Optimizing Health with Dietary Patterns in Prostate Cancer

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NCI Comprehensive Cancer Center

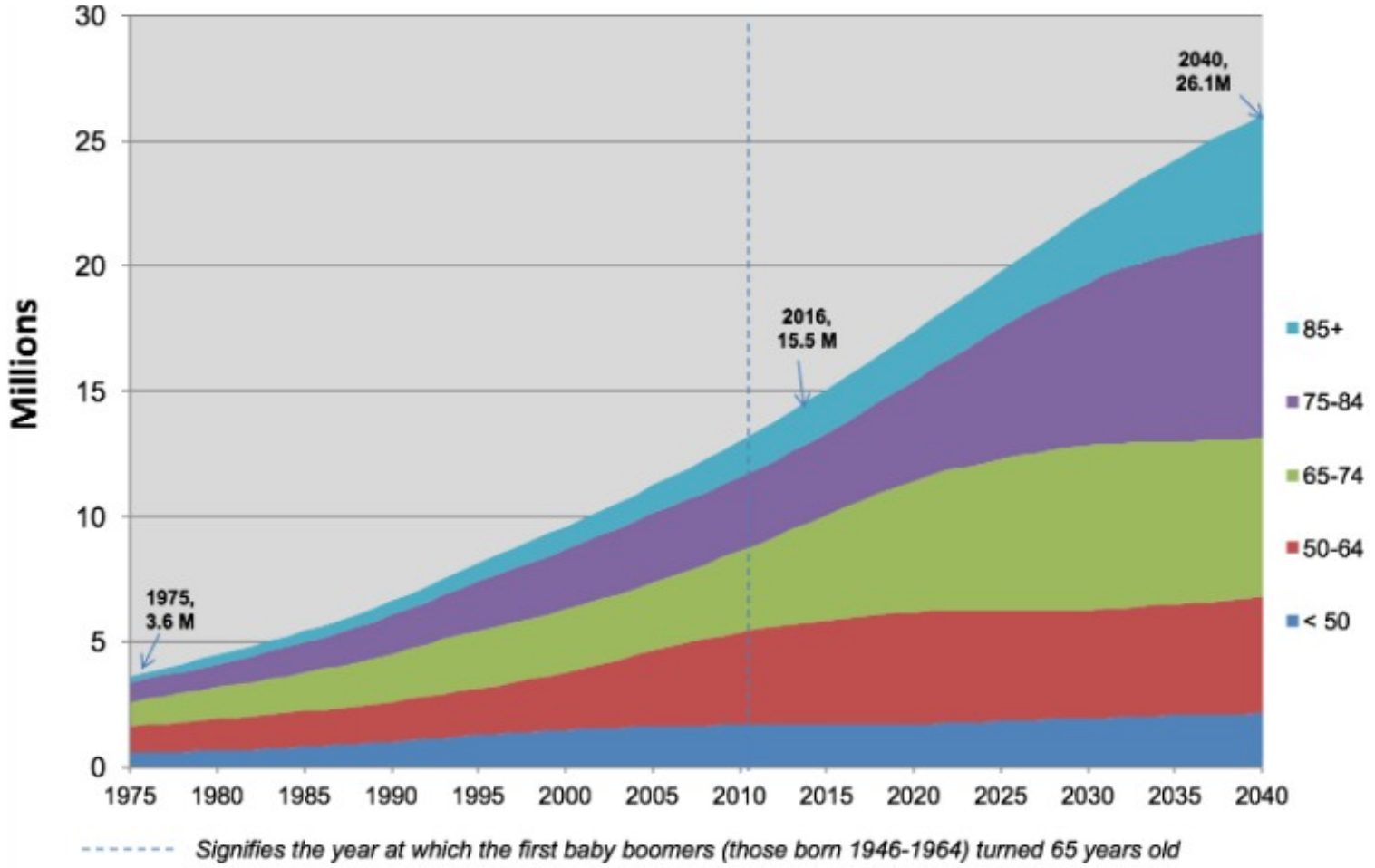
A Cancer Center Designated by the National Cancer Institute

HARVARD T.H. CHAN SCHOOL OF PUBLIC HEALTH

Department of Epidemiology

Prevalence of cancer survivors in the United States, 1975–2040

3.6 million US men are prostate cancer survivors

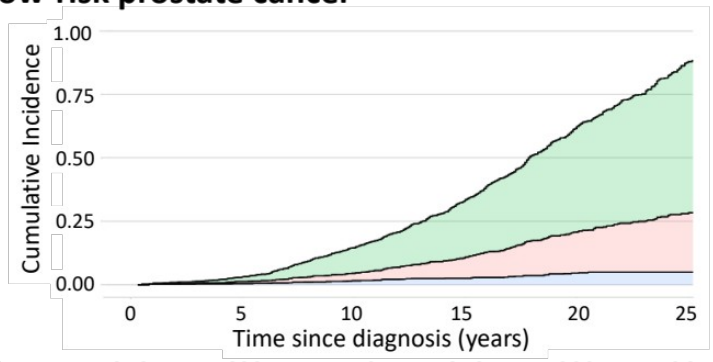


National Cancer Institute 2020

Figure 1. Stacked cumulative incidence (risk) of CVD, prostate cancer, and other cause deaths by AUA risk groups.

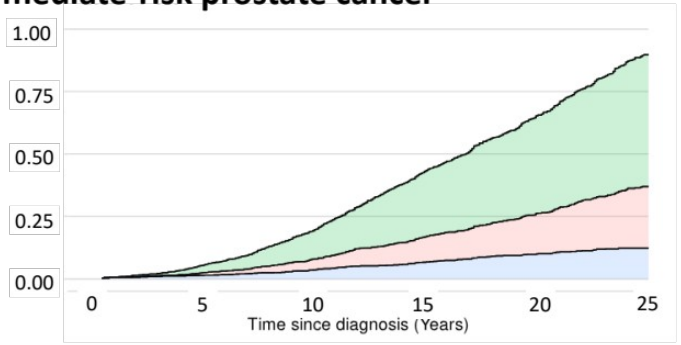
Caroline Himbert, MGB/Harvard

A. Low-risk prostate cancer



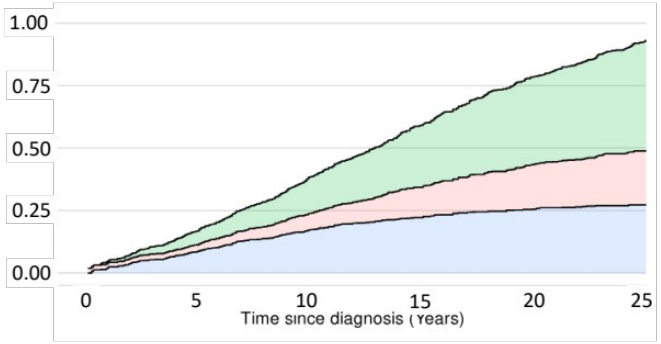
At risk	342	1603	1149	646	222	36
Other-cause	0	26	149	293	434	509
CVD	0	13	46	107	168	198
Prostate cancer	0	6	22	34	49	51

B. Intermediate-risk prostate cancer



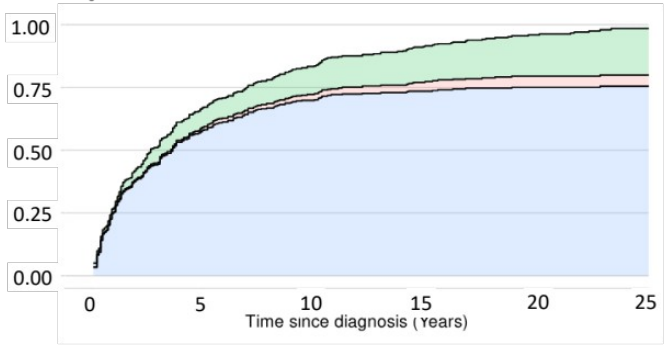
At risk	401	1848	1299	693	272	44
Other-cause	0	59	213	417	539	619
CVD	0	21	79	161	216	266
Prostate cancer	0	20	58	101	132	147

C. High-risk prostate cancer



At risk	54	887	581	325	139	31
Other-cause	0	52	141	228	308	347
CVD	0	10	49	97	137	157
Prostate cancer	0	72	159	202	226	236

D. Advanced prostate cancer



At risk	60	121	59	31	11	2
Other-cause	0	20	32	43	50	55
CVD	0	4	8	12	15	15
Prostate cancer	0	130	173	186	191	192

Potential aspects of diet that impact health

- Individual foods (e.g. tomatoes, dairy products, broccoli)
- Macronutrients (e.g. fats, protein, carbohydrates, alcohol)
- Micronutrients (e.g. vitamins, minerals)
- Phytochemicals (found in plant based foods)
- Carcinogens, contaminants (e.g. pesticide residues, charred meats)
- Dietary patterns (e.g. Mediterranean, inflammatory diets)

Dietary patterns discussed in session

1. Mediterranean diet
2. Plant-based diet
3. Hyperinsulinemic diet
4. Inflammatory diet
5. Healthy lifestyle

Dietary patterns in populations

Dietary score derived from biological markers

Empirically derived

Specific foods associated with clinically significant prostate cancer

Beneficial

Harmful

Mediterranean diet

Mediterranean diet emphasized foods based on the dietary traditions of Crete, Greece, and southern Italy during the mid-20th century with low rates of chronic disease and higher adult life expectancy despite having limited access to healthcare.

← Fish as primary source of animal protein

← Emphasis on healthy fats

← Integrates physical activity

https://www.hsph.harvard.edu/nutritionsource/healthy-weight/diet-reviews/mediterranean-diet/

Mediterranean diet and health

Adherence to a Mediterranean-style diet:

Strong evidence

- **Lowers overall mortality**
- **Lowers risk of cardiovascular disease and cardiovascular death**
- **Lowers risk of diabetes**
- **Lowers risk of breast cancer**
- **May lower weight gain**

Supportive evidence

- May decrease cognitive decline
- May increase “healthy aging” free of chronic disease

Suggestive evidence

- Some evidence may lower risk of advanced prostate cancer

References: Fung et al, Circulation 2009; Lopez-Garcia, AJCN 2013; Estruch, NEJM 2018; Bhushan Eur J Epidemiology 2017; Shai, NEJM 2008

Plant-based diet

(not vegan or vegetarian per se)

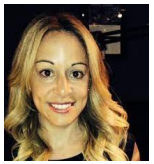
	Plant-based diet	Healthful plant-based diet
Plant Food Groups		
Healthy		
Whole grains	+	+
Fruits	+	+
Vegetables	+	+
Nuts	+	+
Legumes	+	+
Vegetable oils	+	+
Tea & Coffee	+	+
Less healthy		
Fruit juices	+	Reverse
Refined grains	+	Reverse
Potatoes	+	Reverse
Sugar sweetened bev.	+	Reverse
Sweets and Desserts	+	Reverse
Animal Food Groups		
Animal fat	Reverse	Reverse
Dairy	Reverse	Reverse
Egg	Reverse	Reverse
Fish or Seafood	Reverse	Reverse
Meat	Reverse	Reverse

Differences from Mediterranean diet

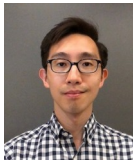
- Olive oil
- Water/moderate wine
- Does not include less healthy items in pattern
- Emphasis on fish over other animal proteins

Satija A, PLOS Medicine 2016; Satija A, J American College Cardiology 2017

Healthful plant-based diet and fatal prostate cancer



Stacy Loeb
NYU



Ben Fu
Harvard

Loeb S*, Fu B, Am J Clinical Nutrition 2022

Healthful plant-based diet and health

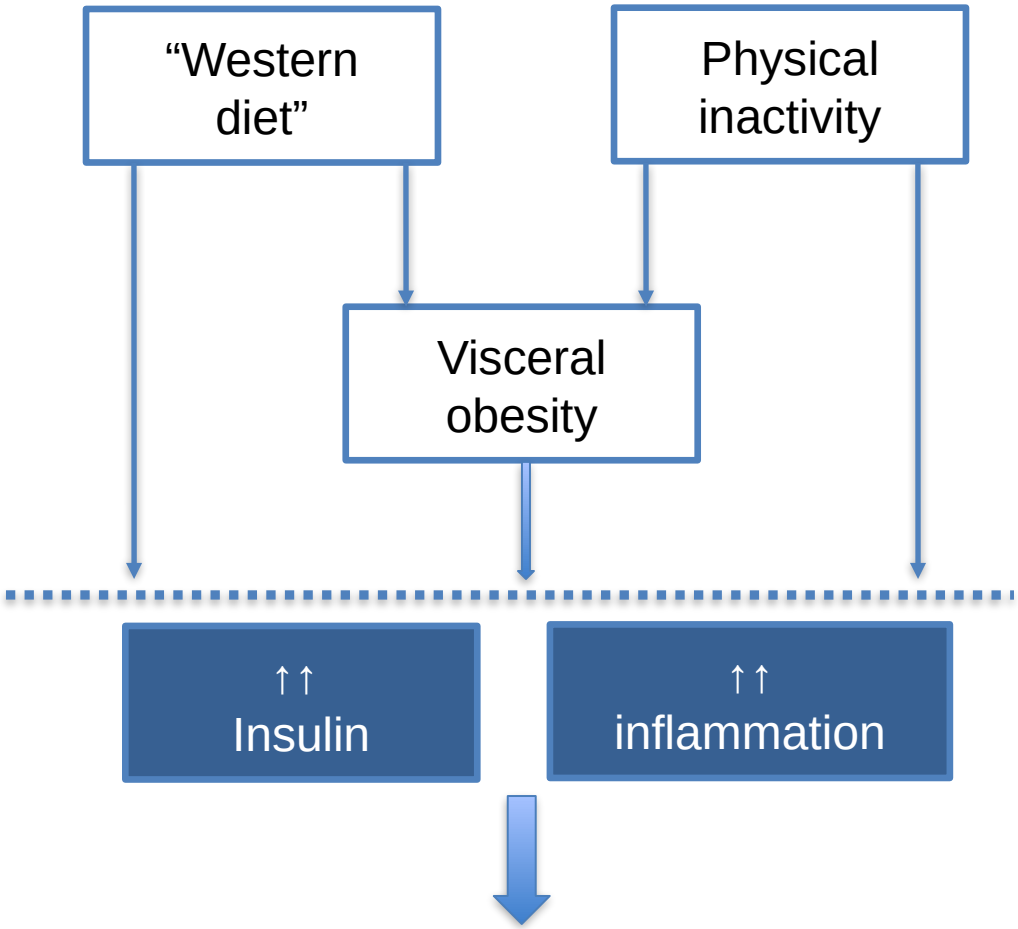
Adherence to a plant-based diet:

Supportive evidence

- May decrease risk of type 2 diabetes
- May decrease risk of cardiovascular disease
- May lower weight gain with age
- May lower cancer risk

- **May improve quality of life:** A higher plant-based diet index was associated with better scores for sexual function, urinary irritation/obstruction, urinary incontinence, and hormonal/vitality.

The cancer triad



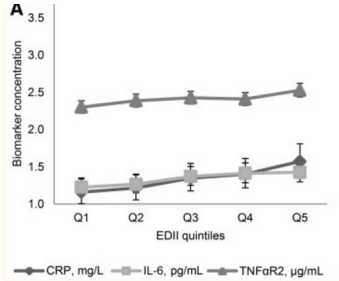
Cannabolized from Ed Giovannucci

Empirically derived diet patterns: inflammatory and hyperinsulinemic diets

Fred Tabung
Harvard
OHSU

Food frequency data
10,000 men and women

39 food groups



C-reactive protein
Interleukin-6
TNF-alpha

“Inflammation diet”

C-peptide
Triglyceride/HDL

“Insulinemic diet”

Tabung F, J Nutr 2016; Tabung F, Br J Nutr 2016

Associated food groups

	Pro-Insulinemic	Pro-Inflammatory
Red Meat	+	+
Processed Meat	+	+
Starchy Vegetables	+	+
Refined vs Whole Grains	+	+
Sugar-Sweetened Beverages	+	+
Coffee	-	-
Alcohol (moderate)	-	-
Vegetables (Non-Starchy; green)	-	-
Fruit / Fruit Juice	-	-
Low-fat dairy	+	
Butter	+	
Eggs	+	
Poultry, non-fatty fish	+	

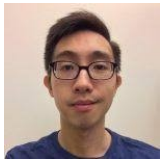
Consistent with Mediterranean and plant-based diet

Consistent with Mediterranean diet

Consistent with Mediterranean and plant-based diet

Consistent with Mediterranean and plant-based diet

Inflammatory and insulinemic diet and lethal prostate cancer risk by age



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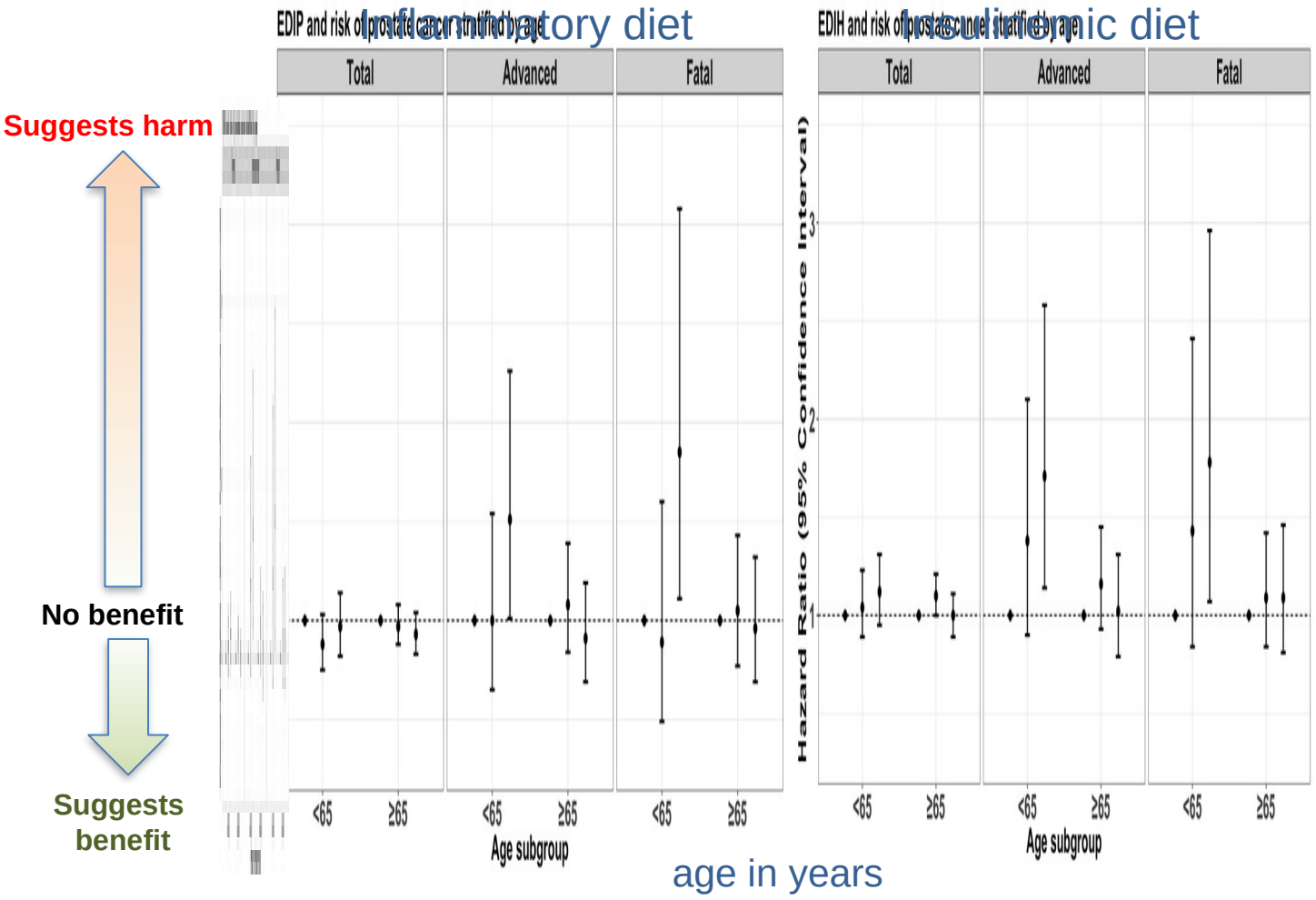


Fu B, Eur Urology 2021

Inflammatory and insulinemic diet and health

Adherence to these dietary patterns:

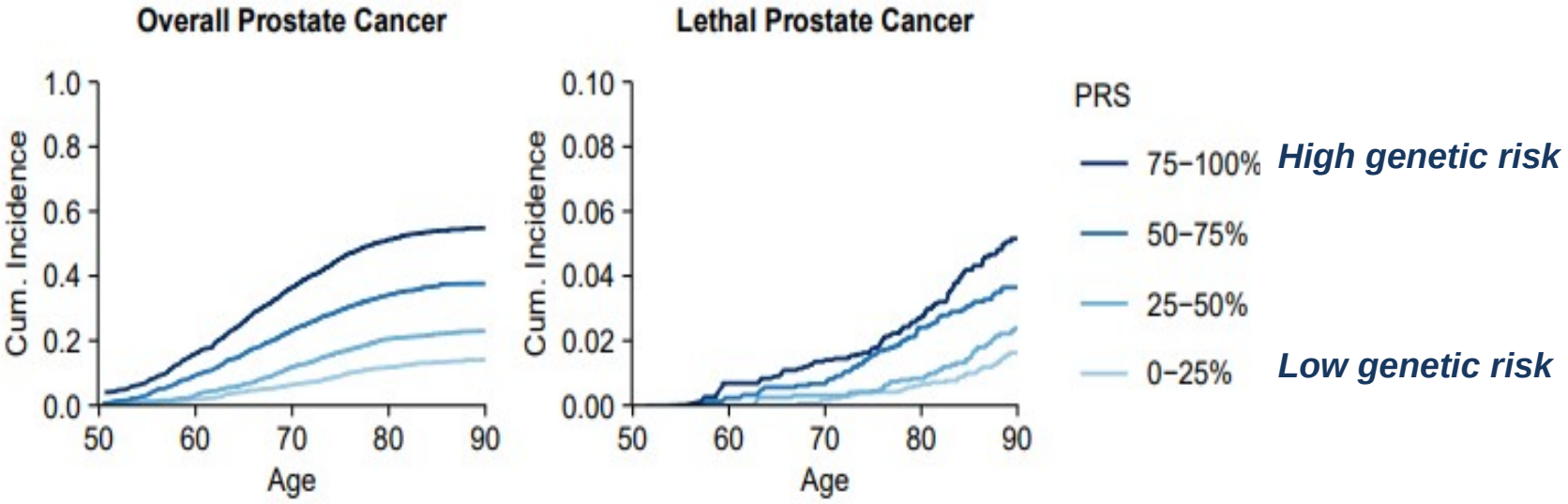
Suggestive evidence

- May increase risk of type 2 diabetes
- May increase risk of cardiovascular disease
- May increase weight gain with age
- May increase cancer risk: hepatocellular carcinoma, colon cancer, fatal prostate cancer
- May increase mortality after diagnosis of colon cancer and multiple myeloma

- Inflammatory diet may increase risk of rheumatoid arthritis

Polygenic risk score predicts prostate cancer risk

Anna Plym
Harvard
Karolinska



Compared to men with the lowest genetic risk, men with the highest risk have a 5.6 times greater risk of prostate cancer overall and 4.2 times greater risk of lethal prostate cancer across their lifetime

Plym et al, AACR Annual Meeting 2021

Can a healthy lifestyle offset genetic susceptibility of prostate cancer?

Definition of Healthy Lifestyle Score

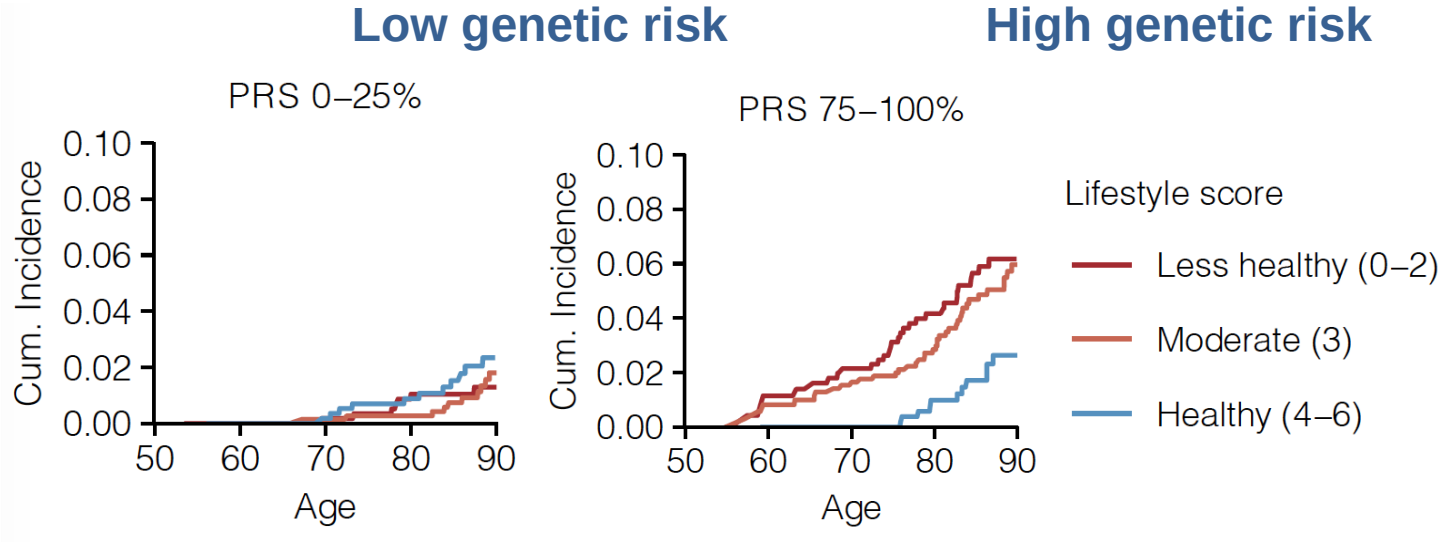
Stacey Kenfield
UCSF

Healthy lifestyle score	
Healthy weight	1 vs. 0
Not smoking	1 vs. 0
Physically active	1 vs. 0
Healthy diet*	3 vs. 2 vs. 1 vs. 0
Total score	0 to 6 points

* Healthy diet: low red meat, fatty fish intake, lycopene intake

Can a healthy lifestyle offset genetic susceptibility?

Anna Plym
Harvard
Karolinska



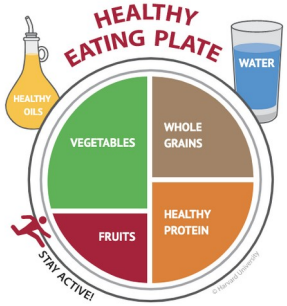
<u>Among men with highest genetic score</u>:
Men with most healthy lifestyle had 45% lower risk (HR 0.55, 95% CI 0.35–0.85) of lethal prostate cancer compared with men with the least healthy lifestyle
 The two strongest factors were healthy weight and vigorous activity

Plym et al, AACR Annual Meeting 2021

Future: Planetary Health Diet Pattern

- Food supply is responsible for 30% of greenhouse emissions
- Plant-based diets associated with lower greenhouse gas emissions and lower fertiliser, cropland, and water needs
  - Not all plant-based diets confer health and environmental benefits
  - Ultra-processed foods require packing and transportation that enhance environmental impact
  - E.g. Almonds have high water needs, and strain on bee population

Summary of evidence



- Dietary patterns illuminate synergistic effects of foods on health and reflect what (and not eat)
- Four dietary patterns share common features :
  - Reduced intake of red/processed meat, dairy
  - Increased intake of healthy plant-based foods, whole grains
  - Healthy fats (olive oil) instead of butter
- Benefits on mortality, cardiovascular health, weight, cognitive function impactful for prostate cancer survivors
- Healthy dietary patterns associated with lower inflammation and insulin
- Healthy diet with weight control and physical activity
- Men at highest risk of lethal prostate cancer may have stronger benefit
- Find a healthy diet that works best for you (and your family) and includes foods you enjoy!

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