than the USDA Food Pyramid, with no food industry influence.

Eat **LESS** from the animal and processed food groups and **MORE** whole foods from the plant food group.

In general, food from the animal and processed food group contribute to disease, while **WHOLE** foods from the plant group contribute to good health.

Source: USDA Economic Research Service, 2009; www.ers.usda.gov/publications/EIB33; www.ers.usda.gov/Data/FoodConsumption/FoodGuideIndex.htm#calories
New York Coalition for Healthy School Food * www.healthyschoolfood.org
Special thanks to Joel Fuhrman, MD, author of ***Disease Proof Your Child: Feeding Kids Right*** * Graphics by MichelleBando.com

The Good News

- Data from Global Burden of Disease study 2019
- **Optimal diet** (higher intake of whole grains, legumes, fish, fruits, vegetables and nuts, decreased intake of red and processed meats, sugar sweetened beverages and refined grains) vs. typical **Western diet**
- Sustained change from Western to Optimal diet increases in Life Expectancy
  - Age 20: Women - **10.7** years, Men – **13** years
  - Age 60: Women – **8** years, Men – **8.8** years
  - Age 80: Women and Men – **3.4** years
- Largest gains seen from eating:
  - More legumes, whole grains and nuts
  - Less red meat and processed meat

Fadnes LT, Økland JM, Haaland ØA, Johansson KA. Estimating impact of food choices on life expectancy: A modeling study. PLoS Med. 2022 Feb 8;19(2):e1003889. doi: 10.1371/journal.pmed.1003889. PMID: 35134067; PMCID: PMC8824353.

The Bad News

- Data from NHANES survey cycles 2001-2002 to 2017-2018
- 10,837 adults aged 65 and older
- Evaluated diet scores based on AHA 2020 Strategic Impact Goals for Diet
  - Composite score: fruits, vegetables, whole grains, fish, nuts, seeds and legumes weighted positively; sugar-sweetened beverages, sodium, processed meat and saturated fat weighted negatively
- The proportion of older adults with **poor diet** quality **increased from 51% to 61%** from 2001-2018
- The proportion of older adults with **intermediate diet** quality **decreased from 49% to 39%** from 2001-2018
- The proportion of older adults with **ideal diet** quality remained **consistently low at 0.4%** from 2001-2018

Long T, Zhang K, Chen Y, Wu C. Trends in Diet Quality Among Older US Adults From 2001 to 2018. JAMA Netw Open. 2022 Mar 1;5(3):e221880. doi: 10.1001/jamanetworkopen.2022.1880. PMID: 35275167.

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“Those who do not find time for exercise will have to find time for illness.”

-The Earl of Derby

Age	"Aerobic" Recommendations	"Resistance" Recommendations
3-5	Be active throughout the day to enhance growth and development	No specific recommendations
6-17	60 minutes of mod-vigorous physical activity/day (vigorous at least 3x/week)	As part of the 60 minutes, include activities that make muscles and bones stronger like climbing on playground equipment, playing basketball or jumping rope at least 3x/week
18-64	150 -300 minutes of moderate PA or 75 minutes of vigorous PA/week	Activities such as lifting weights or doing push-ups that engage all major muscle groups at moderate or greater intensity on 2 or more days a week
65 +	150 -300 minutes of moderate PA or 75 minutes of vigorous PA/week. Includes balance and functional activities	Activities such as lifting weights or doing push-ups that engage all major muscle groups on 2 on more days a week. Include multicomponent PA such as balance and neuromotor activities
All Ages	Sit Less. Move More. All physical activity counts.	

2018 Physical Activity Guidelines Advisory Committee, 2018

Aerobic Intensity

The Power of Physical Activity

<500 MET minutes/week – 22% reduction in mortality

500-999 MET minutes/week – 28% reduction in mortality

≥1000 MET minutes/week – 35% reduction in mortality

Hupin, D., Roche, F., Gremeaux, V., Chatard, J. C., Oriol, M., Gaspoz, J. M., ... & Edouard, P. (2015). Even a low-dose of moderate-to-vigorous physical activity reduces mortality by 22% in adults aged≥ 60 years: a systematic review and meta-analysis. *British Journal of Sports Medicine*, *49*(19), 1262-1267.

Resistance Training

- Resistance Training (RT) decreases all-cause and CVD mortality **independent of aerobic activity**
  - RT 1, 2, 3 times per week or duration of 1-59 minutes resulted in decreased risk of CVD events
  - The lowest risk of CVD and all-cause mortality is attained at RT of 2 times/week
  - No decreased risk seen with RT at more than 4 times or >60 minutes per week

Liu Y, Lee DC, Li Y, Zhu W, Zhang R, Sui X, Lavie CJ, Blair SN. Associations of Resistance Exercise with Cardiovascular Disease Morbidity and Mortality. Med Sci Sports Exerc. 2019 Mar;51(3):499-508. doi: 10.1249/MSS.0000000000001822. PMID: 30376511; PMCID: PMC7385554.

How Much Should I Step it Up?

- NHANES participants
  - 4840 participants, mean age 56.8 years
  - Mean follow-up 10.1 years
  - Step count measured by accelerometer (mean 5.7 days)
- Unadjusted all-cause mortality
  - **<4000** steps/day: **76.7** per 1000 person-years
  - **4000-7999** steps/day: **21.4** per 1000 person-years
  - **8000-11999** steps/day: **6.9** per 1000 person-years
  - **≥12000** steps/day: **4.8** per 1000 person-years
- Compared to <4000 steps/day:
  - **>8000** steps/day **HR 0.49**
  - **≥12000** steps/day **HR 0.35**
- Greater step intensity **not** associated with lower all-cause mortality after adjustment for total steps/day

Saint-Maurice PF, Troiano RP, Bassett DR, et al. Association of Daily Step Count and Step Intensity With Mortality Among US Adults. *JAMA.* 2020;323(12):1151–1160.

Physical Activity Decreases Risk of Chronic Disease

- ↓Dementia 32%
- ↓Diabetes 50%
- ↓Breast Cancer 18%
- ↓Recurrent Breast Cancer 50%
- ↓Colon Cancer 60%
- ↓Prostate Cancer 10%-30%
- ↓Depression 50%
- ↓Anxiety symptoms
- ↓Hypertension 40%
- ↓Heart Disease 40%
- ↓Stroke 27%
- ↓Atrial Fibrillation 48%

And So Much More!!

Larson et al., 2006; Wei et al., 1999; McTiernan et al., 2003; Holmes, Chen, Feskanich, Kroenke, & Colditz, 2005; Slattery & Potter, 2002; Hochberg et al., 2012; Shepard, 2017; Dunn, Trivedi, Kampert, Clark, & Chambliss, 2005; Sayeed et al., 2019; Barlow et al., 2005; Hu et al., 2000; Mozaffarian, Furberg, Psaty, & Siscovick, 2008

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"**AMAZING BREAKTHROUGH!** Scientists have discovered a revolutionary new treatment that makes you live longer. It enhances your memory and makes you more creative. It makes you look more attractive. It keeps you slim and lowers food cravings. It protects you from cancer and dementia. It wards off colds and the flu. It lowers your risk of heart attacks and stroke, not to mention diabetes. You'll even feel happier, less depressed, and less anxious. Are you interested?"

— Matthew Walker

Why We Sleep: The New Science of Sleep and Dreams

How Much Sleep Do You Need?

Age	Amount of Sleep
3-5 years	11-13 hours/day
5-12 years	9-11 hours/day
12-18 years	8.5-9.5 hours/day
Adults	7-9 hours/day

Data from the National Sleep Foundation from http://www.cdc.gov/Features/Sleep/

The Importance of Sleep

- Sleep deprivation causes:
  - Increased sympathetic mediators
  - Increased cortisol
  - Increased ghrelin
  - Decreased leptin
  - Decreased growth hormone
  - Impaired glucose tolerance
  - Suppressed immune system
  - Increased inflammation

Chen, X. et at. "Is Sleep Duration Associated With Childhood Obesity? A Systematic Review and Meta-analysis." *Obesity* (2008) 16, 265-274.
Möller-Levet, C.S., et al. (2013). Sleep loss and the human blood transcriptome. *Proceedings of the National Academy of Sciences*, *110*(12), E1132-E1141. doi:10.1073/pnas.1217154110

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“Peace…
It does not mean to be in a place where there is no noise, trouble or hard work. It means to be in the midst of those things and still be calm in your heart.”

- Unknown

Effect of Stress

- Fight or Flight response
  - Increase sympathetic mediators
  - Decrease parasympathetic mediators
  - Suppresses immune system
- Chronic Stress
  - Increase cortisol
    - Increase fat deposition
    - Increase appetite
    - Increase craving for carbohydrates and fat
    - Weight gain

Cannon, W. B. (1932). *The wisdom of the body*. New York: W.W. Norton & Company, Inc.

Cannon, W. B. (1920). *Bodily changes in pain, hunger, fear and rage: an account of recent researches into the function of emotional excitement.* New York: D. Appleton and Company.

Pasquali, R (2012). The hypothalamic-pituitary-adrenal axis and sex hormones in chronic stress and obesity: pathophysiology and clinical aspects *Annals of the New York Acad Sci*.Aug;1264:20-35.

Effect of Stress

- Increased risk of depression
- Increased risk of anxiety
- Increased risk of cardiovascular disease
- Accelerated HIV progression
- Increased risk of diabetes
- Increased inflammatory mediators:
  - IL-1B, IL-4, IL-6, IL-10, TNF-alpha, interferon-gamma

Cohen S, Janicki-Deverts D, Miller GE. Psychological Stress and Disease. *JAMA.* 2007;298(14):1685–1687.
Hackett RA, Steptoe A. Psychosocial Factors in Diabetes and Cardiovascular Risk. Curr Cardiol Rep. 2016 Oct;18(10):95.
Marsland AL, Walsh C, Lockwood K, John-Henderson NA. The effects of acute psychological stress on circulating and stimulated inflammatory markers: A systematic review and meta-analysis. Brain Behav Immun. 2017 Aug;64:208-219.

Impact of Mind-Body Techniques

- Increases vagal tone
- Decreases sympathetic mediators
- Decreases systolic and diastolic BP
- Improves heart rate variability
- Decreases basal cortisol level
- Decreases urinary free cortisol and epinephrine
- Downregulation of nuclear factor kappa B pathway
- Decreases rumination
- Improves coping strategies
  - Cognitive shift from “threat” to “challenge”

Epel E, et. al. Can meditation slow rate of cellular aging? Cognitive stress, mindfulness, and telomeres. Ann N Y Acad Sci. 2009 Aug;1172:34-53.
Buric I,et al. What Is the Molecular Signature of Mind-Body Interventions? A Systematic Review of Gene Expression Changes Induced by Meditation and Related Practices. Front Immunol. 2017 Jun 16;8:670.

Social Connection

- Nurture a supportive social group
  - Harvard Health Study
    - The quality of our relationships is more important than wealth, status and power in determining longevity and happiness
- Loneliness is a modifiable risk factor
  - Health and Retirement Study
  - Loneliness associated with decline in ADLs, mobility, difficulty climbing stairs and upper extremity tasks
  - Loneliness increased risk of death
    - 22.8% vs. 14.2%

Robert Waldinger TEDx "What Makes a Good Life? Lessons from the Longest Study on Happiness": https://www.youtube.com/watch?v=8KkKuTCFvzI
Perissinotto CM, Stijacic Cenzer I, Covinsky KE. Loneliness in older persons: a predictor of functional decline and death. Arch Intern Med. 2012 Jul 23;172(14):1078-83.

OK…sounds great. But does it work in the real world?

Effect of Lifestyle Habits

- Ford, et. al studied over 23,000 participants aged 35-65, mean follow-up 7.8 years
- Evaluated lifestyle factors:
  - BMI<30
  - No tobacco use
  - 3.5 hr/week or more physical activity
  - High intake fruits, vegetables, whole grains and low red meat consumption
- Following all **4** healthy lifestyle factors resulted in a **78%** decreased risk of developing chronic disease compared to 0 healthy lifestyle factors

Healthy Living Is the Best Revenge: Findings From the European Prospective Investigation Into Cancer and Nutrition–Potsdam Study. *Arch Intern Med.* 2009;169(15):1355–1362. doi:10.1001/archinternmed.2009.237

Effect of Lifestyle Habits

- Loprinzi, et. al reviewed 2003-2006 NHANES data to evaluate:
  - Sufficient physical activity by accelerometer
  - Eating a healthy diet (24-hour recall Healthy Eating Index)
  - Non-smoker
  - Having recommended body fat percentage
- Only **2.7%** of American adults demonstrated all **4** healthy lifestyle characteristics

Healthy Lifestyle Characteristics and Their Joint Association With Cardiovascular Disease Biomarkers in US Adults Loprinzi, Paul D. et al. Mayo Clinic Proceedings , Volume 91 , Issue 4 , 432 - 442

AHA Simple 7

- No tobacco use
- Eat a healthy diet
- Be physically active
- Maintain a healthy body weight
- Manage blood pressure
- Control cholesterol
- Reduce blood sugar
- **1%** of Americans have ideal numbers **for all 7**

Essential 8

Added “Get Healthy Sleep”

https://www.heart.org/en/healthy-living/healthy-lifestyle/lifes-essential-8

https://playbook.heart.org/lifes-simple-7/

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Therapeutic Dose

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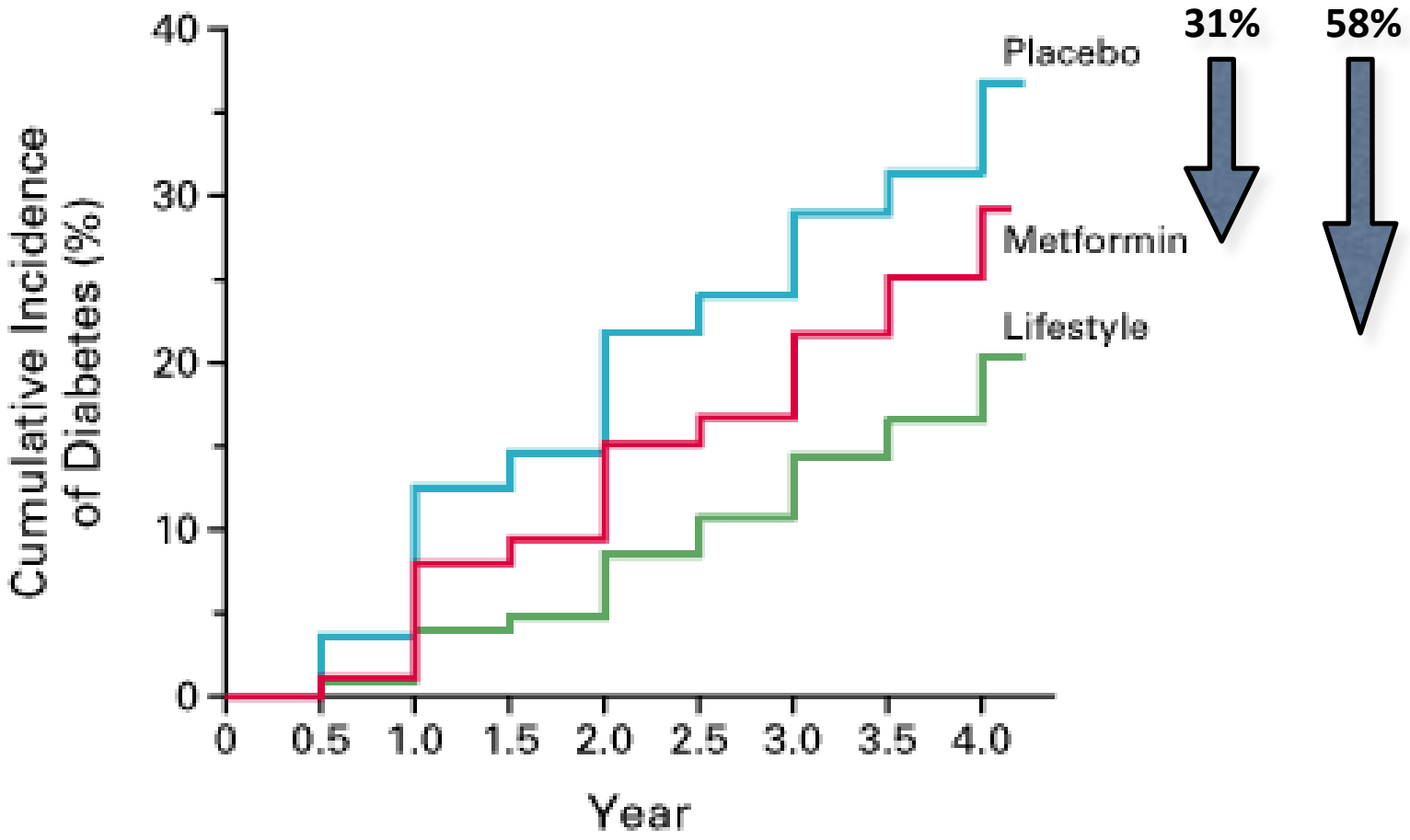
Diabetes Prevention Program



DPP Research Group NEJM (2002): 346 (6): 393

Diabetes

- Participants: 20 men with type 2 DM, currently on insulin therapy
- Fed high-carbohydrate, high-fiber diet that was ***weight-maintaining***
- Followed for 16 days
- Overall insulin requirements decreased 60%
- 11 participants were able to stop insulin entirely
- Serum cholesterol dropped an average of almost 80 points
- This is the **POWER of PLANTS**

J W Anderson, K Ward; High-carbohydrate, high-fiber diets for insulin-treated men with diabetes mellitus, *The American Journal of Clinical Nutrition*, Volume 32, Issue 11, 1 November 1979, Pages 2312–2321

Diabetes

- 74 week randomized, controlled clinical trial comparing effect of low-fat, vegan diet vs. ADA diet
- 99 participants with Type 2 DM, living in community setting, no meals provided
- Weight loss:
  - Vegan: **-4.4 Kg**, ADA: **-3.0 Kg**
- HgbA1C change:
  - Vegan: **-0.34**, ADA: **-0.14**
- Total cholesterol:
  - Vegan: **-20.4**, ADA: **-6.8**
- LDL:
  - Vegan: **-13.5**, ADA: **-3.4**

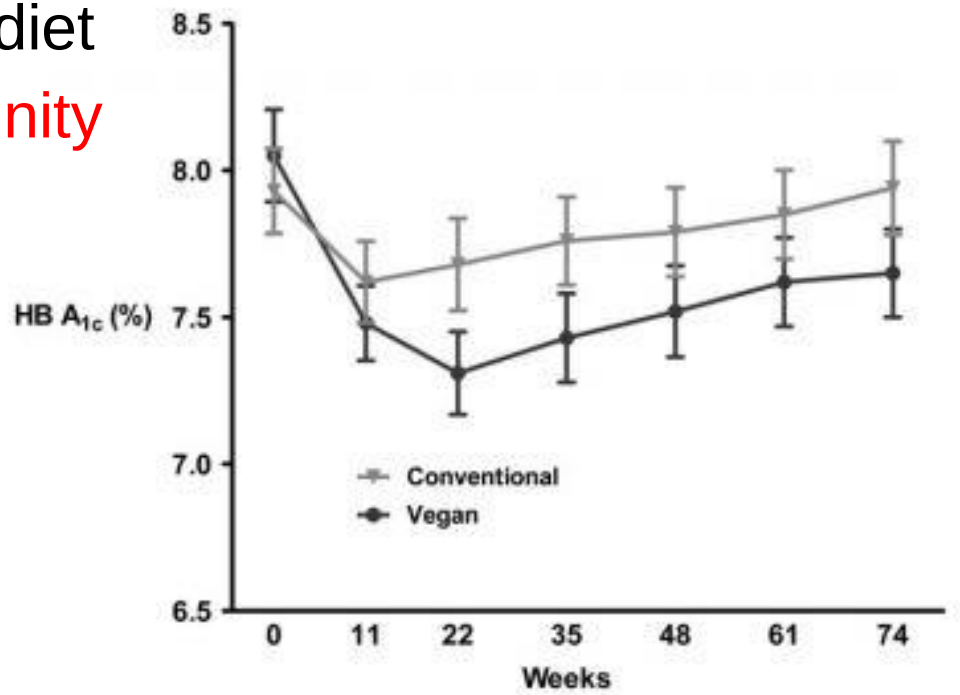


FIGURE 1. Glycated hemoglobin (HB A_{1c}) values for all participants (n = 49 vegan diet; n = 50 conventional diet). The mean (±SD) data shown are last values before any change to diabetes medications carried forward. t Test for between-group comparison of changes from baseline to final values, P = 0.03.

Barnard ND, Cohen J, Jenkins DJ, et al. A low-fat vegan diet and a conventional diabetes diet in the treatment of type 2 diabetes: a randomized, controlled, 74-wk clinical trial. *Am J Clin Nutr*. 2009;89(5):1588S–1596S. doi:10.3945/ajcn.2009.26736H

Cardiovascular Disease

- Patients self-selected, non-randomized
- Considered adherent if they removed meat, fish, eggs, dairy and added oils
- Emphasis on eating green leafy vegetables daily, lots of fruit, vegetables, whole grains
- After 3.7 years 89% were still adherent
  - Separate cohort 77% still adherent after 12 years

FIGURE 1

Restoration of myocardial perfusion[2]

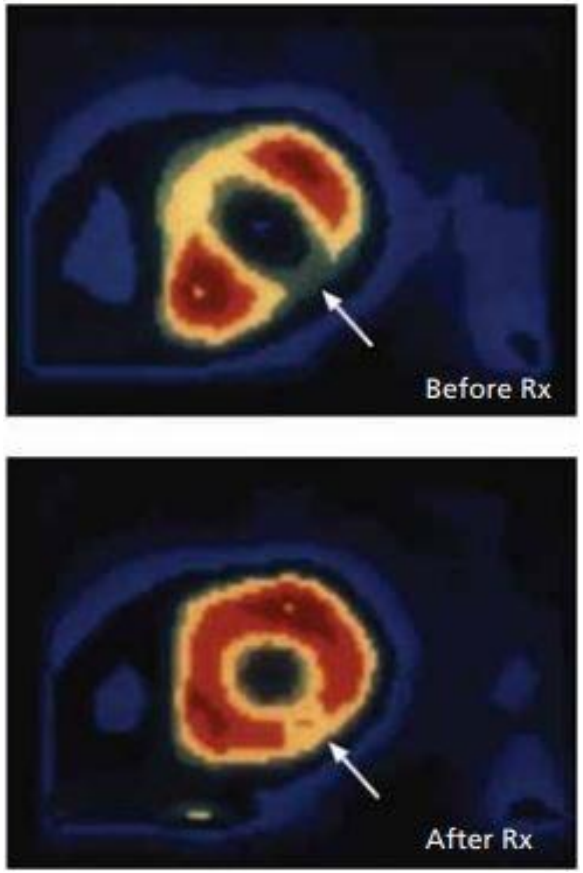
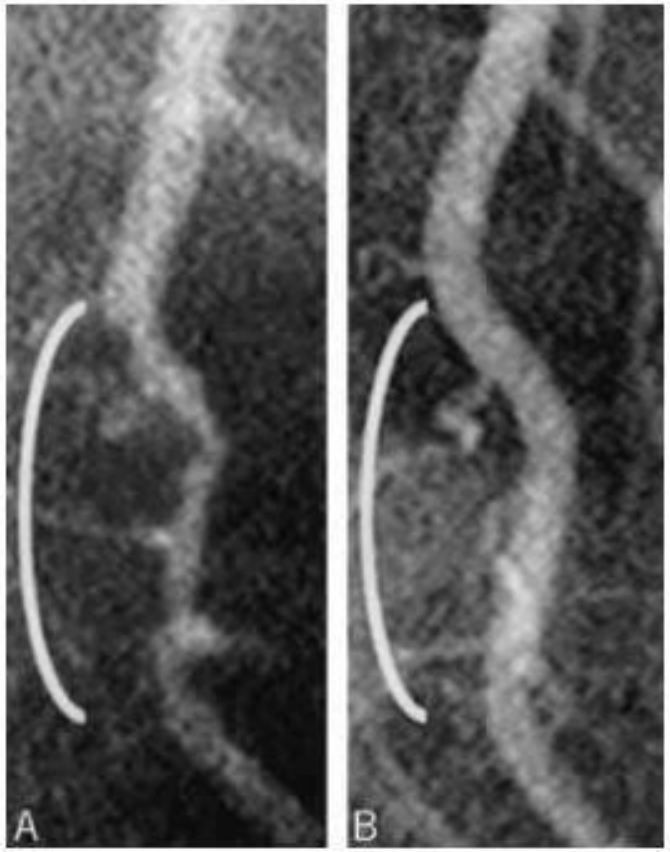


FIGURE 2

Reversal of coronary artery disease[4]

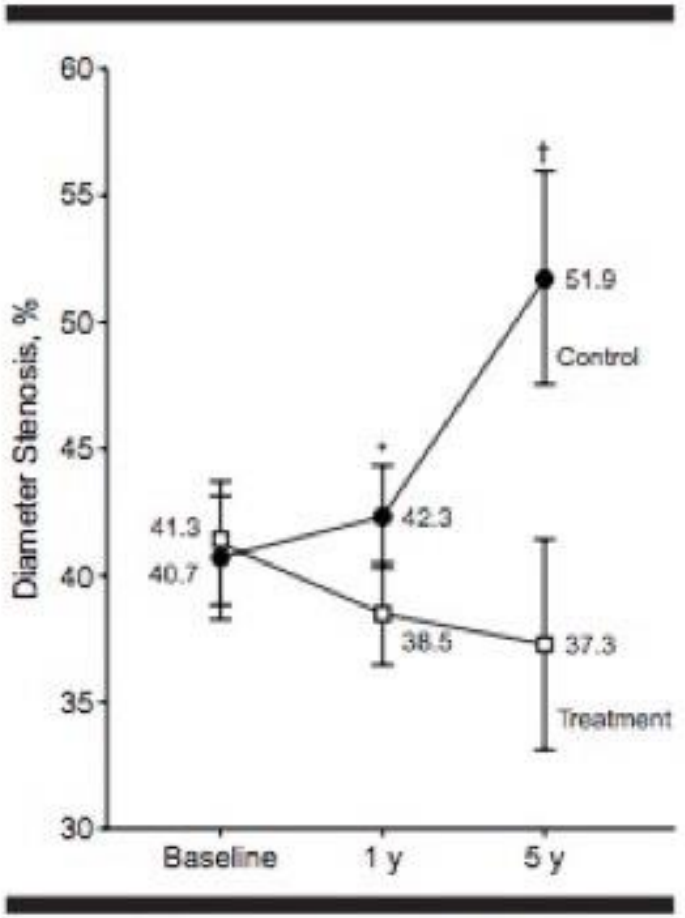


Esselstyn CB, Gendy G, Doyle J, Golubic M, Roizen M. A Way to Reverse CAD. The Journal of Family Practice. 2014, July; 63(7):356-364b

Ornish Lifestyle Heart Trial

Eat Well, Move More, Stress Less, Love More

- Randomized-control study
- Control Group: **10.6% *increase*** in mean coronary artery stenosis
- Intervention Group: **3.4% *decrease*** in mean coronary artery stenosis
- Overall **14% difference** in mean artery stenosis between control group and intervention group



Ornish, D., Schwitz, L. W., Billings, J. H., Brown, S. E., Gould, K. L., Merritt, T. A., … & Brand, R. J. (1998). Intensive lifestyle changes for reversal of coronary heart disease. The *Journal of the American Medical Association, 280*(23), 2001-2007.

How to Live Like a Centenarian

Eat a predominantly whole food, plant-based diet

Enjoy frequent physical activity

Prioritize restorative sleep

Nurture social connections

Engage in healthy stress management activities

Avoid risky substances like tobacco and excessive alcohol

Honor your Ikigai

AMERICAN COLLEGE OF Lifestyle Medicine

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The Six Pillars

Healthful eating

Physical activity

Stress management

Relationships

Sleep

Tobacco cessation