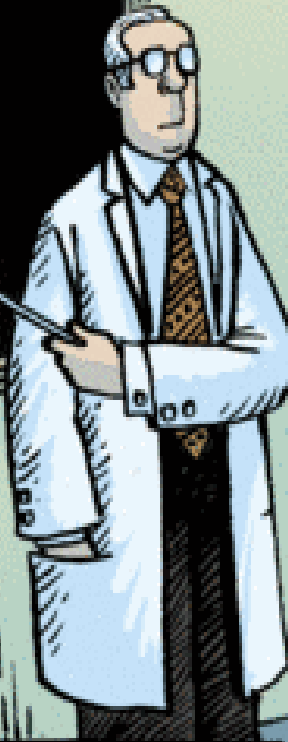


**Il diabete visto dal cardiologo: perché è
importante parlare di prevenzione
primordiale piuttosto che *primaria* e
*secondaria***

**Maurizio del Pinto
CARDIOLOGIA UTIC
AO Perugia**

PREVENTATIVE
MEDICINE
KILLS
RETURN BUSINESS



FIRST DAY OF MED SCHOOL

PARADIGMA CULTURALE ATTUALE

ESC ESC GUIDELINES

European Heart Journal (2021) 00, 1–111
doi:10.1093/eurheartj/ehab484

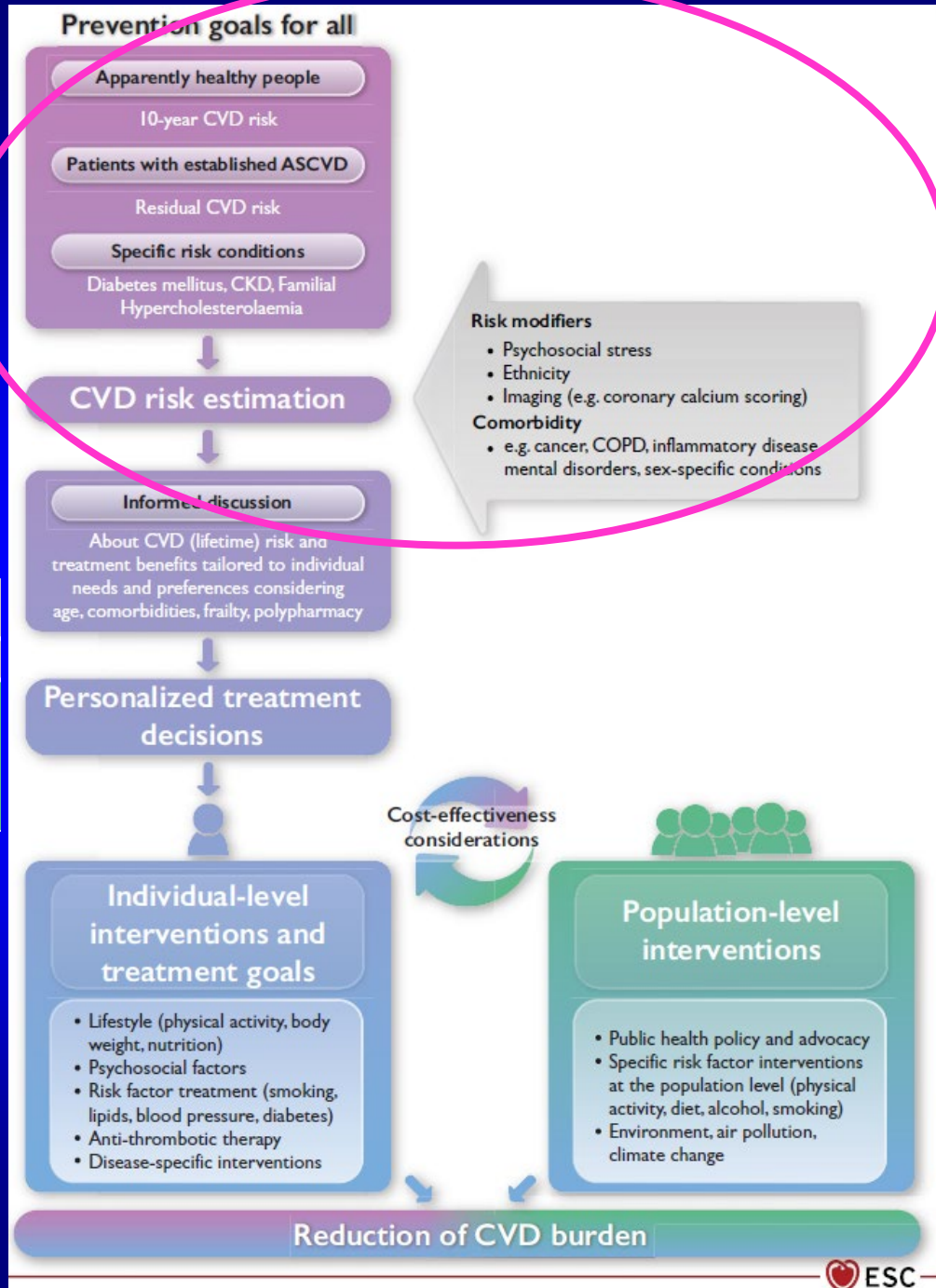
2021 ESC Guidelines on cardiovascular disease prevention in clinical practice

Recommendations in 2021 version

Class

In apparently healthy people <70 years of age without established ASCVD, DM, CKD, genetic/rarer lipid or BP disorders, estimation of 10-year fatal and nonfatal CVD risk with SCORE2 is recommended.

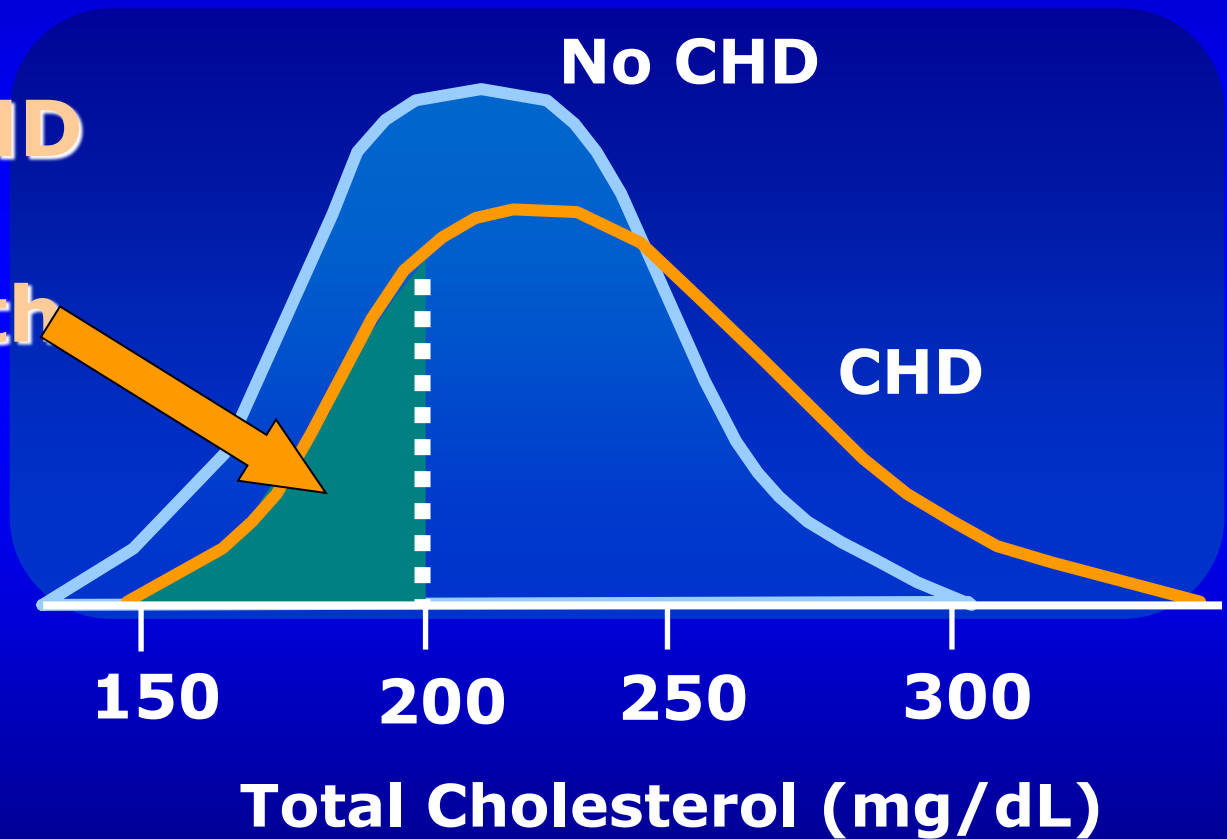
I



Total Cholesterol Distribution: *CHD vs Non-CHD Population*

Framingham Heart Study—26-Year Follow-up

**35% of CHD
Occurs in
People with
TC < 200
mg/dL**



My talk today

- **Diabetes as public health problem**
- **Relationship bw/en environment-omics science**
- **Relationship bw/en individual/population based omics pattern-Risk Factors**
- **Diet & lifestyle as compendium of previous issues in primordial prevention**

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Lifetime risk, life expectancy, and years of life lost to type 2 diabetes in 23 high-income jurisdictions: a multinational, population-based study

Lancet Diabetes Endocrinol
2022; 10: 795-803

- Diabetes is a major *health public issue*
- Lifetime risk to develop type 2 diabetes
- Life expectancy in people with/out type 2 diabetes
- Years of Life lost to type 2 diabetes
- Study cohorts from 23 regions/country (1.5 mld pp/yy) for more than 5 mln of incident cases of diabetes
- 2 Timepoints 5 years apart from 2005-2019

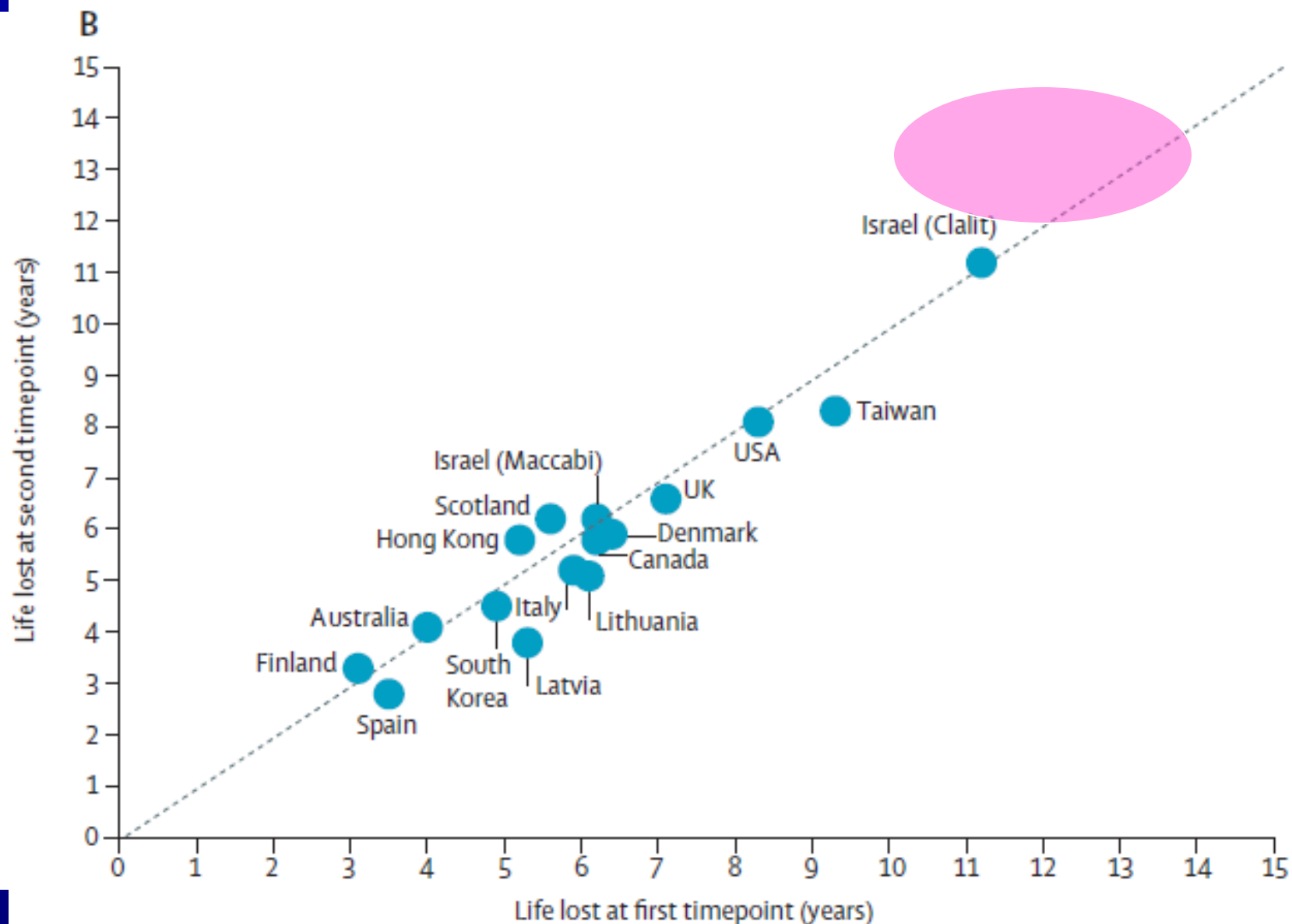
Expected lifetime risk of developing type 2 diabetes from age 20 to age 100 By jurisdiction, sex, and timepoint

	Men			Women		
	Lifetime risk at first timepoint (95% CI)	Lifetime risk at second timepoint (95% CI)	Difference across timepoints	Lifetime risk at first timepoint (95% CI)	Lifetime risk at second timepoint (95% CI)	Difference across timepoints
Australia (2013–14; 2018–19)	29.3% (28.9–29.8)	23.0% (22.6–23.5)	–6.3%	22.6% (22.2–23.1)	16.5% (16.1–16.8)	–6.1%
Austria* (2016–17)	27.3% (26.7–27.9)	..	..	24.1% (23.5–24.6)	..	..
Canada (2011–12; 2016–17)	47.6% (47.3–48.0)	45.6% (45.2–46.0)	–2.0%	41.4% (41.0–41.8)	38.7% (38.4–39.1)	–2.7%
Denmark (2013–14; 2018–19)	27.5% (26.7–28.3)	27.4% (26.6–28.2)	–0.1%	22.6% (21.8–23.3)	21.6% (20.8–22.3)	–1.0%
Finland (2011–12; 2016–17)	42.5% (42.6–44.2)	35.1% (34.2–36.0)	–8.4%	40.5% (39.7–41.2)	30.7% (28.0–30.6)	–10.8%

In people **with type 2 diabetes**: the highest life expectancies is in Japan in 2017–18, where life expectancy at age **20** years was 59.2 years (95% CI 59.2–59.3) for men and 64.1 years (64.0–64.2) for women.

The lowest life expectancy at age 20 years for men with type 2 diabetes was observed in 2013–14 in Lithuania (43.7 years [42.7–44.6]). Among women with type 2 diabetes, the lowest life expectancy at age 20 years occurred in Latvia in 2010–11 (54.2 years [53.4–54.9])

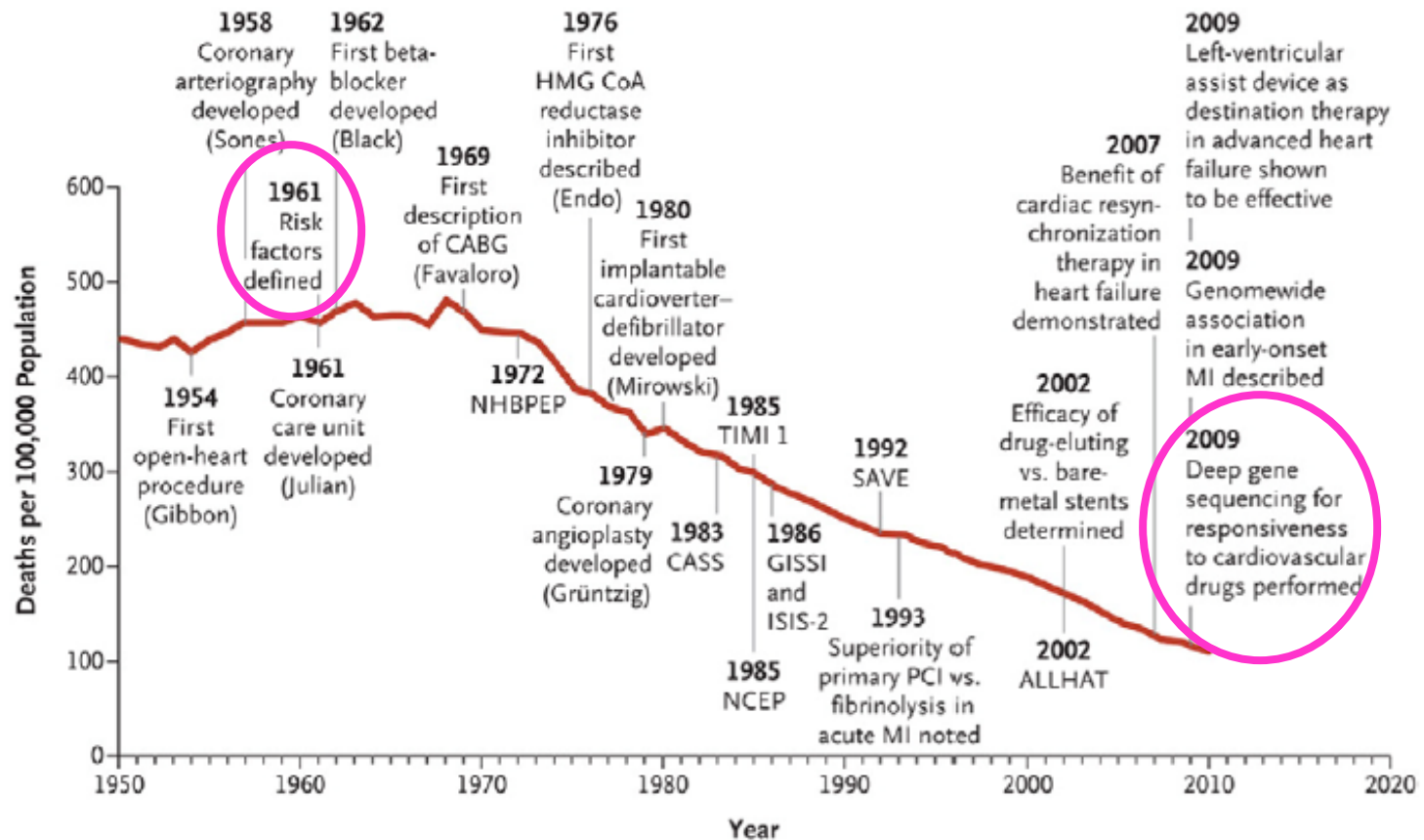
Years of life lost to type 2 diabetes at age 20 years by jurisdiction and sex



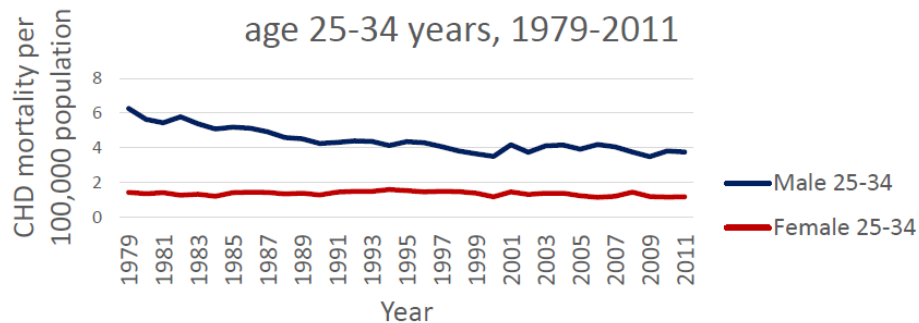
Coronary Heart Disease Mortality Declines in US From 1979 Through 2011

EVIDENCE FOR STAGNATION IN YOUNG ADULTS, ESPECIALLY WOMEN

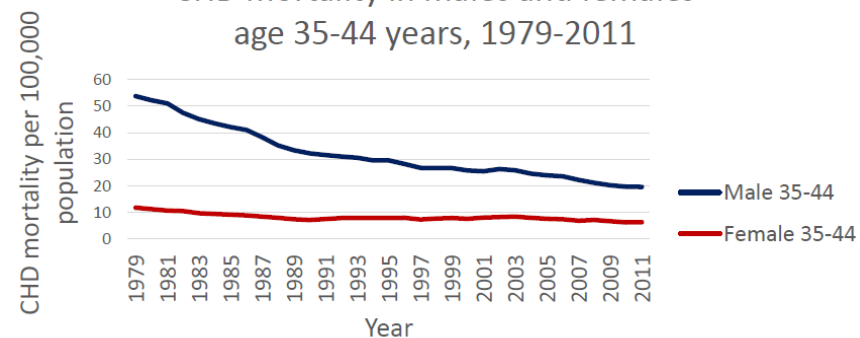
Kobina Wilmot et al; Circulation 15 September 2015



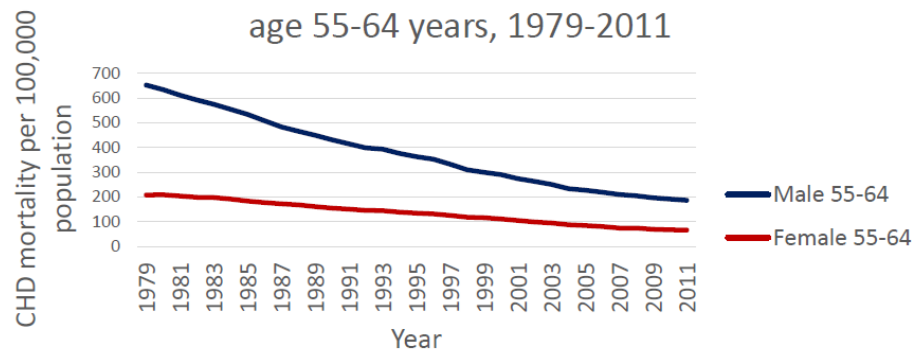
CHD mortality in males and females
age 25-34 years, 1979-2011



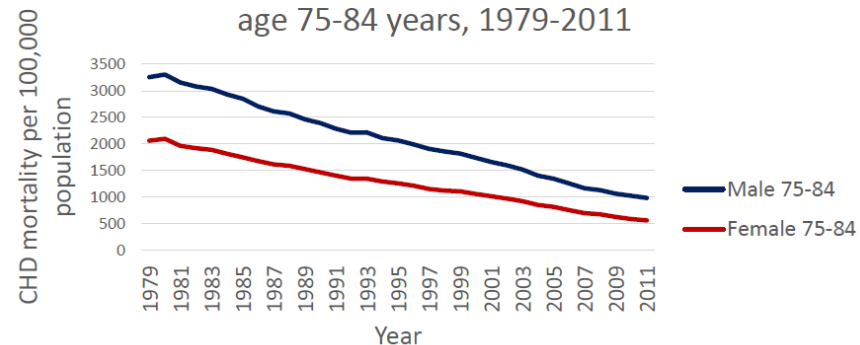
CHD mortality in males and females
age 35-44 years, 1979-2011



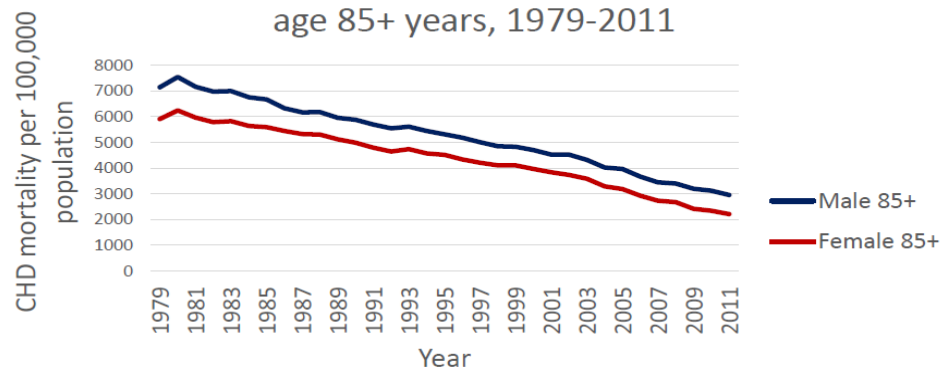
CHD mortality in males and females
age 55-64 years, 1979-2011



CHD mortality in males and females
age 75-84 years, 1979-2011

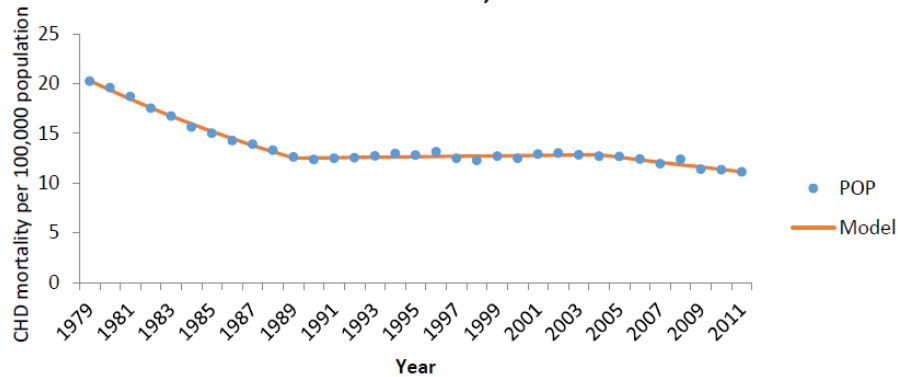


CHD mortality in males and females
age 85+ years, 1979-2011



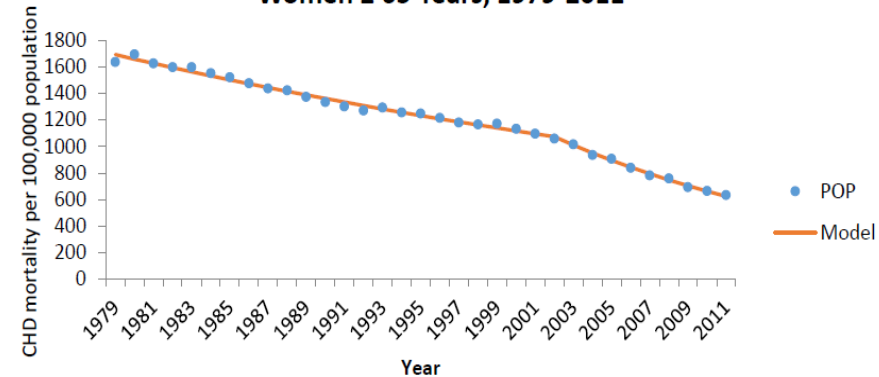
AGE <55 aa

**Joinpoint CHD Mortality Trend Analysis
Women <55 Years, 1979-2011**

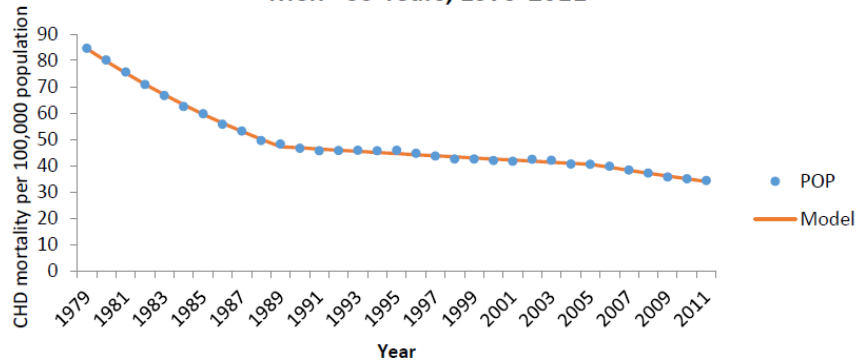


AGE >55 aa

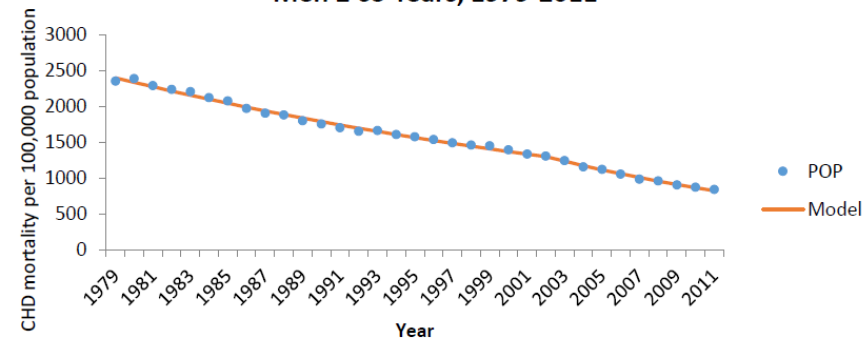
**Joinpoint CHD Mortality Trend Analysis
Women ≥ 65 Years, 1979-2011**



**Joinpoint CHD Mortality Trend Analysis
Men <55 Years, 1979-2011**



**Joinpoint CHD Mortality Trend Analysis
Men ≥ 65 Years, 1979-2011**



My talk today

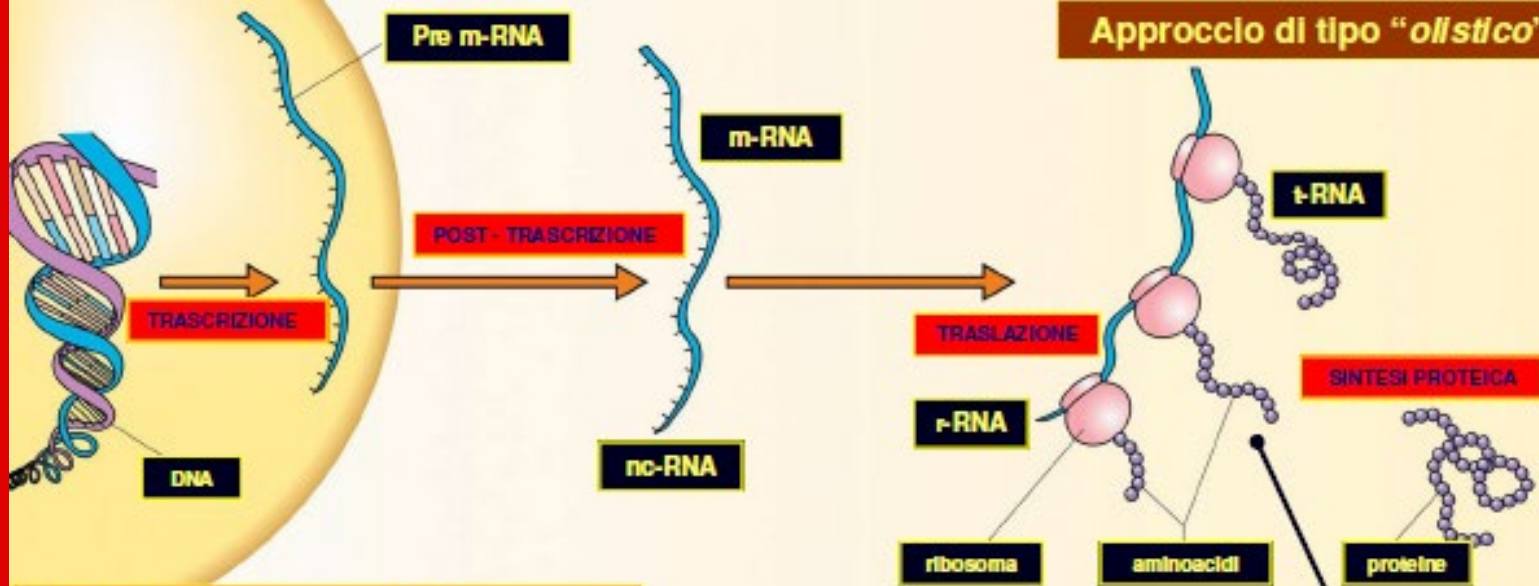
- Diabetes as public health problem
- Relationship bw/en environment-omics science
- Relationship bw/en individual/population based omics pattern-Risk Factors
- Diet & lifestyle as compendium of previous issues in primordial prevention



ONE HEALTH

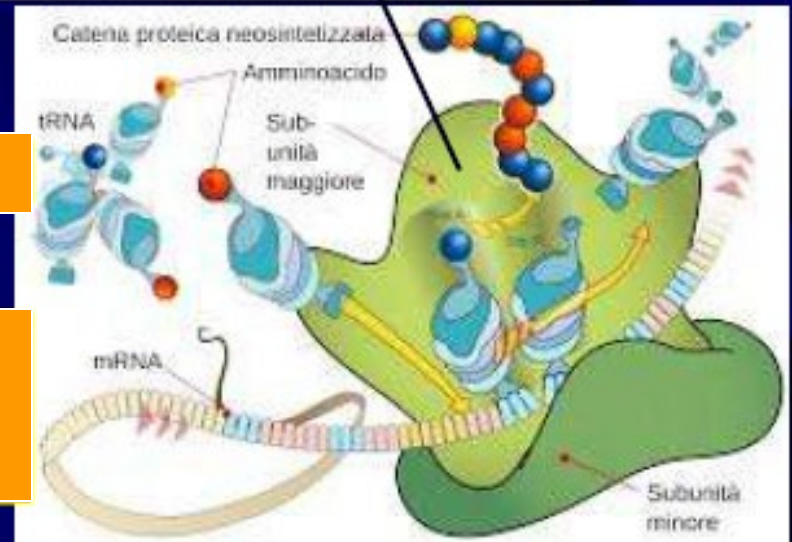
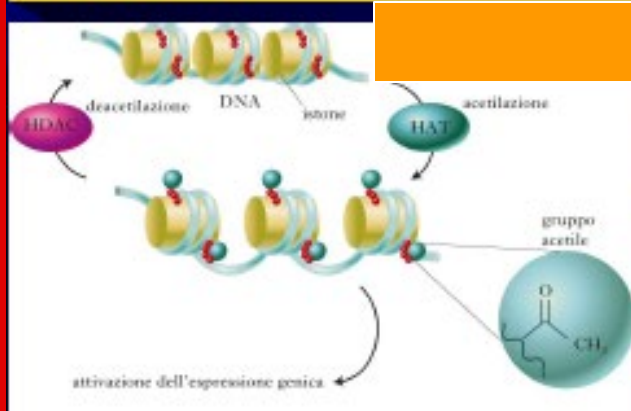
Human health and animal health are interdependent.
At the same time, both depend on the environment.



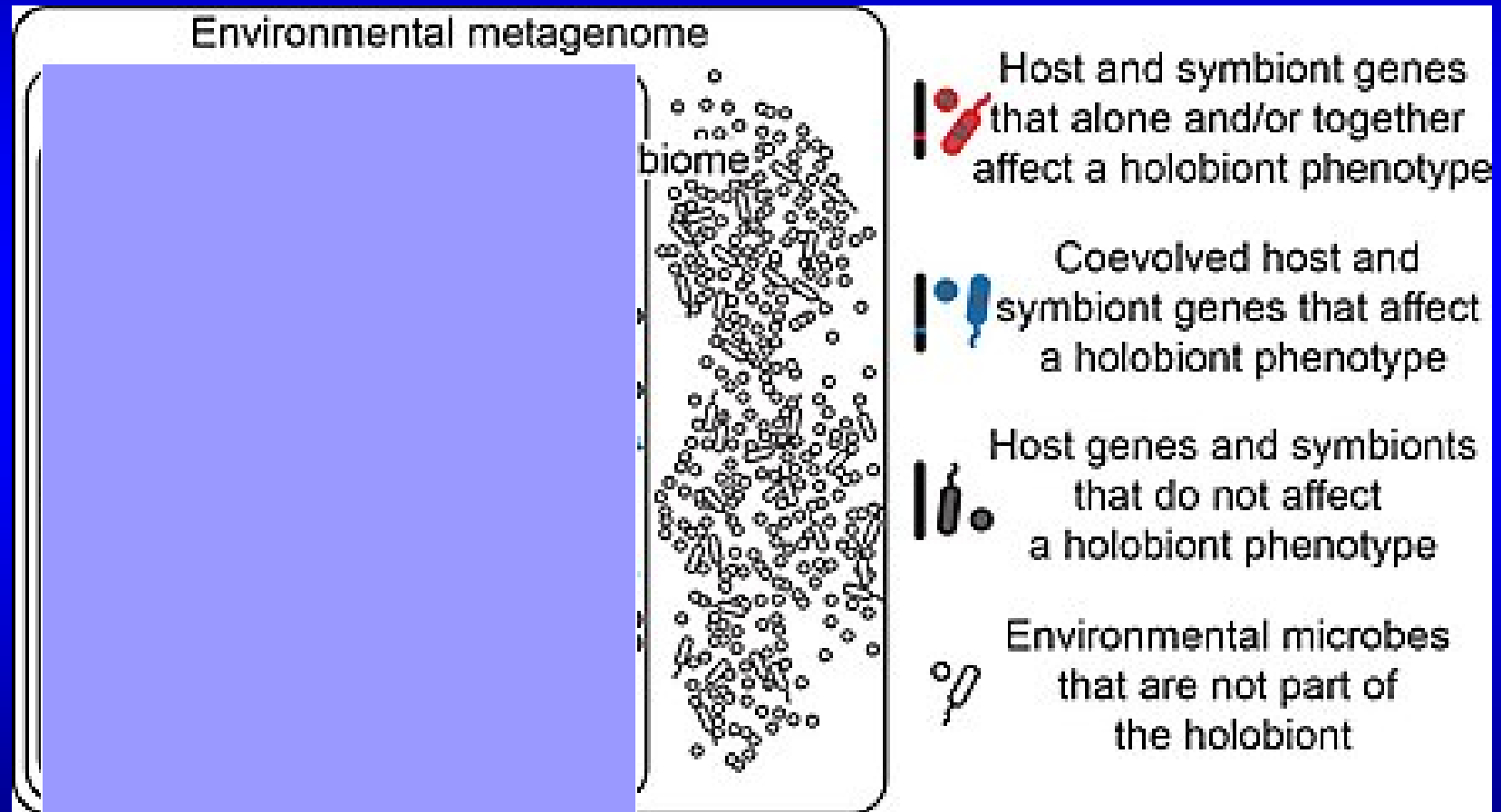


GENOMA

DNA



The Holobiont Phenotype



SOME FUNCTIONS OF THE GUT MICROBIOTA & DISEASE ASSOCIATIONS

Gut Microbiota Functions

Influences

- Immune maturation
and homeostasis
- Host cell proliferation
- Vascularization
- Neurologic signaling
- Pathogen burden
- Intestinal endocrine
functions
- Bone density
- Energy biogenesis

Biosynthesis

- Vitamins
- Steroid hormones
- Neurotransmitters

Metabolism

- Branched-chain and
aromatic amino acids
- Dietary components
- Bile salts
- Drugs
- Xenobiotics

Disease Indications

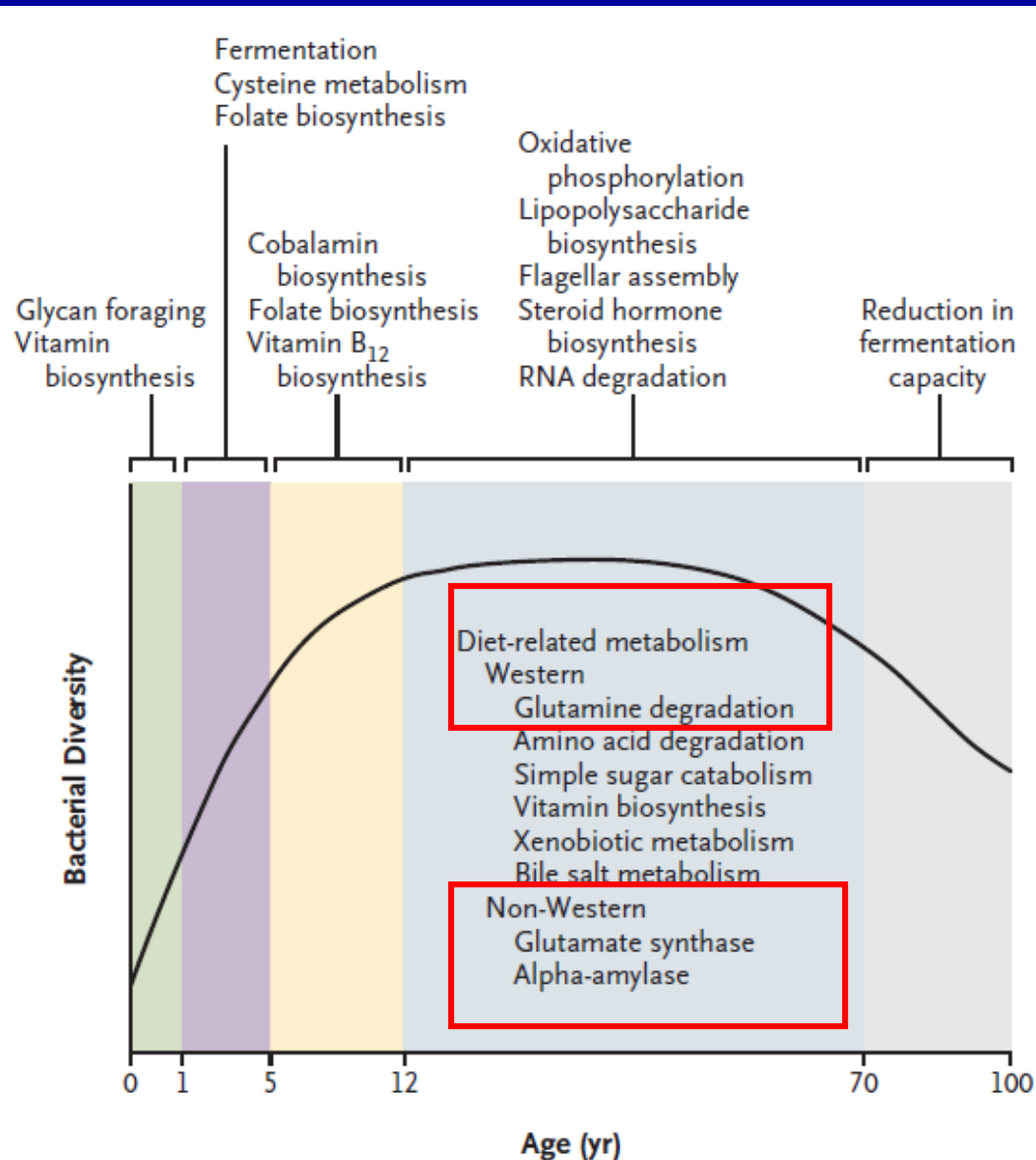
- Neurologic
- Psychiatric
- Respiratory
- Cardiovascular
- Gastrointestinal
- Hepatic
- Autoimmune
- Metabolic
- Oncologic

Elizabeth G. Phimister, Ph.D., *Editor*

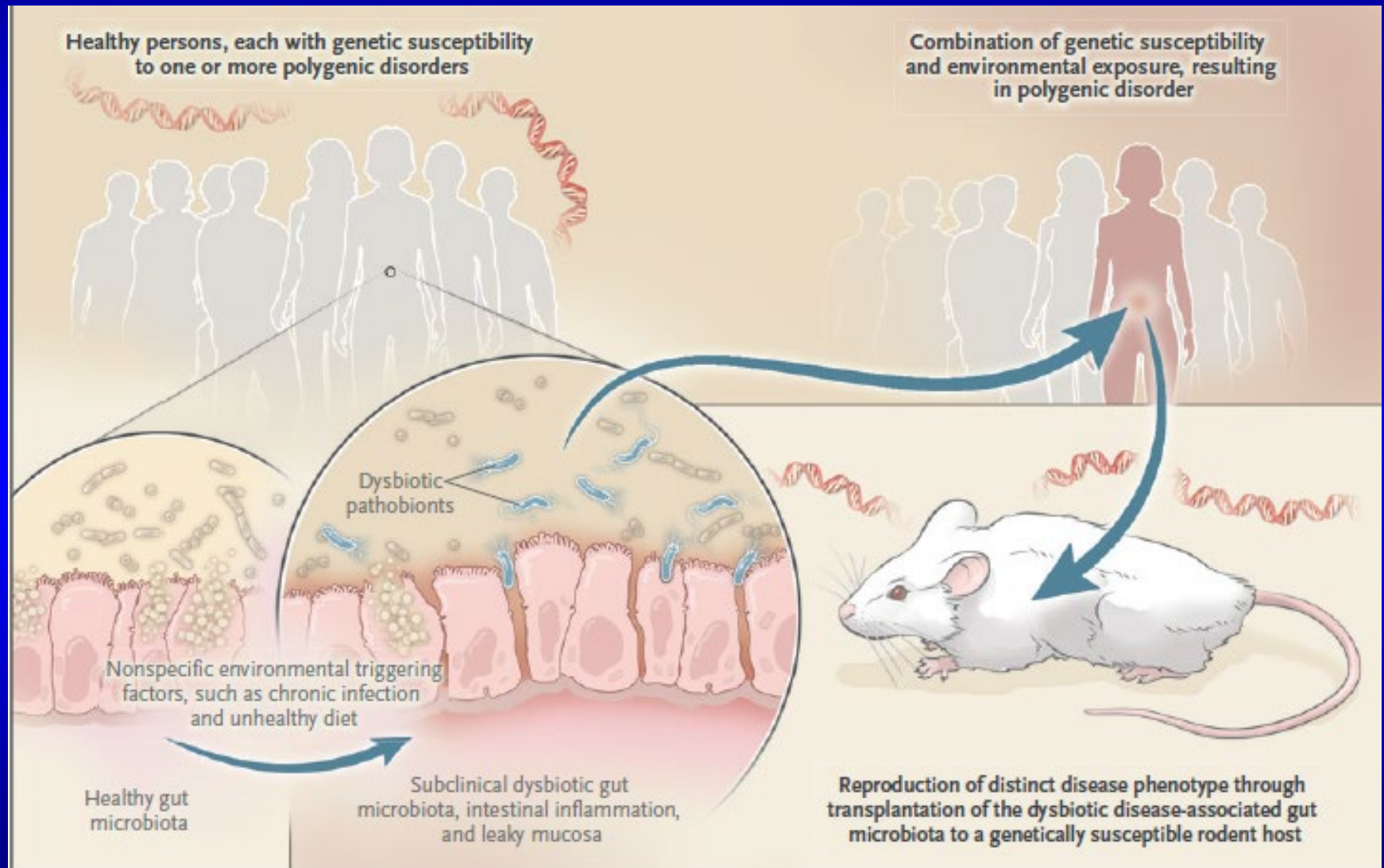
The Human Intestinal Microbiome in Health and Disease

Susan V. Lynch, Ph.D., and Oluf Pedersen, M.D., D.M.Sc.

Temporal Development of the Gut Microbiota in Humans



"Common Ground" Hypothesis of Pathogenesis Caused by Dysbiotic Gut Microbiota



My talk today

- Diabetes as public health problem
- Relationship bw/en environment-omics science
- **Relationship bw/en individual/population based omics pattern-Risk Factors**
- Diet & lifestyle as compendium of previous issues in primordial prevention

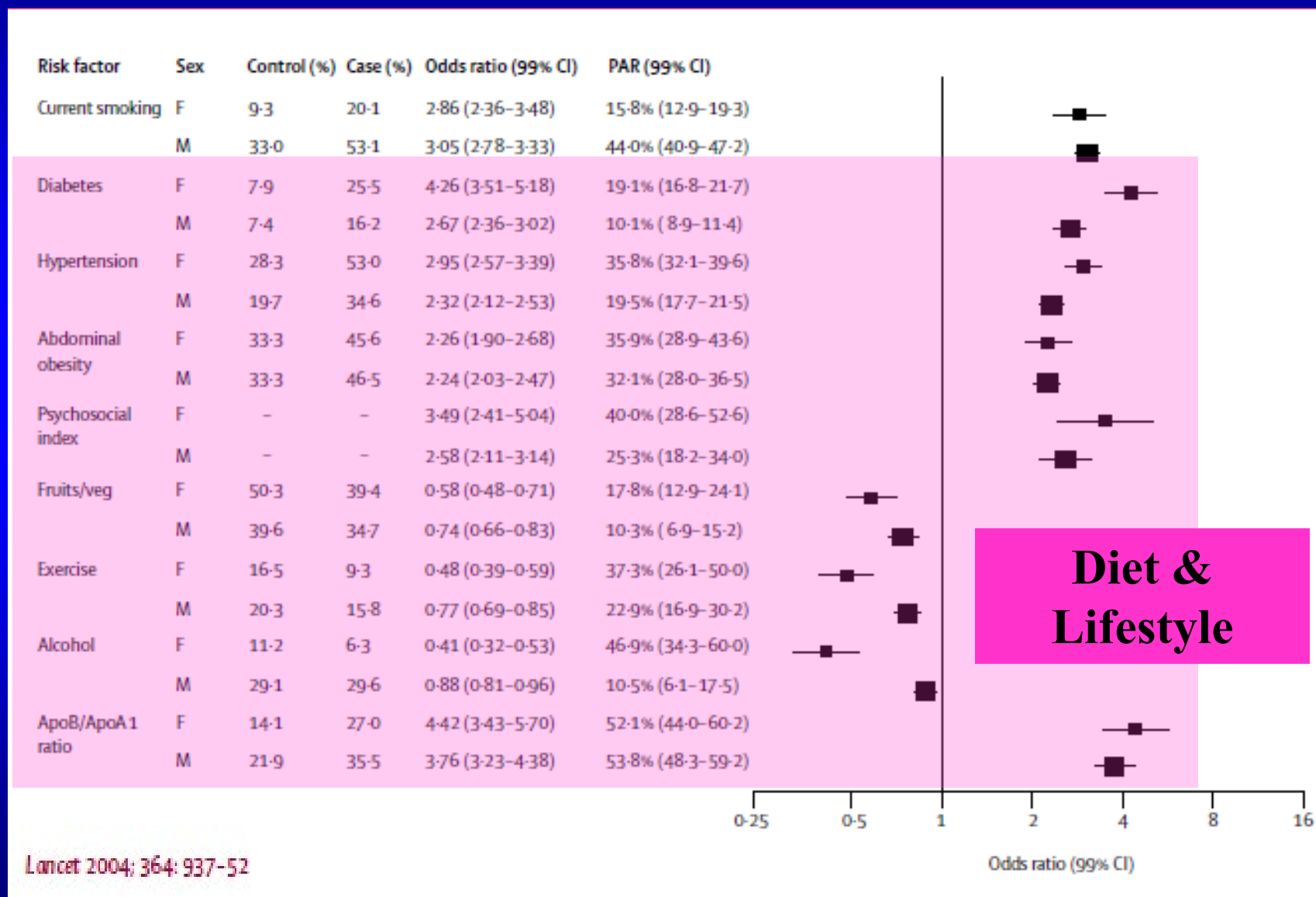
- Primordial prevention is the prevention of the development of risk factors in the first place with lifestyle only and thus avoiding the use of medications to treat risk factors and”gap in medicine culture”....to prevent...
- Expensive, not always effective, coronary procedures like coronary angioplasty and bypass surgery, saving money for the individual, family, and the society.

- In 1978, Strasser suggested that prevention of cardiovascular disease (CVD) should go beyond the concept of primary prevention. He coined the term '**primordial prevention**' to denote activities that prevented the penetration of risk factors into the population by intervening to stop the appearance of the risk factors
- The 3rd International Heart Health Conference held in 1998 in Singapore focused attention on “preventing the risk to heart health, from “**womb to tomb**”, meaning that cardiovascular risk prevention had to be encouraged throughout the life span
- *..to promote eating habits in school-age children in order to ensure they develop into adults aged 30 years with favourable risk profiles who can control their lipid levels without the need for ...statin... drugs*

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

Lancet 2004; 364: 937-52

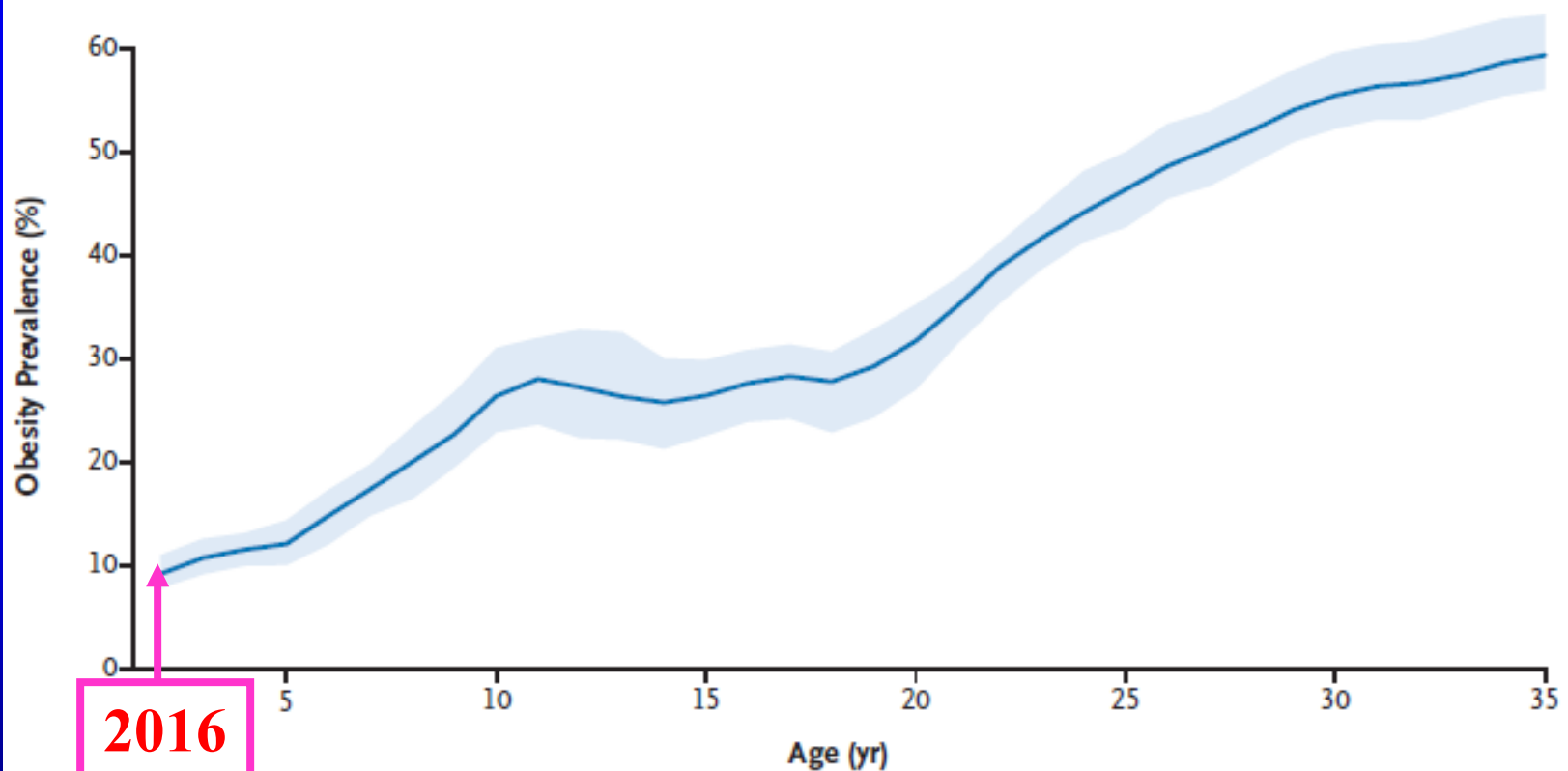
Association of Risk Factors with AMI in men and women after adjustment for age, sex, and geographic region



ORIGINAL ARTICLE

Simulation of Growth Trajectories of Childhood Obesity into Adulthood

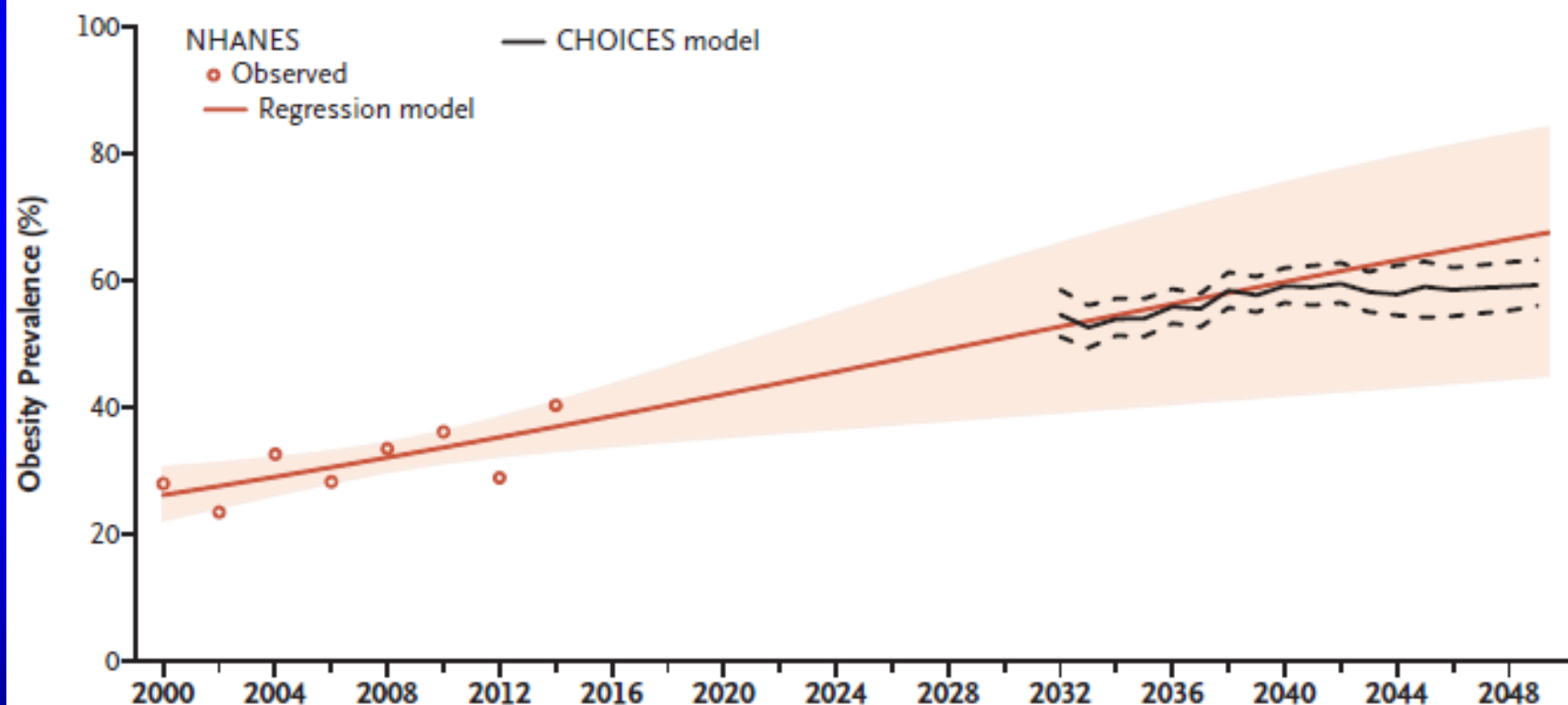
Predicted Prevalence of Obesity among 2-Year-Olds at Future Ages



ORIGINAL ARTICLE

Simulation of Growth Trajectories of Childhood Obesity into Adulthood

Predicted Prevalence of Obesity at 35 Years of Age, According to Calendar Year



My talk today

- Diabetes as public health problem
- Relationship bw/en environment-omics science
- Relationship bw/en individual/population based omics pattern-Risk Factors
- Diet & lifestyle as compendium of previous issues in primordial prevention

Associations of healthy food choices with gut microbiota profiles

Am J Clin Nutr 2021;00:1–12

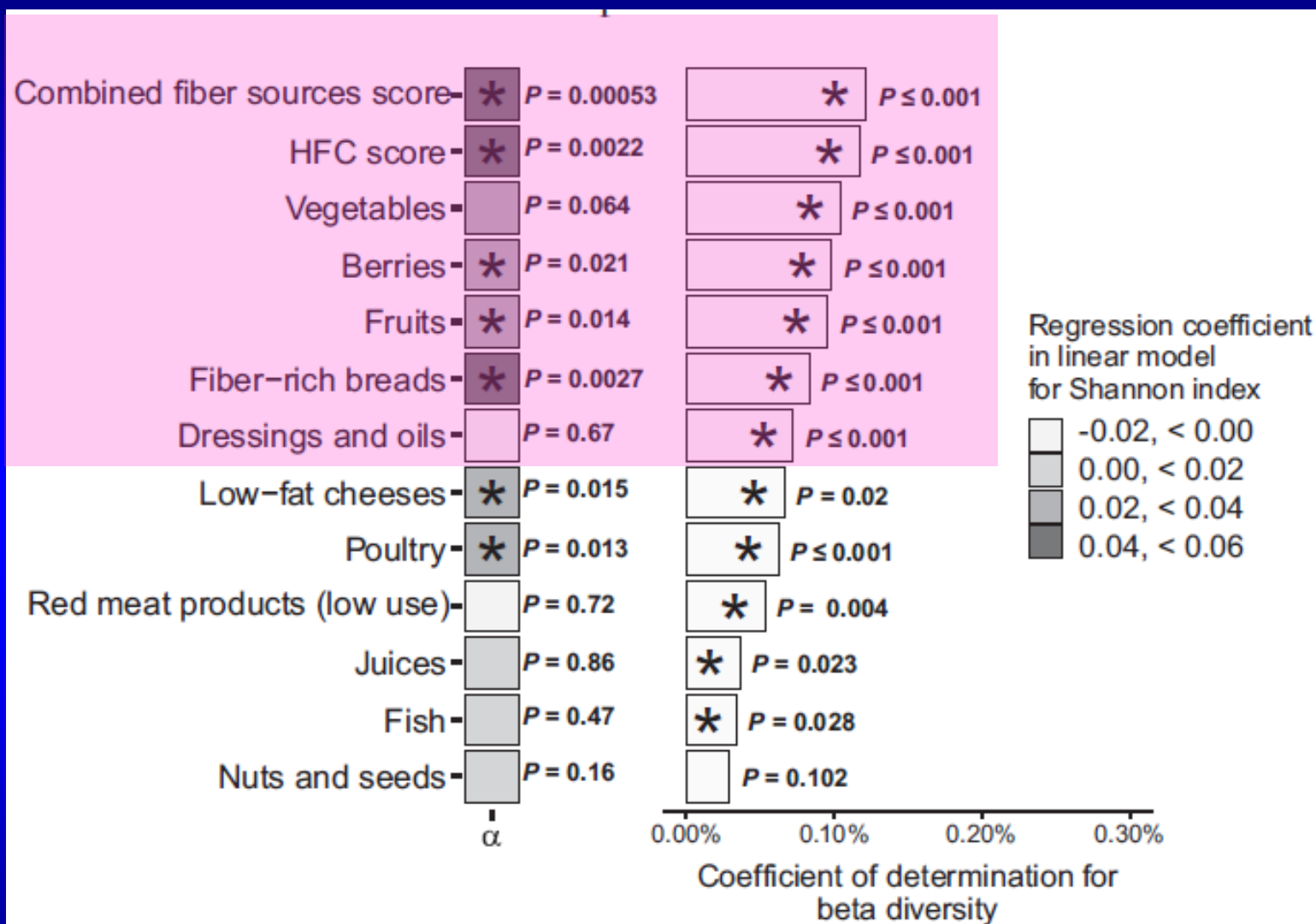
- Food is an important, influential environmental factors for long-term health. Our everyday diet increases or decreases the risk of noncommunicable conditions: cardiovascular diseases, metabolic syndrome, and cancer .
- Diet is also among the most important environmental factors that our microbial population in the gastrointestinal tract is exposed to and modified by daily (GUT MICROBIOTA)
- Gastrointestinal diseases, obesity & tipe 2 diabetes, cardiovascular diseases, rheumatoid arthritis, and neurological disorders have all been associated with the **gut microbiota**. Many of these disorders are also associated with **diet**
- Dietary choices can have a large influence on the composition and function of our gut microbiota
- The gut microbiota has various functions beneficial to health
- What remains to be determined is the role of the gut microbiota in these diet findings

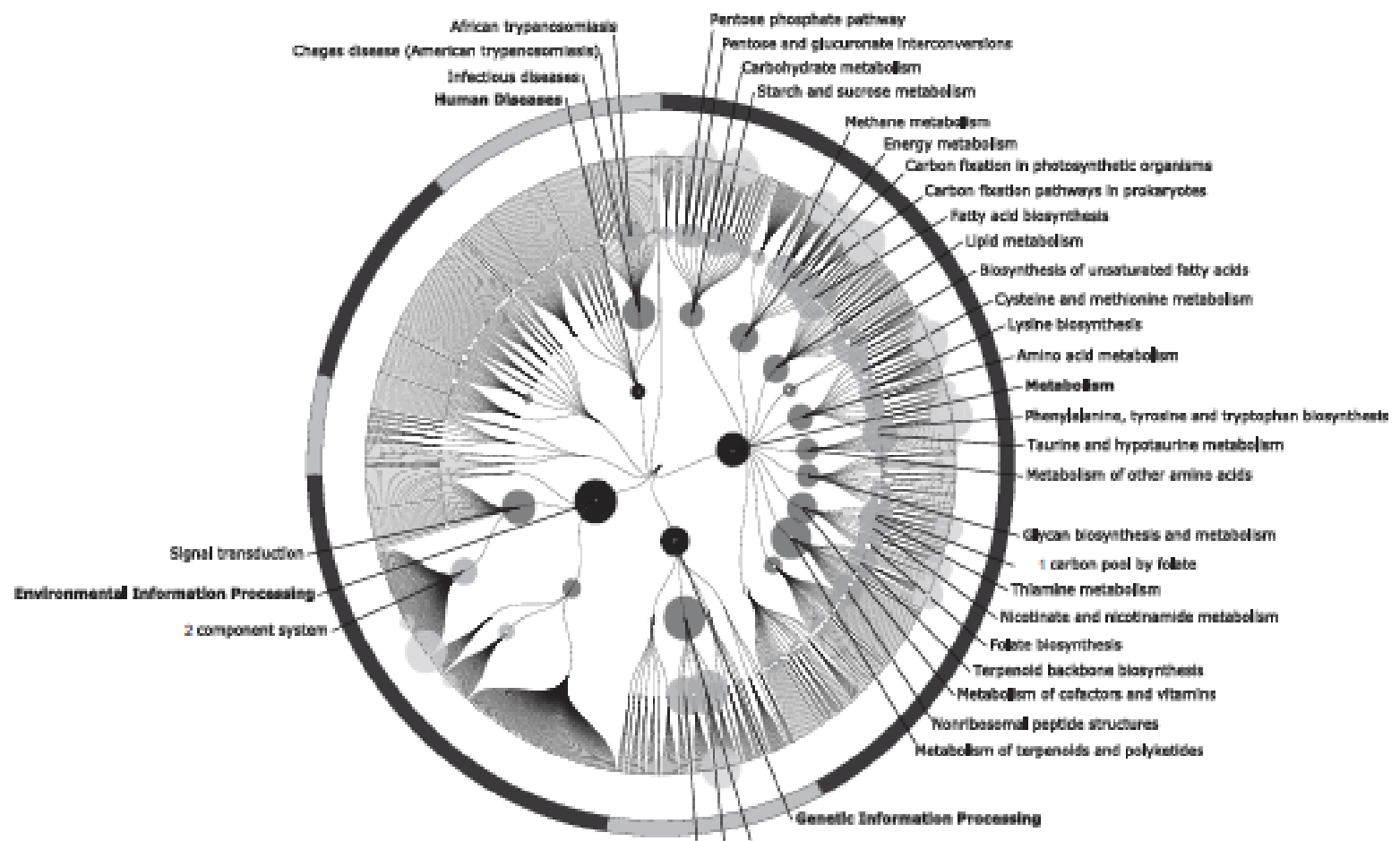
Associations of healthy food choices with gut microbiota profiles

Am J Clin Nutr 2021;00:1–12

- In the study, it has been examined the associations between the gut microbiota and consumption of food items recommended to be part of a healthy diet in a cross-sectional setting, in a large, Finnish, population-based study sample
- Main objective: to assess whether healthy food choices, indicated by a summary score, are related to gut microbiota composition within samples (alpha diversity) and between samples (beta diversity).
- Furthermore: to assess key bacterial taxa that have been previously identified as SCFA producers and their associations with healthy food choices
- Finally: analysis through Kyoto Encyclopedia of Genes and Genomes orthology (KO) groups to uncover the functional potential of the microbiota and how it associates with healthy food choices. *(Ortologia: in biologia è il legame evolutivo tra geni presenti in specie diverse)*

Associations of healthy food choices with gut microbiota profiles





Inverse associations of functional pathways in the gut microbiota with the HFC score

Conclusions: Our results from a large, population-based survey confirm and extend findings of other, smaller-scale studies that plant and fiber-rich dietary choices are associated with a more diverse and compositionally distinct microbiota, and with a greater potential to produce SCFAs. *Am J Clin Nutr* 2021;00:1–12.

Human Food Acquisition

An evolutionary perspective

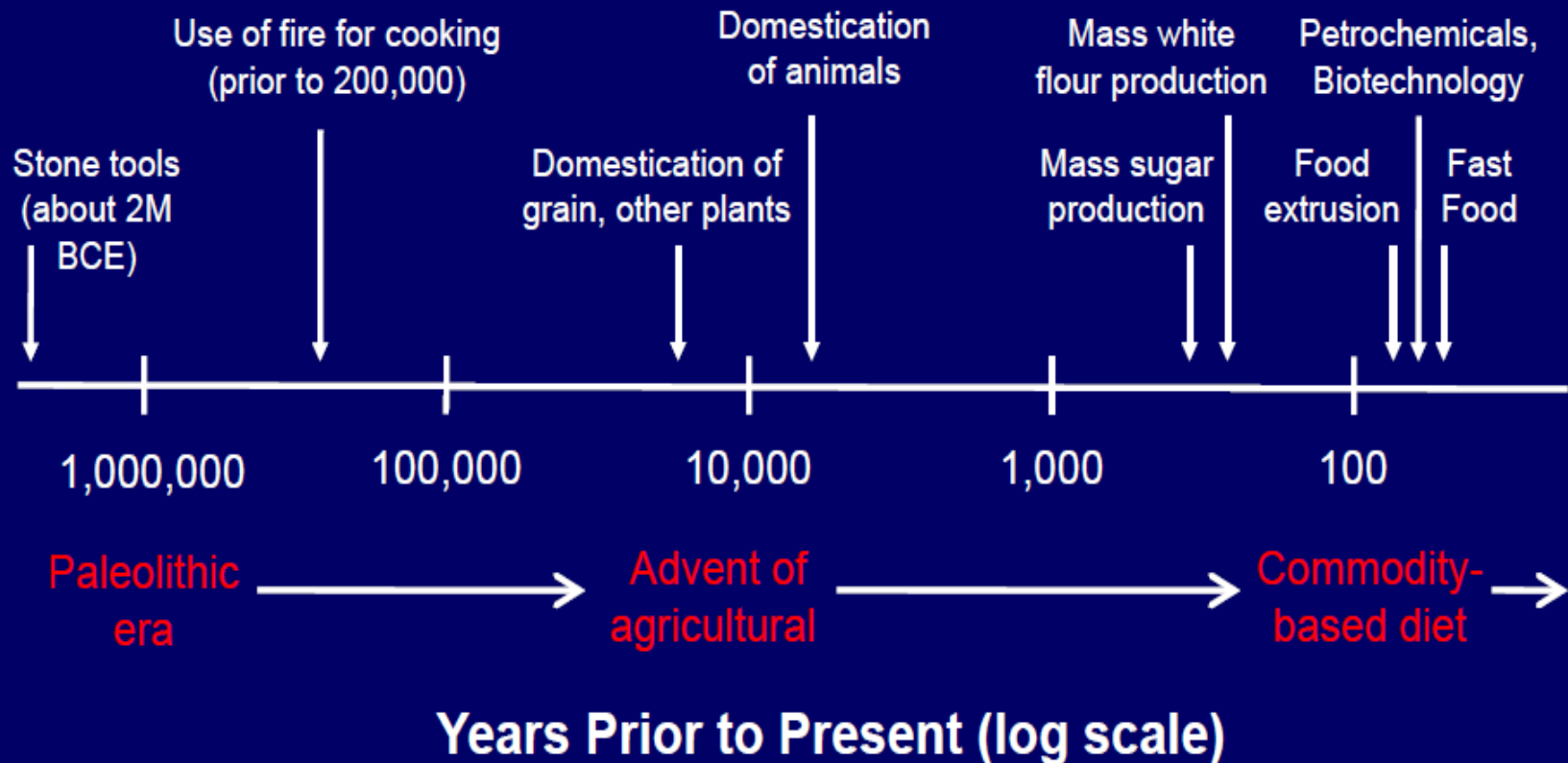
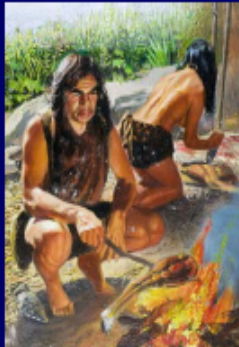
Food is typically either:

Hard to get

or

Hard to eat

Food Technology: A Timeline



Impact of Technology on Health & Nutrition

Paleolithic period

Dietary variety increased – large animals, tubers, nuts, etc

- Improved calorie and nutrient availability
- Less time spent acquiring and eating foods
- Decreased demand on the digestive track
 - ✧ Development of a smaller gut, larger brain
 - ✧ Evolution of modern *Homo sapiens*

Impact of Technology on Health & Nutrition

Advent of Agriculture

Diet dominated by a few staple grains

- Huge increase in available calories
- Decrease in nutrient density – grains has a relatively low nutrient to calorie ratio (compared to other plant or animal foods)
 - ✧ Massive expansion of human populations
 - ✧ Development of civilization, culture
 - ✧ Endemic protein and micronutrient deficiency diseases, especially with grain refinement. (Archeological evidence of decreased stature with development of agrarian cultures)

Cohen & Armelagos. Editors. (1984) *Paleopathology at the Origins of Agriculture*. Orlando, FL: Academic Press.

Impact of Technology on Health & Nutrition

Commodity-based diet era

Diet dependent on highly processed foods

- Remarkable decrease in the cost of food
 - At minimum wage, 1 hour of work can pay for enough fast food to satisfy a full day's calorie requirements
- Decrease in the amount of time spent in food preparation and cooking
 - ✧ Major potential effect on chronic disease development

Ultra-Processed Products

Extreme chemical and mechanical manipulation



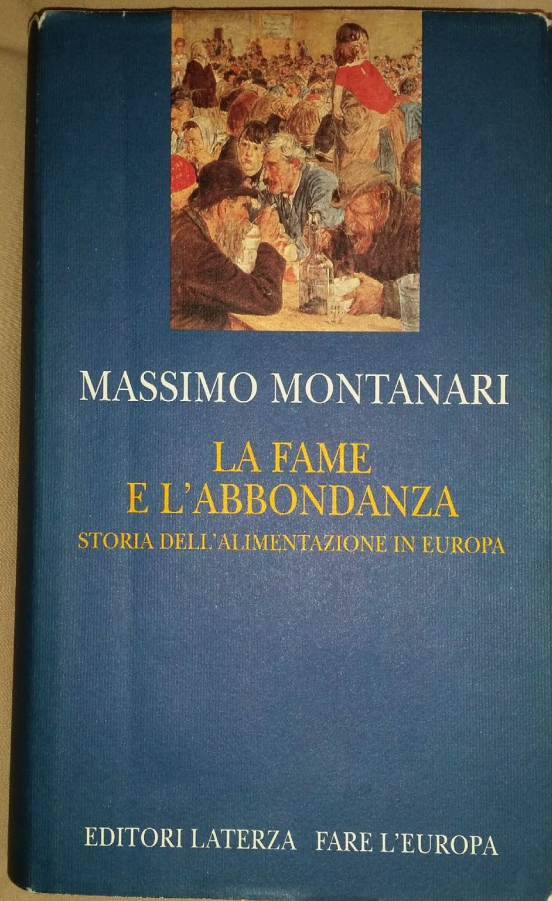
Traditional diet

- Composed of a variety of foods
 - vegetables
 - fruits
 - grains
 - legumes, etc
- Marketed in limited forms

Ultra-processed diet

- Prepared primarily from 3 foods
 - corn
 - wheat
 - soy
 - (and animal raised on these)
- Marketed in enormous variety

From species diversity to product diversity

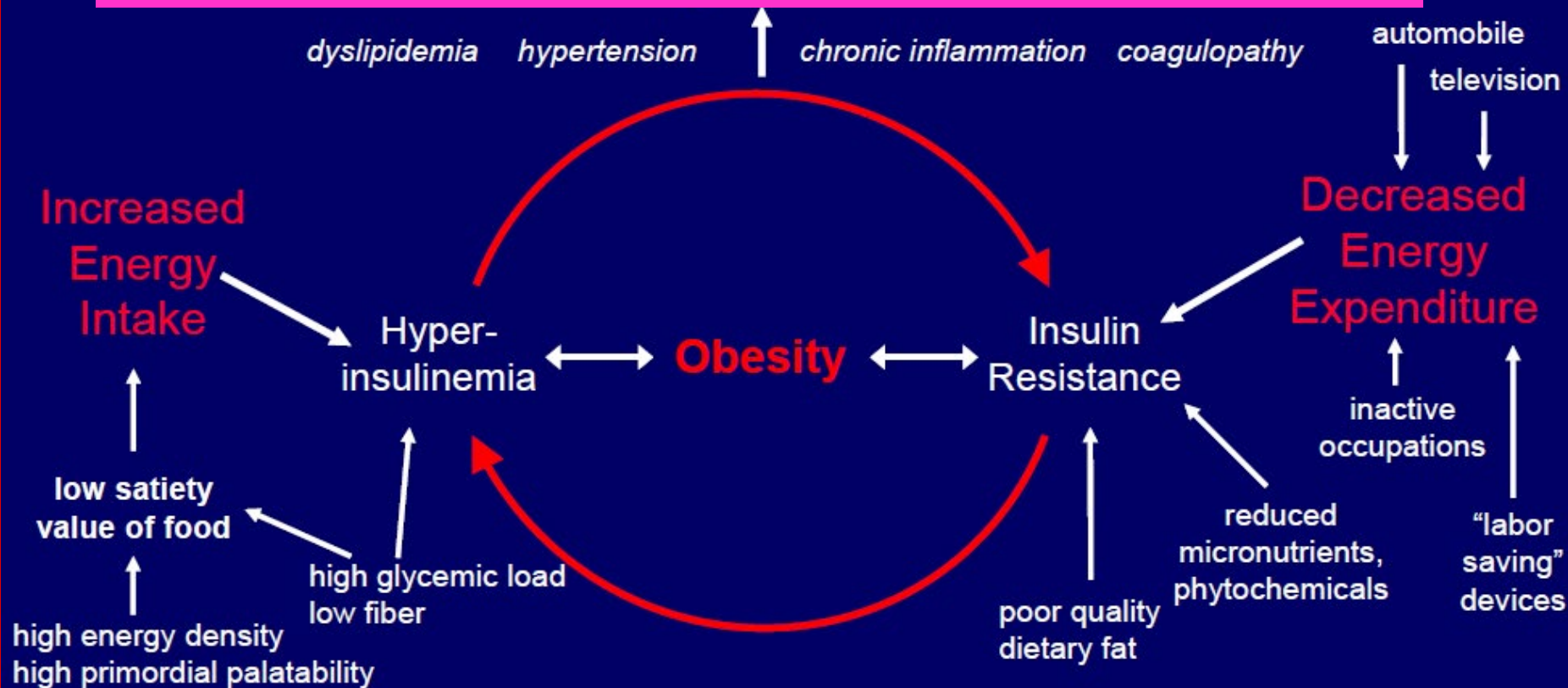


*In questi tempi di disgrazie e di miseria
non ci è consentito inseguire la fama
poetica, poiché dobbiamo badare alla
fame delle nostre case....*

Fabio Fulgenzio V sec D.C

**...comune linguaggio alimentare in
europa dal III secolo....scontro
mondo greco-romano e mondo
barbarico (civiltà del pane vs
civiltà della carne)...opposizione
mantenuta nei secoli
successivi...non più
etnico/culturale ma sociale ed
economica....il mondo della
povertà ed umiltà vs quello del
potere e ricchezza: fame contro
abbondanza**

Effects of Technology on Chronic Disease



Adherence to Mediterranean diet and health status: meta-analysis

Francesco Sofi, researcher in clinical nutrition,^{1,2,5} Francesca Cesari, researcher,¹ Rosanna Abbate, full professor of internal medicine,^{1,5} Gian Franco Gensini, full professor of internal medicine,³ Alessandro Casini, associate professor of clinical nutrition^{2,4,5}

Objective: review all prospective cohort studies that analysed relation between adherence to a Mediterranean diet, mortality, and chronic disease in primary prevention setting

Prospective cohort : >514.816 subjects. 33.576 deaths

Mortality..all cause

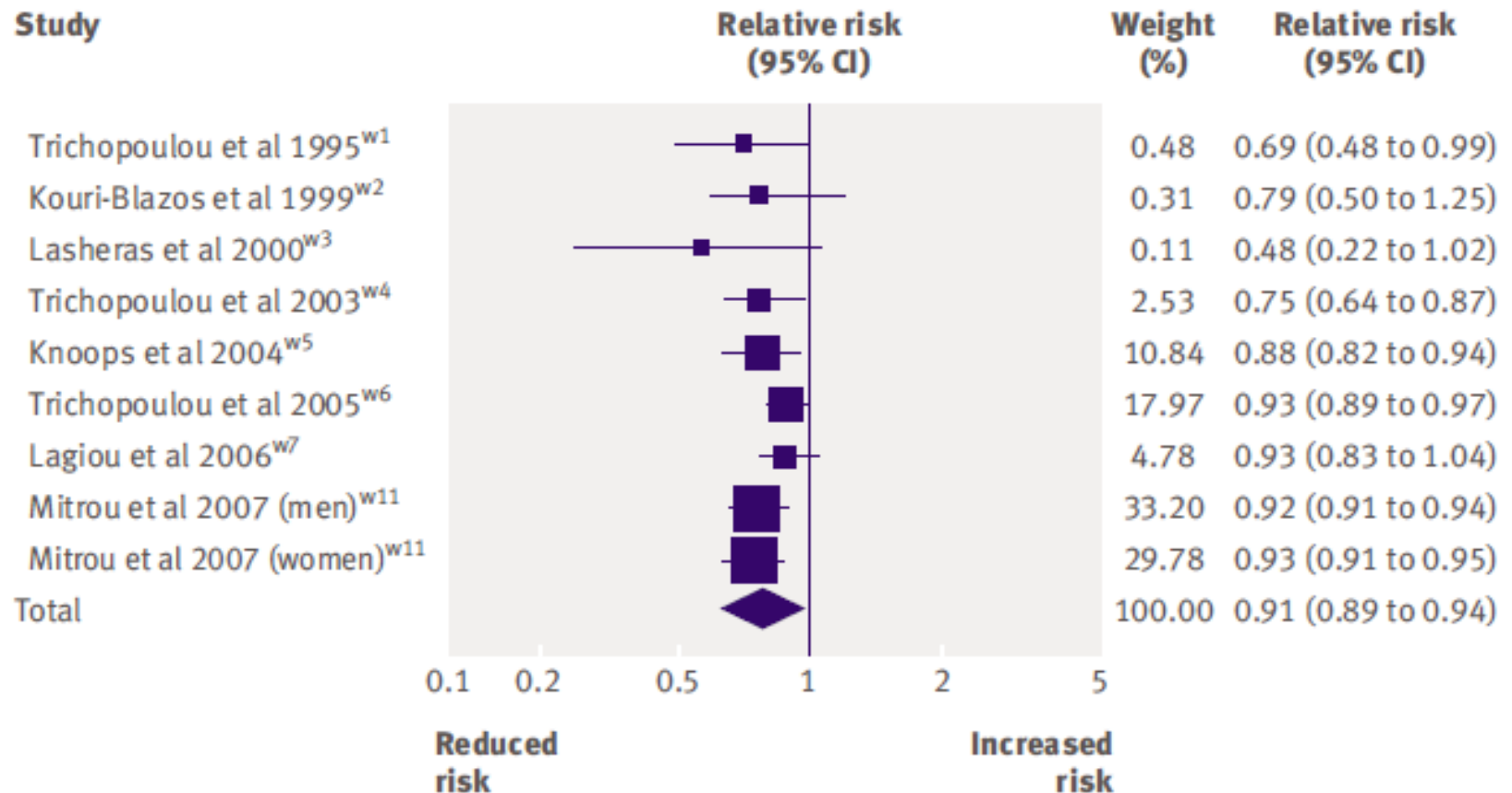


Fig 2| Risk of all cause mortality associated with two point increase in adherence score for Mediterranean diet. Squares represent effect size; extended lines show 95% confidence intervals; diamond represents total effect size

Death by CVD

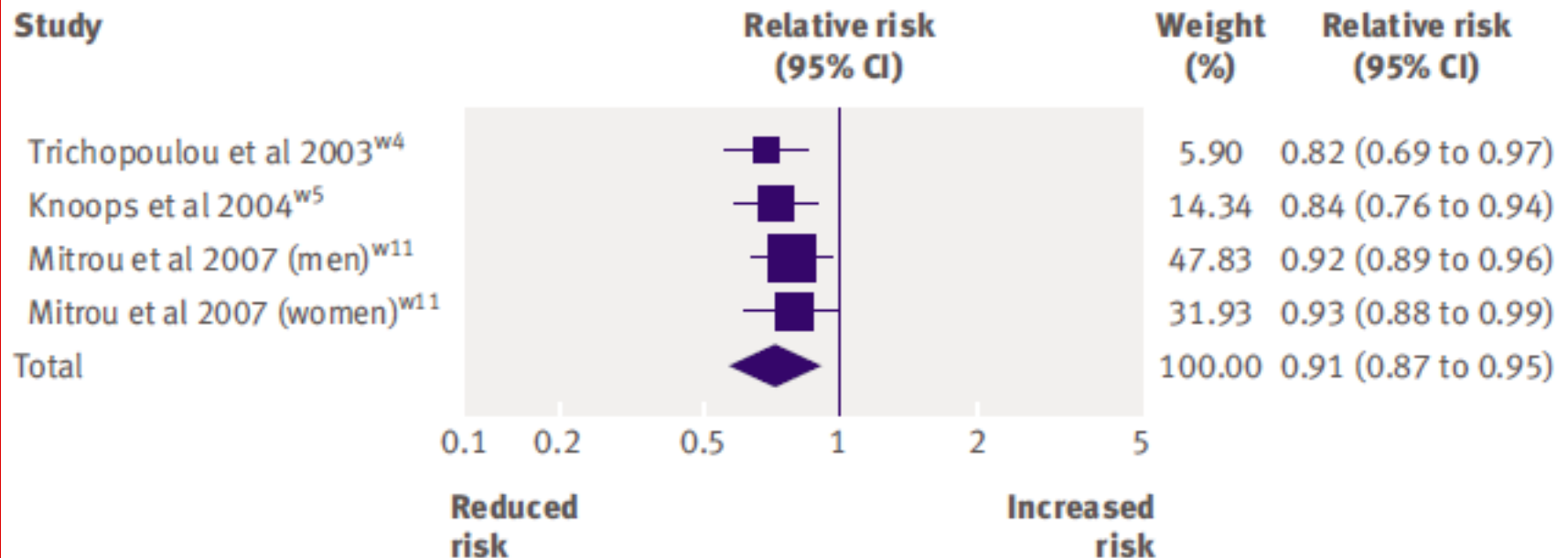


Fig 3 | Risk of mortality from cardiovascular diseases associated with two point increase in adherence score for Mediterranean diet. Squares represent effect size; extended lines show 95% confidence intervals; diamond represents total effect size

CANCER

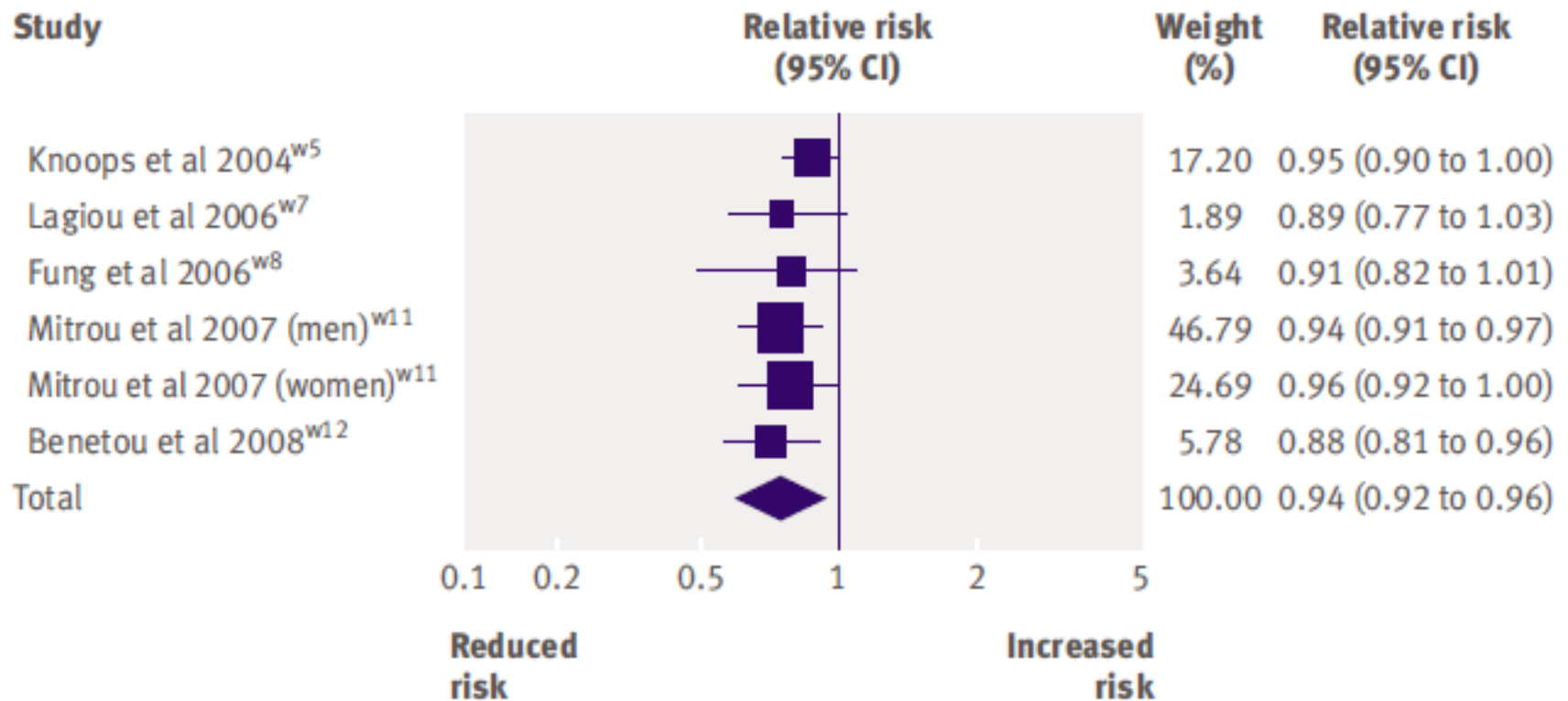
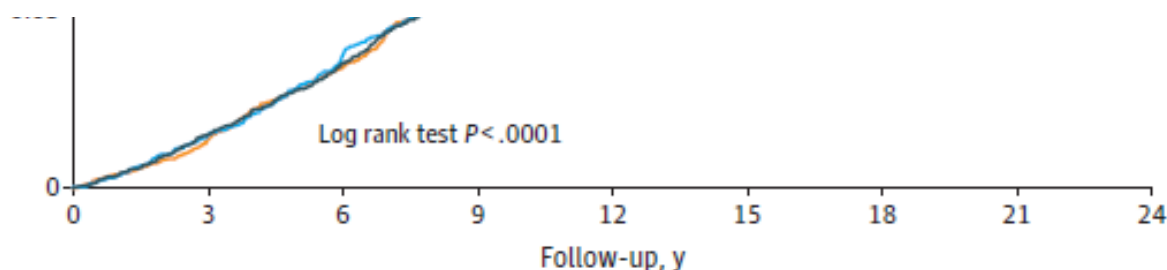
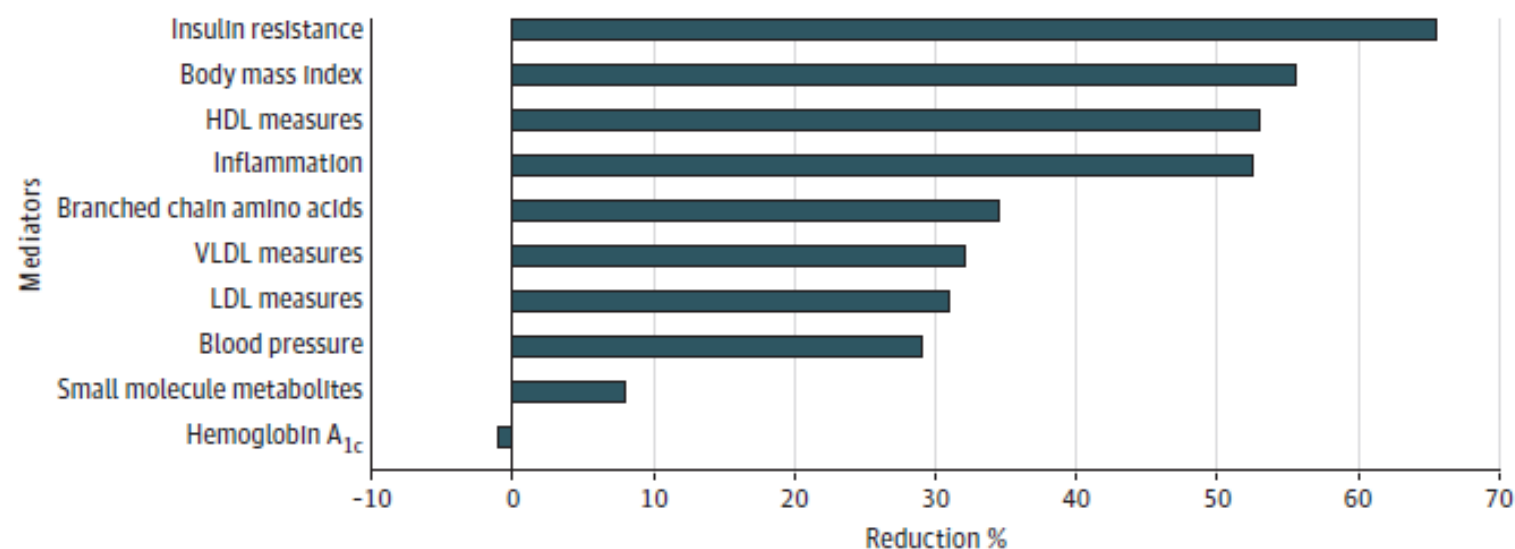


Fig 4 | Risk of occurrence of or mortality from cancer associated with two point increase in adherence score for Mediterranean diet. Squares represent effect size; extended lines show 95% confidence intervals; diamond represents total effect size

Original Investigation | Nutrition, Obesity, and Exercise

Association of the Mediterranean Diet With Onset of Diabetes in the Women's Health Study

Proportion of Diabetes Risk Reduction for Mediterranean Diet Score of 6 or Greater



No. at risk								
MED score 0-3	9873	9737	9535	9238	8093	7664	7083	6521
MED score 4-5	9184	9080	8889	8588	7678	7294	6772	6178
MED score ≥6	6260	6186	6061	5896	5293	5059	4738	4329