



The Heart of Anti-Aging

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Co-Founders of CORAEON

Heart Centered Anti-Aging

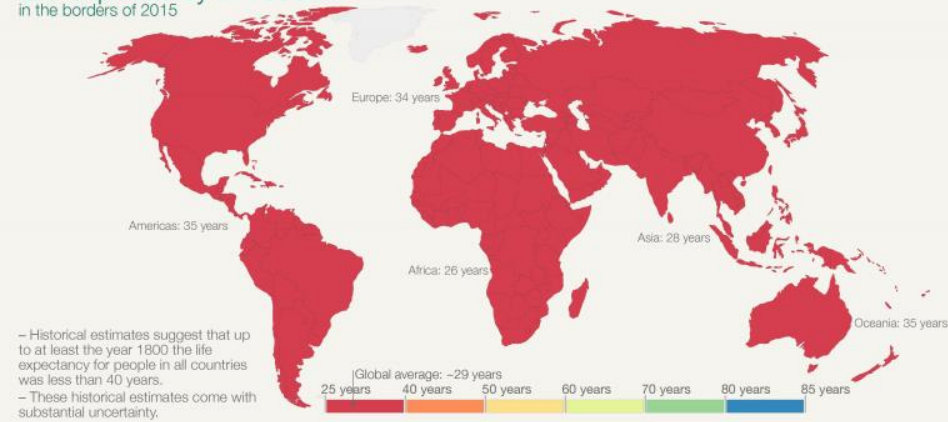
coraeon.com

functionalheart.com

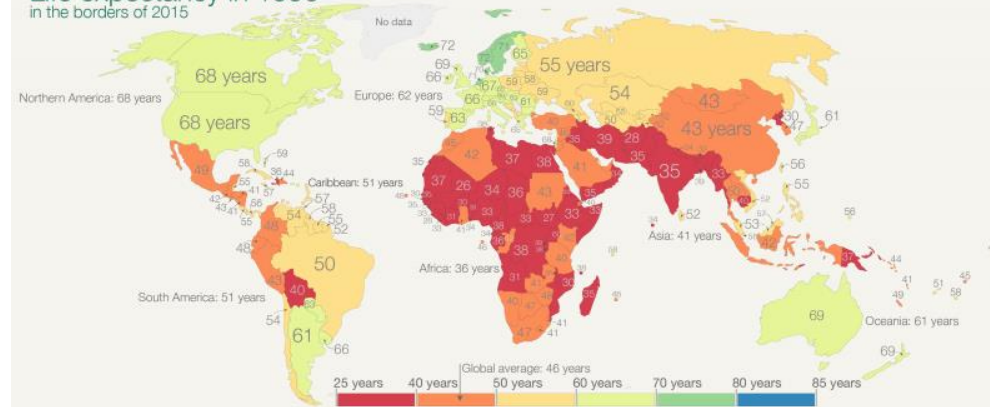
Life expectancy in 1800, 1950, and 2015

Our World
in Data

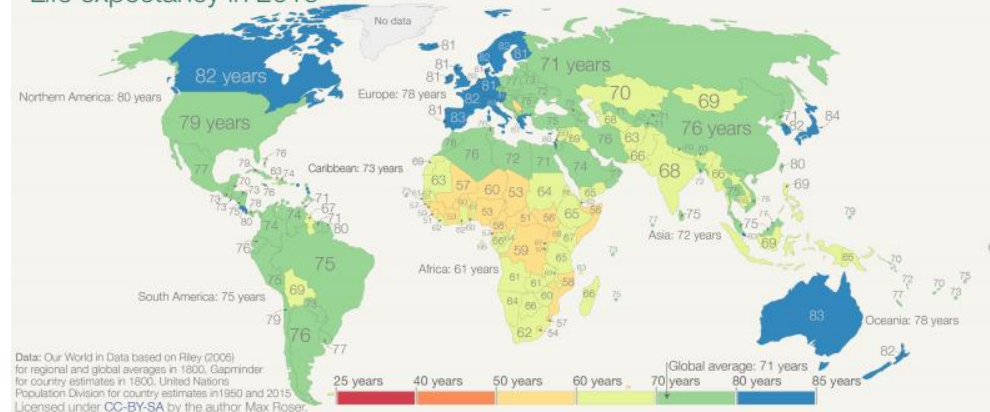
Life expectancy in 1800 in the borders of 2015



Life expectancy in 1950 in the borders of 2015

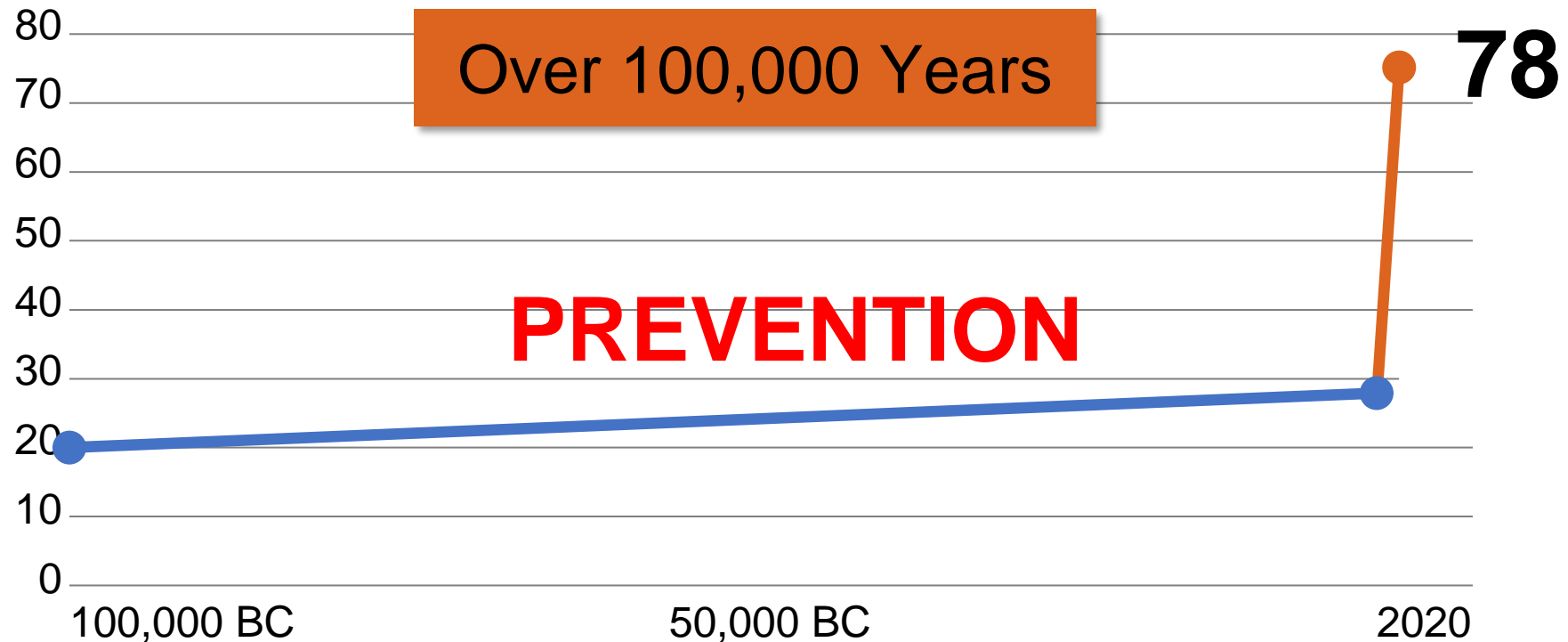


Life expectancy in 2015



Life Expectancy at Birth

Reversal of Established Disease

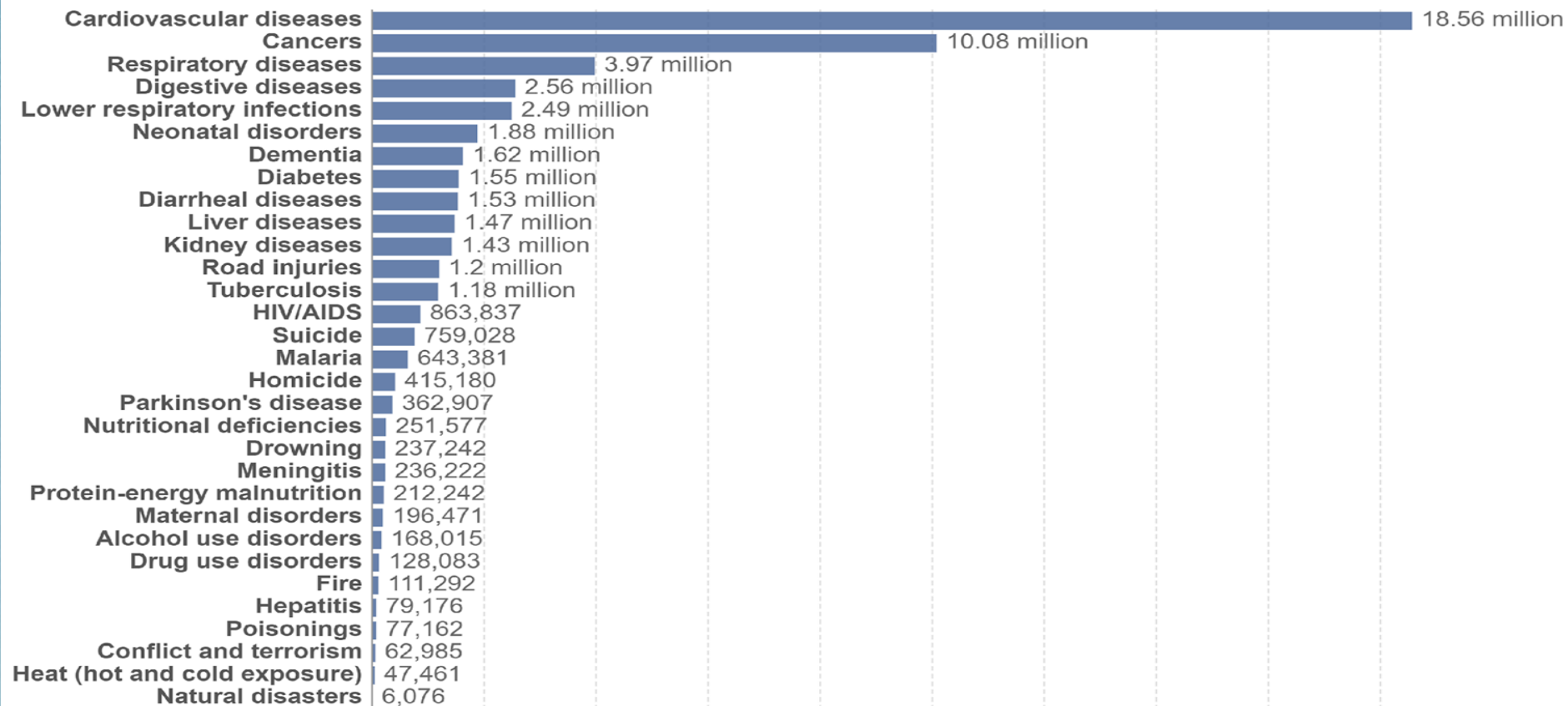


Source: Encyclopedia Britannica, Census Bureau, 2010

This deal got us age-related diseases, their accumulation and bad quality of life


Causes of death, World, 2019

The estimated annual number of deaths from each cause. Estimates come with wide uncertainties, especially for countries with poor vital registration¹.



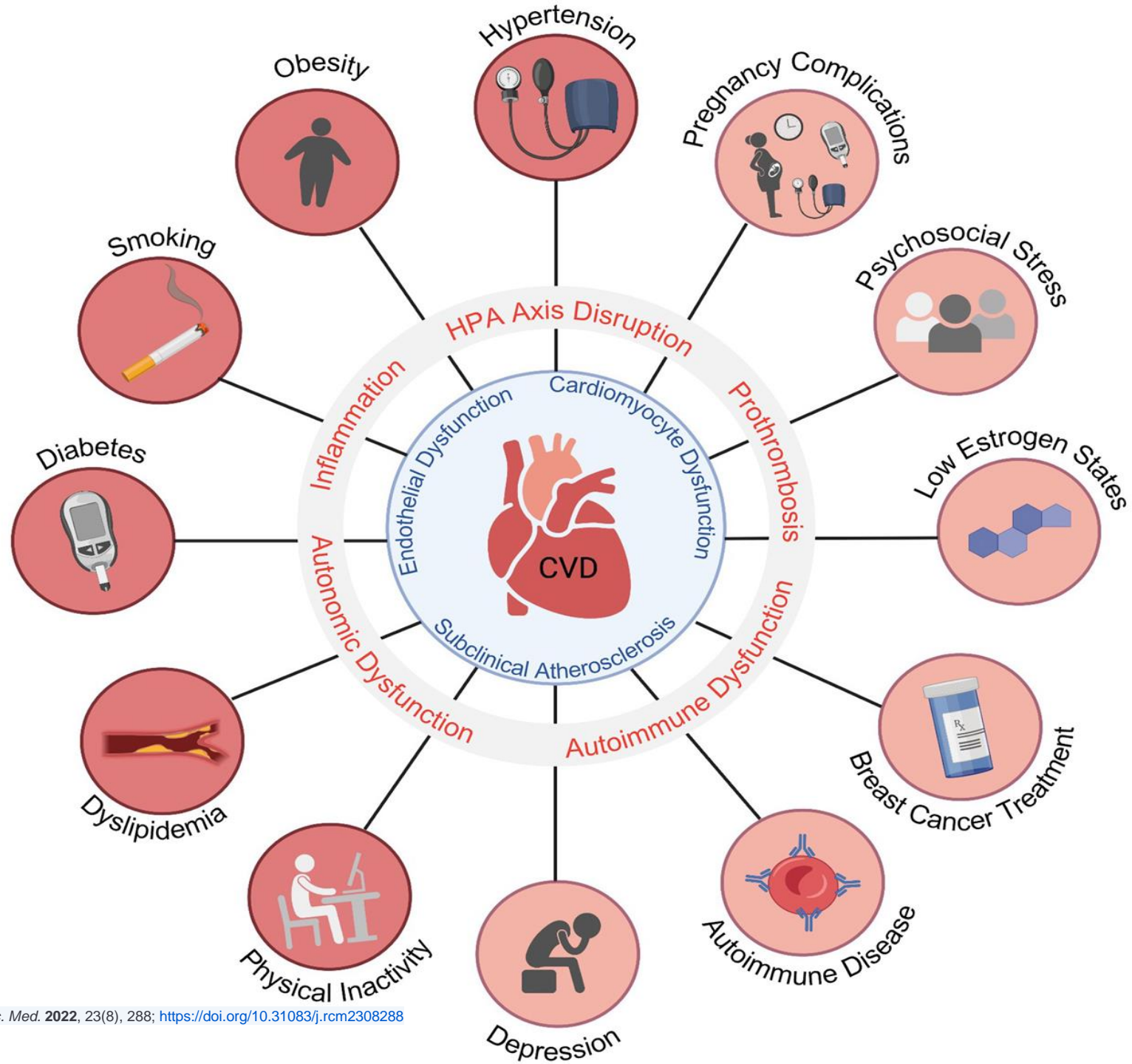
Source: IHME, Global Burden of Disease (2019)

OurWorldInData.org/causes-of-death • CC BY

1. Civil and Vital Registration System: A Civil and Vital Registration System (CVRS) is an administrative system in a country that manages information on births, marriages, deaths and divorces. It generates and stores 'vital records' and legal documents such as birth certificates and death certificates. 
You can read more about how deaths are registered around the world in our article: [How are causes of death registered around the world?](#)

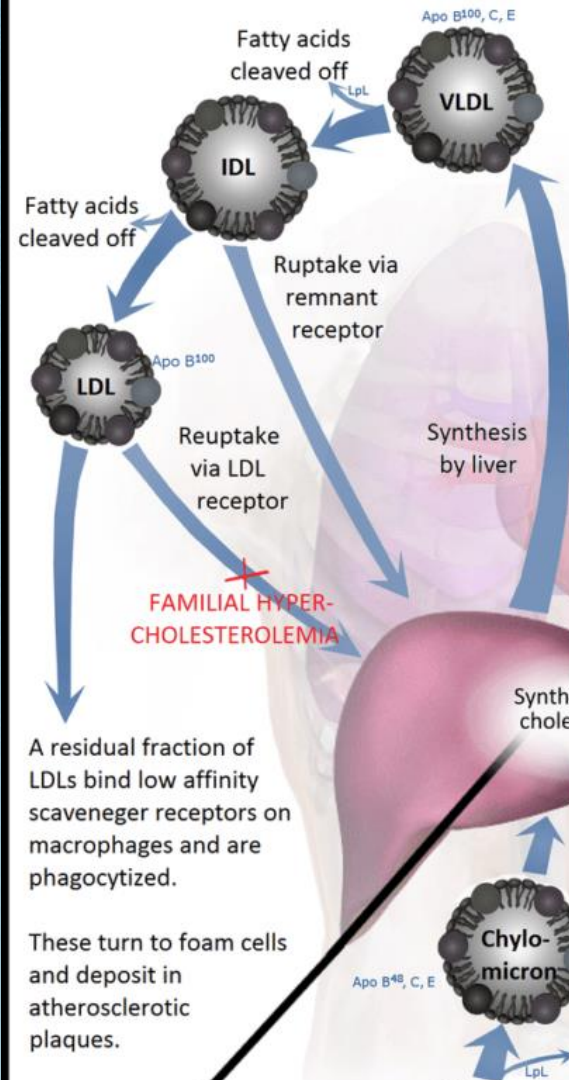
Every 30 seconds someone dies of heart disease

Traditional CVD Risk Factors

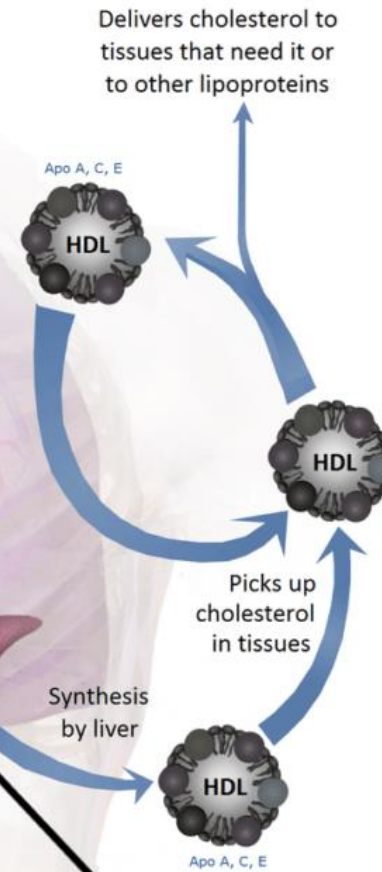


Nontraditional CVD Risk Factors

Endogenous Pathway (LDL)



Reverse Transport Pathway (HDL)

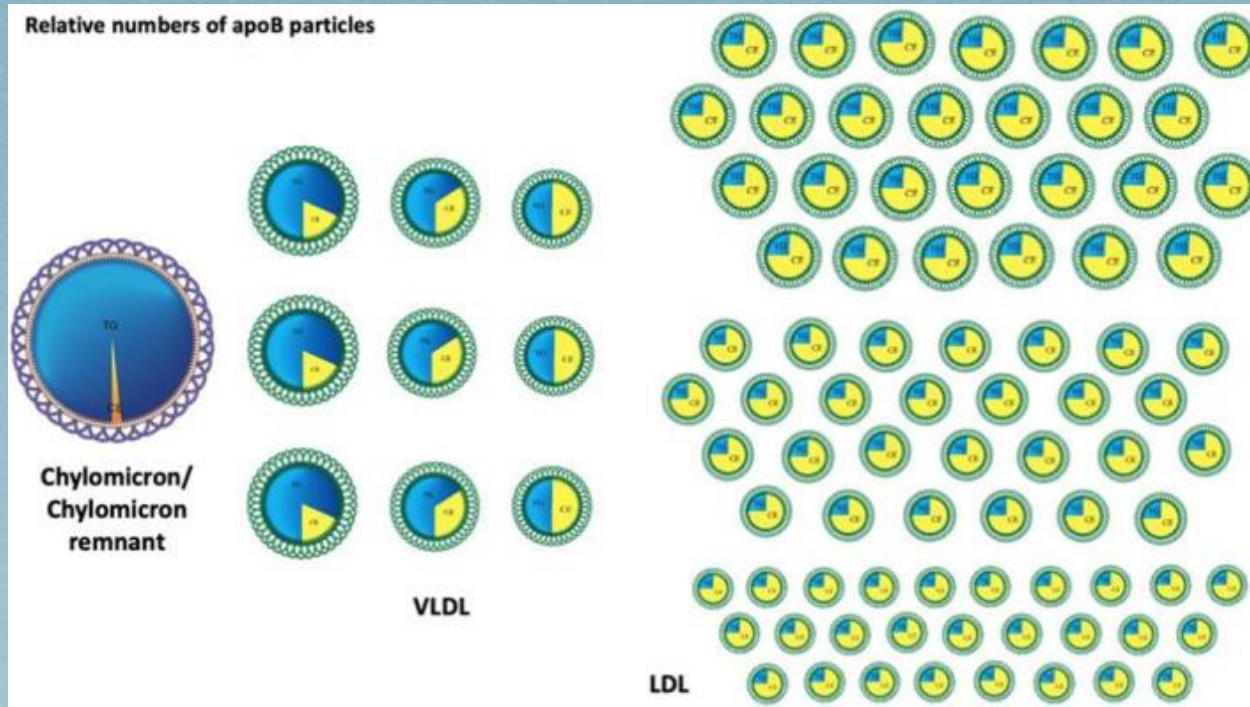


FAMILIAL DYSBETA-LIPOPROTEINEMIA

Exogenous Pathway (chylomicrons)

Dietary triglycerides, phospholipids and cholesterol absorbed into enterocytes of the small bowel

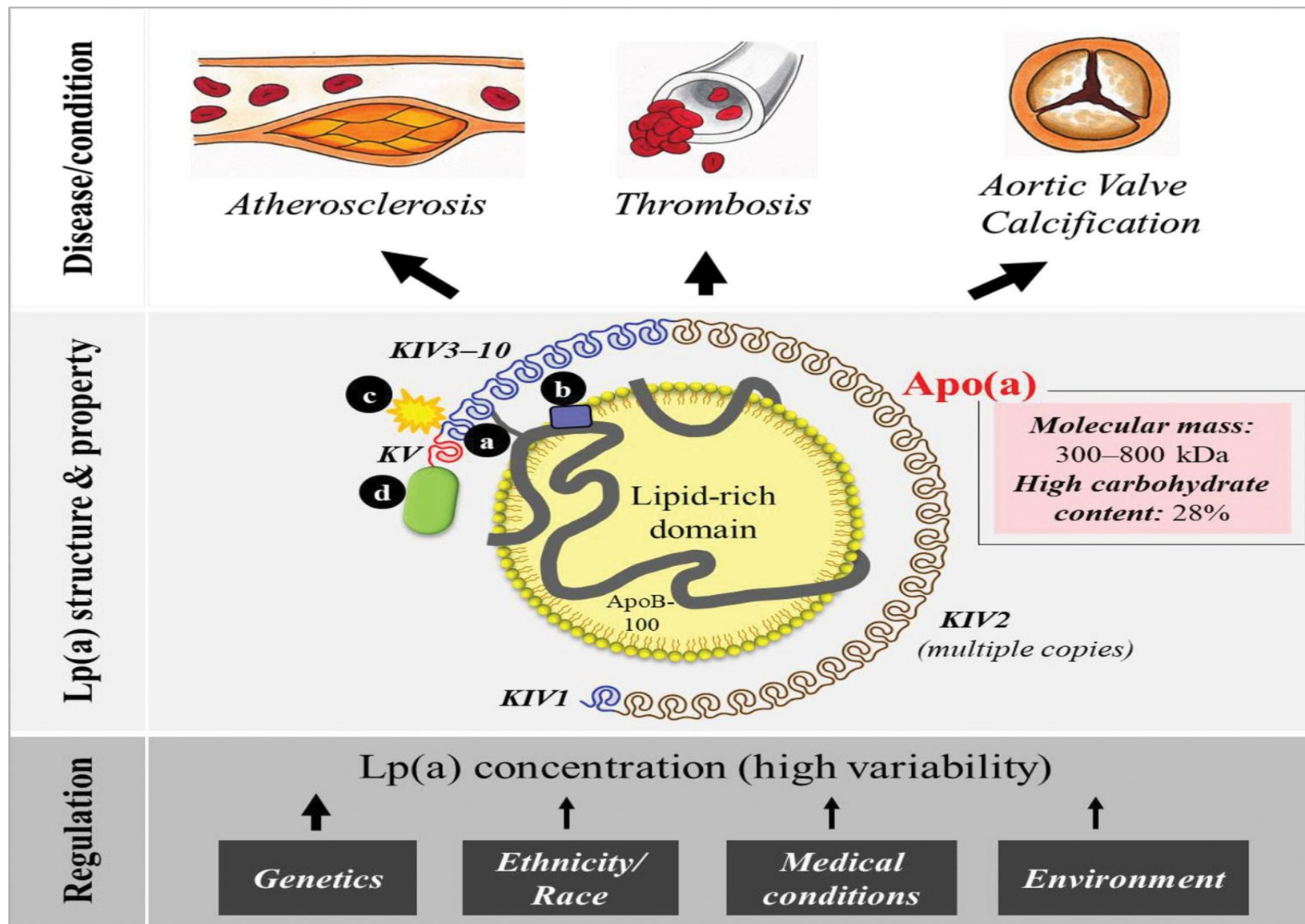
Causes of elevated Apo B
Chol Synthesis, Reabsorption, Clearance (LDLr)
Triglyceride Burden / Insulin Resistance



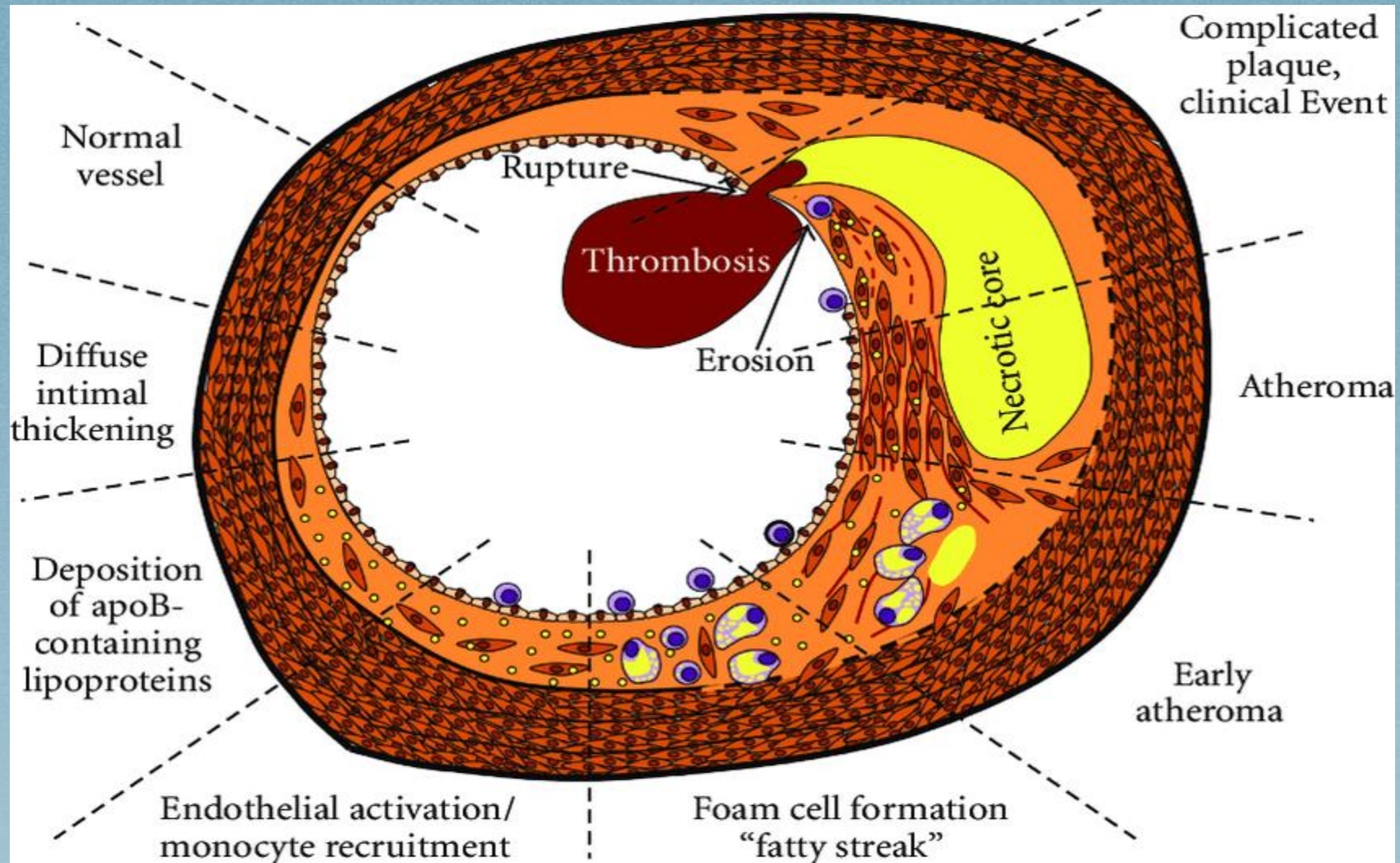
[JAMA Cardiol.](#) 2019 Dec 1;4(12):1287-1295. doi: 10.1001/jamacardio.2019.3780

4 Big Risk Factors for
CAD:
Apo B
Insulin Resistance
HTN
Smoking

All Data link ApoB
with ASCVD:
Epidemiological
Clinical Trials
Mendelian
Randomization



Gissette Reyes-Soffer. Arteriosclerosis, Thrombosis, and Vascular Biology. Lipoprotein(a): A Genetically Determined, Causal, and Prevalent Risk Factor for Atherosclerotic Cardiovascular Disease: A Scientific Statement From the American Heart Association, Volume: 42, Issue: 1, Pages: e48-e60, DOI: (10.1161/ATV.0000000000000147)



T1 - Hyperglycemia and Endothelial Dysfunction in Atherosclerosis:
Lessons from Type 1 Diabetes

10.1155/2012/569654 International journal of vascular medicine

“Atherosclerosis is a multifocal, smoldering, immunoinflammatory disease of medium-sized and large arteries fuelled by lipids.”

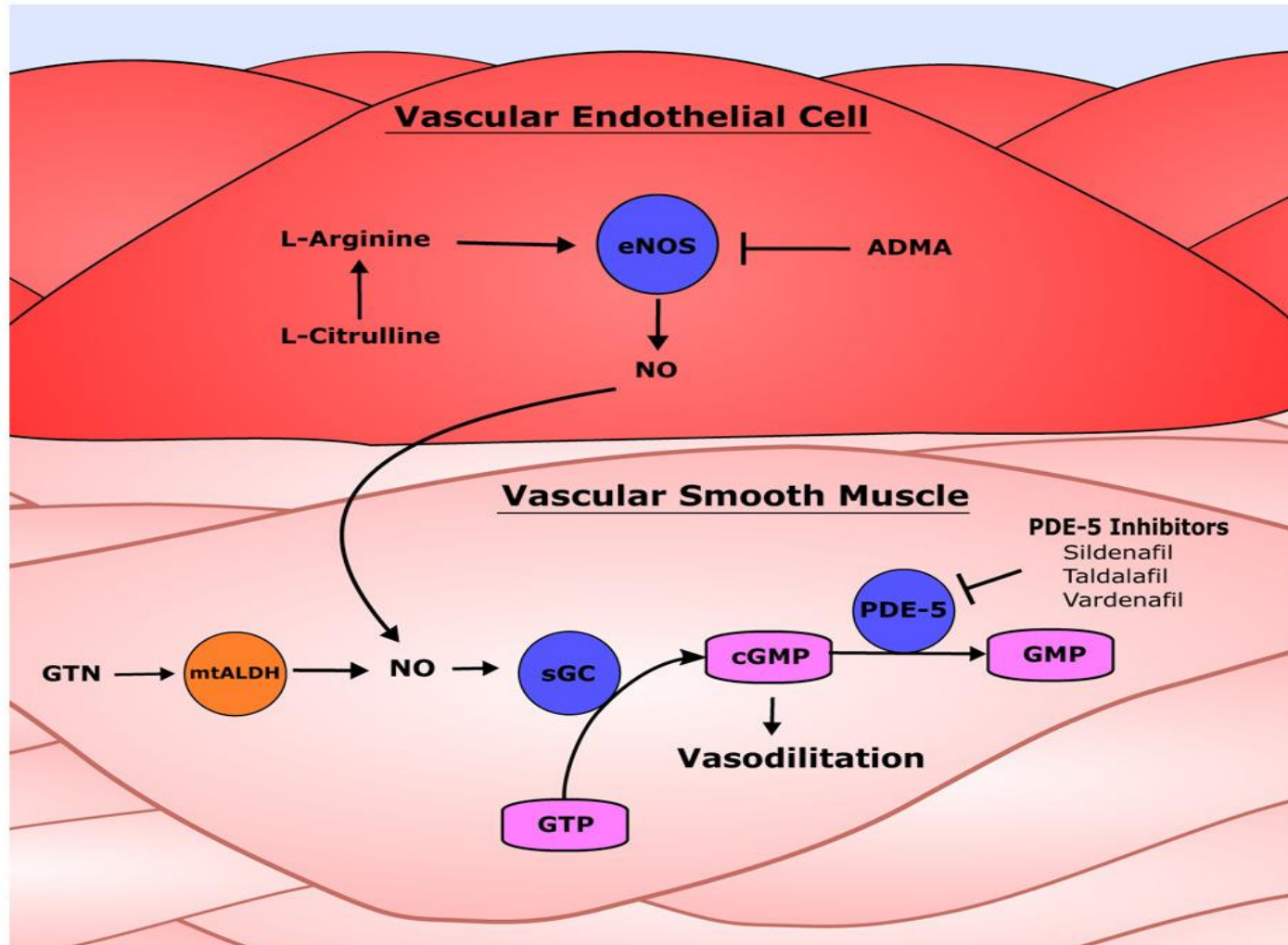
[Falk, 2006]

First Sign of a MI - Sudden Death 50% in men 69% in women



Myocardial Infarction: Histopathology and Timing of Changes

<https://doi.org/10.1177/2374289520976639>



Nitric Oxide Supplements

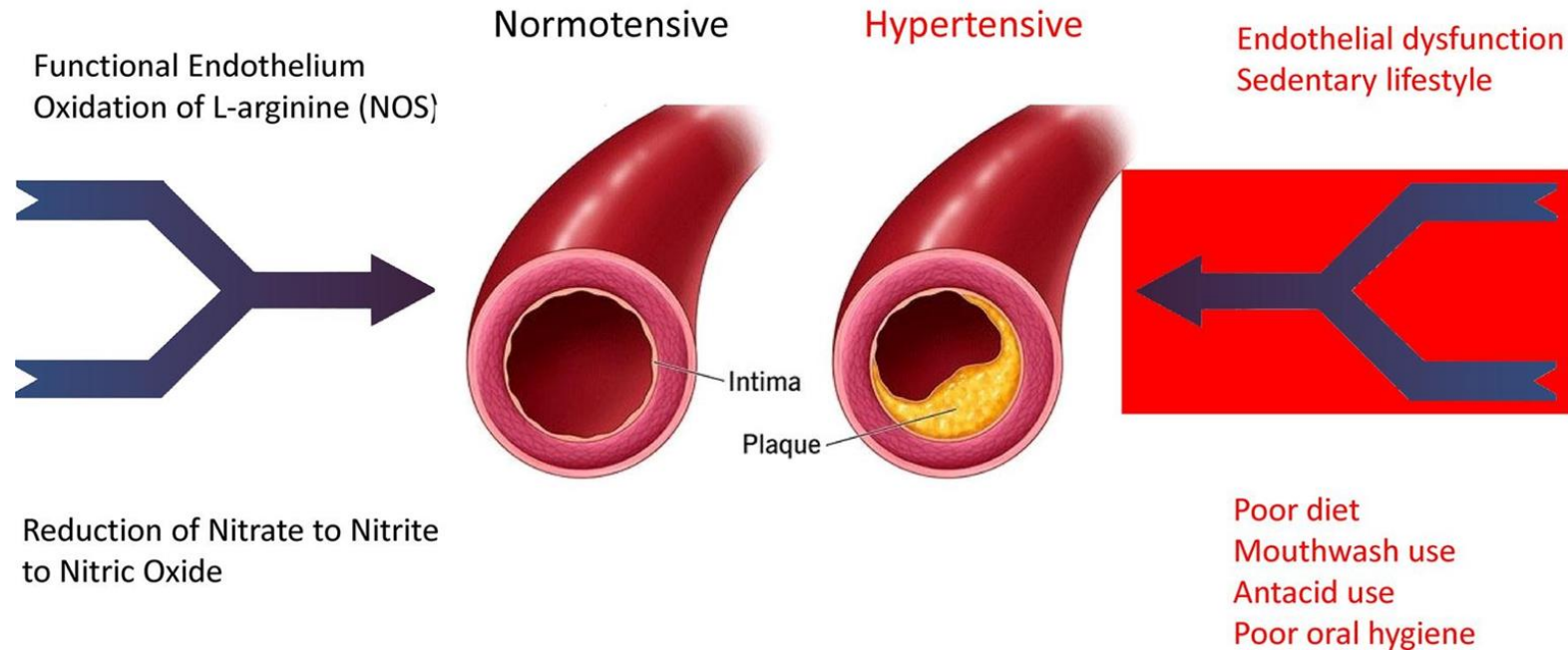
Arginine may not be the best option anymore. Research may not have caught up though

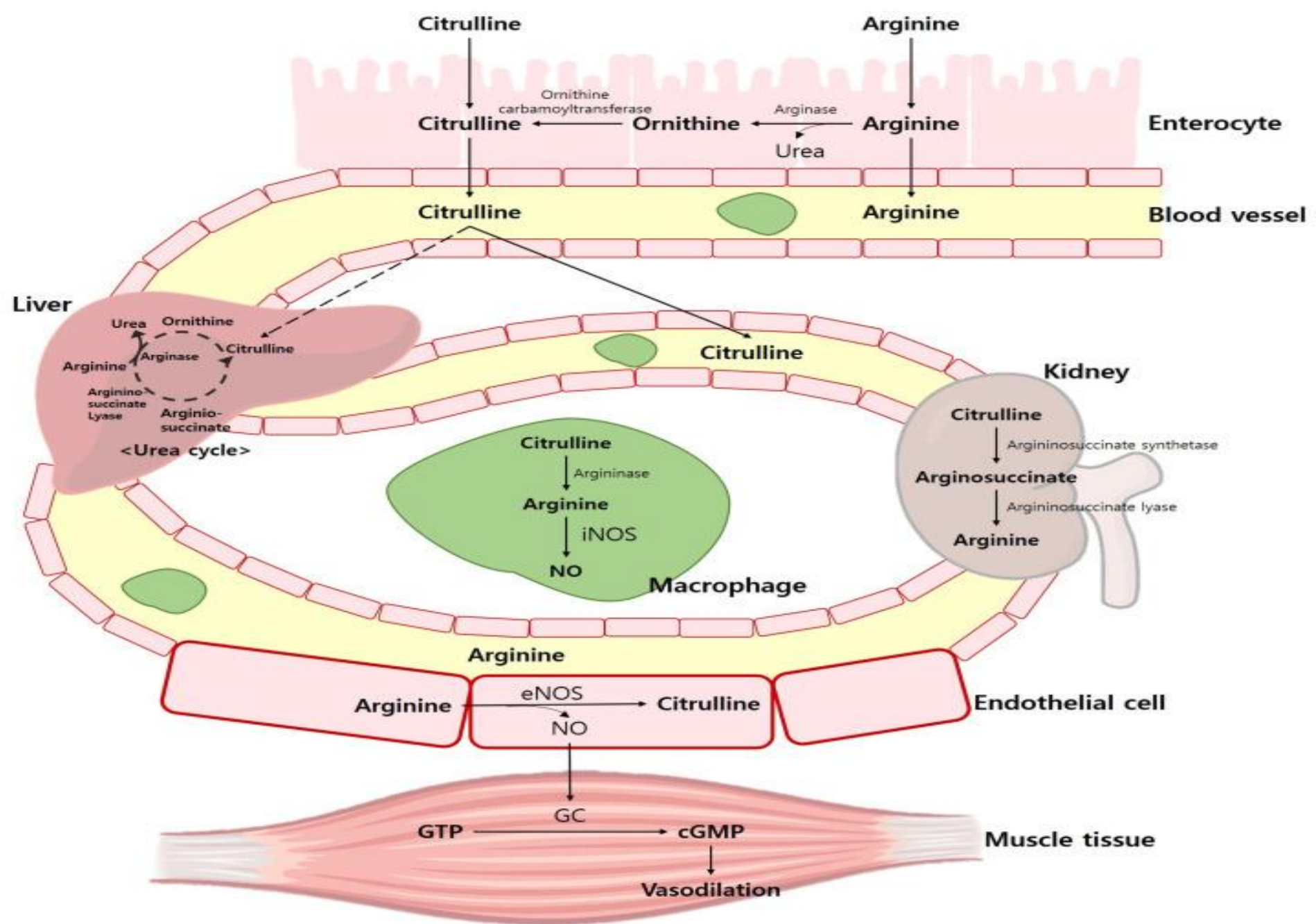
Other options:

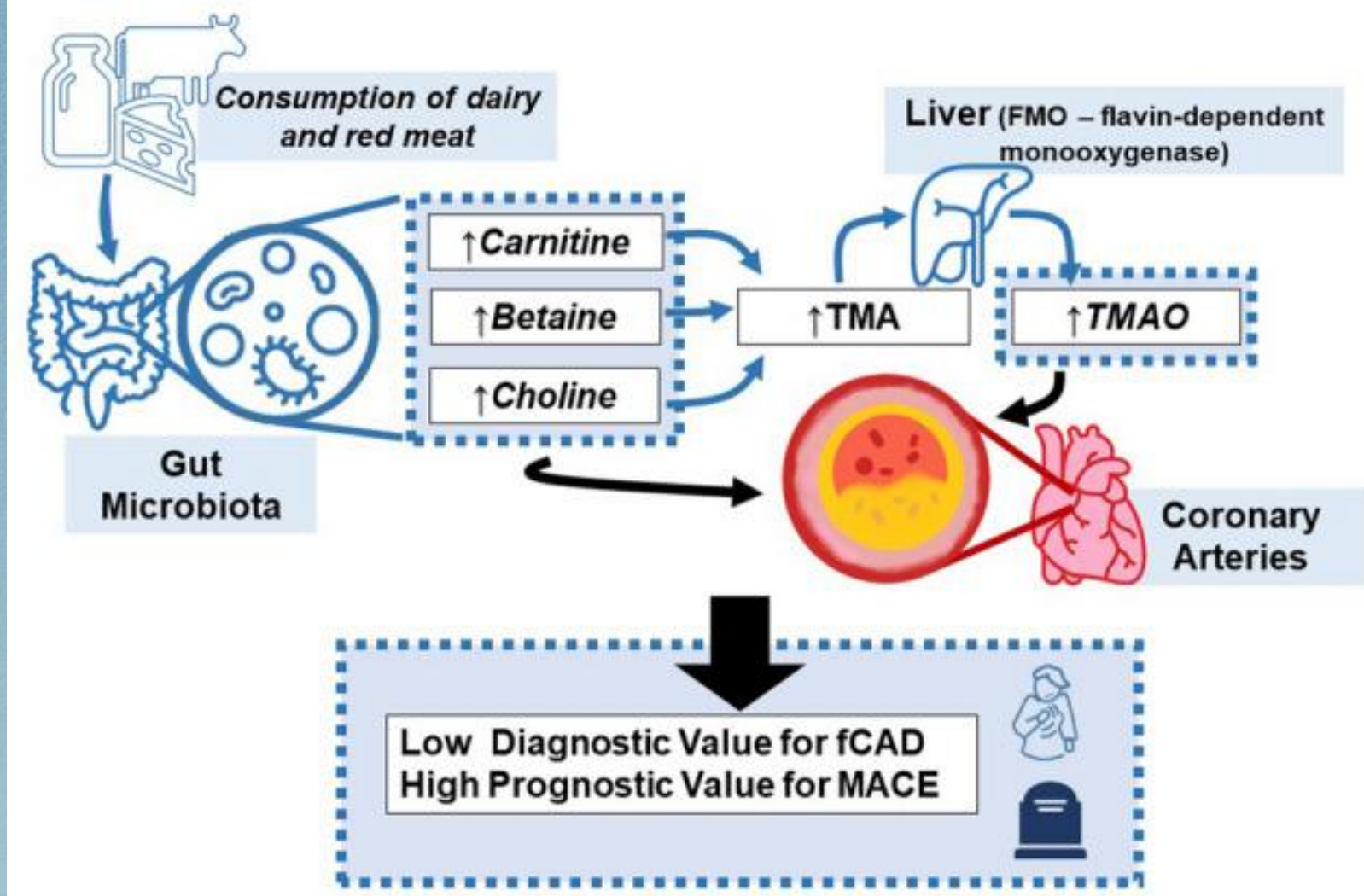
L-Citrulline
Potassium Nitrate
Beet Root Powder

Sufficient Nitric Oxide Production

Insufficient Nitric Oxide Production

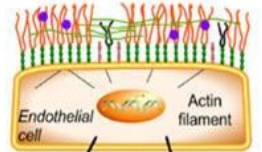






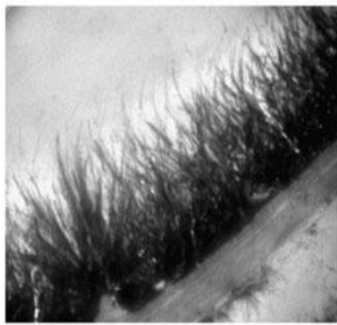
Gut microbiota-dependent metabolite trimethylamine N-oxide (TMAO) and cardiovascular risk in patients with suspected functionally relevant coronary artery disease (fCAD)

Mechanosensing and mechanotransduction

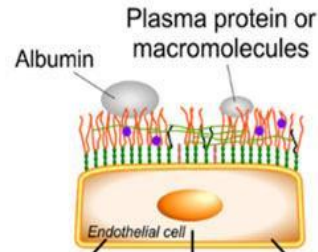


Flow-induced vasodilatation
reactive hyperemia

Flow-induced NO production



Selective permeability barrier



Plasma protein or macromolecules

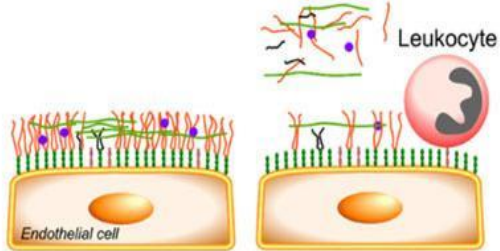
Albumin

Protection against proteinuria

Protection against tissue edema

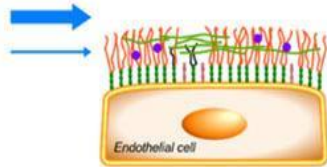
Restriction of high molecular weight Dextran access

Space between blood and vessel wall



Prevention of leukocytes adhesion and extravasation

Shear stress



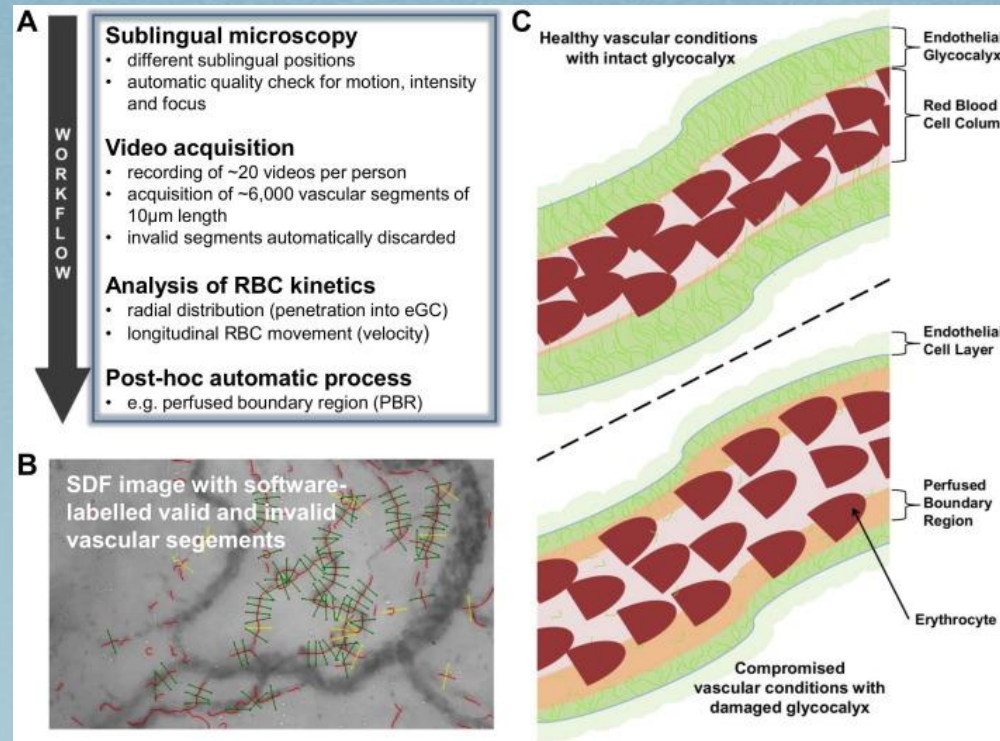
Direct effect of shear stress on plasma membrane



Glycocheck

A side-stream dark field camera visualizes passing red blood cells (RBC) by emitting stroboscopic green light in the sublingual microcirculation.

The dedicated Glycocheck™ software then estimates the dynamic lateral RBC movement into the glycocalyx, which is expressed as the perfused boundary region (PBR; in μm)



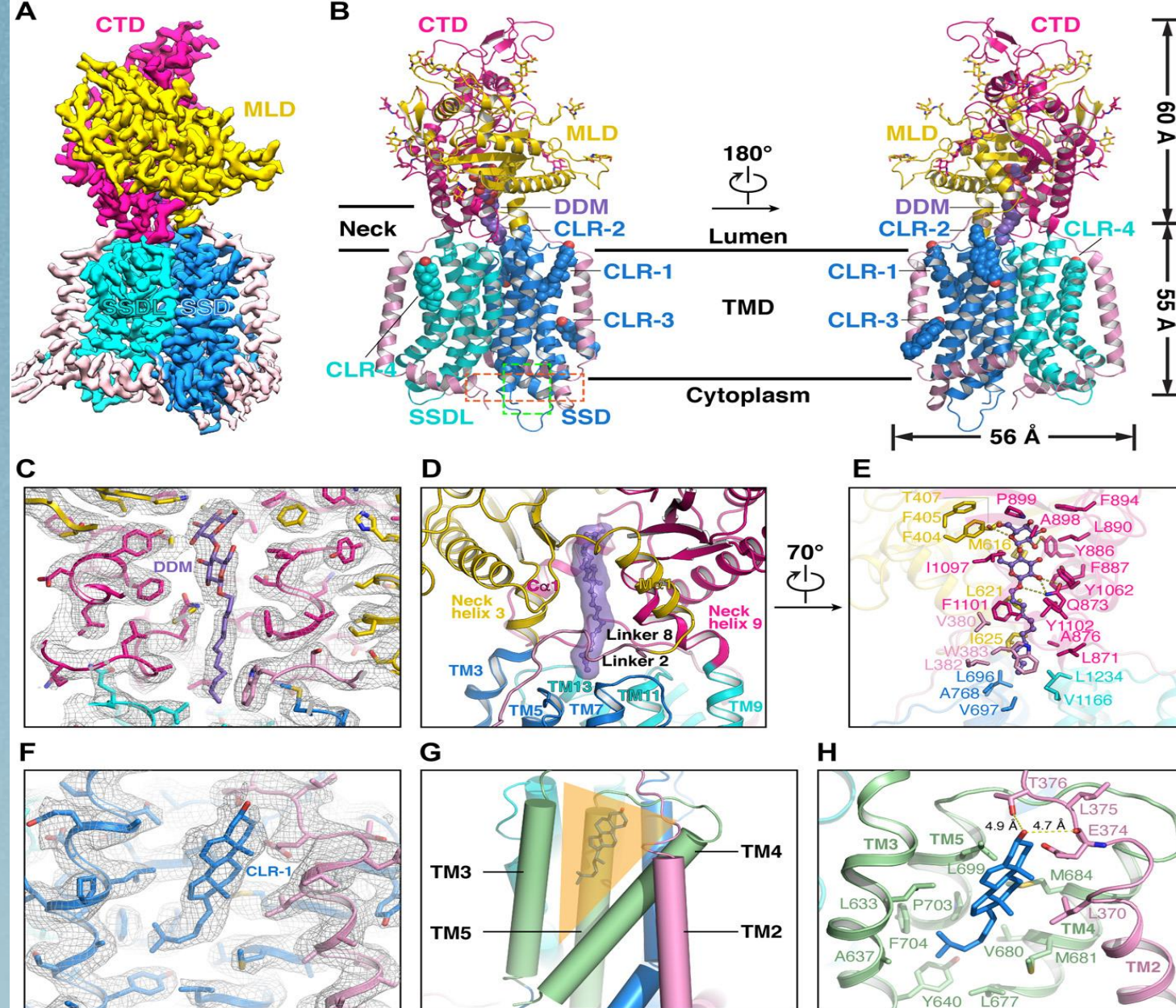
Chondroitin Sulfate Glucosamine Sulfate

Treatment	Reference
Hydrocortisone	Chappell et al. 2007, 2009b, 2010 [41, 43, 44]
Antithrombin	Chappell et al. 2009a, 2009b, 2010 [42–44]
Protein C	Marechal et al. 2008 [50]
Nitric oxide	Bruegger et al. 2008 [45]
Hyaluronic acid and chondroitin sulphate	Henry and Duling 1999 [13]
Sulodexide	Broekhuizen et al. 2010 [54]
Lidoflazine	Flameng et al. 1983 [55]
Albumin	Jacob et al. 2006, 2009 [46, 47]
Hydroxethyl starch	Rehm et al. 2004; Jacob et al. 2006 [8, 46]
N-acetylcysteine	Nieuwdorp et al. 2006 [9]
Metformin	Eskens et al. 2013 [51]



Rhamnan Sulfate

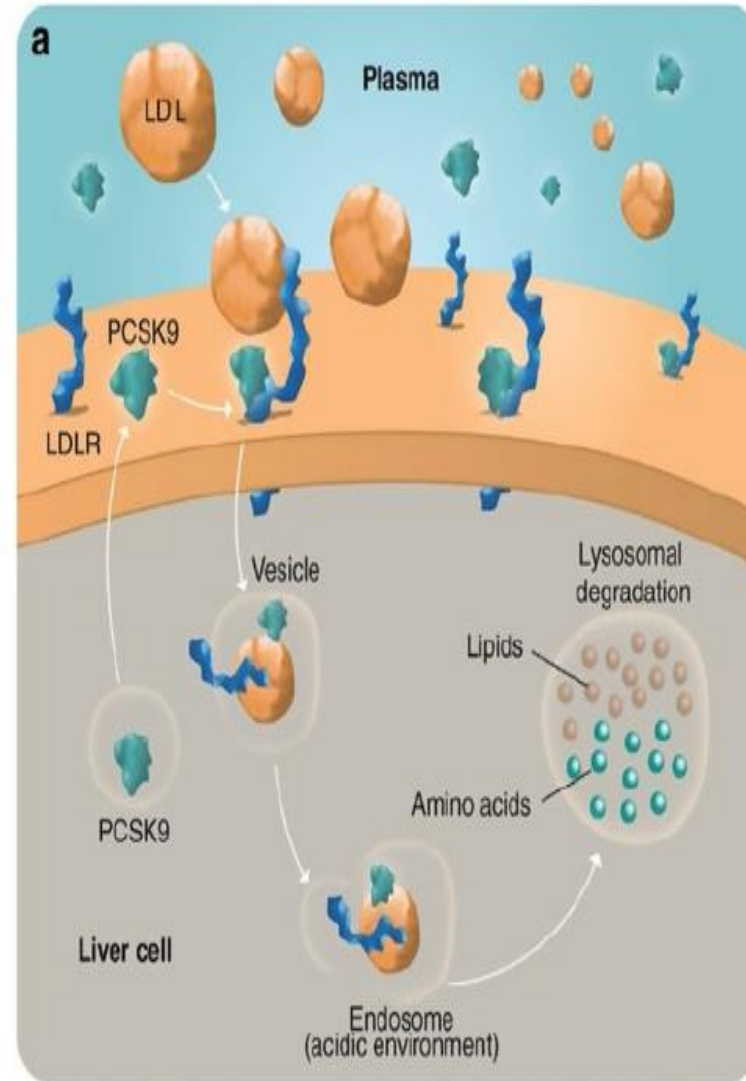




Helen Hobbs in early 2000's discovered a group with a mutation in PCSK9 Gene - less PCSK9 - less degradation of LDLR
LDLc-10-20mg/dl, no CAD
No increase of other diseases - Cancer, DM2, Dementia

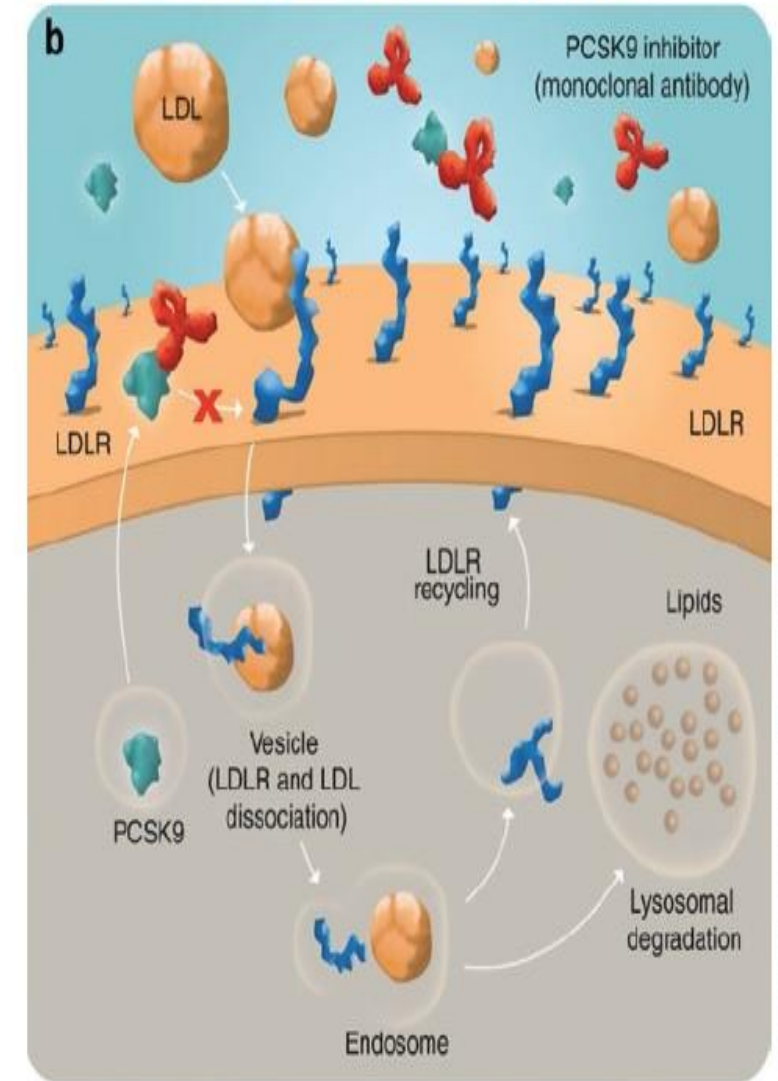
Another group - hyperfunctioning gene - reduced LDLR , increased LDLc & CAD - form of FH

How does PCSK9 work?

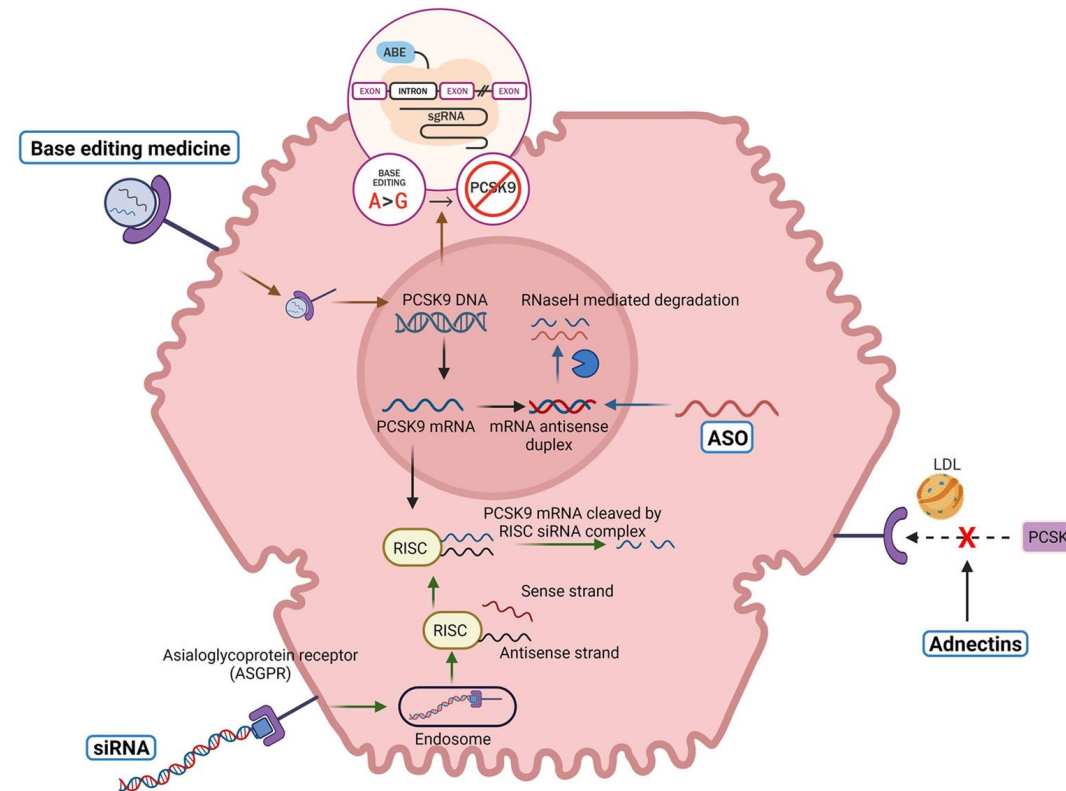


a) Secreted PCSK9 binds to LDLR on the liver cell surface and mediates the lysosomal degradation of the complex formed by PCSK9 - LDLR - LDL.

How does Inhibitors work?



b) In the presence of a monoclonal antibody that binds to PCSK9, the PCSK9-mediated degradation of LDLR is inhibited, resulting in an increased uptake of LDL-cholesterol by LDLR as more LDLR are recycled at the cell surface.



Statins - 7% Muscle aches
Increase in Transaminases
Ins resistance - 0.4% DM2
Follow HgbA1C, Insulin,
CGM

No convincing data on negative
Mitochondrial effects
Zone 2 testing (180-age)
No good data that CoQ10 helps

Cholesterol Pool Sizes		
9.36 gms = 0.33 oz = ~ 2 tsp	mg/kg	g/70 kg
Liver	27.0	1.89
Red blood cells	37.0	2.59
Lipoproteins	20.3	1.42
Peripheral tissues	133.7	9.36
Investigators concluded that neither the size nor turnover of these pools was significantly affected by blood lipid or lipoprotein levels nor by statin treatment, and thus whole-body cholesterol turnover <u>did not correlate</u> with the usual parameters of atherosclerotic risk		

Cholesterol is essential for Life
Smith-Lemli -Optz Syndrome:
Microencephaly, death

Statin Pleiotropy

Increased synthesis of nitric oxide Improvement of endothelial dysfunction

Inhibition of free radical release

Decreased synthesis of endothelin-1

Inhibition of LDL-C oxidation

Upregulation of endothelial progenitor cells

Reduced number and activity of inflammatory cells

Reduced inflammatory response

Reduced levels of C-reactive protein

Reduced macrophage cholesterol accumulation

Stabilization of atherosclerotic plaques

Reduced production of metalloproteinases

Inhibition of platelet adhesion/aggregation Reduced thrombogenic response

Reduced fibrinogen concentration

Reduced blood viscosity

Red Yeast Rice



Red yeast rice preparations have been shown to be safe and effective in improving lipid profiles, and, to some extent in reducing the risk of cardiovascular events. Red yeast rice should not routinely be used in the place of conventional treatments (statins, ezetimibe and PCSK9 inhibitors) for which higher-quality long-term outcomes data exist.

However, in specific situations (statin intolerance, patients with dyslipidaemia ineligible for statin therapy, strong patient preference), the use of red yeast rice may be considered. When recommending a red-yeast rice product to patients, it is important to ensure that the product has been produced according to the principles of GMP, to ensure consistency of dose of the active ingredient, and the absence of harmful contaminants

Some red yeast rice products contain a contaminant called citrinin, which is toxic and can damage the kidneys.

In a 2021 analysis of 37 red yeast rice products, only one had citrinin levels below the maximum level currently set by the European Union.

Red Yeast Rice for Hyperlipidemia

RYR at 200–4800 mg daily appears to be a safe and effective treatment for hyperlipidemia, effectively regulating blood lipid levels with an exceptional impact on TG.

Looking forward, high-quality clinical trials with longer observation periods are required to evaluate the efficacy and safety of RYR as a long-term medication.

- RYR should be considered for patients who have a suboptimal lipid profile despite diet and lifestyle interventions (IIaB)

Patients not indicated for statin therapy owing to low CVD risk

Patients who are unwilling to take statin/any lipid lowering drug

- In primary prevention, in pts who are unwilling to take a statin, RYR is recommended alone or in combination with other available LLTs (IC)

Patients with statin intolerance and the drucebo effect

Patients with statin intolerance and the drucebo effect

- RYR may be considered as part of a supportive strategy to manage dyslipidaemias and CV risk in SAMS likely to result from the drucebo effect (IIbC)

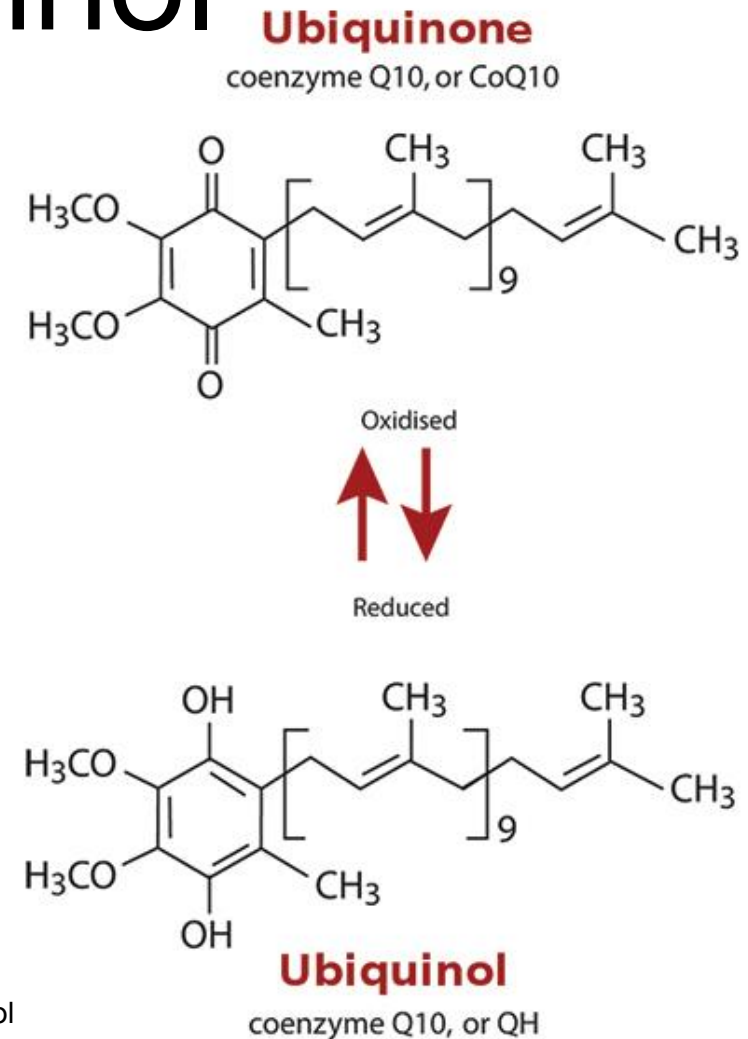
- RYR should be considered as an alternative approach to statins in patients with confirmed statin intolerance (IIaB)

CoQ10

Ubiquinone & Ubiquinol

Patients with heart failure with preserved ejection fraction (HFpEF) have few pharmacologic therapies, and it is not known if supplementing with ubiquinol and/or d-ribose could improve outcomes. The overall objective of this study was to determine if ubiquinol and/or d-ribose would reduce the symptoms and improve cardiac performance in patients with HFpEF.

In conclusion, ubiquinol and d-ribose reduced the symptoms of HFpEF and increased the EF. These findings support the use of these supplements in addition to standard therapeutic treatments for patients with HFpEF.



Optimal Moderate High

Test Name	08/04/2023 (Current)	01/06/2023	06/16/2022	06/15/2022	03/30/2022	02/01/2022
LIPID PANEL						
TRIGLYCERIDES	115	105	100	-	148	284
CHOLESTEROL, TOTAL	152	152	122	-	183	192
HDL CHOLESTEROL	50	57	51	-	50	43
LDL-CHOLESTEROL	81	76	53	-	107	108
CHOL/HDLRATIO	3.0	2.7	2.4	-	3.7	4.5
NON-HDL CHOLESTEROL	102	95	71	-	133	149
LIPOPROTEIN FRACTIONATION, ION MO						
LDL PARTICLE NUMBER	1489	1196	826	-	1926	1528
LDL SMALL	368	257	177	-	464	350
LDL MEDIUM	297	214	171	-	447	239
HDL LARGE	5757	7190	4354	-	6958	5259
APOLIPOPROTEINS						
LIPOPROTEIN (a)	66	91	72	-	74	22
APOLIPOPROTEIN A1	-	-	163	-	-	-
APOLIPOPROTEIN B	88	75	62	-	105	109
INFLAMMATION						
HS CRP	0.7	2.5	3.0	-	3.0	1.3
FIBRINOGEN ANTIGEN	-	-	285	-	-	-
SDMA (Symmetric dimethylarginine)	109	108	-	98	-	-
LP PLA2 ACTIVITY	89	80	71	-	92	105

CLIENT SERVICES: 866.697.8

SPECIMEN: CZ923596Q

PAGE 8 OF 12

Bergamot

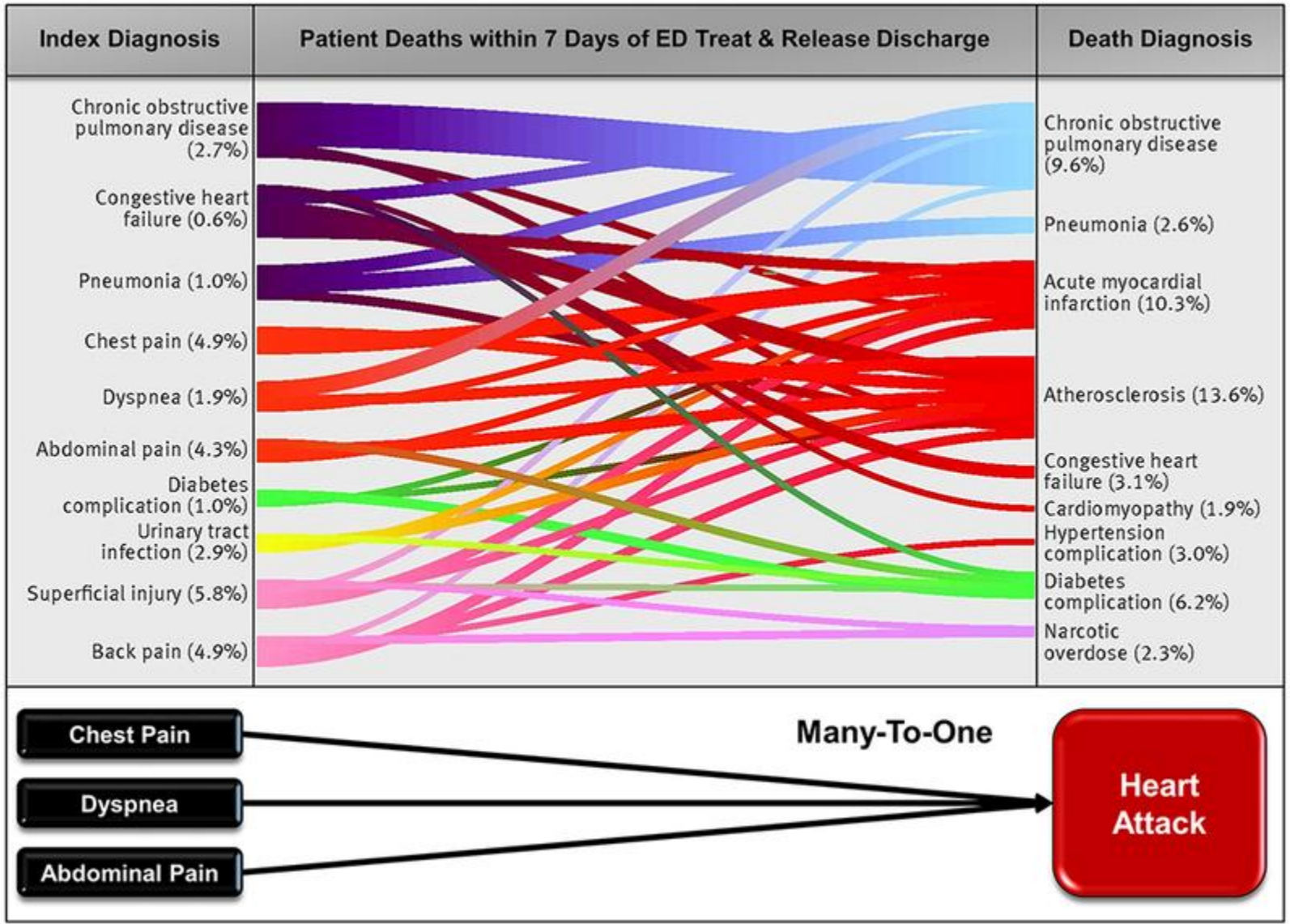


In the present study, we investigated bergamot fruit extract (BFE) and its principal components (neoeriocitrin, naringin, neohesperidin, melitidin, and brutieridin) for their ability to regulate cholesterol levels in HepG2 and Caco-2 cells.

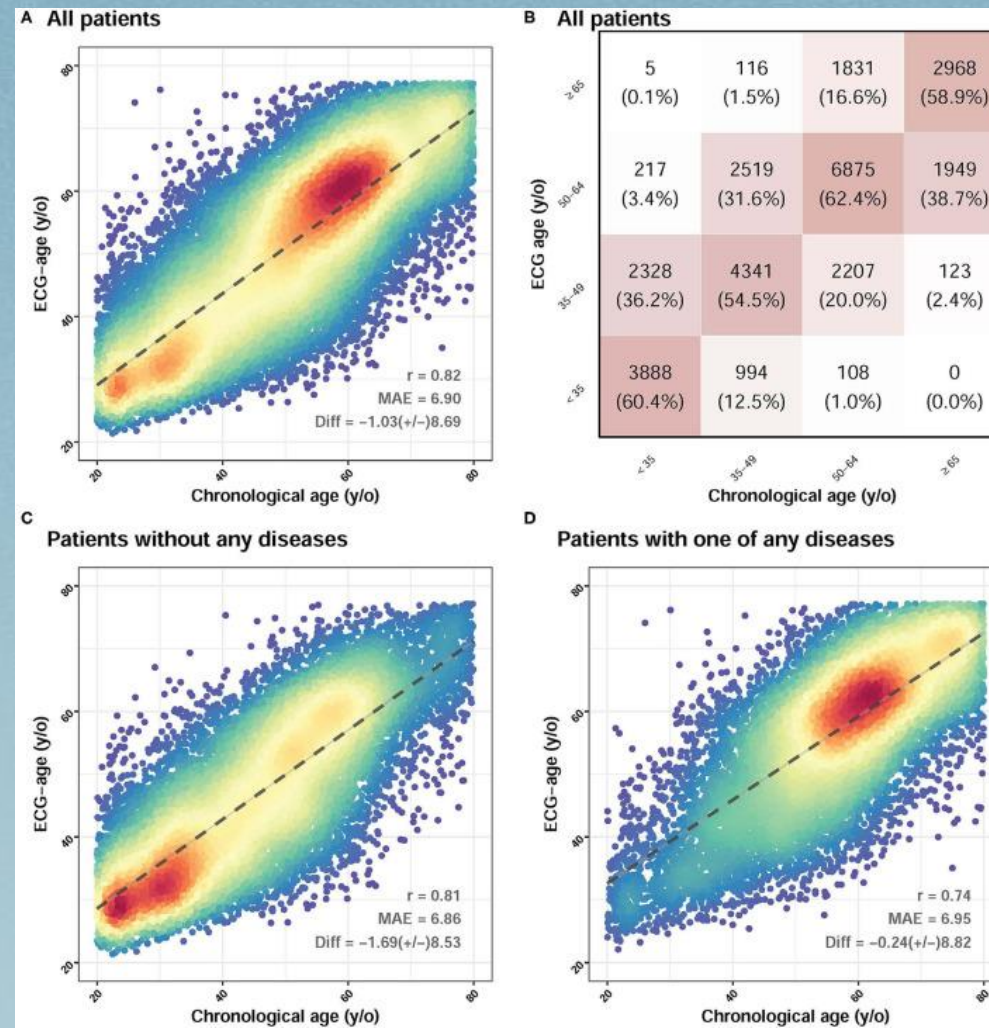
An increase in AMP-kinase phosphorylation was observed in BFE and neohesperidin-treated cells. In Caco-2 cells, brutieridin exhibited a significant reduction in cholesterol uptake and decreased the level of Niemann-Pick C1 Like 1, an important cholesterol transporter. Taken together, our data suggest that the cholesterol-lowering activity of bergamot is distinct from statins. We hypothesize that BFE and its principal constituents lower cholesterol by inhibiting cholesterol synthesis and absorption.



In the United States, between 10,000 and 50,000 heart attacks are missed per year at emergency departments (EDs).



Electrocardiogram-Based Heart Age Estimation by a Deep Learning Model Provides More Information on the Incidence of Cardiovascular Disorders



From: **Deep Learning of Electrocardiograms in Sinus Rhythm From US Veterans to Predict Atrial Fibrillation**

JAMA Cardiol. 2023;8(12):1131-1139. doi:10.1001/jamacardio.2023.3701

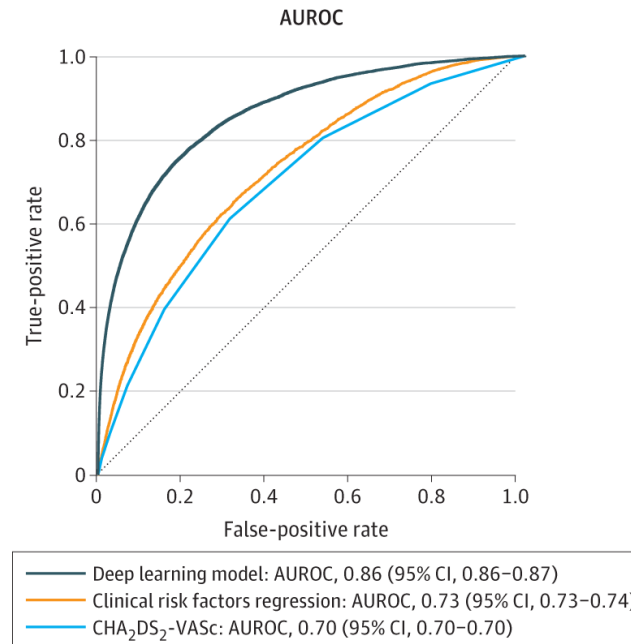


Figure Legend:

Deep Learning Model Performance Compared With Clinical Risk Factor Models Performance of deep learning model on all electrocardiograms held out from the model training compared with predicting atrial fibrillation using a clinical risk factors model (age; sex; history of heart failure; diabetes; cerebrovascular accident, transient ischemic attack, or thromboembolism; prior myocardial infarction; peripheral vascular disease; and chronic kidney disease) or the CHA₂DS₂-VASc (congestive heart failure, hypertension, age, diabetes mellitus, prior stroke or transient ischemic attack or thromboembolism, vascular disease, age, sex category) score. AUROC indicates area under the receiver operating characteristic curve.

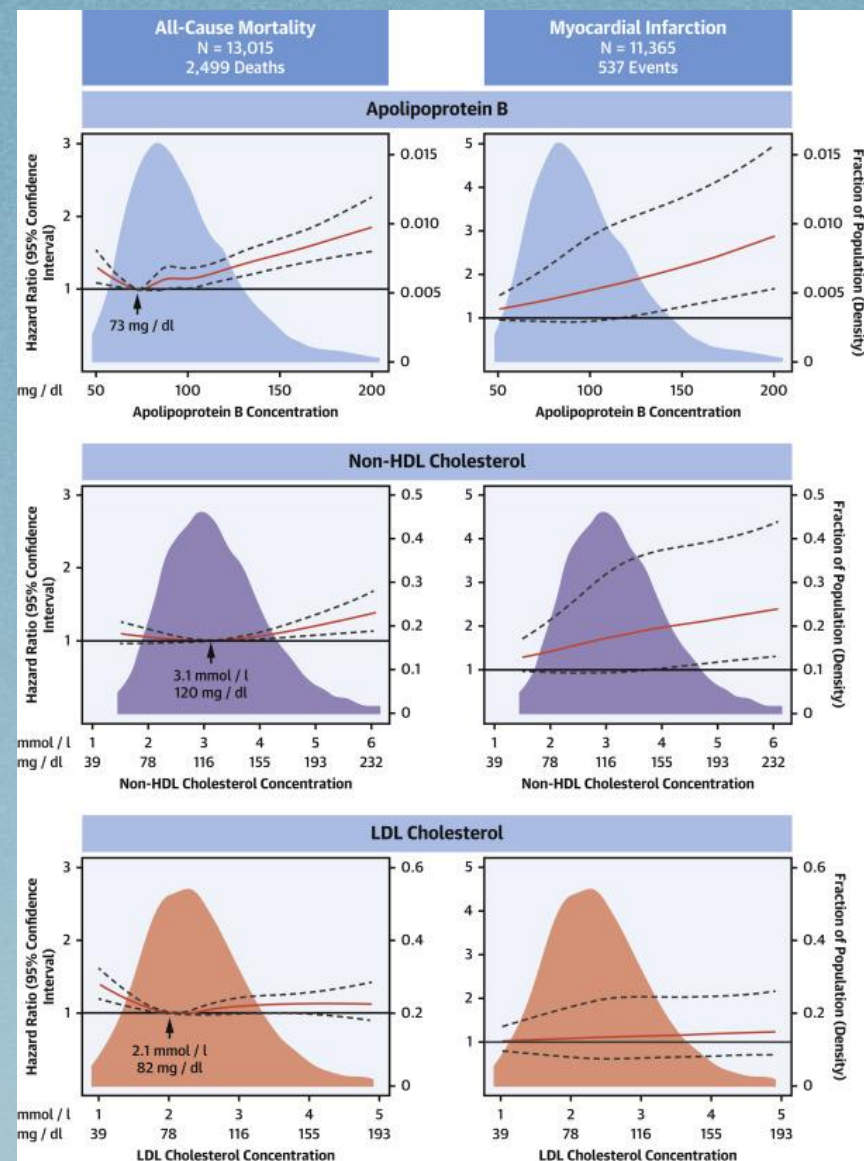
Advanced Lipid Panel

Lipid Tests

Total Cholesterol			264		
	<200	200-240	>240 mg/dL		
			177		
	<100	100-160	>160 mg/dL		
			42		
	>50	40-50	<40 mg/dL		
Triglycerides			155		
	<150	150-200	>200 mg/dL		
Non-HDL-C			222		
	<130	130-190	>190 mg/dL		
ApoB			148		
	<80	80-120	>120 mg/dL		
			46		
	<20	20-40	>40 mg/dL		
			26		
	<20	20-30	>30 %		
			45		
	<30	30-40	>40 mg/dL		
			<15		
	<30	30-50	>50 mg/dL		
ApoA-I			145.7		
	>160	120-160	<120 mg/dL		

Lipid Ratios

TC/HDL-C			6.3		
	<4	4-6	>6		
VLDL-C/TG			0.29		
	<0.2	0.2-0.3	>0.3		
ApoB/ApoA-I			1.02		
	<0.6	0.6-0.9	>0.9		
HDL-C/TG			0.27		
	>0.5	0.25-0.5	<0.25		








Clinical Therapeutics/Volume 44, Number 8, 2022
 Original Research
 Apolipoprotein B Displays Superior Predictive Value
 Than Other Lipids for Long-Term Prognosis in
 Coronary Atherosclerosis Patients

Cholesterol Balance Laboratory Report: High Cholesterol Absorption

Increased Phytosterols may
indicate defective ATP
Binding cassette or increased
NP receptors
Phytosterol Supplements may
not be a good idea

Boston Heart Cholesterol Balance® Test¹

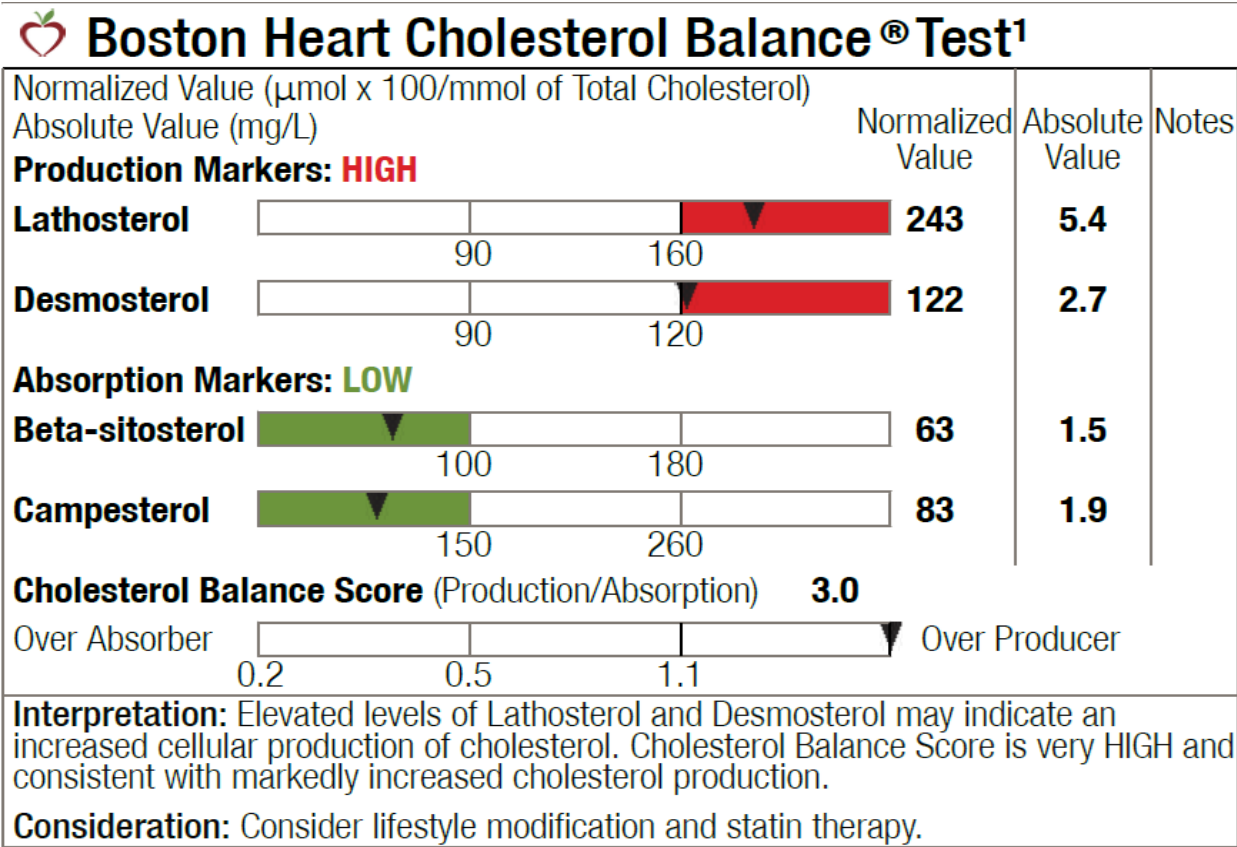
Normalized Value ($\mu\text{mol} \times 100/\text{mmol}$ of Total Cholesterol)		Normalized Value	Absolute Value	Notes
Absolute Value (mg/L)				
Production Markers: LOW				
Lathosterol		72	1.4	
Desmosterol		41	0.8	
Absorption Markers: HIGH				
Beta-sitosterol		380	7.9	
Campesterol		453	9.1	
Cholesterol Balance Score (Production/Absorption)		0.2		
Over Absorber		Over Producer		

Interpretation: Increased amounts of Beta-sitosterol and Campesterol may indicate an increase in intestinal absorption of cholesterol. Beta-sitosterol level is very HIGH and consistent with markedly increased cholesterol absorption and may be associated with elevated LDL-C levels, tendon xanthomas, phytosterolemia, and increased heart disease risk.

Consideration: Consider lifestyle modification and ezetimibe therapy.

Cholesterol Balance Laboratory Report: High Cholesterol Production

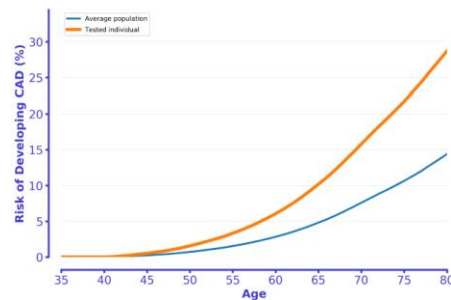
Desmosterol - Brain Cholesterol
(esp in APOE4)
Lathosterol - Peripheral Chol Syn



Polygenic Risk Map

CAD RISK REPORT

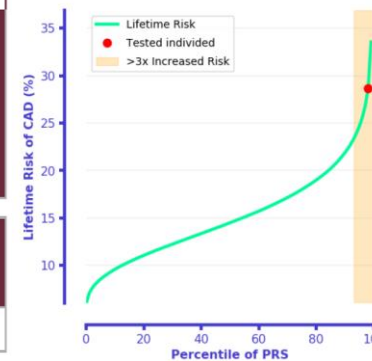
RELATIVE RISK OF CAD		SUMMARY
<p>Risk Threshold 3X remainder</p> <p>Not elevated High</p>		<p>Based on the PRS outlined below the relative risk of developing CAD is Average.</p>
RESULTS		
Polygenic Risk Score	Not elevated (58 th percentile)	



CAD RISK OVER TIME

Everyone's CAD risk increases with age. The blue line on the chart shows this increase for a females with an average PRS. The PRS (orange line) of the tested individual shows that this person's risk rises at around the same rate as the average (blue line).

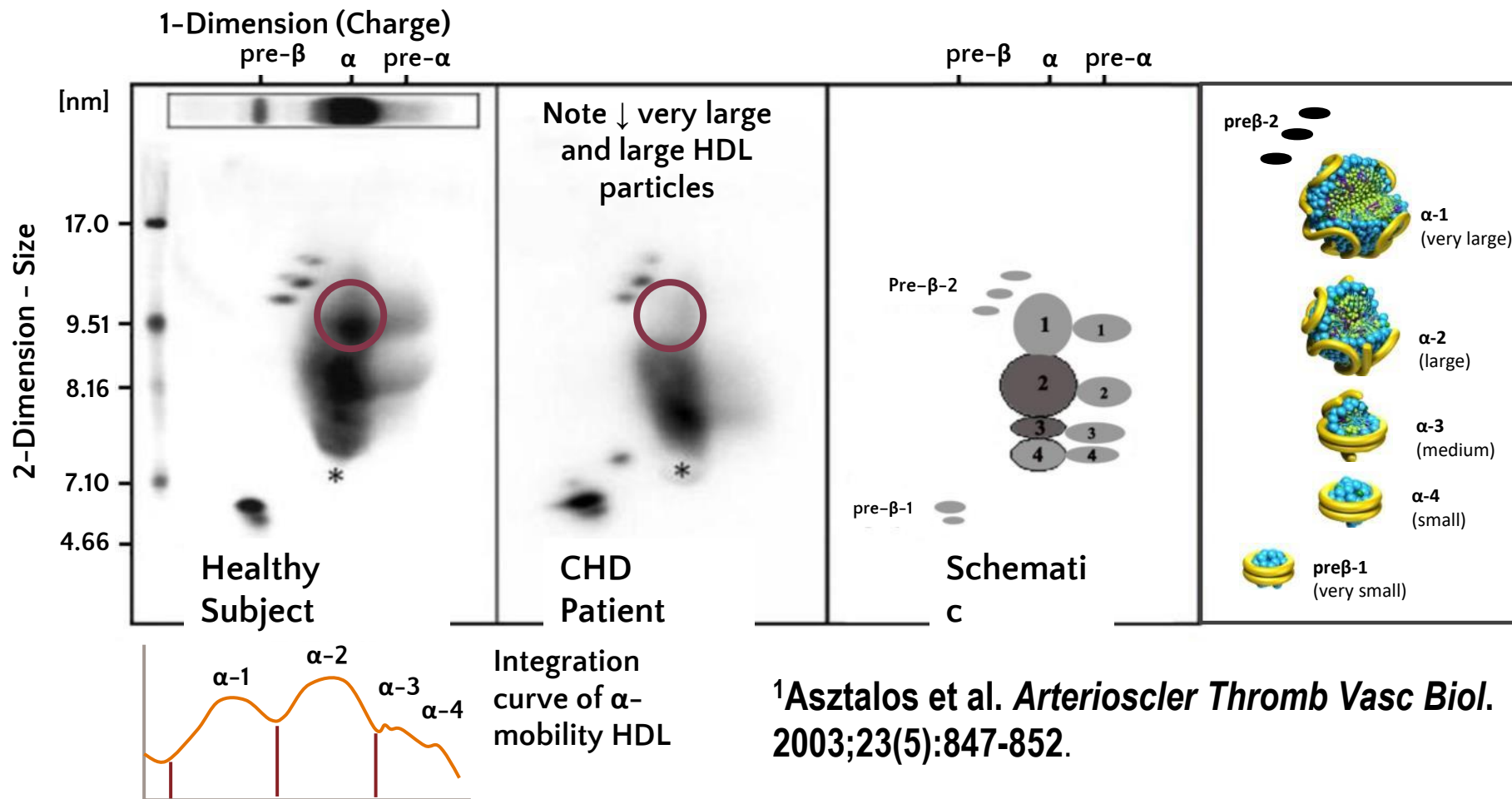
CAD POLYGENIC RISK REPORT



POLYGENIC RISK SCORE EXPLAINED

A polygenic risk score (PRS) measures the component of disease risk from many genetic variants spread throughout the genome. Lifetime risk of CAD is calculated by comparing the tested individual's PRS to a reference population. PRS above the percentile is considered high because it confers a greater than 22% lifetime risk, which is three times the risk of disease compared to the remainder of the population. The chart shows how PRS translates to lifetime risk of coronary artery disease. This CAD PRS comprises 1,926,521 genome-wide variants.

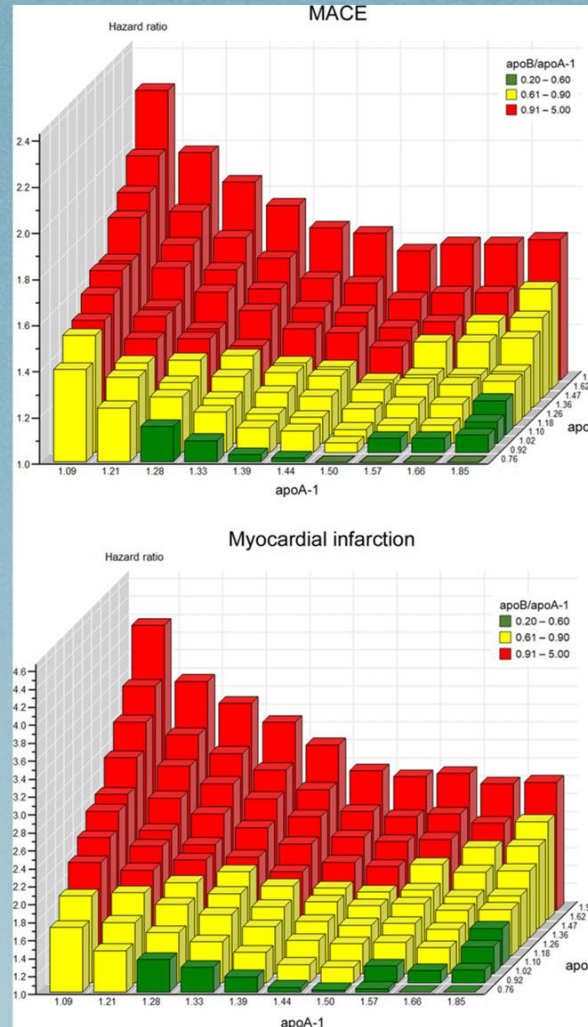
Boston Heart HDL Map[®]: “For every 1 mg/dL increase in apoA-I in very large α -1 HDL there is a 26% reduction in CVD risk.” ¹



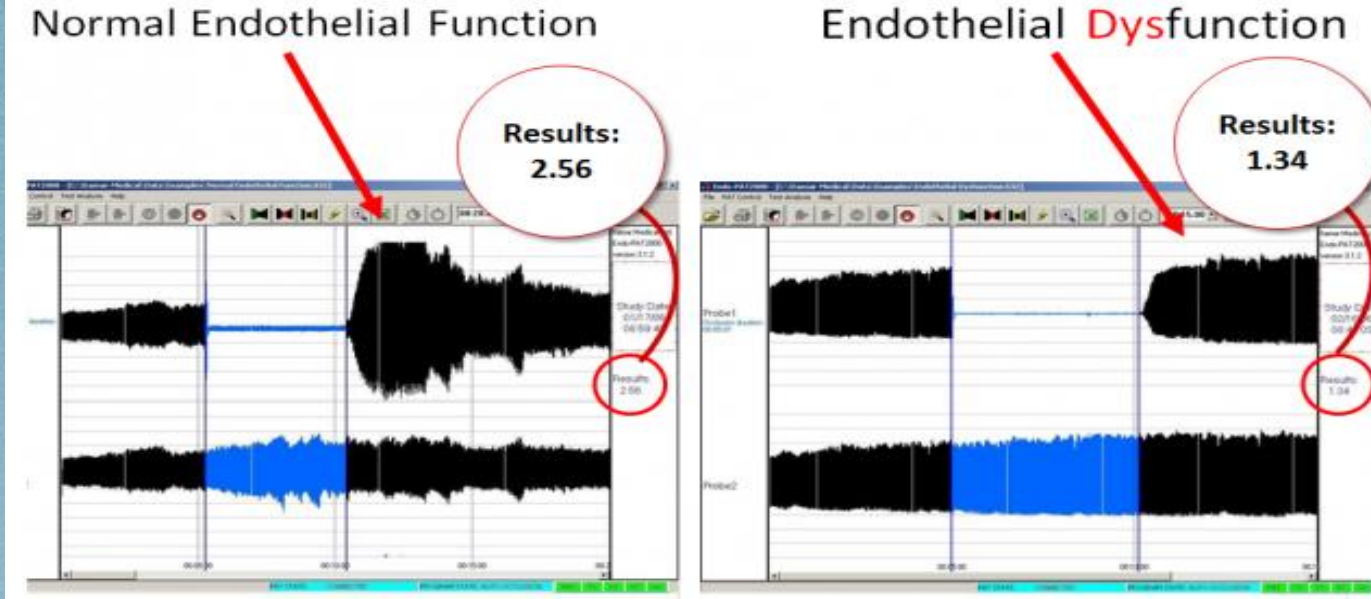
¹Asztalos et al. *Arterioscler Thromb Vasc Biol.* 2003;23(5):847-852.

APO B - Biomarker &
Causally related to
ASCVD

May go back to a
time when we
energy deprived -
good for us until 100
years ago



We do not really
need any Apo B -
most animals do
not have it.
Children have
ApoB <20mg/dl
Peter Libby
B&WH
If ApoB <30 - no
CAD

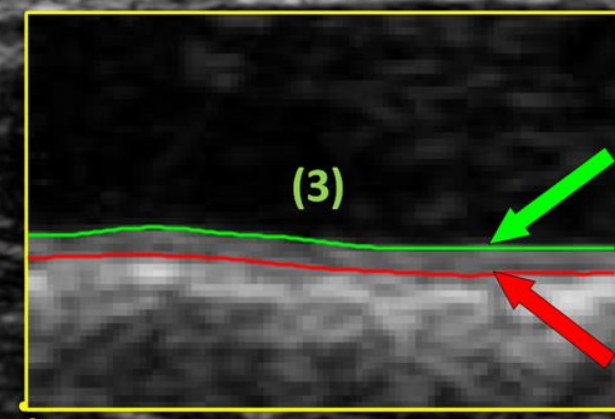


In a study of 528 patients with high risk for CV events over 5 years, the EndoPAT reactive hyperemia index (RHI) was measured before and after coronary angiogram.⁴ The RHI, brain natriuretic peptide (BNP), and CV score by SYNTAX were independent risk predictors for all future CV events such as MI, CV death, unstable angina, ischemic CVA, coronary artery bypass graft, CHF, and PAD. When RHI was added to FRS, BNP, and SYNTAX, the net reclassification index was significantly improved by 27.5 %



R
MID
CCA

Carotid
Bulb



Lumen-intima
interface

IMT

Media-adventitia
interface

Near Wall

Lumen

Far Wall



Region of
Interest (ROI)



Cardiac Cycle Indicator

(1)

Expand

M/PW



DOB

Age 57

Gender Female

Date of scan
Aug 2022Report #
99Page
1/3

Referring Physician

Sonographer
Admin

Visualized plaque and atherosclerotic burden assessment

65

Vascular Age

Vascular age is a measurement of the apparent age of your arteries. If your vascular age is higher than your chronological age, you may be at higher risk for developing cardiovascular disease.

0.728 mm

Carotid Intima-Media Thickness Test (C-IMT)

The C-IMT is a measurement of the thickness of the innermost two layers of the wall of your carotid artery. An increased thickness indicates the presence of an atherosclerotic disease process and vascular inflammation.

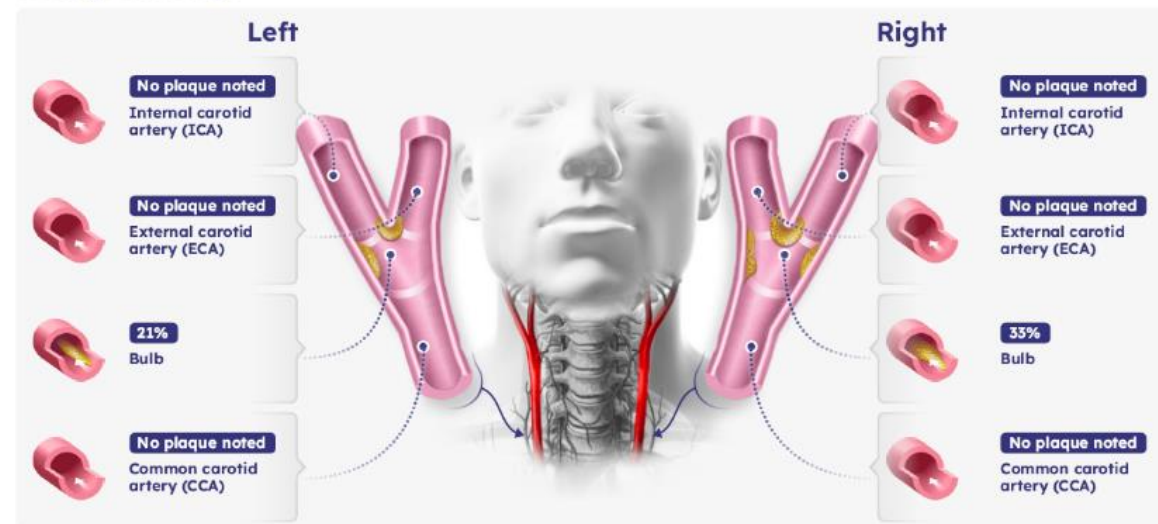
2.57 mm

Largest Plaque

Heterogenous

Plaques can be soft (highest risk), heterogeneous (moderate risk) or calcified (lower risk).

Artery Blockage



Carotid Intima-Media Thickness Test (C-IMT)

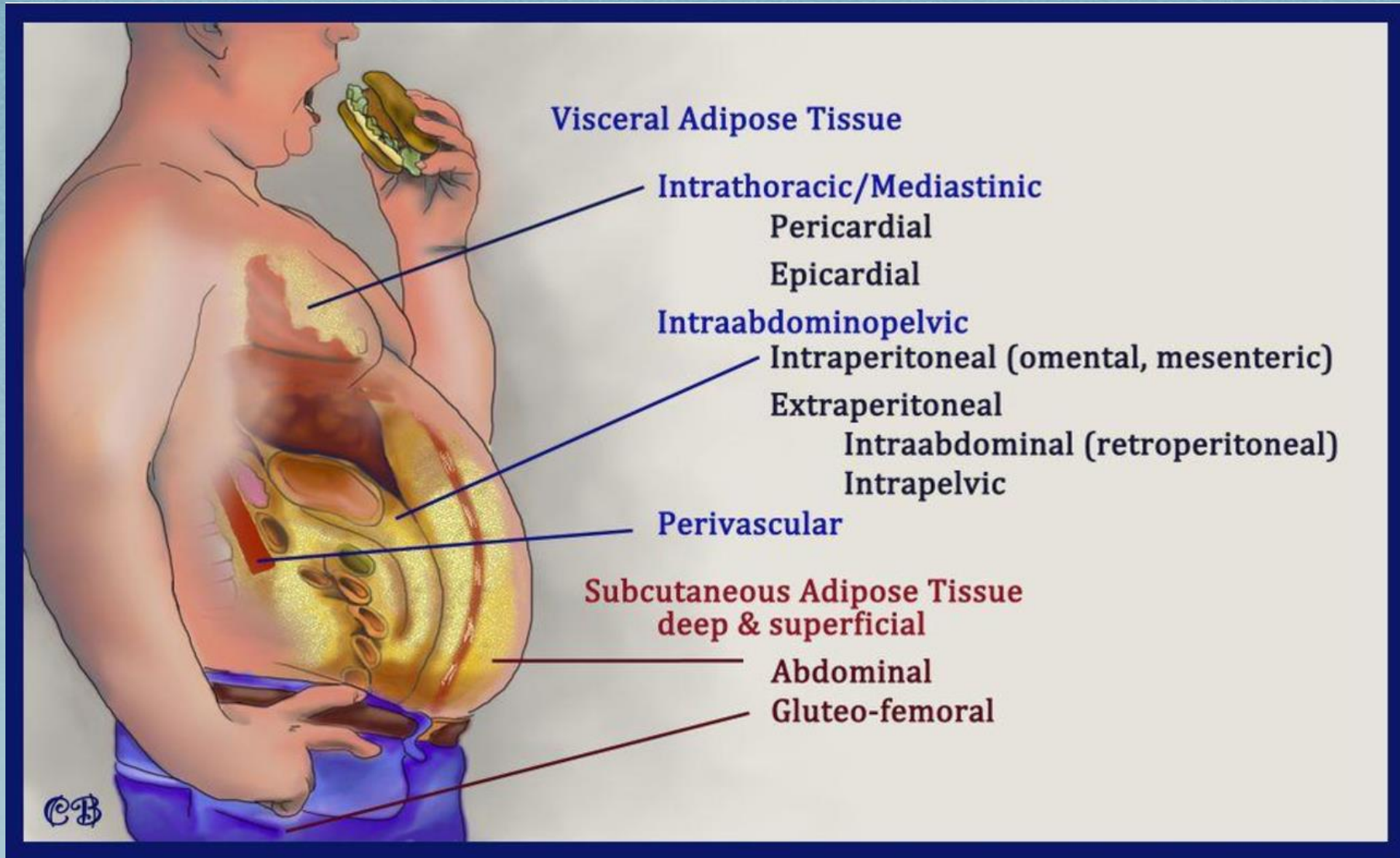
Your percentile
score74th

The American Society of Echocardiography (ASE) recommends that $IMT \geq 75$ th percentile is considered high and indicative of increased cardiovascular risk.



Diseases Associated with Obesity





ID	Height	Age	Gender	Test Date / Time
Jane Doe	5 ft 05.0 in	31	Female	05.28.2020 07:13

Body Composition Analysis

	Values	Total Body Water	Lean Body Mass	Weight
Intracellular Water (lb)	39.9	64.2	88.0	135.3
Extracellular Water (lb)	24.3			
Dry Lean Mass (lb)	23.8			
Body Fat Mass (lb)	47.4			

Muscle-Fat Analysis

Weight (lb)	55 70 85 100 115 130 145 160 175 190 205	135.3	
SMM (lb)	70 80 90 100 110 120 130 140 150 160 170	47.6	
Body Fat Mass (lb)	40 60 80 100 120 140 160 180 200 220 240 260 280 300 320	47.4	

Obesity Analysis

BMI (kg/m ²)	10.0 15.0 18.5 21.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0	22.5	
PBF (%)	8.0 15.0 18.0 25.0 28.0 33.0 38.0 43.0 48.0 53.0 58.0	35.0	

Segmental Lean Analysis

			ECW/TBW
Right Arm (lb) (%)	40 60 80 100 120 140 160 180 200	4.17 88.6	0.374
Left Arm (lb) (%)	40 60 80 100 120 140 160 180 200	4.03 85.6	0.374
Trunk (lb) (%)	70 80 90 100 110 120 130 140 150	39.6 92.7	0.377
Right Leg (lb) (%)	70 80 90 100 110 120 130 140 150	13.36 89.6	0.374
Left Leg (lb) (%)	70 80 90 100 110 120 130 140 150	13.49 90.5	0.377

ECW/TBW Analysis

ECW/TBW	0.320 0.340 0.360 0.380 0.390 0.400 0.410 0.420 0.430 0.440 0.450	0.376	

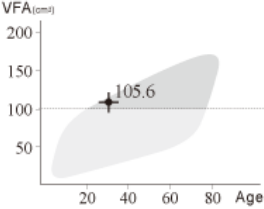
Body Composition History

Weight (lb)	135.5	134.9	135.4	136.1	137.6	135.2	134.6	135.3	
SMM (lb)	42.8	43.2	44.0	44.7	45.6	45.3	45.7	47.6	
PBF (%)	40.3	39.5	38.6	37.9	37.4	36.7	35.9	35.0	
ECW/TBW	0.376	0.378	0.376	0.374	0.376	0.376	0.378	0.376	

☒ Recent ☐ Total 03.12.20 07:13 03.25.20 07:15 04.02.20 07:05 04.16.20 07:01 04.26.20 06:58 05.02.20 06:45 05.13.20 07:11 05.28.20 07:13

SEE WHAT YOU'RE MADE OF

Visceral Fat Area



Body Fat - Lean Body Mass Control

Body Fat Mass - 18.3 lb
Lean Body Mass + 9.3 lb
(+) means to gain fat/lean (-) means to lose fat/lean

Segmental Fat Analysis

Right Arm (3.3 lb)	156.0%
Left Arm (3.3 lb)	158.9%
Trunk (24.0 lb)	202.2%
Right Leg (7.3 lb)	132.8%
Left Leg (7.1 lb)	132.4%

Basal Metabolic Rate

1231 kcal

Leg Lean Mass

26.9 lb

TBW/LBM 73.0 %

Reactance

	RA	LA	TR	RL	LL
Xc(Ω) 5kHz	21.1	20.9	1.9	20.8	20.2
50kHz	37.0	36.9	3.2	37.5	35.3
250kHz	32.3	32.2	3.4	26.4	27.8

Whole Body Phase Angle

5.4°

	RA	LA	TR	RL	LL
Φ (°) 50kHz	4.7	4.5	7.0	6.2	6.0

Results Interpretation QR Code

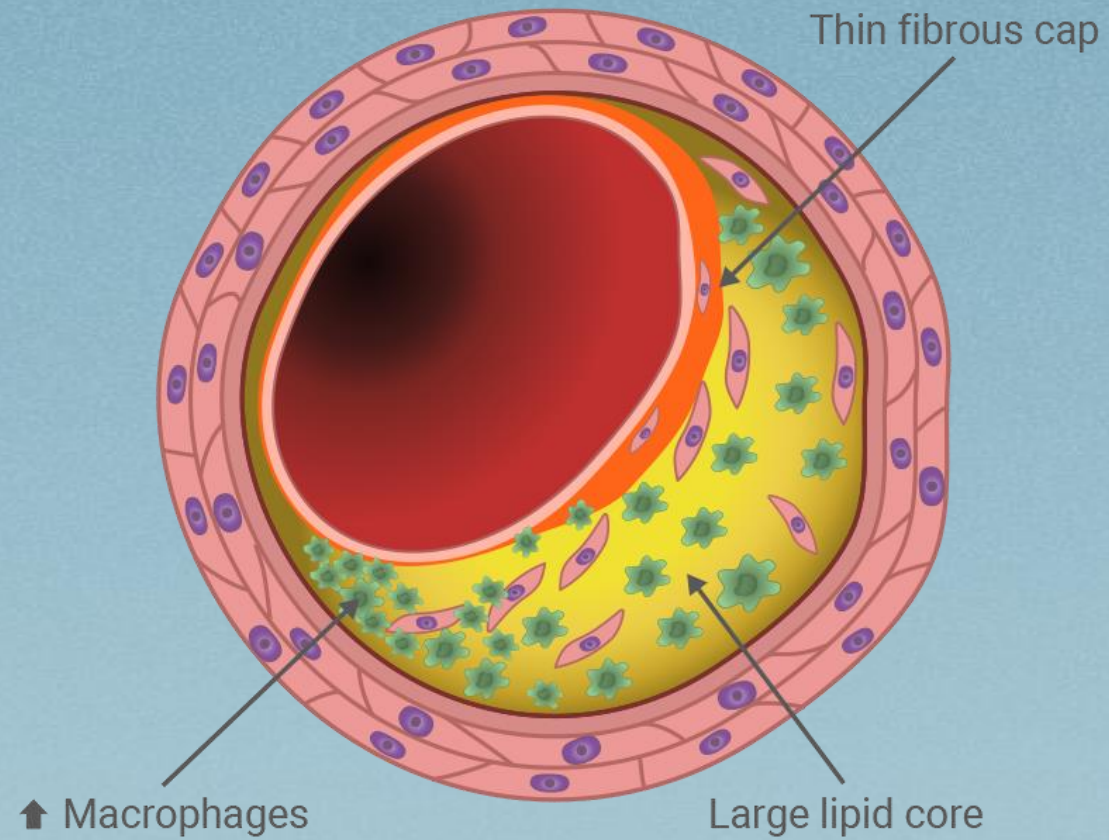
Scan the QR Code to see results interpretation in more detail.

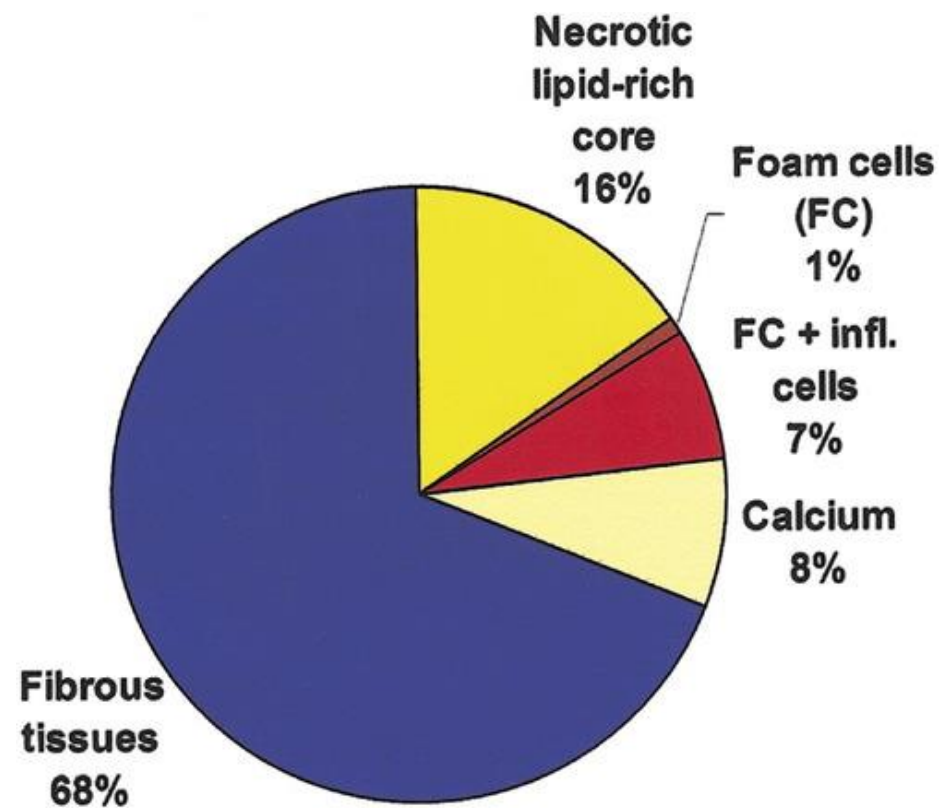


Impedance

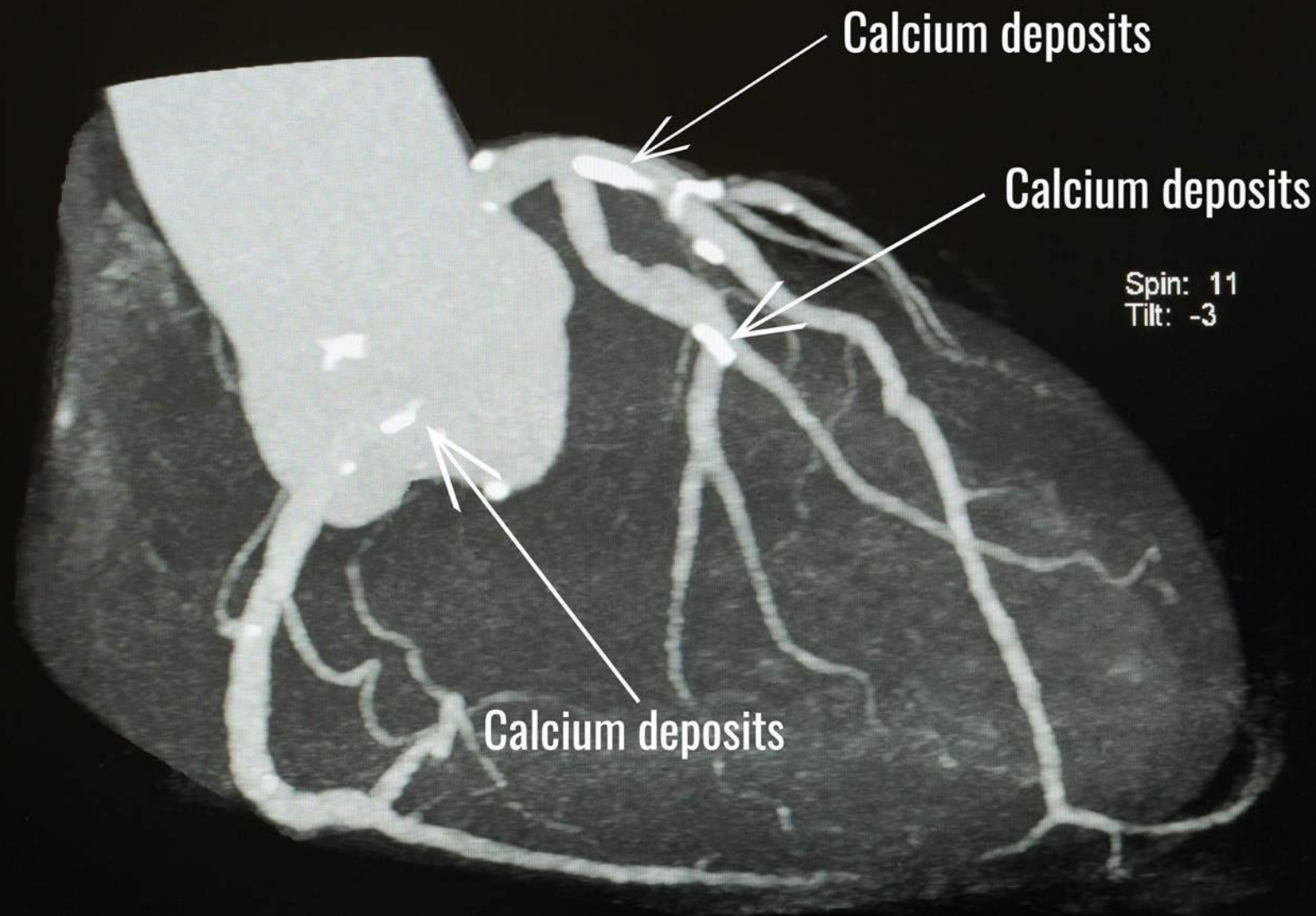
	RA	LA	TR	RL	LL
Z(Ω) 1kHz	513.6	530.2	31.0	407.2	396.2
5kHz	503.3	521.9	30.0	397.3	386.8
50kHz	452.0	470.2	26.3	346.4	338.7
250kHz	411.5	429.7	22.4	313.2	307.3
500kHz	396.7	414.8	20.0	305.0	300.2
1000kHz	384.3	402.2	17.8	299.4	294.0

Vulnerable plaque





Erling Falk et al. *J Am Coll Cardiol* 2006; 47:C7-C12.



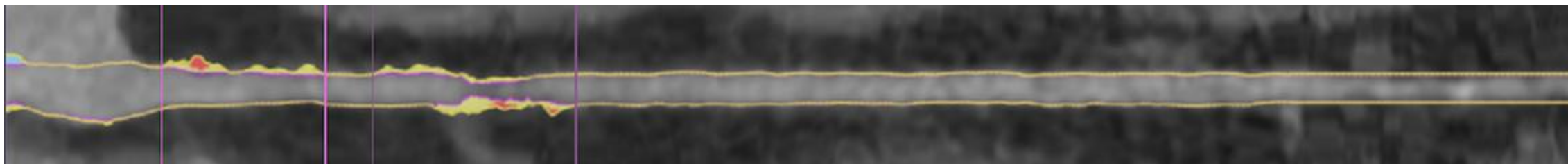
Coronary Calcium Scoring

Marker of fatty deposits (atherosclerosis) in the coronary arteries

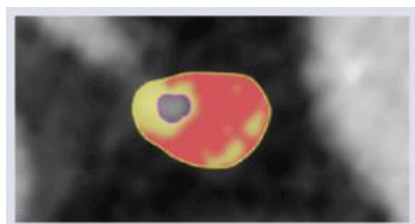


Not All Plaque Is the Same. **Clearly.**

It's not just about identifying the presence of plaque. Determining the amount and type of atherosclerosis (plaque) present enables earliest diagnosis and precision treatment possible.



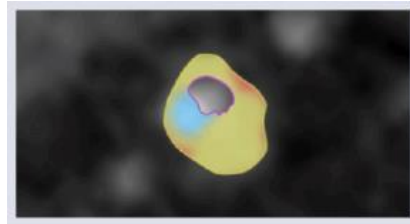
PLAQUES THAT LOOK DIFFERENT BEHAVE DIFFERENTLY.



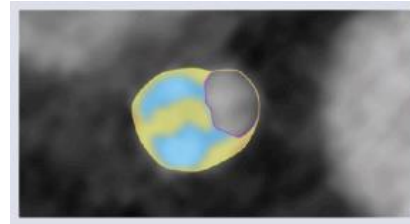
LOW-DENSITY-NON-CALCIFIED PLAQUE (RED)



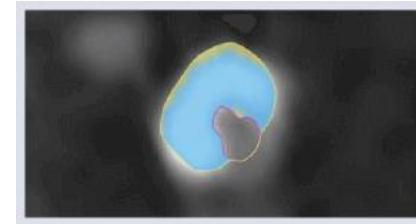
NON-CALCIFIED PLAQUE (YELLOW)



ALL PLAQUE TYPES



NON-CALCIFIED (YELLOW) AND CALCIFIED PLAQUE (BLUE)



CALCIFIED PLAQUE (BLUE)

HIGH RISK

INTERMEDIATE RISK

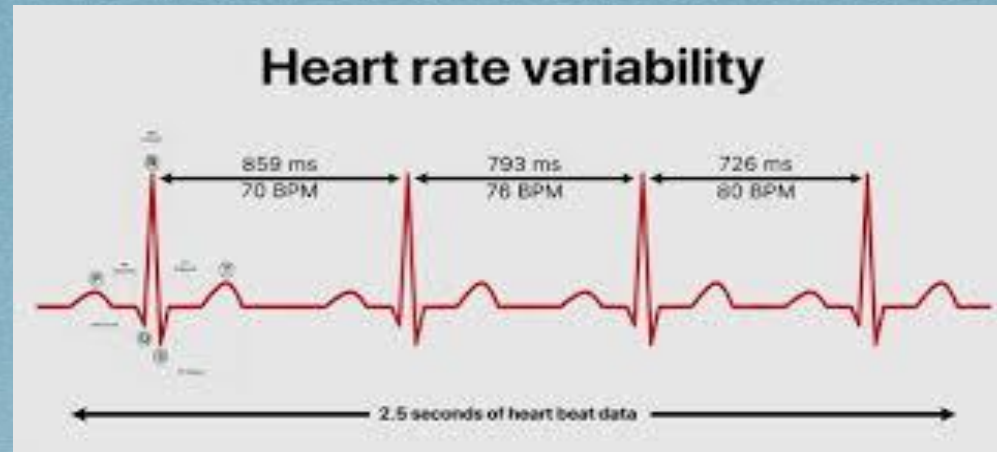
LOW RISK

Transforming plaque type is the only trackable approach to personalizing heart attack prevention.

Comparison Report

ALL	<div>mm³PAV</div>	Compared	<div>#%</div>	Current
		Cleerly ID: 7616EE30 10/28/2021		Cleerly ID: C05F9BA1 1/24/2024
Total Plaque Volume (mm ³)		269.7	+12%	301.3
▶ Total Non-Calcified Plaque Volume (mm ³)		105.7	-17%	87.9
Low-Density - Non-Calcified Plaque Volume (mm ³)		1	-100%	0
Total Calcified Plaque Volume (mm ³)		164	+30%	213.4

CAUTION: Changes in the patient, scanner, and other technical factors between multiple CT scans may impact the accuracy of the comparison reports. Only segments dRCA, R-PDA, R-PLB, LM, pLAD, dLAD, D1, pCx, LCx, and OM1 were considered, any remaining were excluded from the comparison analysis because of significant differences in image quality, artifacts, stents, or presence of occlusions, therefore the plaque volumes here only represent plaque from comparable segments and may be less than plaque volumes reported elsewhere.



Regular Exercise
Healthy Diet
Connection with others
Stress Management

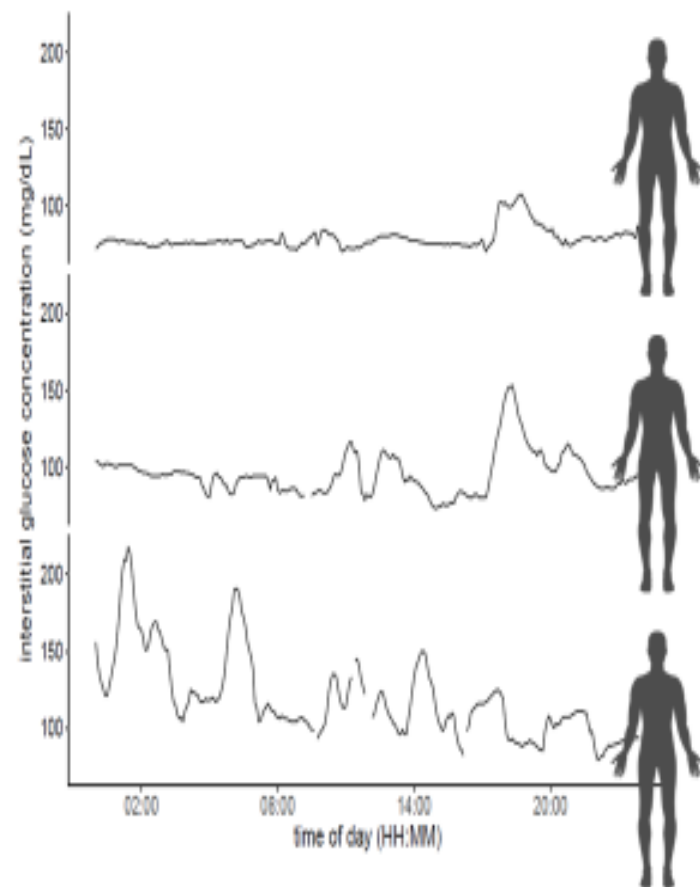
Continuous Glucose Monitoring

Different people spike to different foods

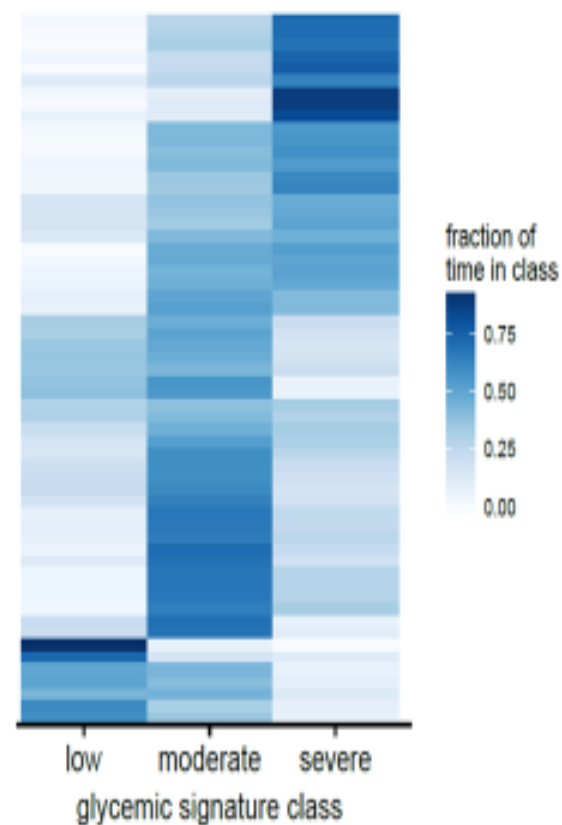
Dexcom



Abbott

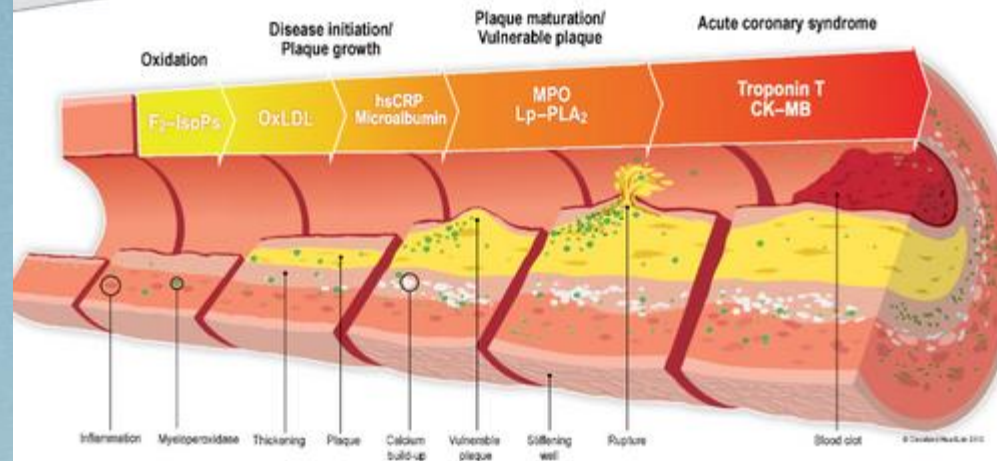


Glucotypes

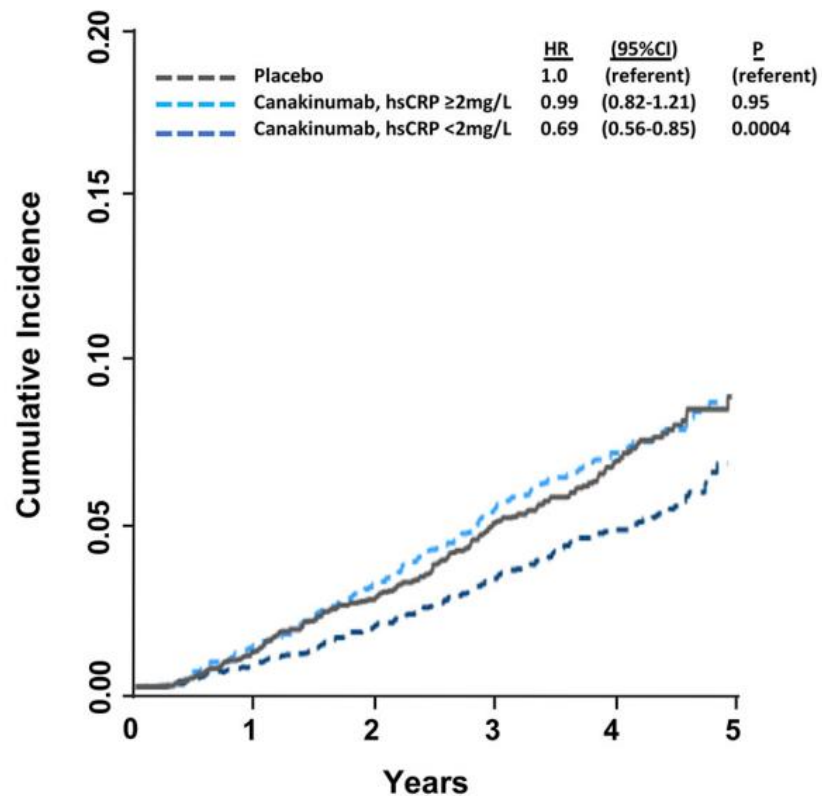


Inflammatory Biomarkers and the Progression of Atherosclerosis

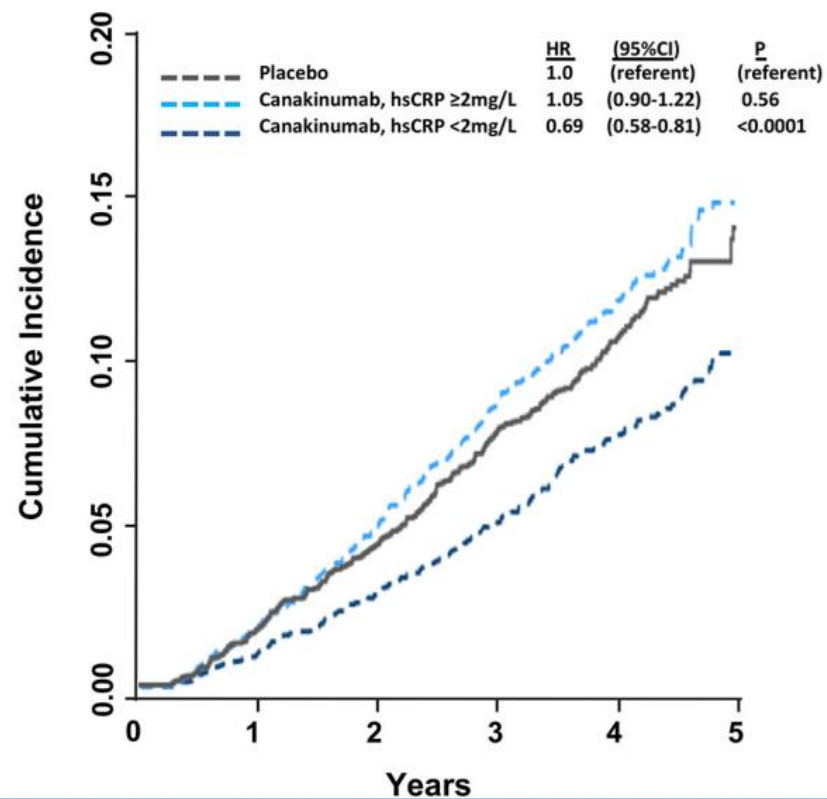
The progression of atherosclerosis is marked by specific inflammatory biomarkers, and their levels can be measured to determine a patient's risk for heart disease and cardiac events.



CANTOS - Cardiovascular Mortality



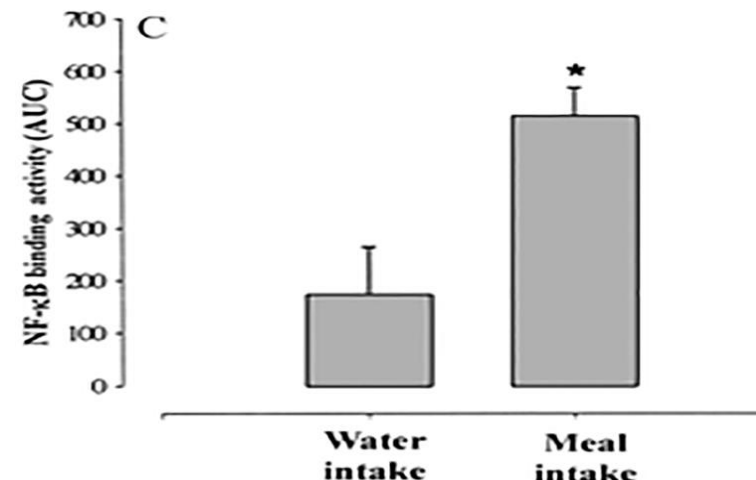
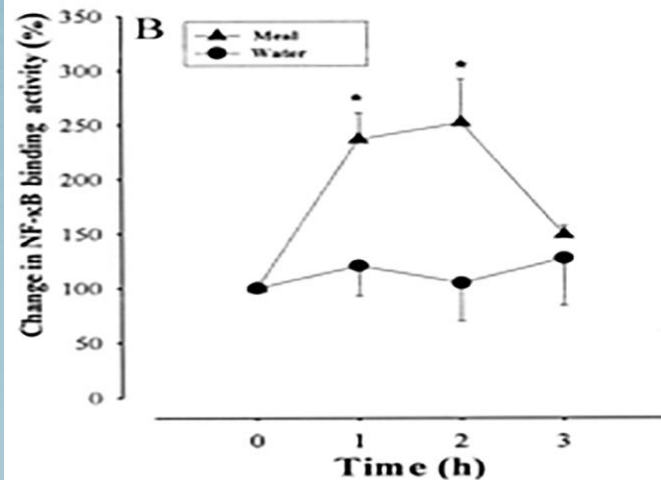
CANTOS - All Cause Mortality

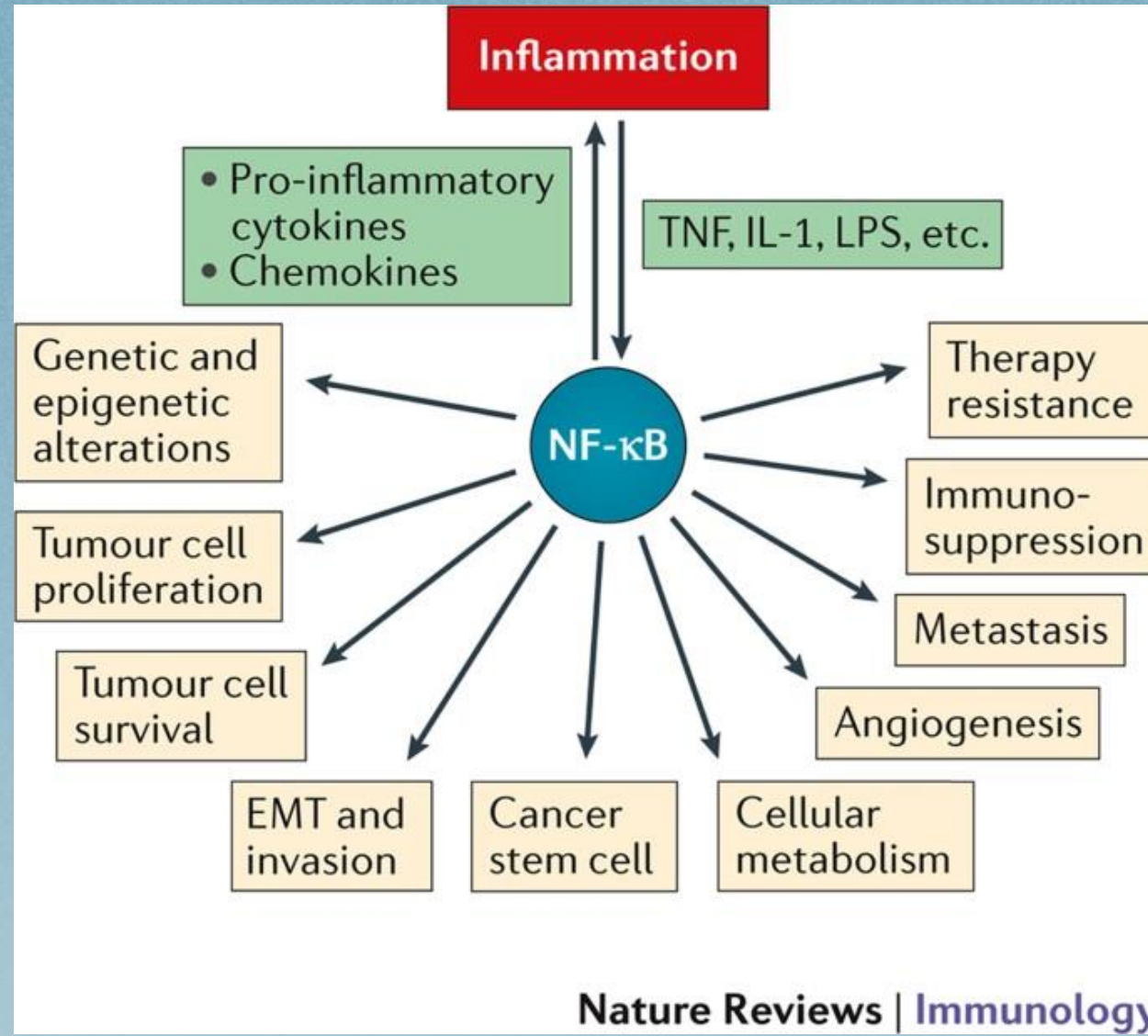


Am J Clin Nutr. 2004 Apr;79(4):682-90. doi: 10.1093/ajcn/79.4.682.

Increase in intranuclear nuclear factor kappaB and decrease in inhibitor kappaB in mononuclear cells after a mixed meal: evidence for a proinflammatory effect

Patients were given an egg-muffin and sausage-muffin and 2 hash browns, which contained 910kcal, 81g carbohydrate, 51g fat, and 32 g protein over 15 min.

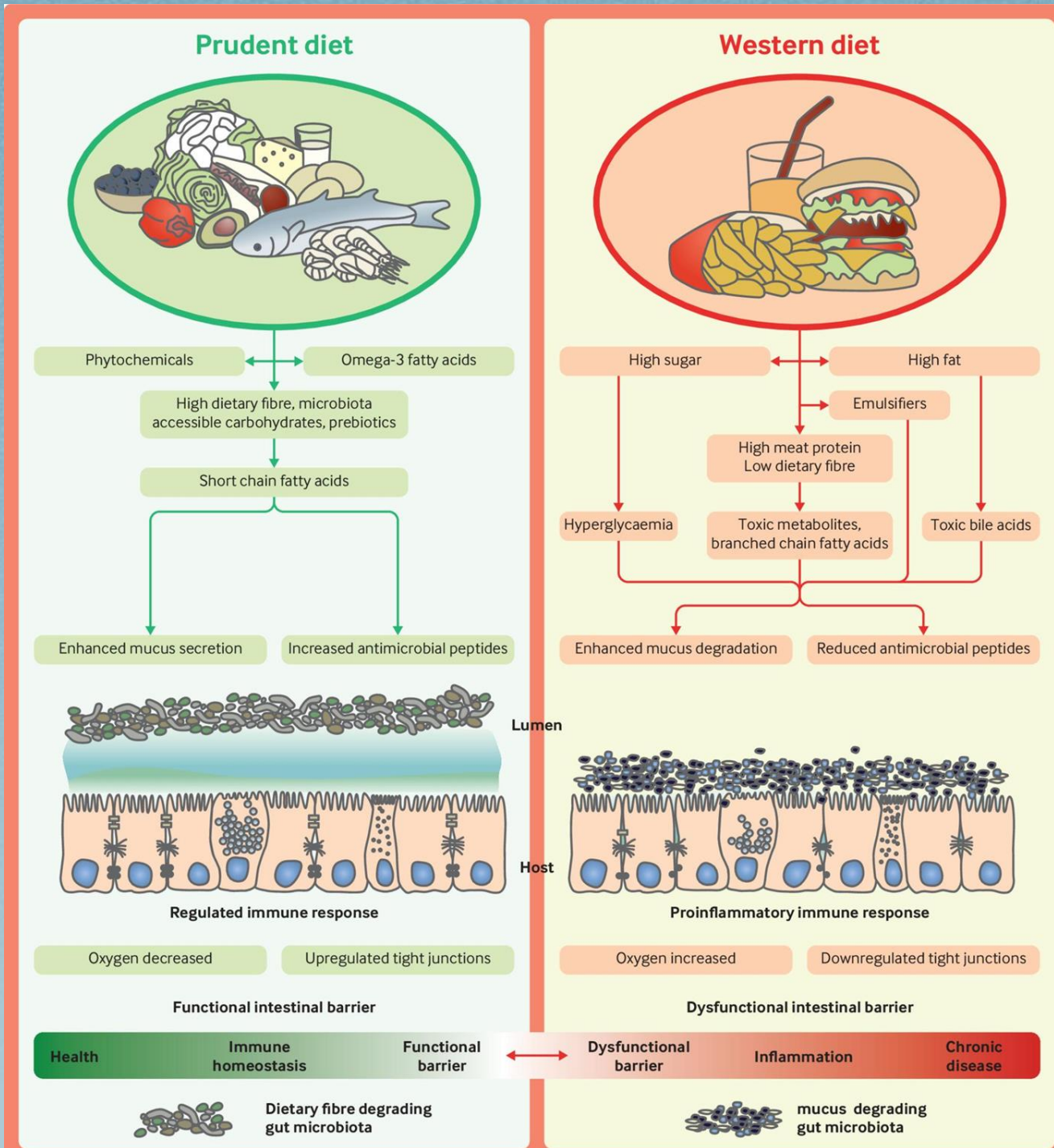




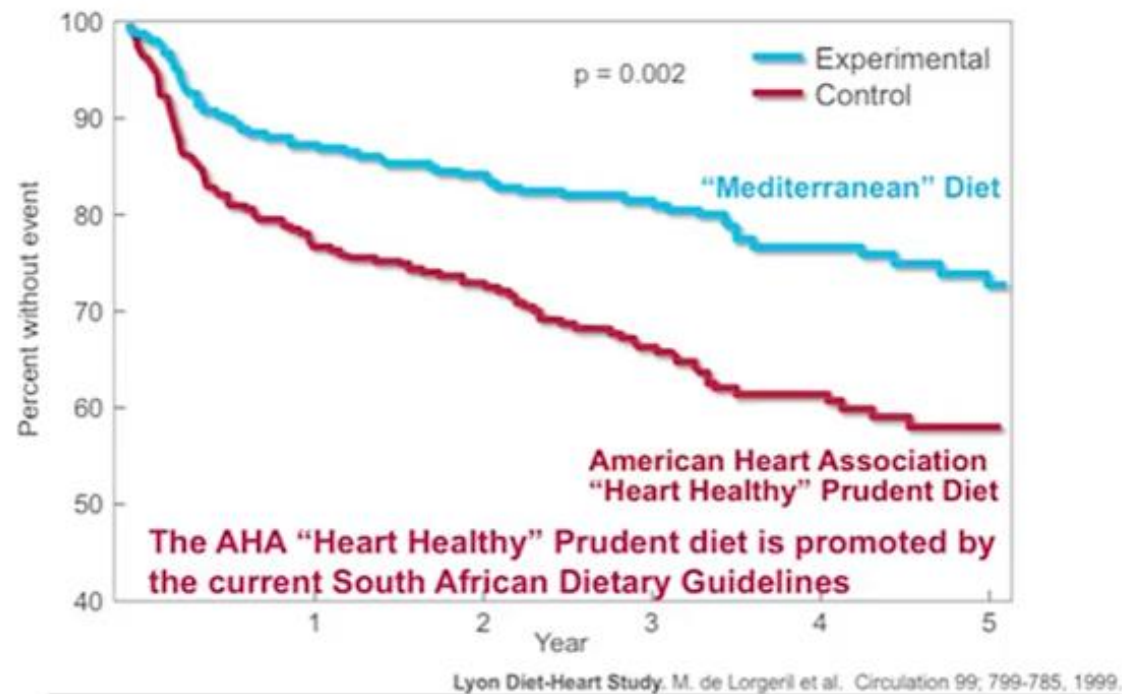
Triglycerides - proxy for insulin resistance - carb reduction

Saturated Fats raise Apo B
Worst are tropical oils (Coconut or Palm - C18)

Saturated Fats also inhibit the sterol Binding protein in the liver resulting in fewer LDLR

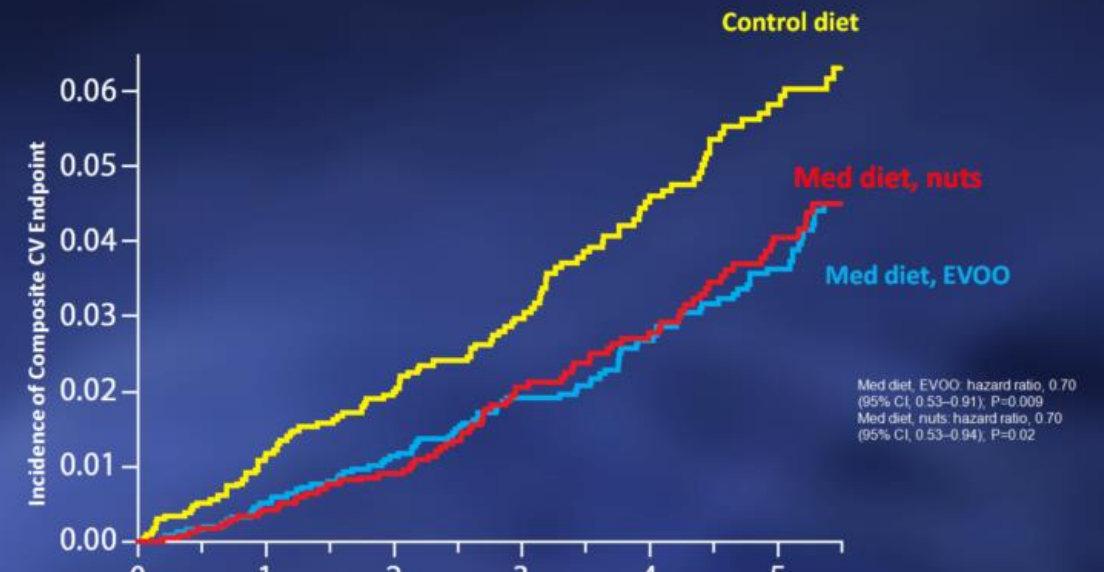


LYON DIET-HEART STUDY

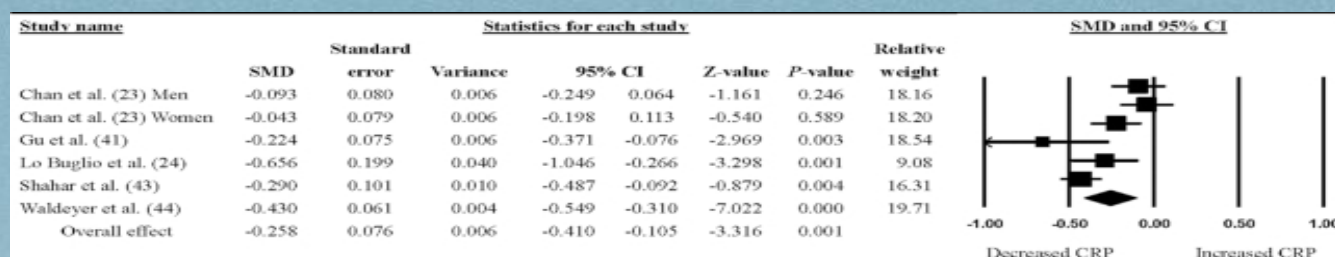


PREDIMED: Primary Prevention of CVD with a Mediterranean Diet: Primary End Point

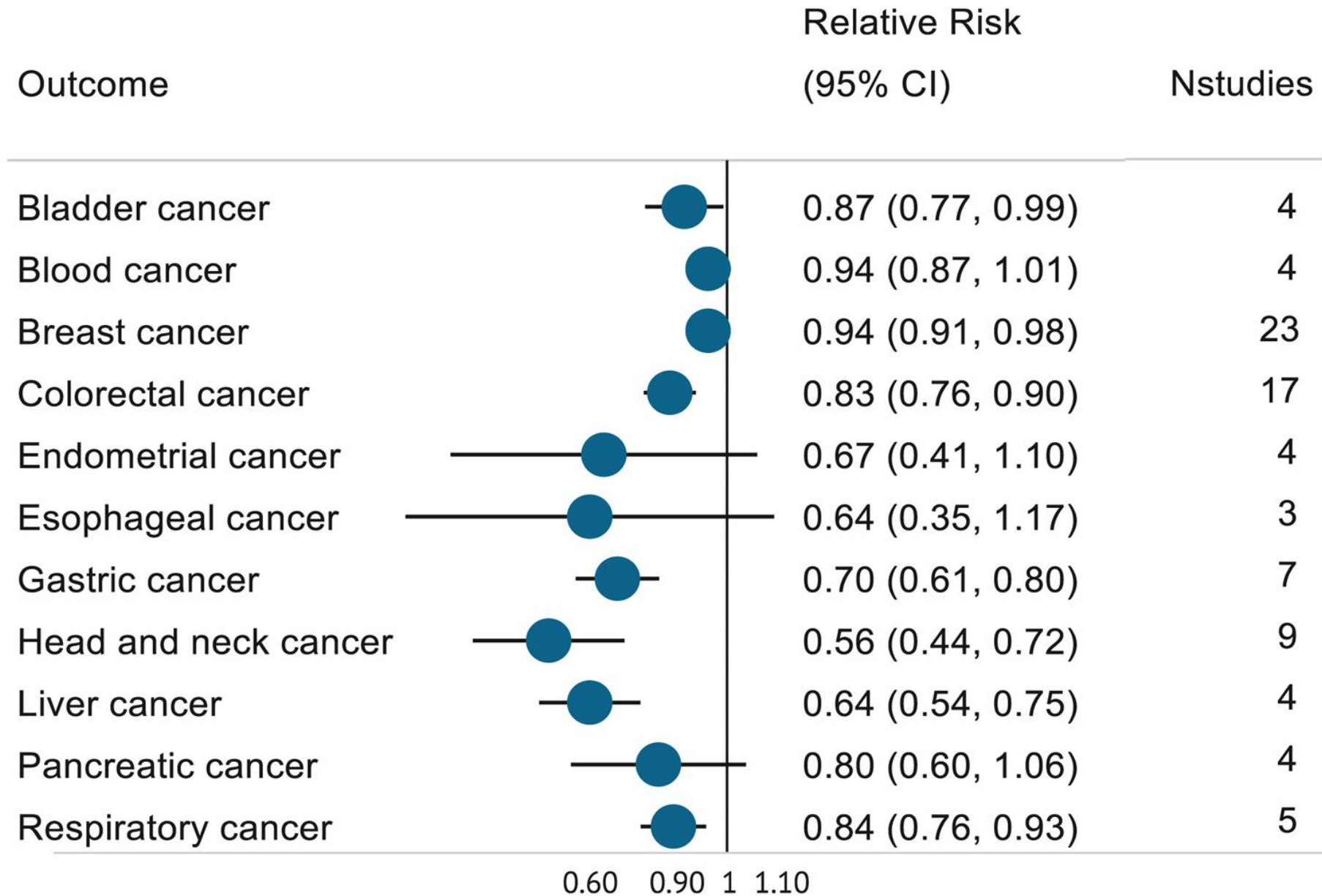
acute myocardial infarction, stroke, or death from cardiovascular causes



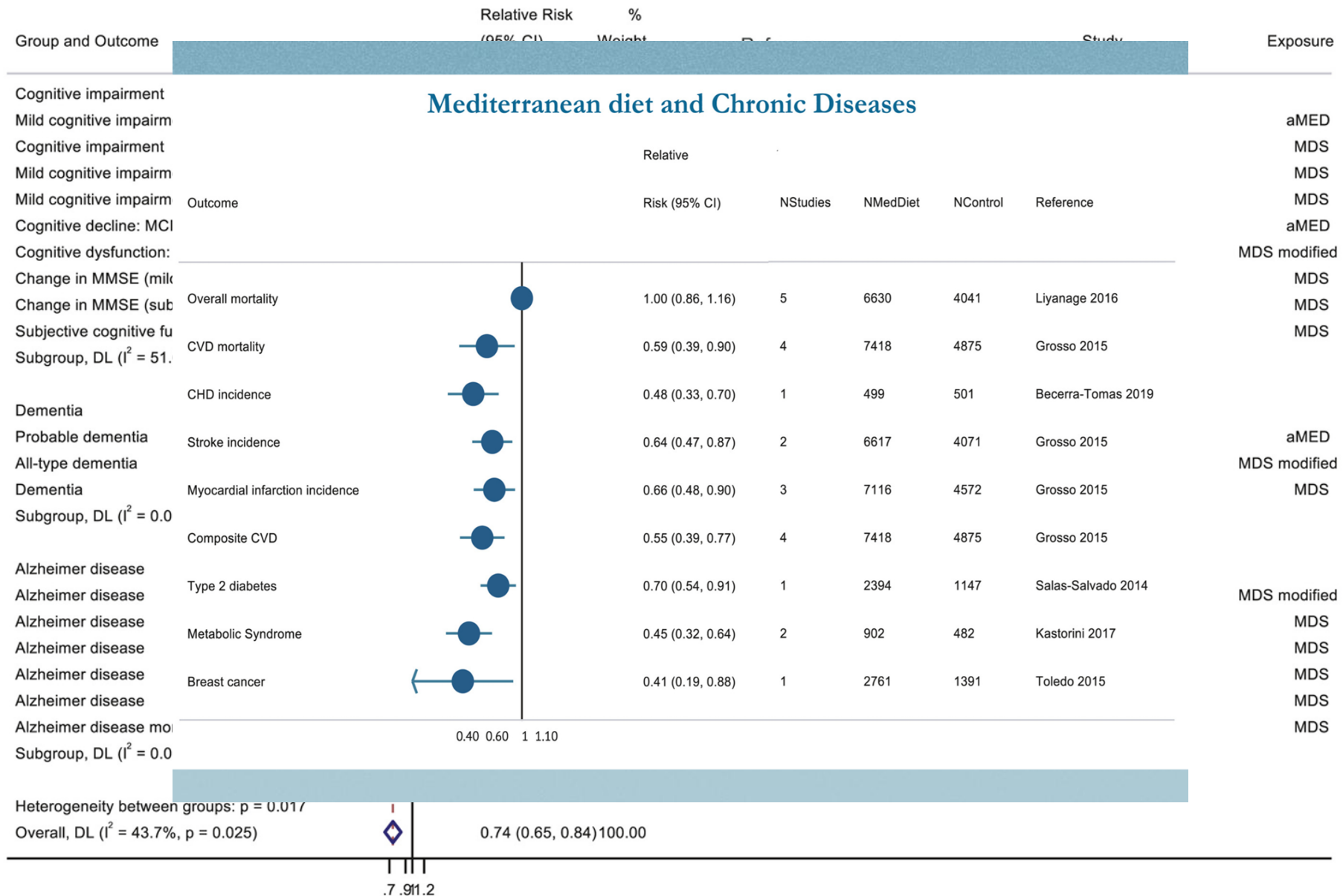
Adv Nutr. 2021 Mar; 12(2): 363–373. Published online 2020 Oct 1.
doi: 10.1093/advances/nmaa116
PMCID: PMC8009747PMID: 33002104
The Mediterranean Dietary Pattern and Inflammation in Older Adults: A Systematic Review and Meta-analysis



Mediterranean Diet and Cancer

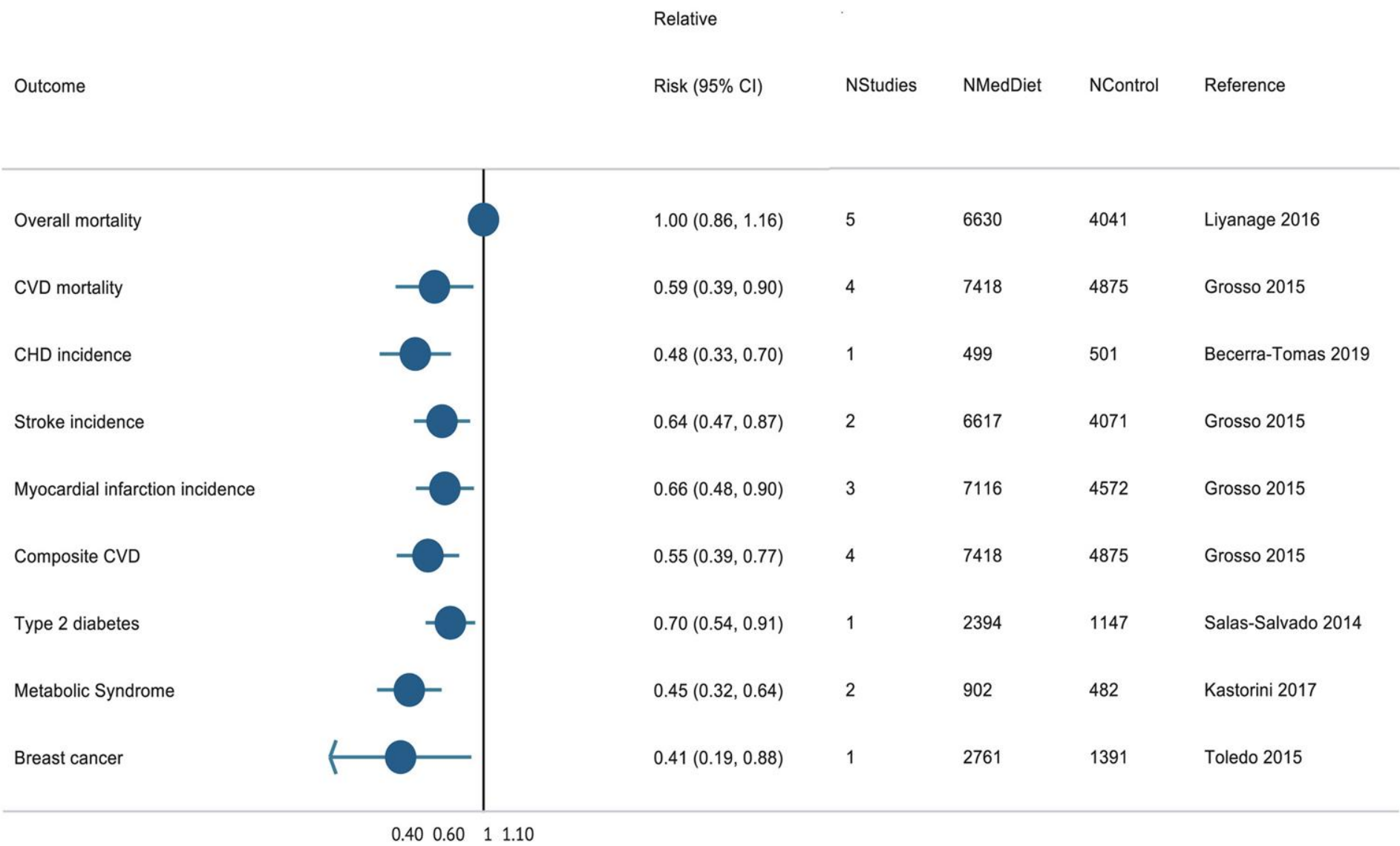


Mediterranean diet and cognitive function



NOTE: Weights and between-subgroup heterogeneity test are from random-effects model

Mediterranean diet and Chronic Diseases



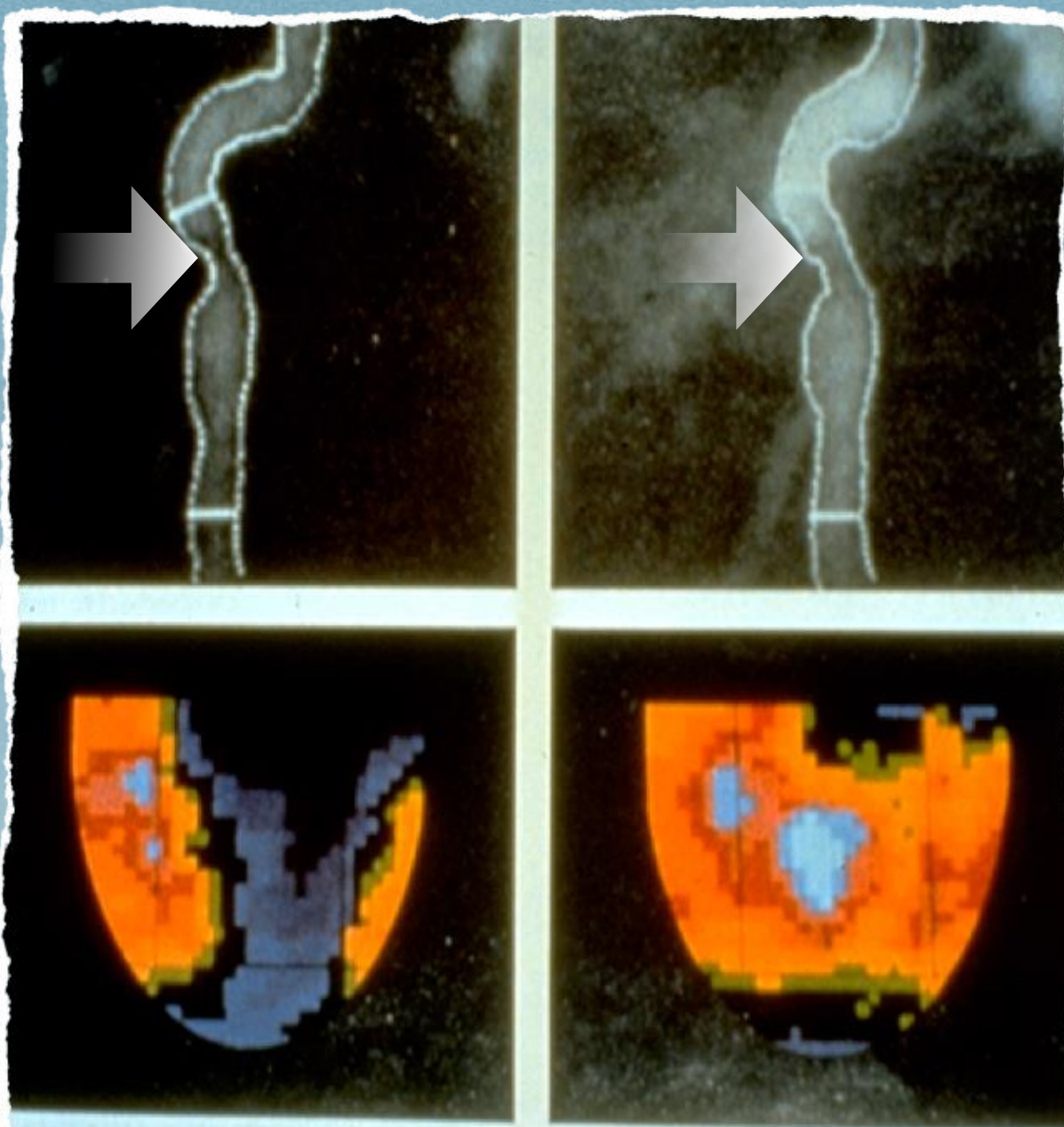
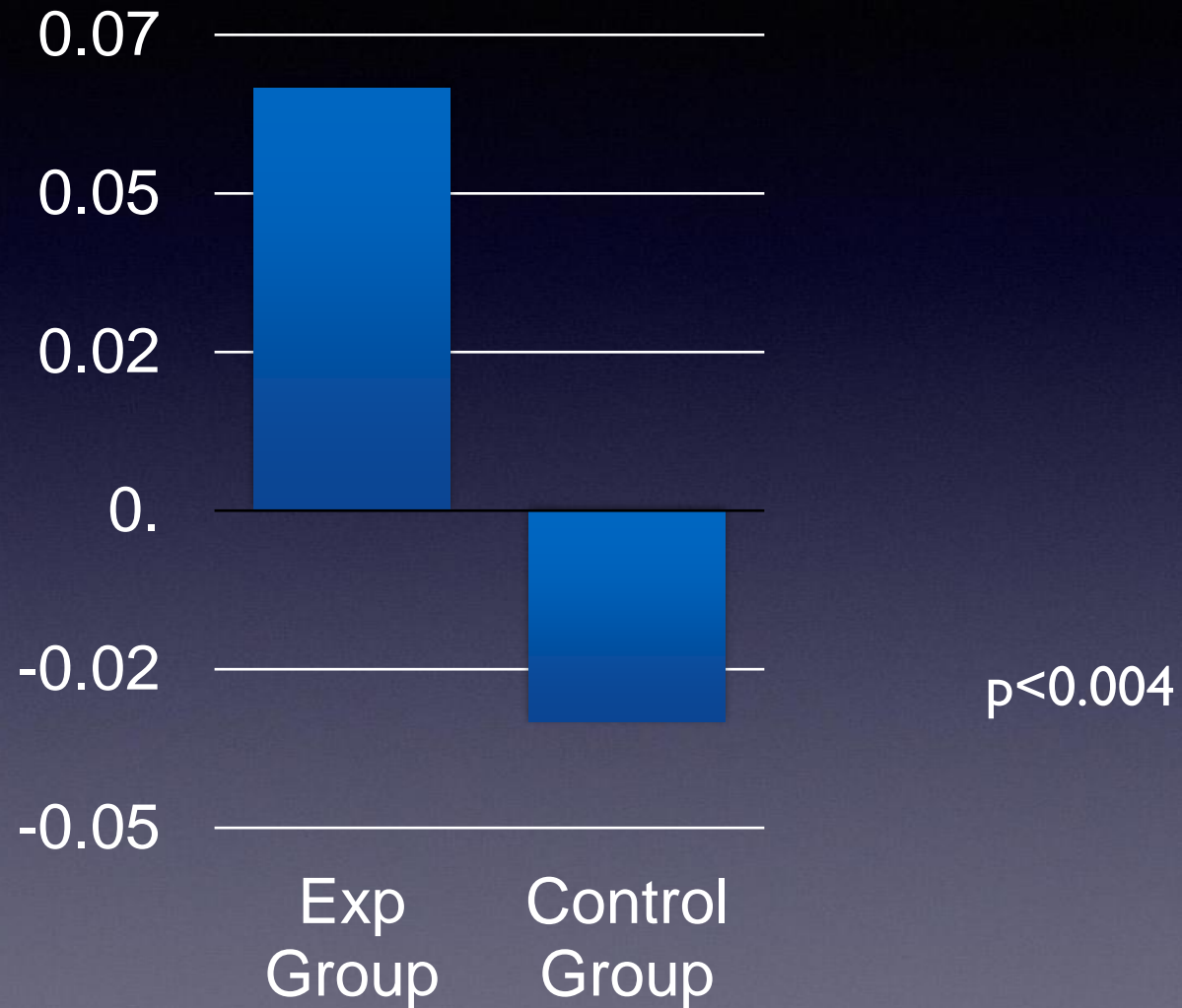


Figure 2. Quantitative coronary angiograms and cardiac PET scans obtained

Mean Changes in Telomere Length After 5 Years



Omega-3 fatty acids

Low levels of EPA and DHA (Omega-3 Index) are associated with early-onset coronary atherosclerosis.

OMEGA-3 (EPA+DHA) INDEX REPORT

RISK			The Omega-3 Index is associated with a low risk of cardiovascular disease because it is in the top population quartile. The Omega-3 Index categories are based on the top (75th percentile) and bottom (25th percentile) quartiles of the reference population. Consumption of foods high in omega-3 fatty acids (EPA and DHA) or supplements containing omega-3 fatty acids can increase the Omega-3 Index. Index <2.2: High Index 2.2-3.2: Moderate Index >3.2: Optimal
High (<2.2%)	Moderate (2.2%-3.2%)	Low (>3.2%)	
		✓	

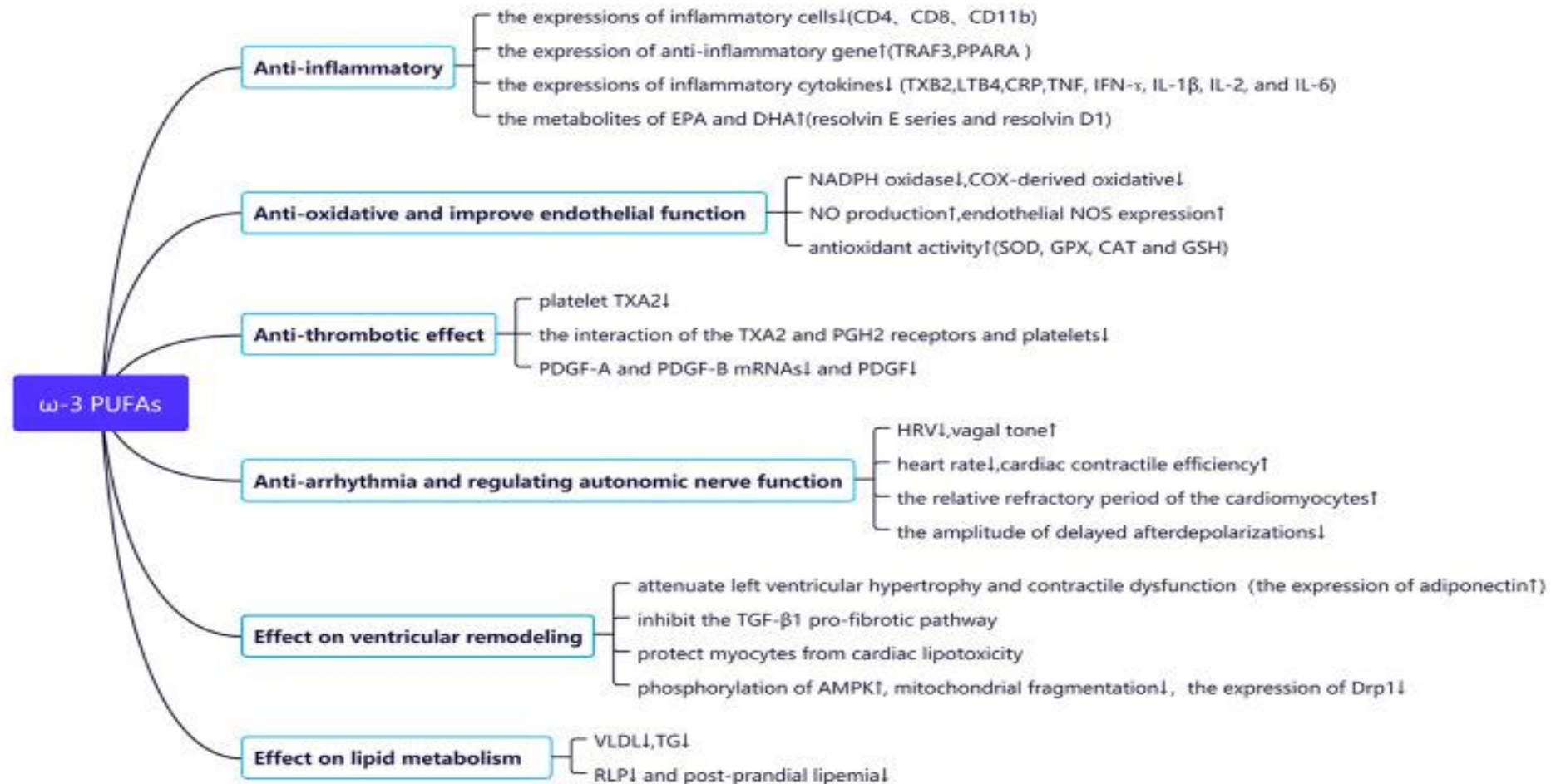
Test Name	In Range	Out of Range	Reference Range/Comments
OMEGA 3 AND 6 FATTY ACIDS, PLASMA			Lab: EZ
OMEGA 3 (EPA+DHA) INDEX		6.7 H	1.4-4.9 % See Note 1
OMEGA 6/OMEGA 3 RATIO		3.4 L	5.7-21.3
EPA/ARACHIDONIC ACID RATIO		0.3 H	0.2 OR LESS
ARACHIDONIC ACID	10.9		5.2-12.9 %
EPA		3.3 H	0.2-1.5 %
DHA	3.4		1.2-3.9 % See Note 2

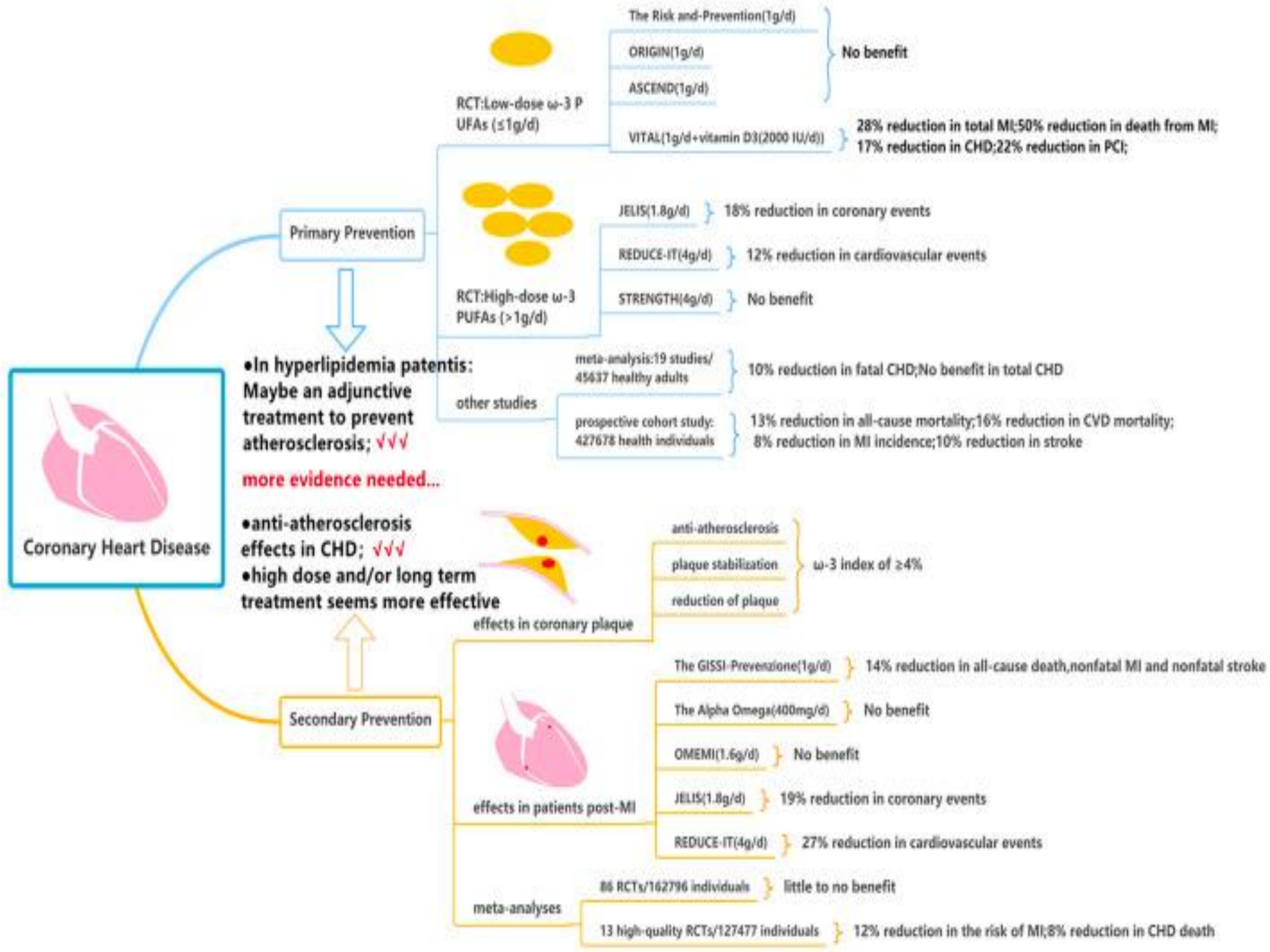
Foods High in Omega-3*			
Fish	Oils	Nuts and Seeds	Grains and Beans
Salmon	Walnut	Walnuts	Soybeans
Mackerel	Soybean	Flax seeds	Tofu
Sardines	Flax	Pecans	
Swordfish	Canola		
Bluefish	Cod liver		
Crab	Olive		
Cod	Sardine		
Scallops			

* Adapted from http://www.tufts.edu/med/nutrition-infection/hiv/health_omega3.html, March 13, 2012

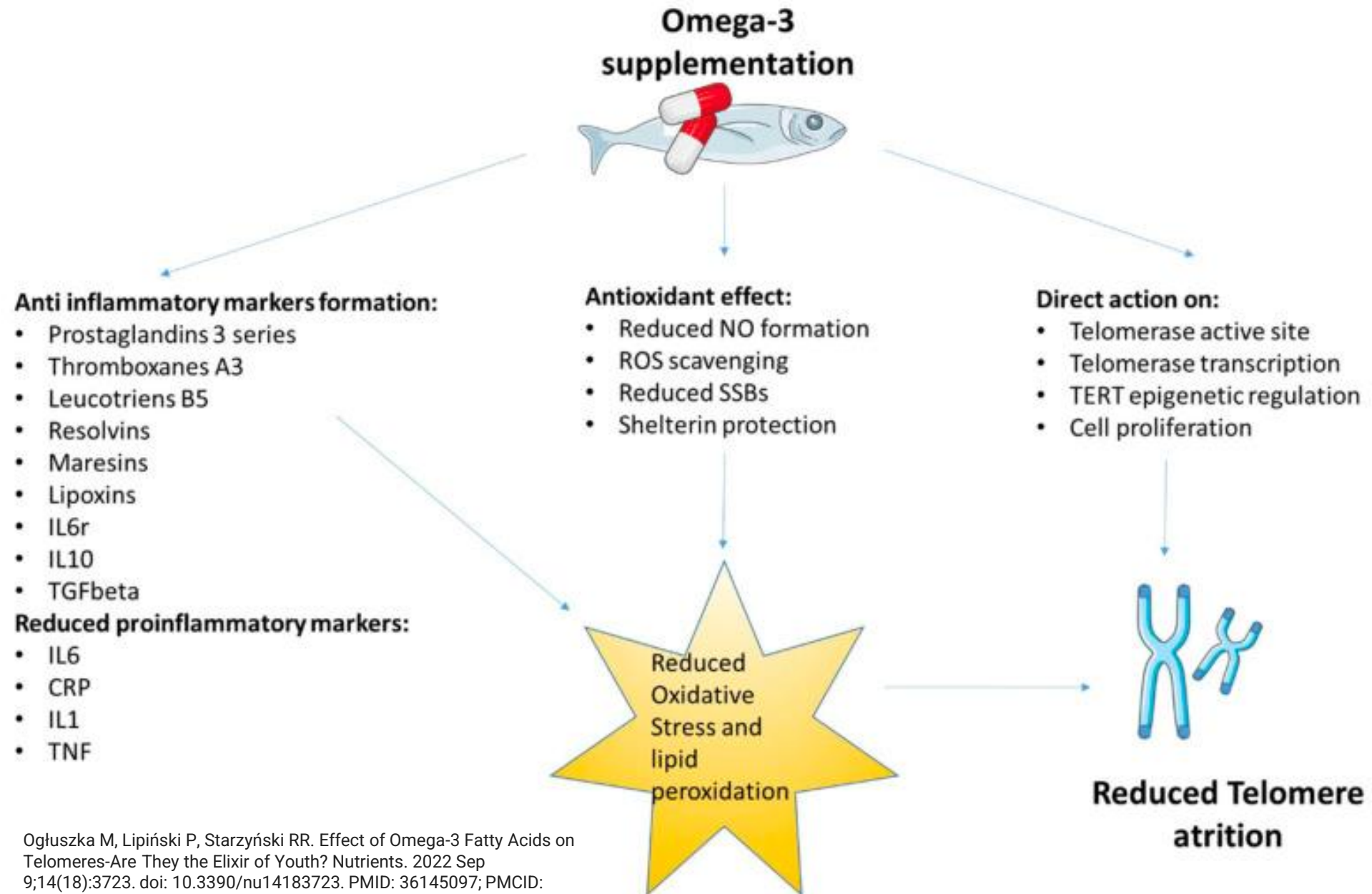
Bittner, D.O., Goeller, M., Zopf, Y. *et al.* Early-onset coronary atherosclerosis in patients with low levels of omega-3 fatty acids. *Eur J Clin Nutr* 74, 651–656 (2020). <https://doi.org/10.1038/s41430-019-0551-5>

The Effects of Fish Oil on Cardiovascular Diseases: Systematical Evaluation and Recent Advance





Effect of Omega-3 Fatty Acids on Telomeres—Are They the Elixir of Youth?

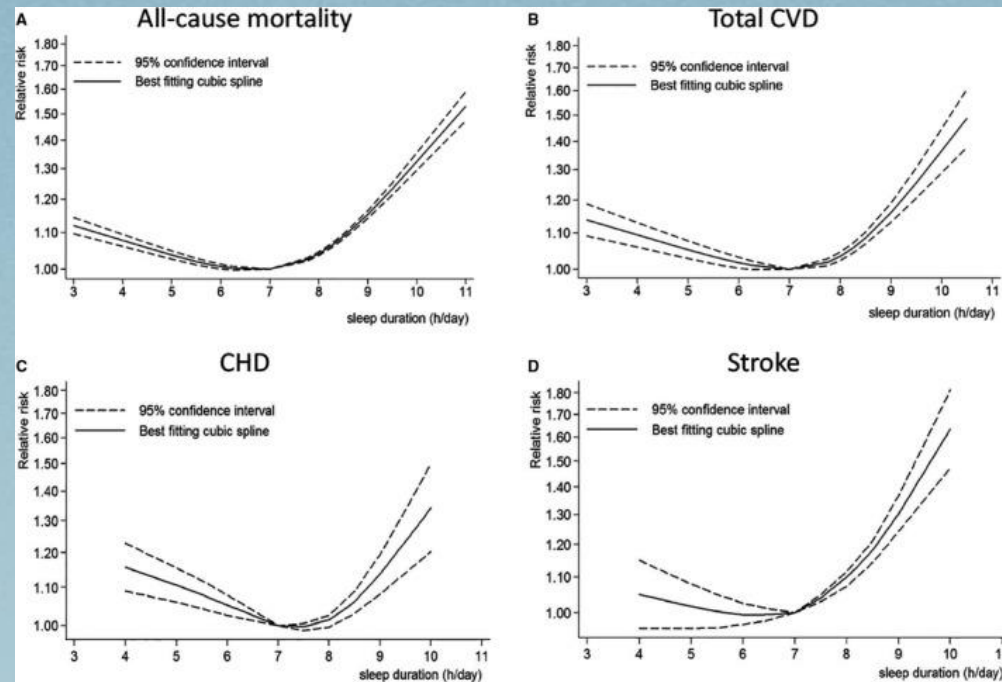


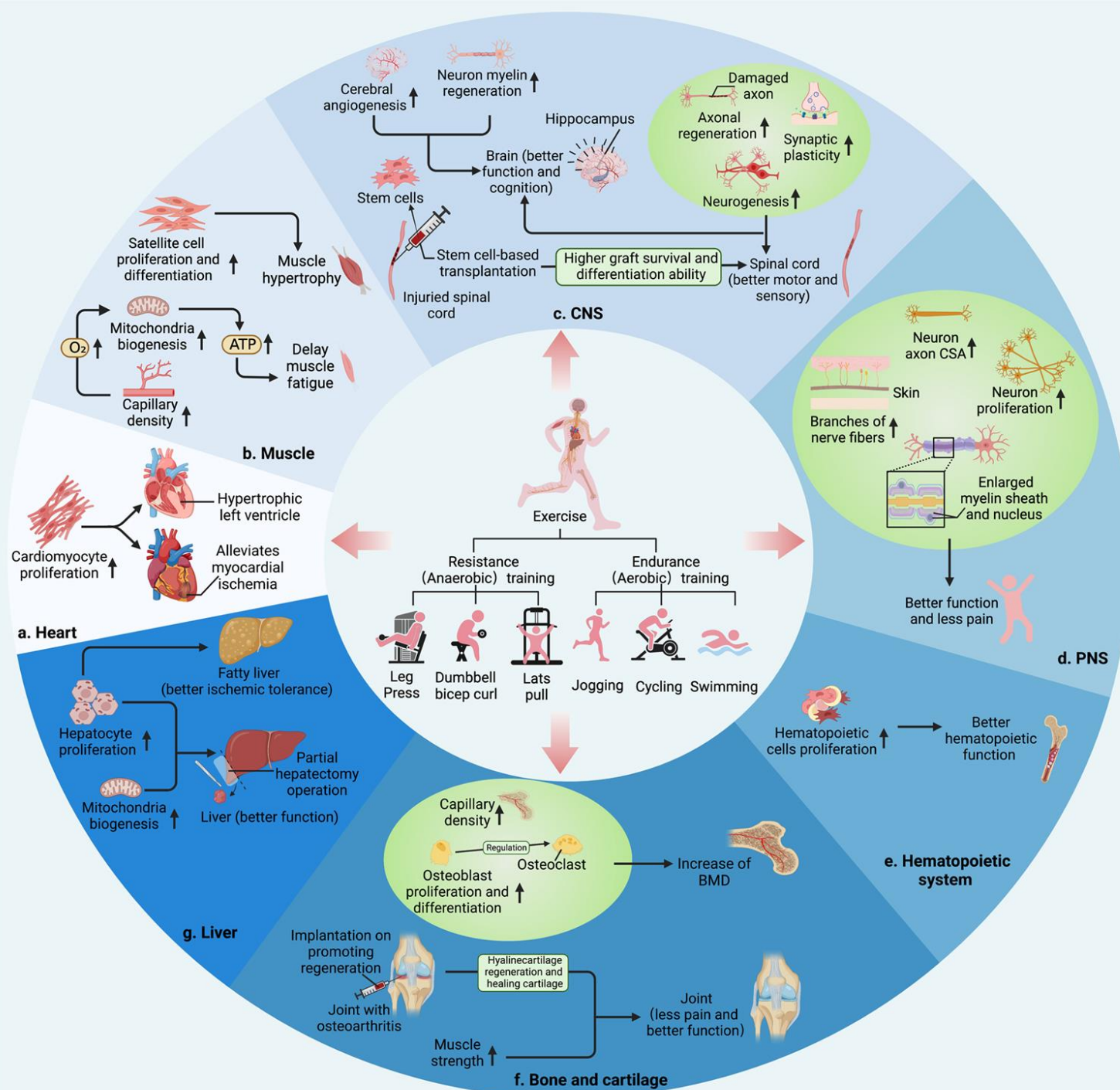
Sleep Duration and All-Cause Mortality: A Systematic Review and Meta-Analysis of Prospective Studies

Sleep. 2010 May 1; 33(5): 585–592.

- Both short (≤ 6 hours/day) and long (≥ 8 hours/day) sleep durations increase the risk of mortality compared with sleep of 7 hours/day

Simple 7 (8):
Smoking
Healthy Diet
Weight
Cholesterol
Blood Pressure
Blood Glucose
Physical Activity
(Sleep)





Semaglutide and Cardiovascular Outcomes in Obesity without Diabetes

- N Engl J Med 2023; 389:2221-2232

- **CONCLUSIONS**

- In patients with preexisting cardiovascular disease and overweight or obesity but without diabetes, weekly subcutaneous semaglutide at a dose of 2.4 mg was superior to placebo in reducing the incidence of death from cardiovascular causes, nonfatal myocardial infarction, or nonfatal stroke at a mean follow-up of 39.8 months.



Berberine

Berberine is a plant alkaloid derived from roots, rhizomes, and stem bark of several plants with a historical use in various ancient medicines.

From: Advances in Molecular Toxicology, 2017

Berberine

BBR has been recognized as being capable of decreasing cardiovascular risk through reducing oxidative stress, low-density lipoprotein (LDL), triglycerides, and insulin resistance and improving the mood.²² A multicenter randomized trial showed BBR reduced LDL-c levels as well as total cholesterol/HDL-c and ApoB/ApoA1 ratios, while increasing Apo A1, all of which are improvements in cardiovascular risk indicators.²³

Berberine is possibly effective for...



- **Canker sores.** Applying a gel containing berberine can reduce pain, redness, oozing, and the size of canker sores.
- **Diabetes.** Taking berberine by mouth seems to slightly reduce blood sugar levels in people with diabetes.
- **A digestive tract infection that can lead to ulcers (*Helicobacter pylori* or *H. pylori*).** Adding berberine by mouth to multiple medications that are typically used to treat this condition might work as well as other accepted treatments for this condition. These other treatments also use multiple medications.
- **High levels of cholesterol or other fats (lipids) in the blood (hyperlipidemia).** Taking berberine by mouth, alone or with other ingredients, might help lower total cholesterol, low-density lipoprotein (LDL or "bad") cholesterol, and triglyceride levels in people with high cholesterol.
- **High blood pressure.** Taking 0.9 grams of berberine by mouth daily along with the blood pressure-lowering drug amlodipine reduces blood pressure better than taking amlodipine alone in people with high blood pressure.
- **A hormonal disorder that causes enlarged ovaries with cysts (polycystic ovary syndrome or PCOS).** Taking berberine by mouth might lower blood sugar, improve cholesterol and triglyceride levels, reduce testosterone levels, and lower waist-to-hip ratio in people with PCOS.

Effective management of atherosclerosis progress and hyperlipidemia with nattokinase: A clinical study with 1,062 participants

Front Cardiovasc Med. 2022; 9: 964977. Published online 2022 Aug 22.

Nattokinase (NK), known as a potent fibrinolytic and antithrombotic agent, has been shown to have antiatherosclerotic and lipid-lowering effects.

A significant reduction in the thickness of the carotid artery intima-media and the size of the carotid plaque was observed.

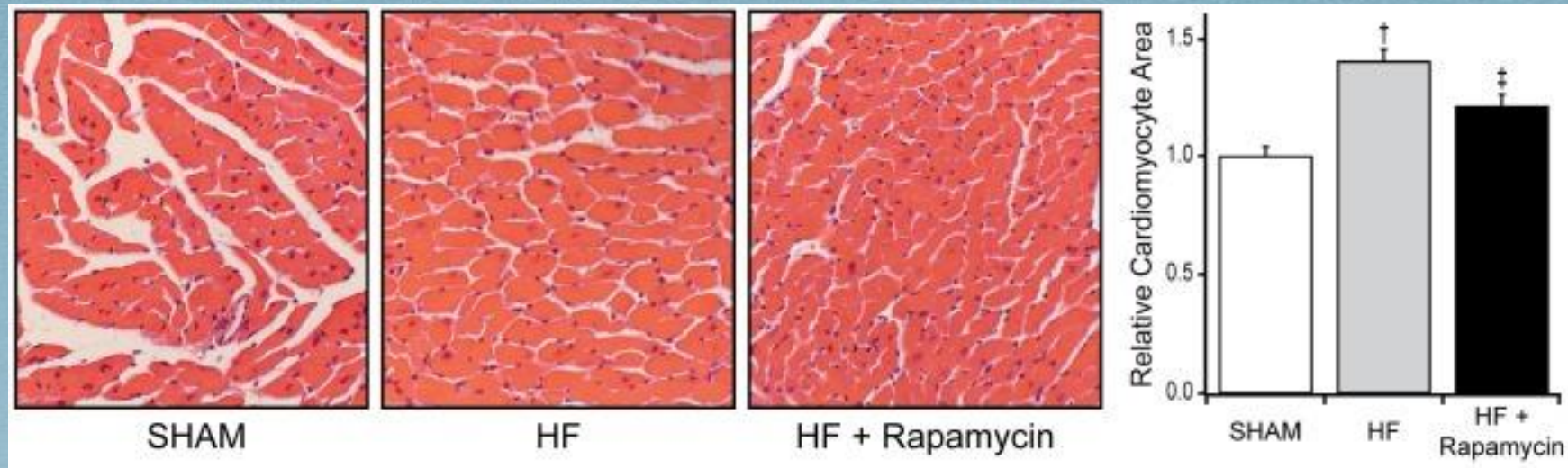
Niacin in Patients with Low HDL Cholesterol Levels Receiving Intensive Statin Therapy

List of authors.

The AIM-HIGH Investigators *

There was no incremental clinical benefit from the addition of niacin to statin therapy during a 36-month follow-up period, despite significant improvements in HDL cholesterol and triglyceride levels.

Sirolimus (Rapamycin) is the product of the bacterium *Streptomyces hygroscopicus* originally found in a soil sample from Easter Island, also known as "Rapa Nui." Because of this history, sirolimus has been marketed as rapamycin and has been found to be an effective immunosuppressant as well as antiproliferative agent.



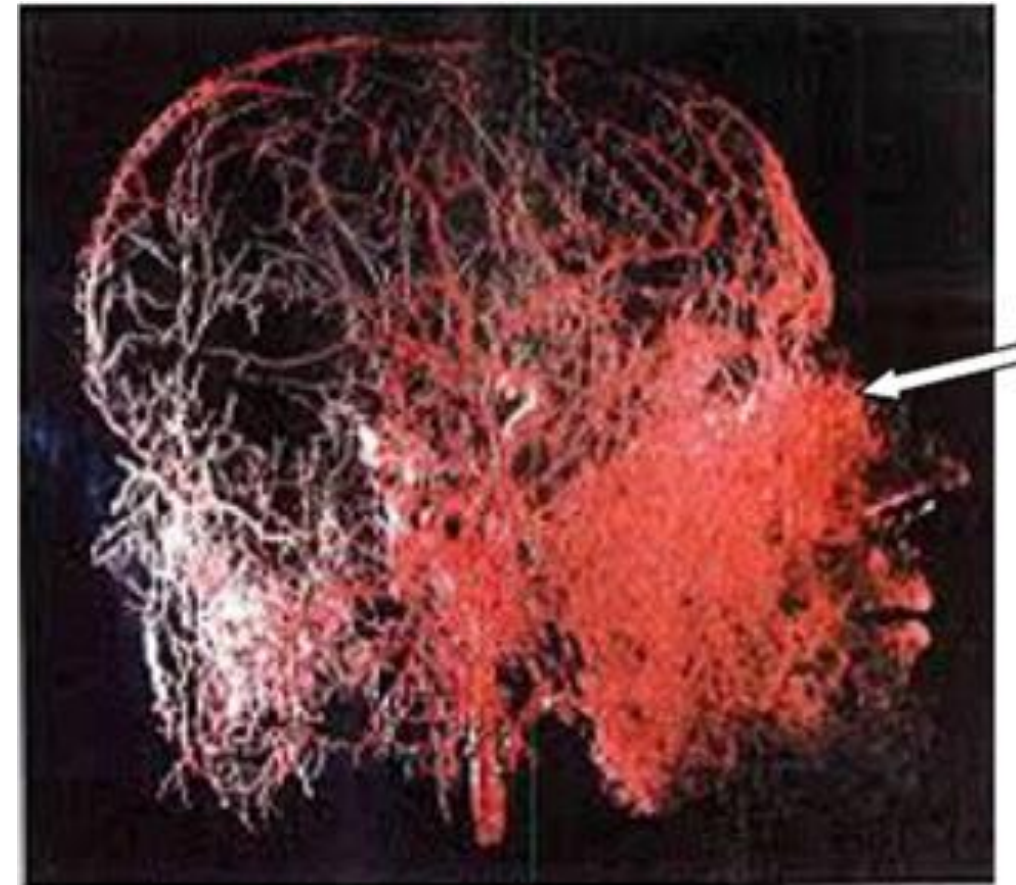
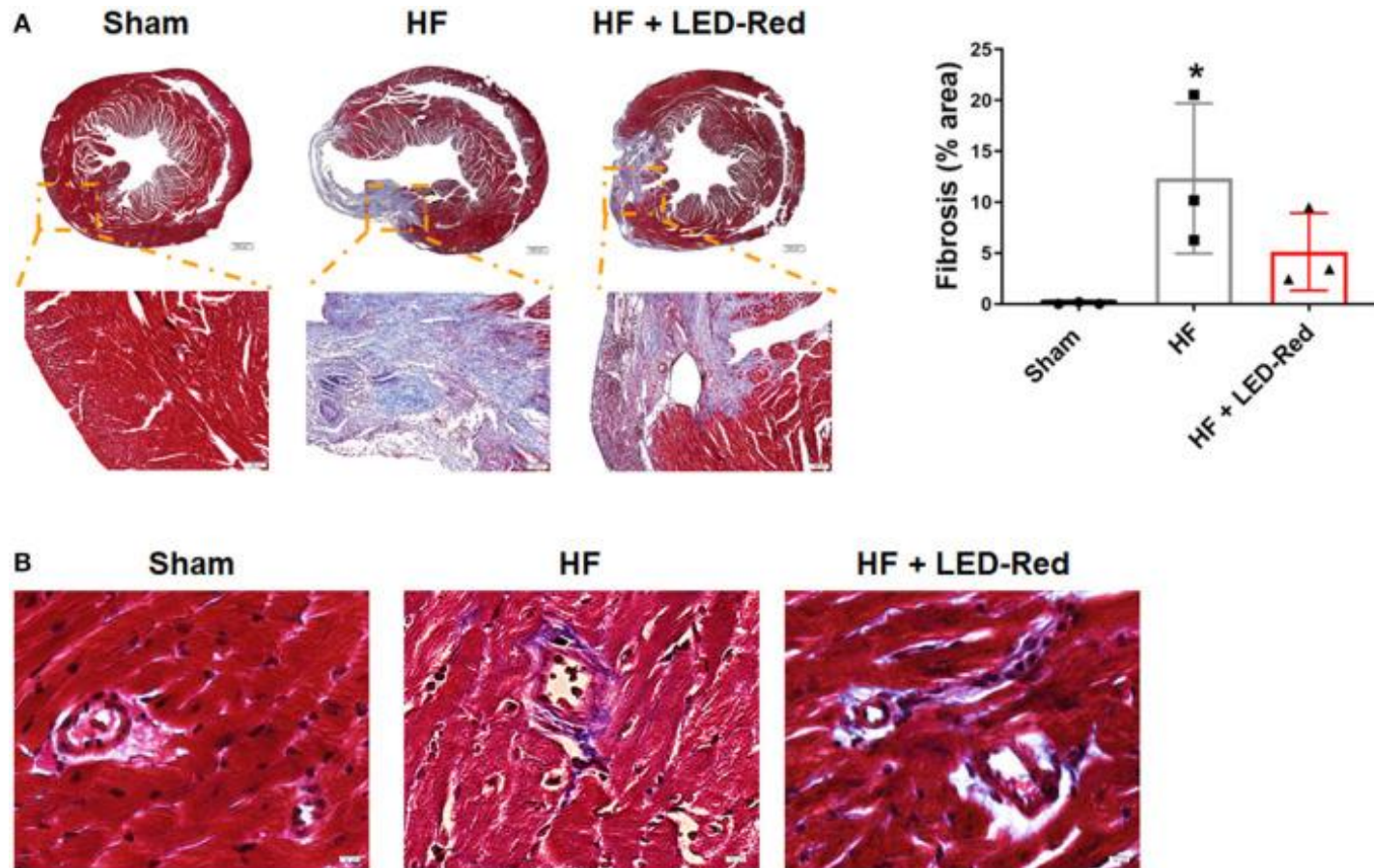
Anti-Remodeling Effects of Rapamycin in
Experimental Heart Failure
Effect of mTOR inhibition with rapamycin on
pathologic remodeling in established HF
PLoS One. 2013; 8(12)

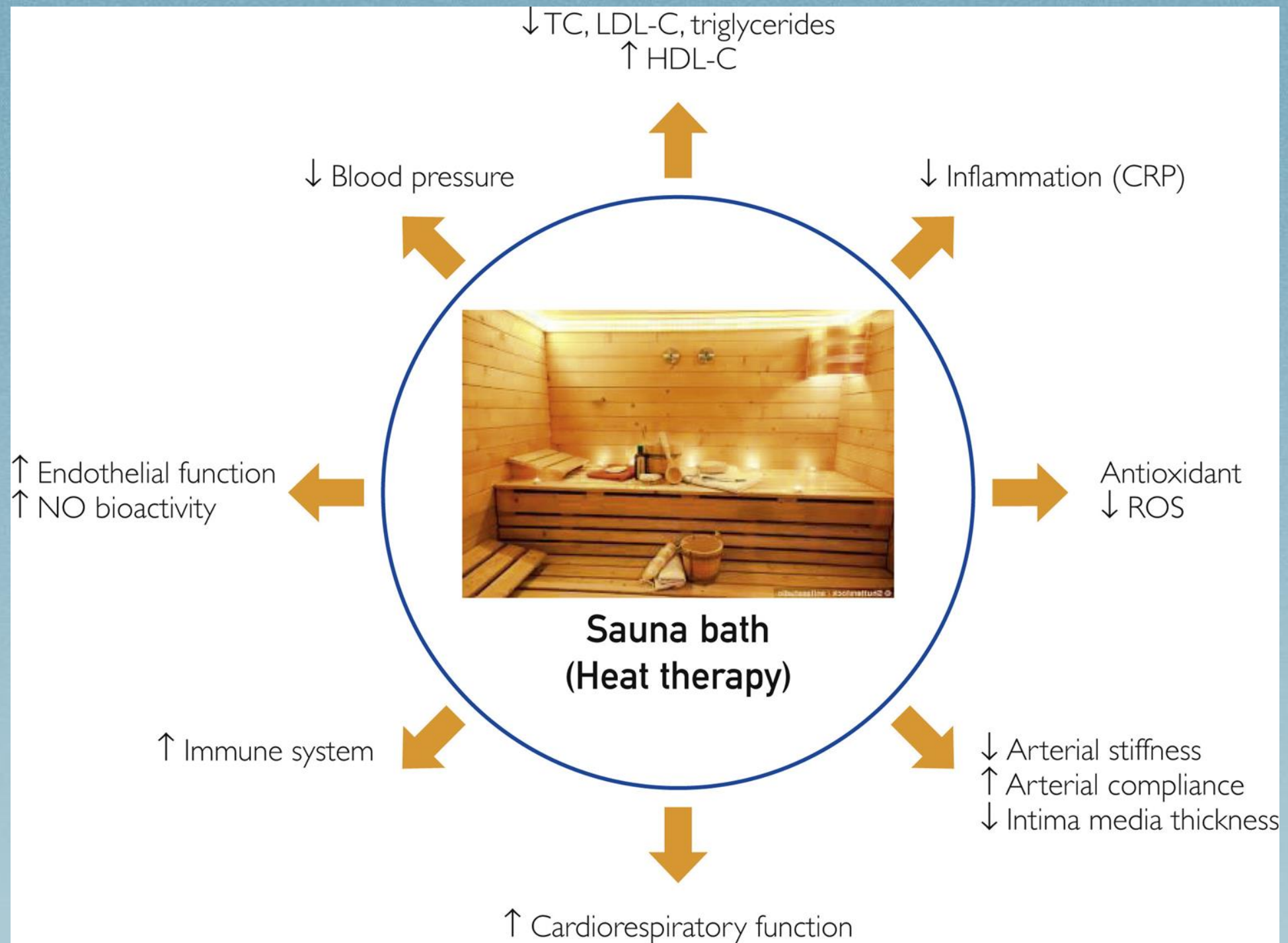
Front Cardiovasc Med. 2021; 8: 753664.

Photobiomodulation therapy is defined as the utilization of non-ionizing electromagnetic energy to trigger photochemical changes within cellular structures that are receptive to photons.

Mitochondria is particularly receptive to red and near-infrared (NIR) photons. At the cellular level, visible red and near infrared light energy are absorbed by mitochondria, which perform the function of producing ATP

The key to this entire process is a mitochondrial enzyme called cytochrome oxidase c, a chromophore, which accepts photonic energy of specific wavelengths when functioning below par.



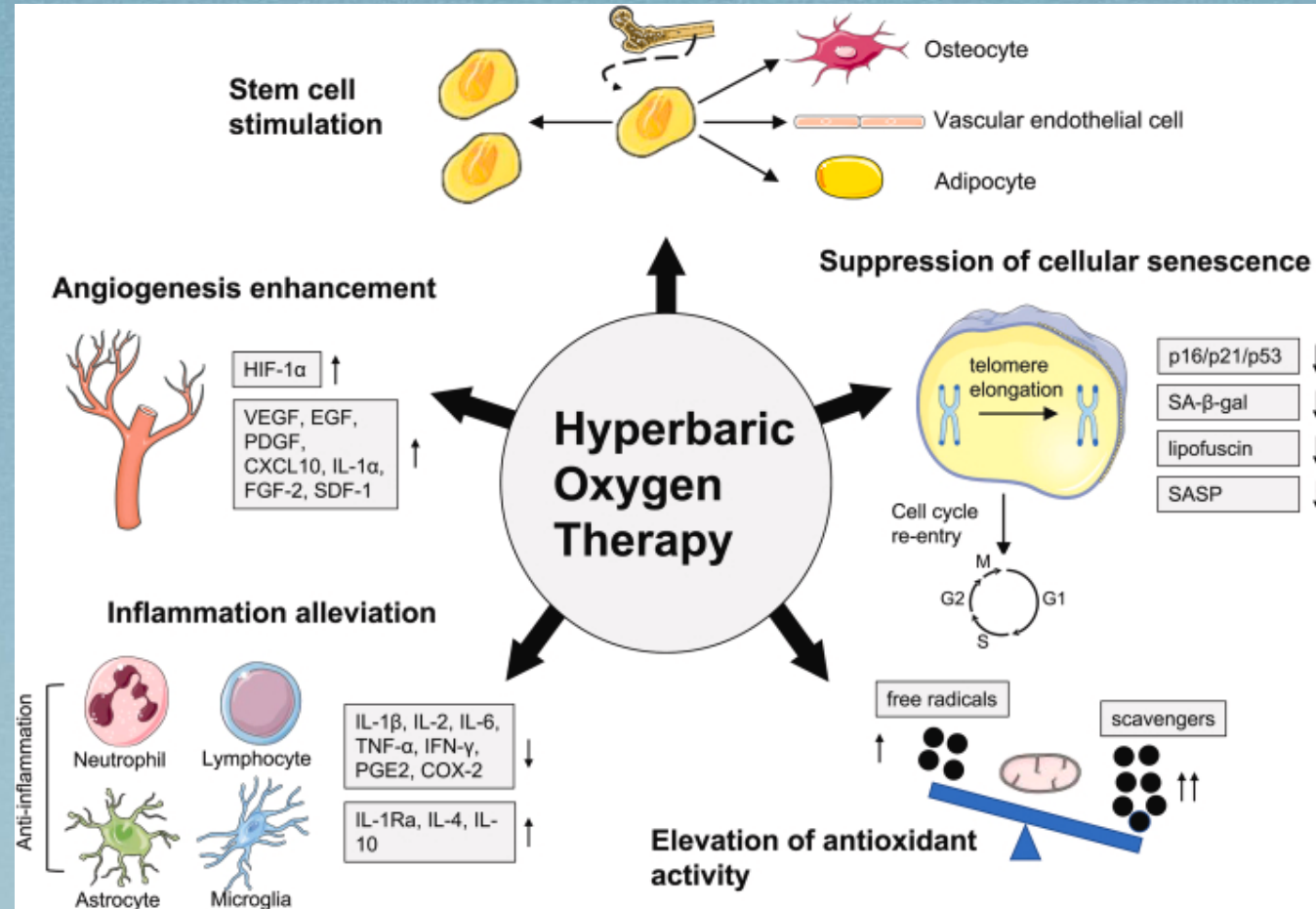


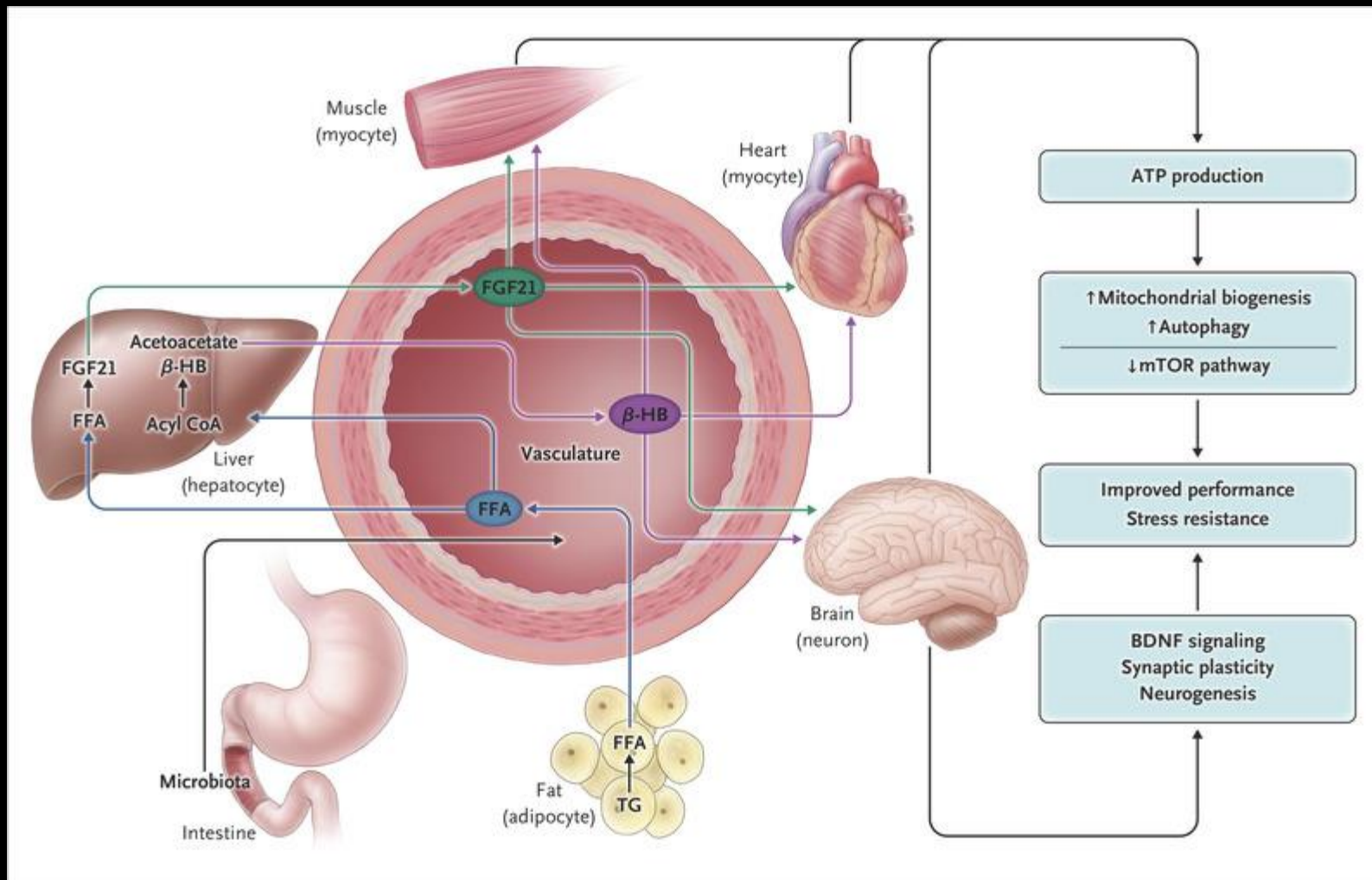


Reduced
CRP
LDL
Tgd
Markers of
Plaque
Instability

Whole-Body Cryotherapy Decreases the Levels of
Inflammatory, Oxidative Stress, and Atherosclerosis
Plaque

Mediators Inflamm. 2018; 2018: 8592532.





Intermittent Fasting
N Engl J Med 2019; 381:2541-2551

Amazoning Health Care

You do your shopping at home
– why would you not do your
healthcare at home?



Wearables



Microsampling





Cardiovascular disease is a multifaceted problem which requires a multifaceted and multidisciplinary approach.



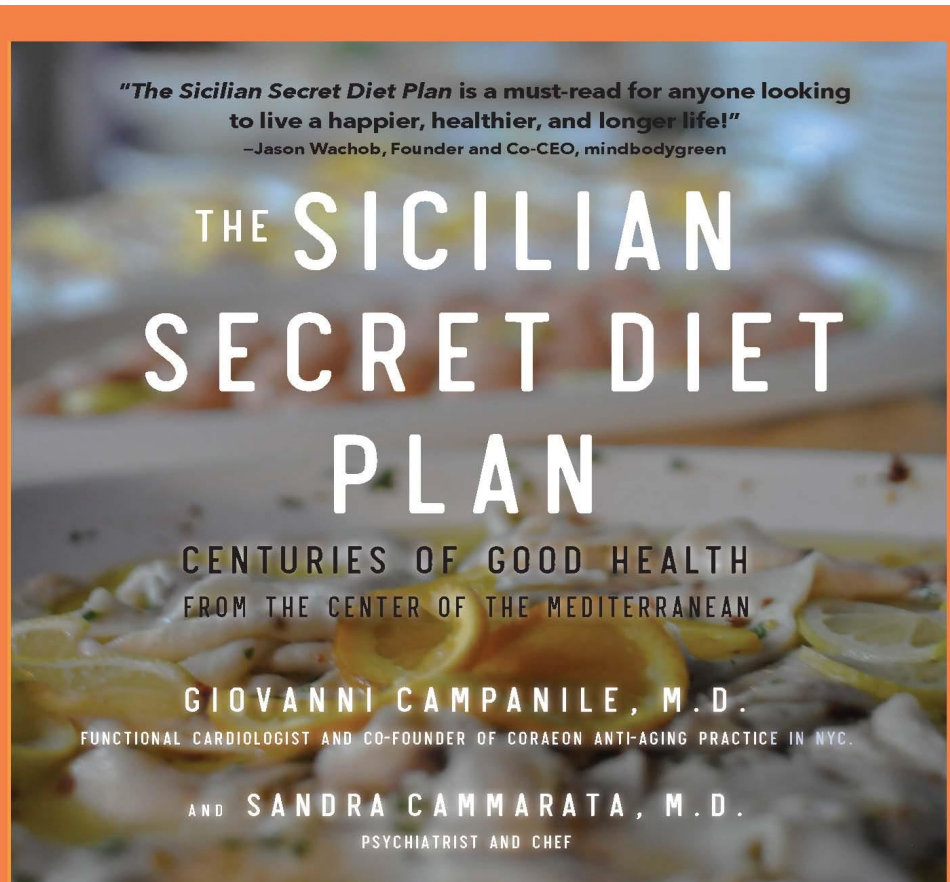
Coraeon.com

Functionalheart.com

Lifesciencepharmacy.com

Giovanni Campanile, MD, FACC

Scott Berliner R.Ph.



LIFE SCIENCE

PHARMACY

Questions?

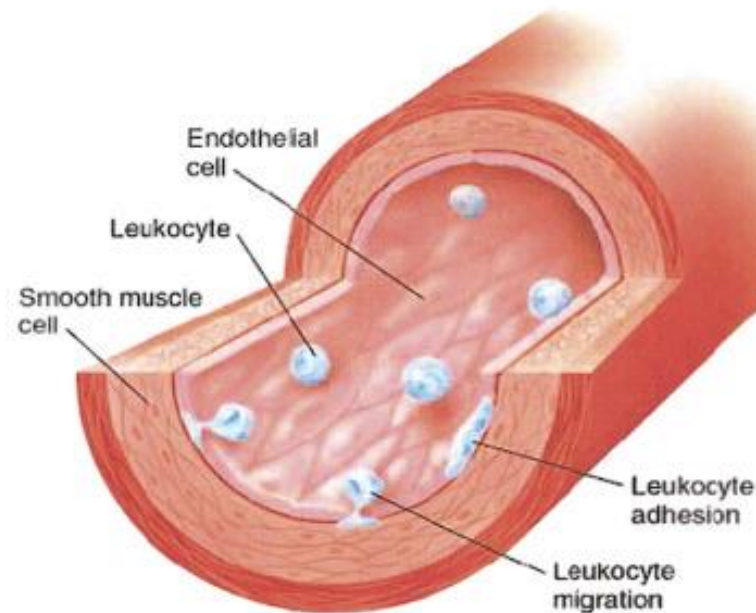
Hormones and Cardiovascular Health

Hormones may influence many pathways in the cardiovascular system, which includes the heart and blood vessels. While hormones play a key role in maintaining cardiovascular health, high levels of some hormones can contribute to cardiovascular disease.

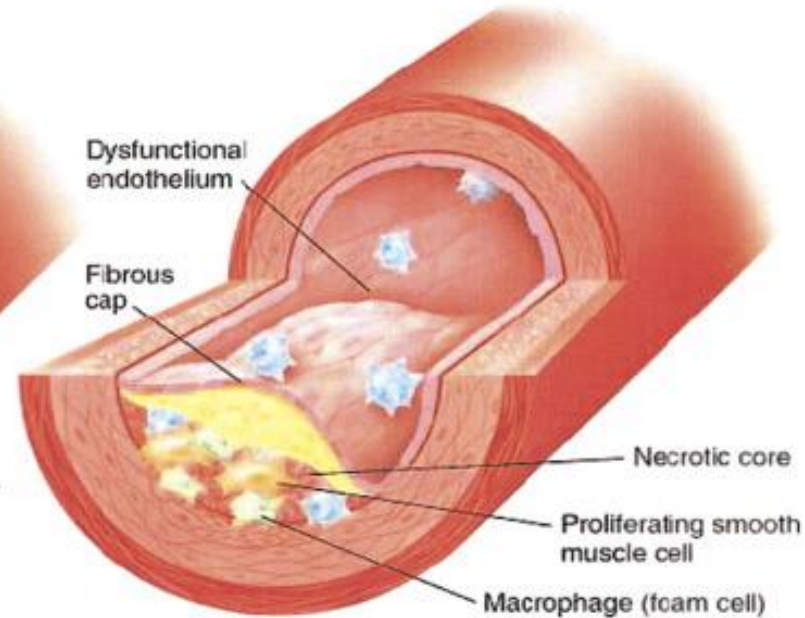


Hall ME, Yanes L, Long RC, et al. Hormones of the Cardiovascular System. [Updated 2015 Feb 6]. In: Feingold KR, Anawalt B, Blackman MR, et al., editors. Endotext [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK279096/>

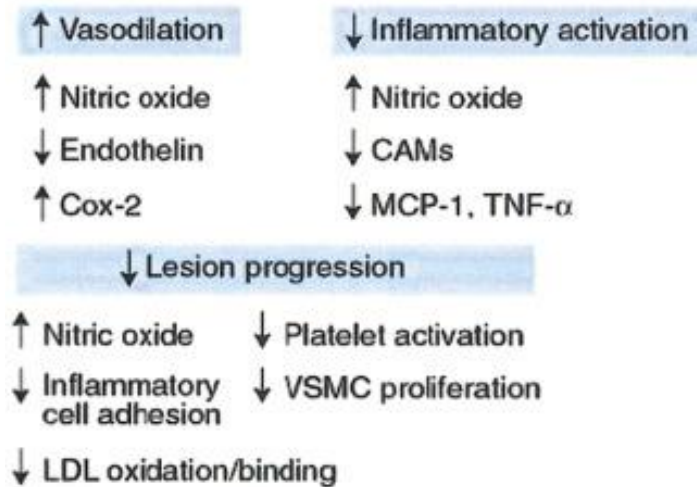
Early atherogenesis



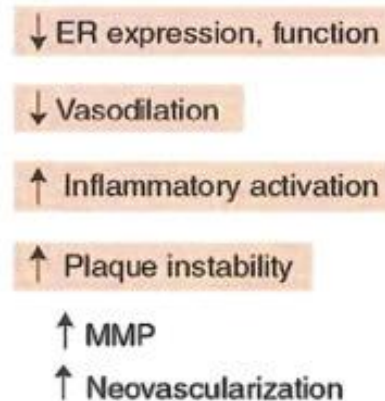
Established atherosclerosis



Beneficial effects of HRT



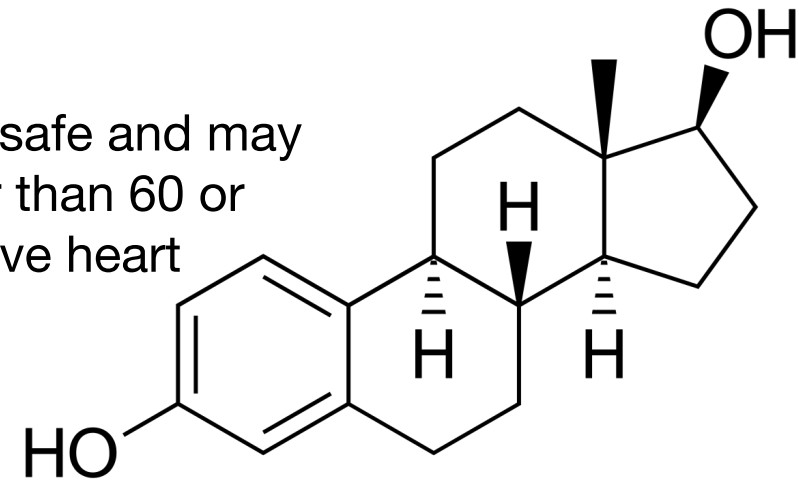
Altered biology of HRT



Do hormones play a role in women's heart health?

Estrogen is protective of the heart in the pre-menopausal years—it relaxes the arteries and promotes good cholesterol. “But as menopause approaches, estrogen declines, and we see more cardiovascular risk factors, such as high cholesterol and hypertension, in women,” Dr. Spatz says. “The incidence of heart disease in women starts going up around age 65—about 10 years later than in men—and that’s likely due to the lingering positive effects of estrogen.”

When prescribed properly, estrogen is considered mostly safe and may help lower cardiovascular risk, but only in women younger than 60 or who are less than 10 years into menopause and do not have heart disease.

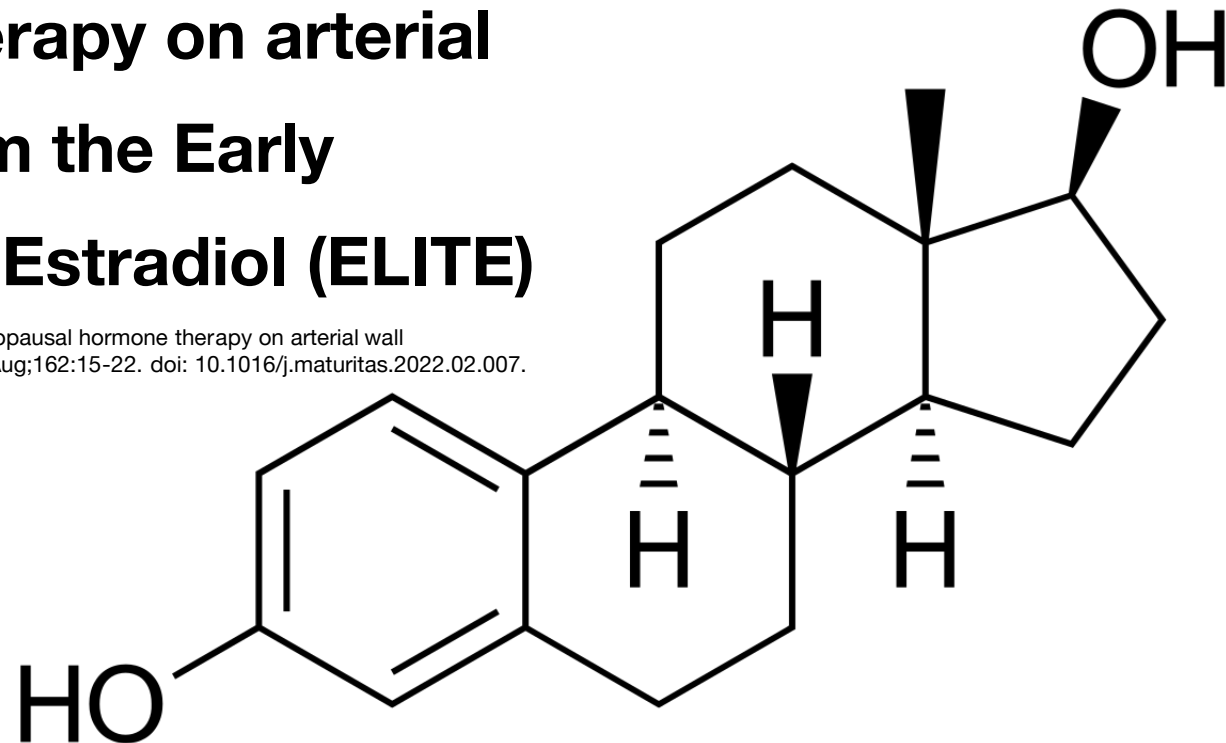


The Kronos Early Estrogen Prevention Study (KEEPS): what have we learned?

Miller VM, Naftolin F, Asthana S, Black DM, Brinton EA, Budoff MJ, Cedars MI, Dowling NM, Gleason CE, Hodis HN, Jayachandran M, Kantarci K, Lobo RA, Manson JE, Pal L, Santoro NF, Taylor HS, Harman SM. The Kronos Early Estrogen Prevention Study (KEEPS): what have we learned? Menopause. 2019 Sep;26(9):1071-1084. doi: 10.1097/GME.0000000000001326. PMID: 31453973; PMCID: PMC6738629.

Effect of menopausal hormone therapy on arterial wall echomorphology: Results from the Early versus Late Intervention Trial with Estradiol (ELITE)

Karim R, Xu W, Kono N, Sriprasert I, Li Y, Yan M, Stanczyk FZ, Shoupe D, Mack WJ, Hodis HN. Effect of menopausal hormone therapy on arterial wall echomorphology: Results from the Early versus Late Intervention Trial with Estradiol (ELITE). Maturitas. 2022 Aug;162:15-22. doi: 10.1016/j.maturitas.2022.02.007. Epub 2022 Mar 17. PMID: 35474254; PMCID: PMC9232990.



Integrated Effects of Menopausal Hormonal Treatments - KEEPS

Brain

Both o-CEE & tE2:

- Neutral effect on cognition
- ↓ Hot flashes
- Improved sleep

CEE only:

- ↓ Anxiety & depression

tE2 only:

- ↓ Deposition β -amyloid
- ↑ Libido

Metabolism

Both o-CEE & tE2:

- ↓ HOMA-IR

CEE only:

- ↑ HDL; ↓ LDL

Both o-CEE & tE2:

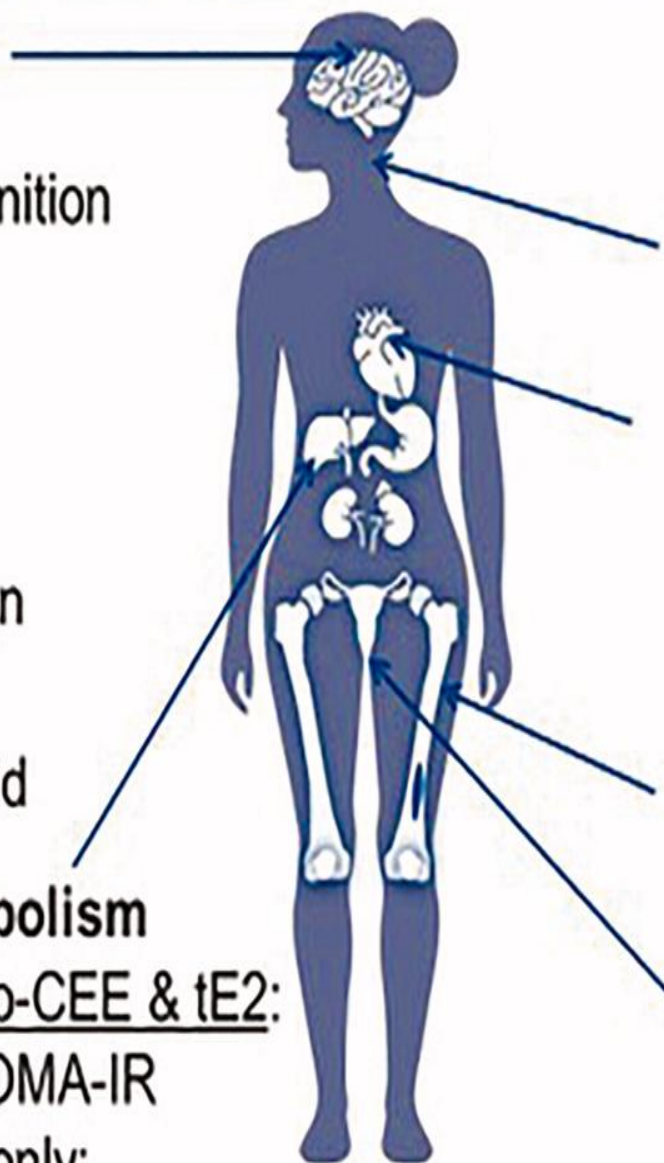
- Neutral effect on CIMT

- No significant differences in coronary artery calcification

- Maintained bone mineral density

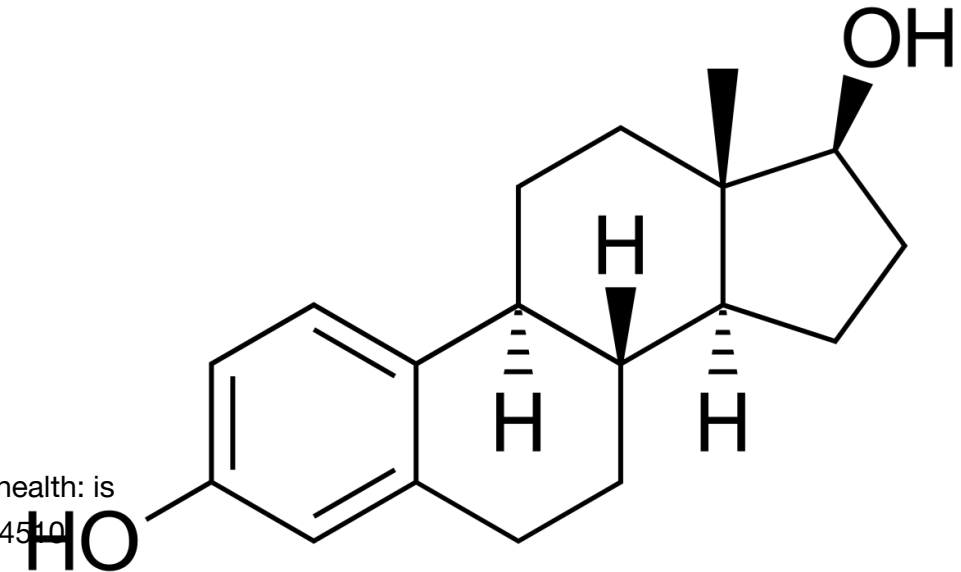
- Sexual function:

↑ lubrication, ↓ pain



In general, KEEPS data provide reassurance regarding the efficacy and safety of these specific doses of oCEE (0.45 mg/day) or tE2 (50 µg/day), both with oral progesterone (200 mg/day for 12 days/month), for women who may be considering use of MHT to reduce postmenopausal symptoms. As with any randomized clinical trial, the results may not be generalizable to patients outside the study population, such as older women or those at higher cardiovascular risk.

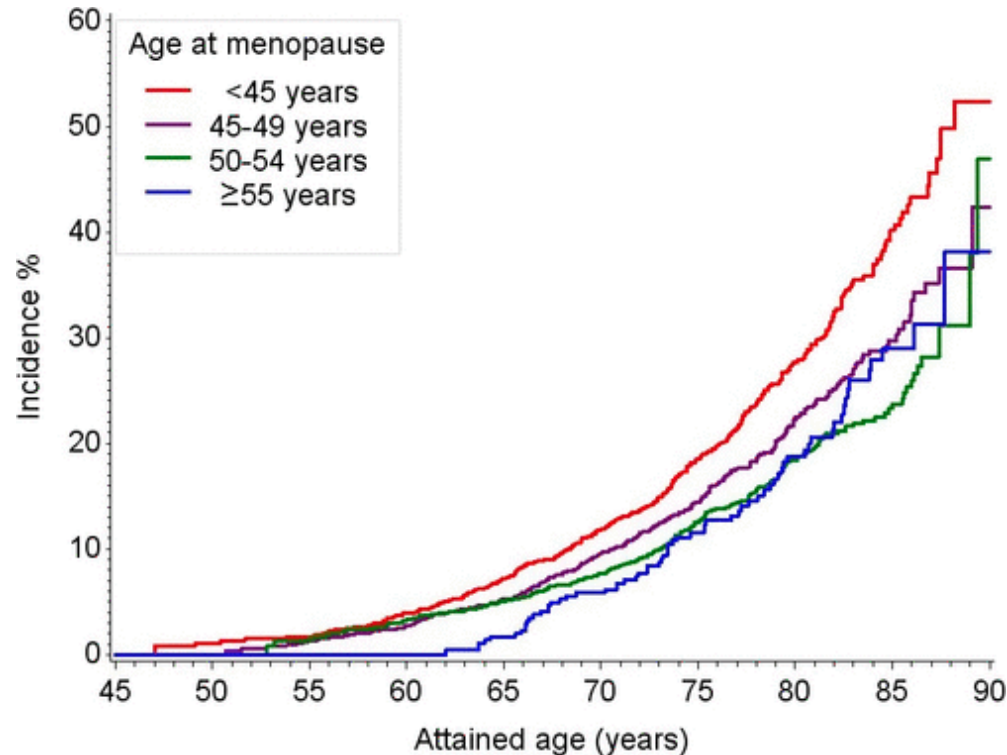
“The protective role of estrogen in cardiovascular diseases is associated with a decrease in fibrosis, stimulation of angiogenesis and vasodilation, enhancement of mitochondrial function and reduction in oxidative stress”



Menopause is now listed as a female-specific CVD risk factor per the American Heart Association

By following women over the MT, SWAN documented sharp increases in total cholesterol, low-density lipoprotein cholesterol (LDL-C) and apolipoprotein (Apo)B levels within a 1-year interval surrounding the FMP (final menses period).⁷² Importantly, the menopause-related acceleration in LDL-C was associated with greater risk of carotid plaque later in life in a follow-up analysis.

Association of Age at Menopause With Incident Heart Failure: A Prospective Cohort Study and Meta-Analysis



These results provided evidence that early age at menopause is associated with a modestly greater risk of HF. Identification of women with early menopause offers a window of opportunity to implement interventions that will improve overall cardiovascular health during the postmenopausal years.

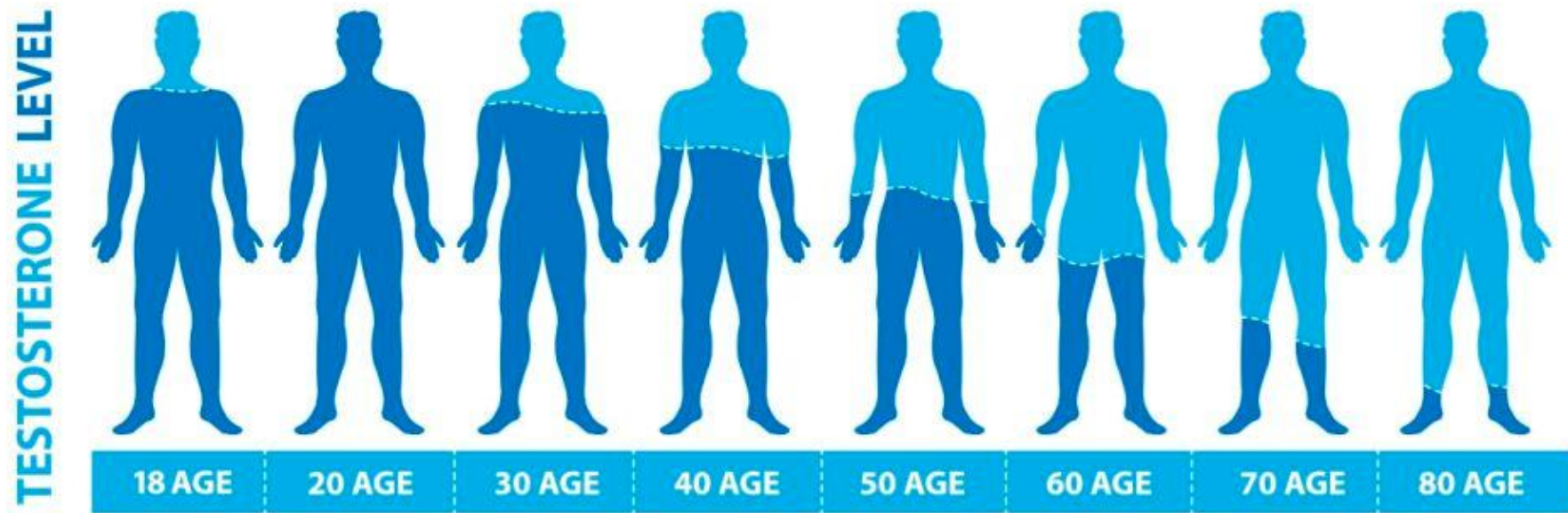
What about men?

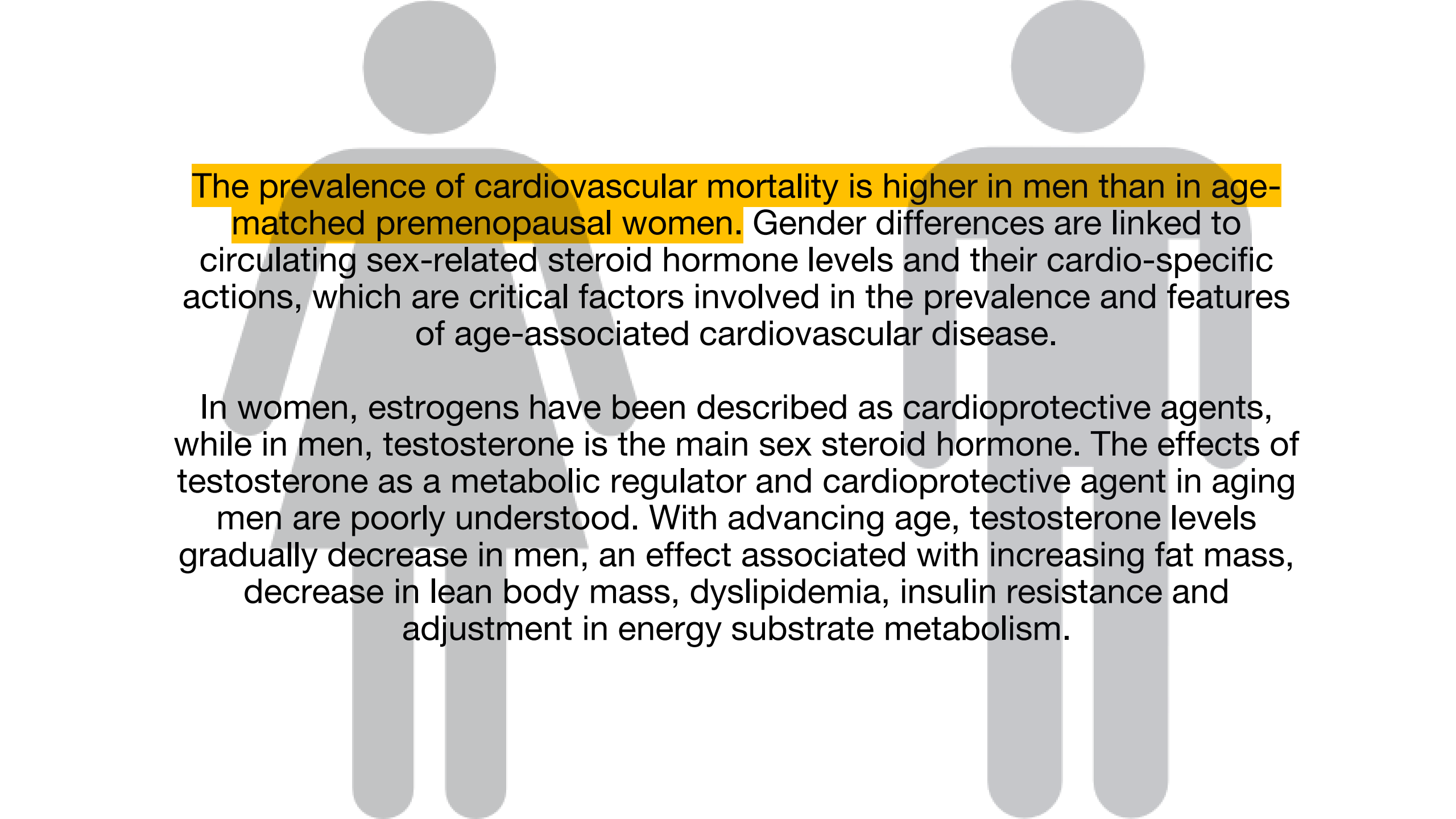
Role of androgens in cardiovascular pathology

Androgenic steroid hormones act through genomic and non-genomic mechanisms and significantly influence the function of ECs (Endothelial cells) and their progenitors. These hormones are involved in the regulation of the vascular tone, proliferation, mobility, adhesion, and anti-thrombotic properties of vascular endothelium. Androgens also participate in important pathogenic mechanisms such as atherogenesis and vascular inflammation.

Many studies indicate that androgens play a vasculoprotective role through the anti-inflammatory, anti-apoptotic, and vasodilatory actions on endothelium and VSMCs (vascular smooth muscle cells) and recruitment of epithelial progenitor cells, EPCs essential for vascular repair.

In the context of human disease relevance, androgen deficiency treated with testosterone prescriptions at physiological concentrations has been associated with lower cardiometabolic risk and treatment outcomes.



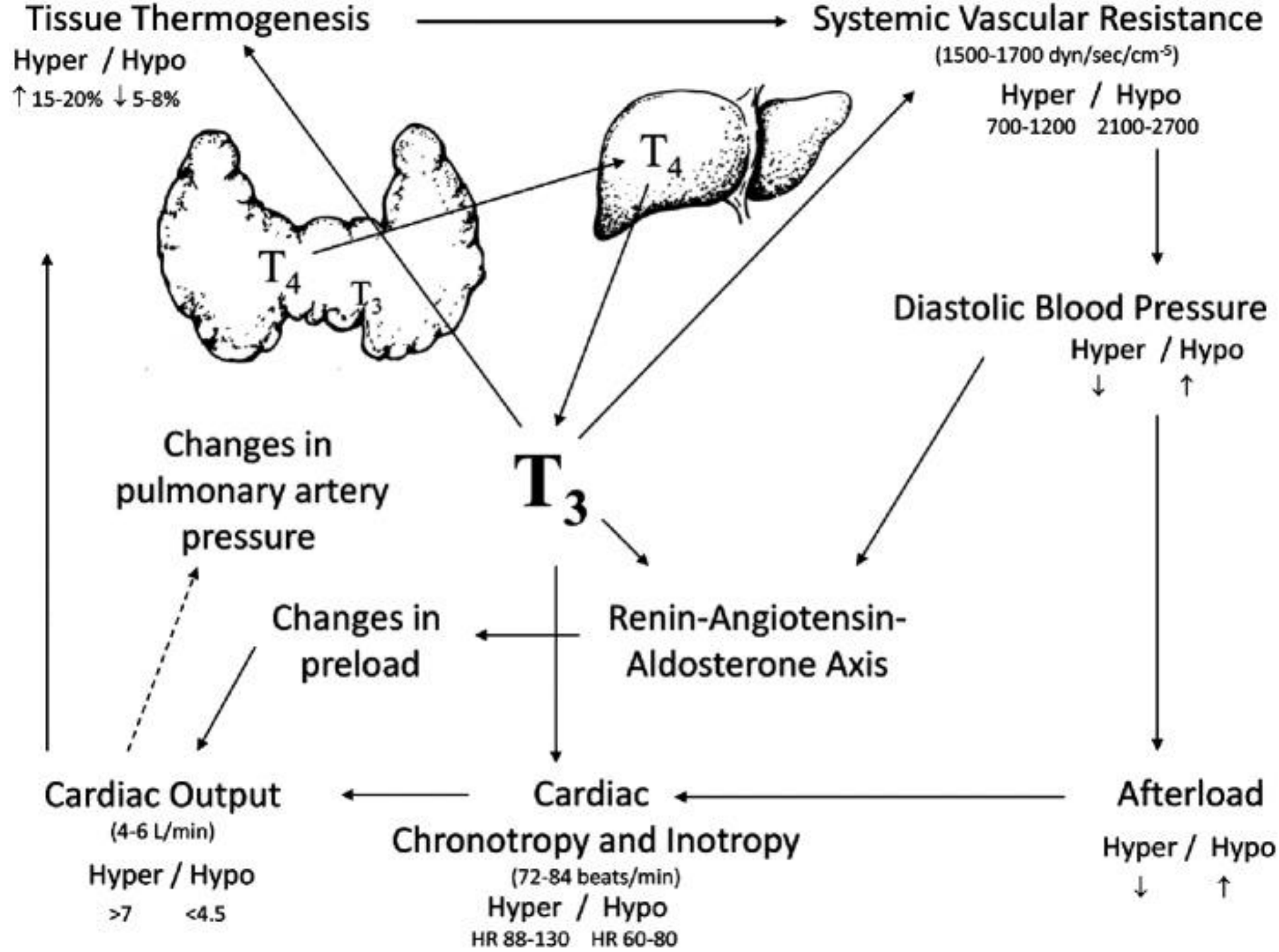


The prevalence of cardiovascular mortality is higher in men than in age-matched premenopausal women. Gender differences are linked to circulating sex-related steroid hormone levels and their cardio-specific actions, which are critical factors involved in the prevalence and features of age-associated cardiovascular disease.

In women, estrogens have been described as cardioprotective agents, while in men, testosterone is the main sex steroid hormone. The effects of testosterone as a metabolic regulator and cardioprotective agent in aging men are poorly understood. With advancing age, testosterone levels gradually decrease in men, an effect associated with increasing fat mass, decrease in lean body mass, dyslipidemia, insulin resistance and adjustment in energy substrate metabolism.

Thyroid Health

- Approximately one-fourth of overtly hypothyroid patients have reversible, predominantly diastolic, hypertension. Indeed, blood pressure and TSH levels have been correlated, even **within the reference range**
- Increases in plasma homocysteine levels have been reported in overt hypothyroidism and, in some studies, with subclinical hypothyroidism
- In some studies, subclinical hypothyroidism has also been associated with other risk factors for ASCVD, including a hypercoagulable state, increased carotid intima-media thickness, decreased flow-mediated vasodilation and nitric oxide availability, and higher high-sensitivity C-reactive proteins levels
(We measure all of these markers in our patients)



Factors that inhibit proper production of thyroid hormones

- Stress
- Infection, trauma, radiation, medications
- Fluoride (antagonist to iodine)
- Toxins: pesticides, mercury, cadmium, lead
- Autoimmune disease: Celiac

Factors that increase conversion of T4 to RT3

- Stress
- Trauma
- Low-calorie diet
- Inflammation (cytokines, etc.)
- Toxins
- Infections
- Liver/kidney dysfunction
- Certain medications

Factors that contribute to proper production of thyroid hormones

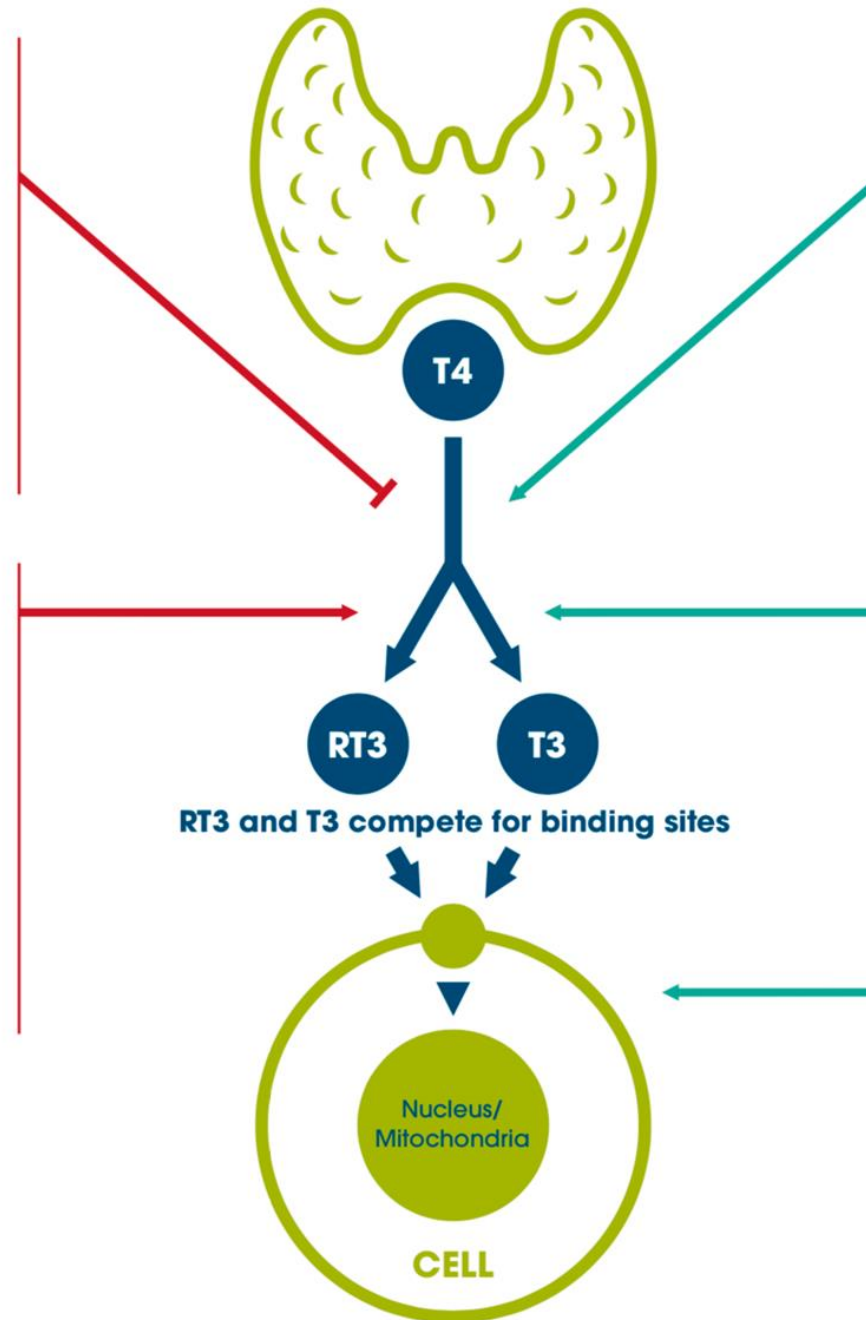
- Nutrients: iron, iodine, tyrosine, zinc, selenium, vitamin E, B2, B3, B6, C, D

Factors that increase conversion of T4 to T3

- Selenium
- Zinc

Factors that improve cellular sensitivity to thyroid hormones

- Vitamin A
- Exercise
- Zinc



New-Onset Heart Failure in the Setting of T4-Conversion Disorder

Providers should be mindful of patients who may have T4-conversion disorder, as low T3 is a strong prognostic predictor of death in patients with heart disease. Further research is warranted in discovering the pathophysiology in which T4-conversion disorders manifest. With this, optimal thyroid hormone therapy may be tailored for these individuals and improve their quality of life. By sharing this case, we aim to aid providers with their differential diagnoses and bring to light a potential area of further investigation.

My Approach:

- Being clinical about finding the appropriate supplements
- Listen to symptoms and matching it with lab levels, not looking at them as independent concerns
- Monitor nutrient levels and editing supplements as appropriate
- Monitor Thyroid Health
- Monitor Hormone Health



Cardiovascular disease is a multifaceted problem which requires a multifaceted and multidisciplinary approach.

"The Sicilian Secret Diet Plan is a must-read for anyone looking to live a happier, healthier, and longer life!"

—Jason Wachob, Founder and Co-CEO, mindbodygreen

THE SICILIAN SECRET DIET PLAN

CENTURIES OF GOOD HEALTH
FROM THE CENTER OF THE MEDITERRANEAN

GIOVANNI CAMPANILE, M.D.

FUNCTIONAL CARDIOLOGIST AND CO-FOUNDER OF CORAEON ANTI-AGING PRACTICE IN NYC.

AND SANDRA CAMMARATA, M.D.

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Friday 1:30pm – 2:30pm

The Heart of Anti-Aging

Please scan this QR code on you mobile
or tablet device to access the session feedback survey



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