



1984

2014

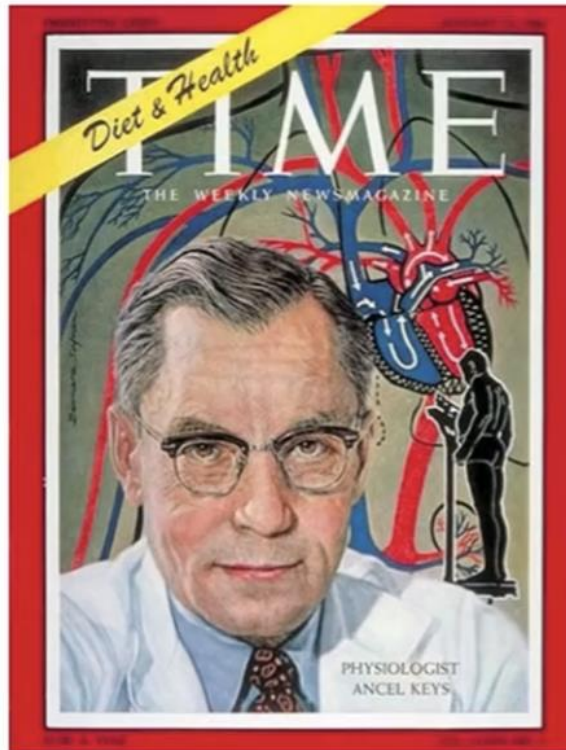
THE MYTH OF CHOLESTEROL AND FAT

Presented by

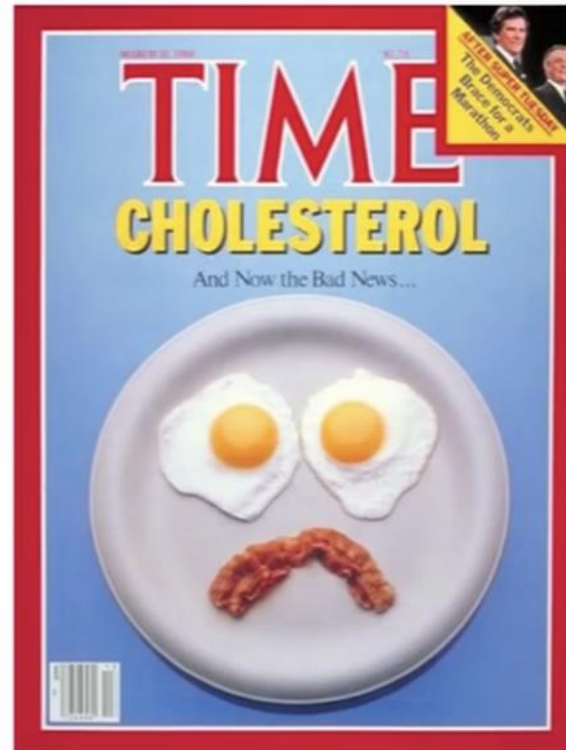
Mindfulness In Biz

September 2019

HISTORICAL DEVELOPMENT



Ansel Keys (1961): saturated fats in the diet clogged arteries and caused heart disease



This 1984 cover article blamed cholesterol from saturated fats as a cause of heart disease

HISTORICAL DEVELOPEMENT

美國參議院營養與人類需要專責委員會(1977)



HISTORICAL DEVELOPMENT

各國政府都建議國民少吃脂肪及多吃穀類食物



美國農業部



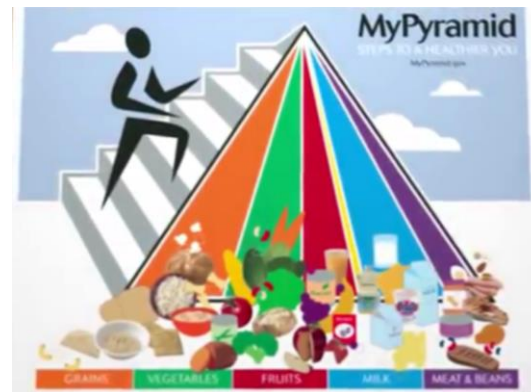
香港食物環境衛生署

HISTORICAL DEVELOPMENT

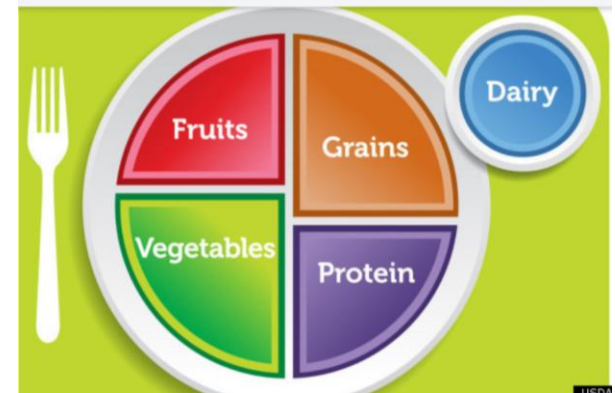
The USDA ditches the Food Pyramid for a Plate



1990s



2005



2012

HISTORICAL DEVELOPMENT

 香港特別行政區政府
衛生署 衛生防護中心

Eng 簡

健康資訊

[主頁](#) > [健康資訊](#) >
[非傳染病及健康生活](#) >
健康飲食金字塔 均衡營養好體格

健康飲食金字塔 均衡營養好體格

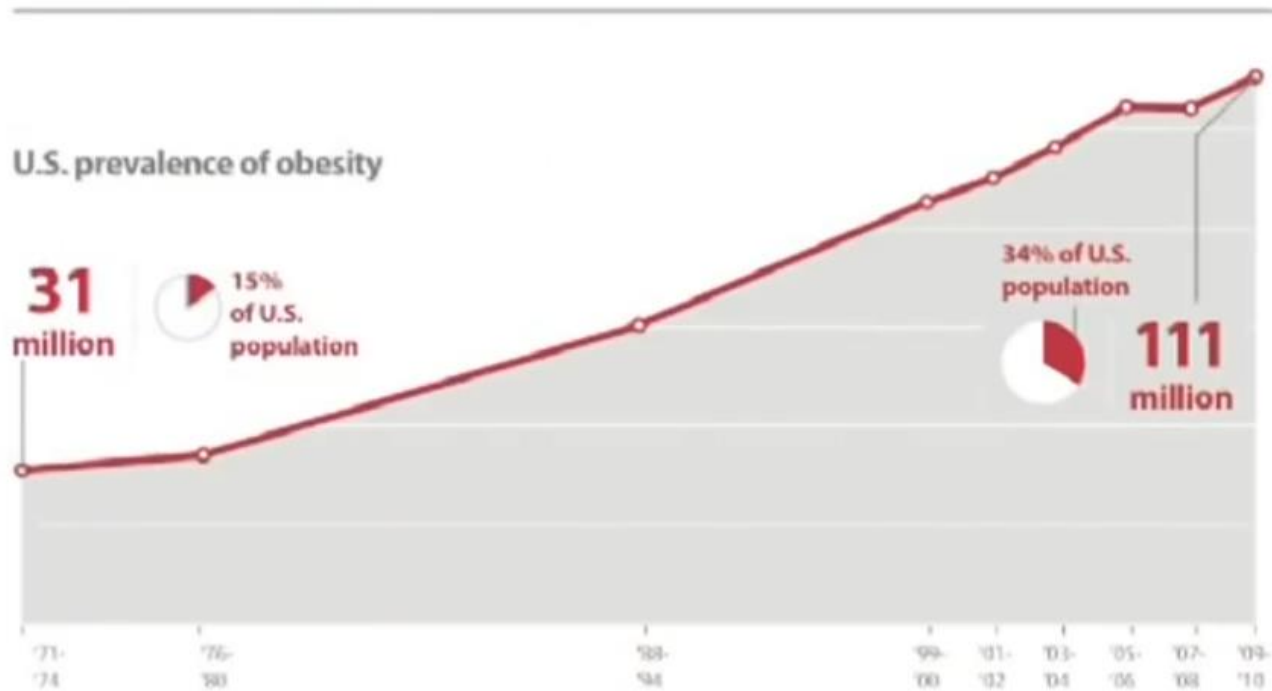
健康飲食金字塔

均衡飲食是維持健康的要素，我們應依照「健康飲食金字塔」的原則飲食，以穀物類為主，並多吃蔬菜及水果，進食適量的肉、魚、蛋和奶類及其替代品，減少鹽、油、糖分；並以去肥剩瘦，多採用低油量的烹調方法如蒸、燉、焗、無、焗、白灼等或用易潔鑊煮食，及減少煎炸，以求達致飲食均衡、促進健康。



HISTORICAL DEVELOPMENT

肥胖患病率增加了一倍以上

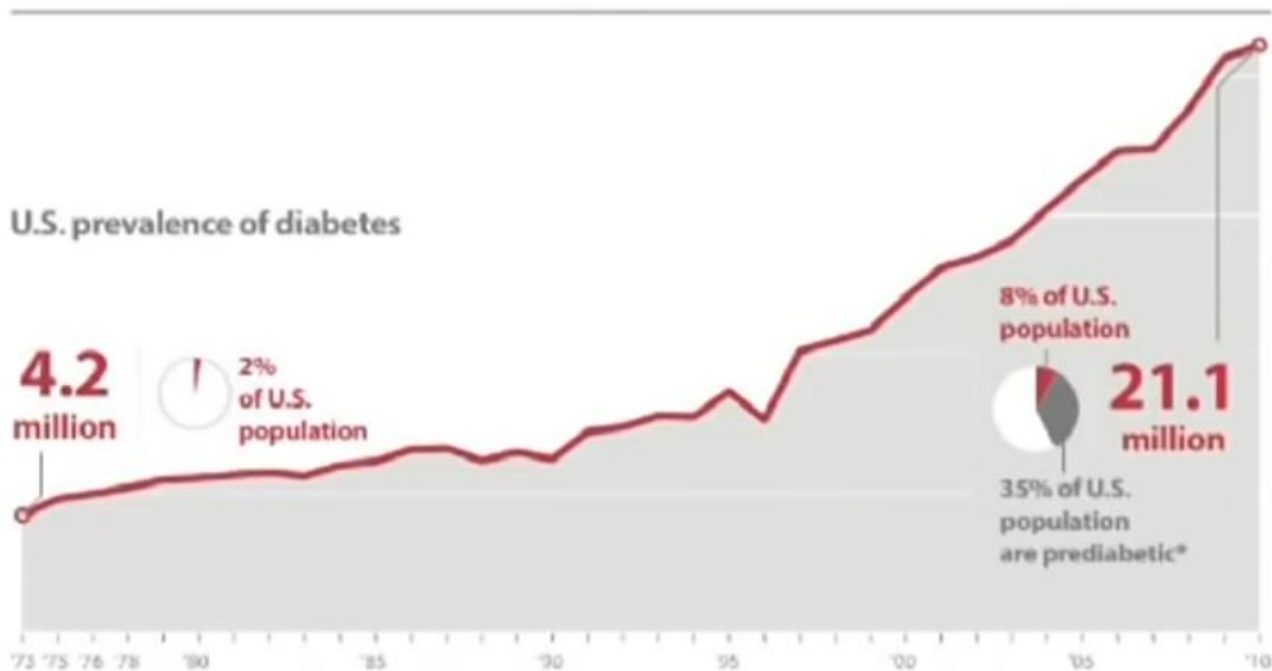


Sources: Prevalence of Overweight, Obesity, and Extreme Obesity Among Adults. Centers for Disease Control, 2011.



HISTORICAL DEVELOPMENT

糖尿病患者率增加了四倍



* Prediabetes indicates abnormal blood sugar, but to a lesser extent than diabetes. It is a precursor to diabetes and indicative of metabolic dysfunction.

Source: Diabetes Data and Trends, Centers for Disease Control, Diabetes Statistics 2011, National Diabetes Information Clearinghouse.

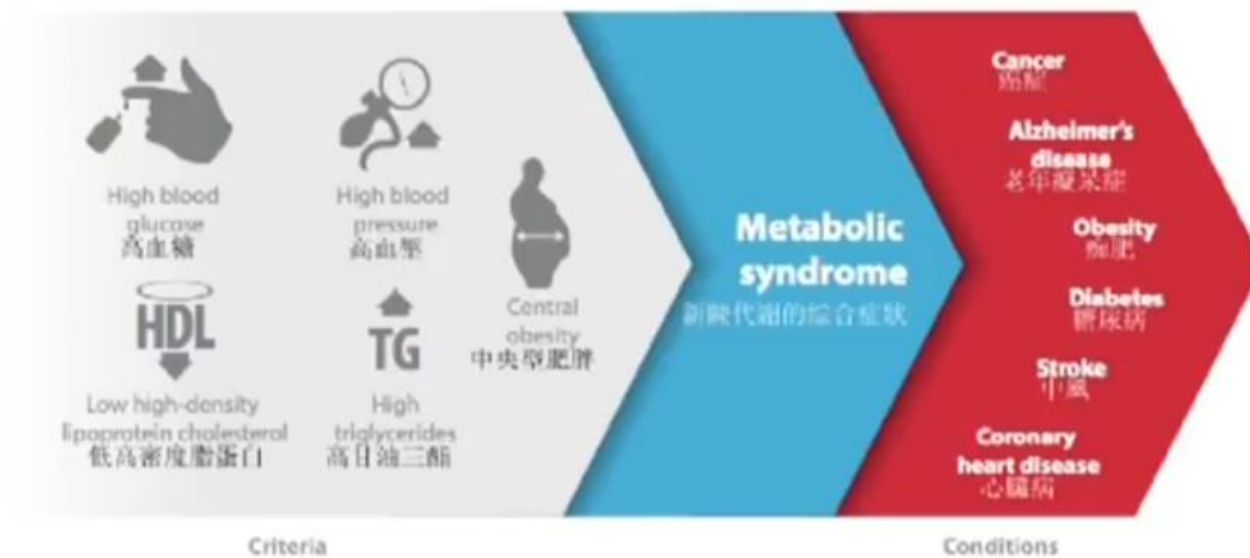


HISTORICAL DEVELOPMENT

新陳代謝的綜合症狀是大部份慢性疾病的病因

Five criteria indicate metabolic dysfunction

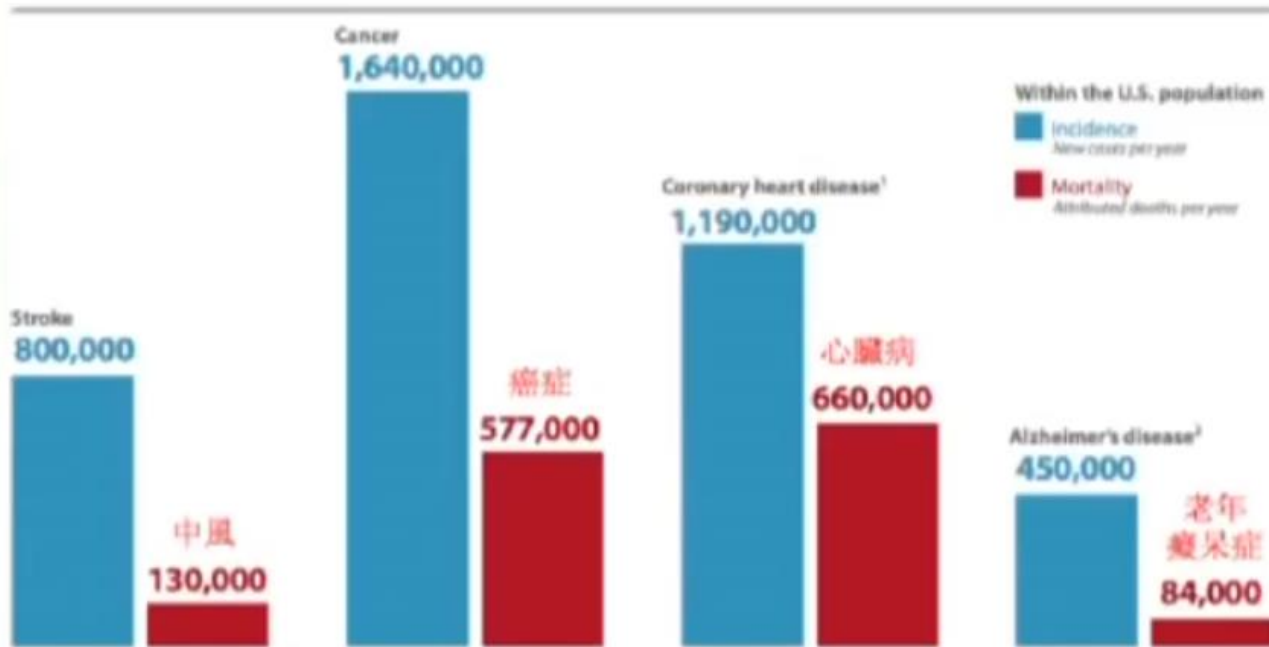
Metabolic syndrome is defined as having any three at the same time



Source: Hotamisligil GS. Inflammation and metabolic disorders. *Nature*, 2006.

HISTORICAL DEVELOPMENT

每年有超過100萬美國人死於與糖尿病和肥胖相關的疾病



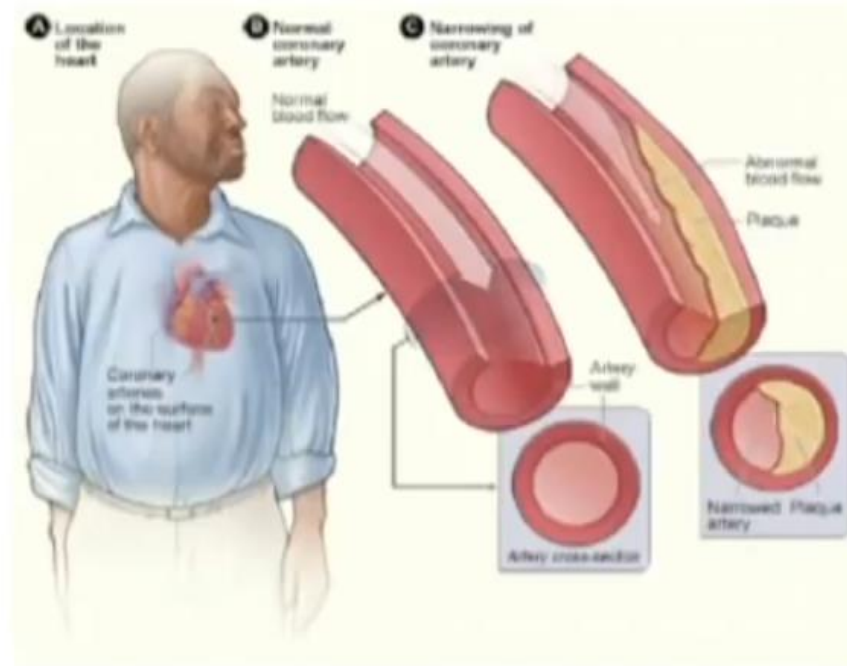
1. Incidence calculated as the total number of fatal and nonfatal myocardial infarctions and heart failures per year.
2. The Alzheimer's Association asserts that the number of deaths caused by Alzheimer's disease each year is significantly greater than current mortality estimates indicate.

Source: Statistical Abstract of the United States 2009, U.S. Census Bureau; Heart Disease Facts, Center for Disease Control; 2013 Alzheimer's Disease Facts and Figures, Alzheimer's Association; Heart Disease and Stroke Statistics 2013, American Heart Association.



HISTORICAL DEVELOPMENT

動脈硬化, 心臟病



National Heart, Lung and Blood Institute, National Institute of Health

HISTORICAL DEVELOPMENT

The higher the level of LDL cholesterol in your blood, the greater your chance is of getting heart disease. The higher the level of HDL cholesterol in your blood, the lower your chance is of getting heart disease.

National Heart, Lung and Blood Institute, National Institute of Health

HISTORICAL DEVELOPMENT

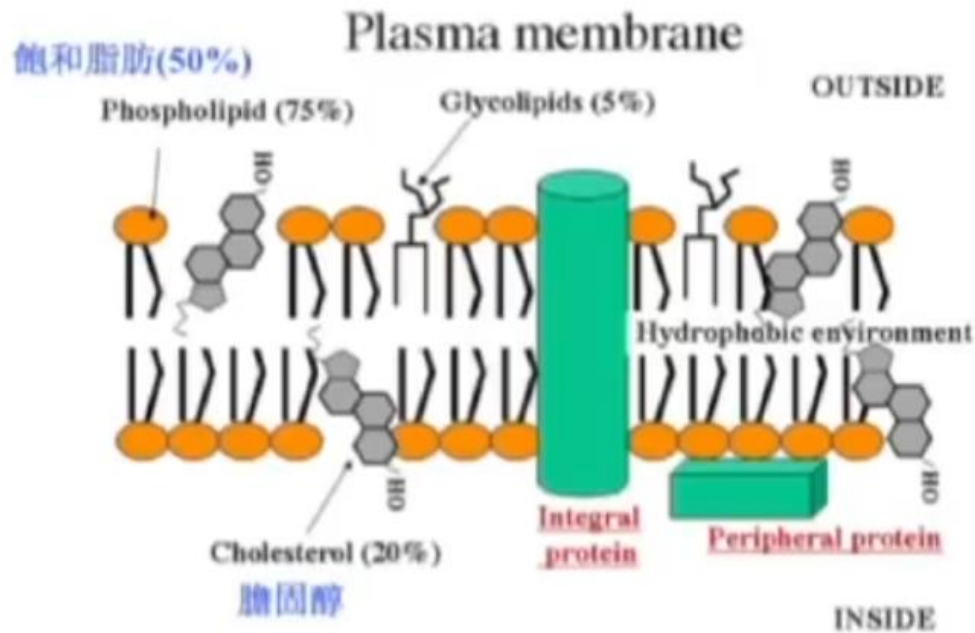
“飽和脂肪導致心臟病”假說的歷史

Diet-heart hypothesis: heart disease was caused by too much fat in the diet (Ancel Keys)

- Nikolai Anitschkow fed rabbits purified cholesterol and noticed “vascular” lesions similar to atherosclerosis in humans (1913)
- Ancel Keys claimed that saturated fat consumption indirectly causes heart disease (Seven Countries Study 1954 -1970), but he also stated in 1952 that the cholesterol content of human diets is unimportant in human atherosclerosis
- “There’s no connection whatsoever between cholesterol in food and cholesterol in blood. And we’ve known that all along. Cholesterol in the diet doesn’t matter at all unless you happen to be a chicken or a rabbit” (Ancel Keys 1997)

CHOLESTEROL

Cholesterol, a waxy, whitish-yellow fat and a crucial building block in cell membranes. It's also used to make vitamin D, hormones (including testosterone and estrogen), and fat-dissolving bile acids.



CHOLESTEROL

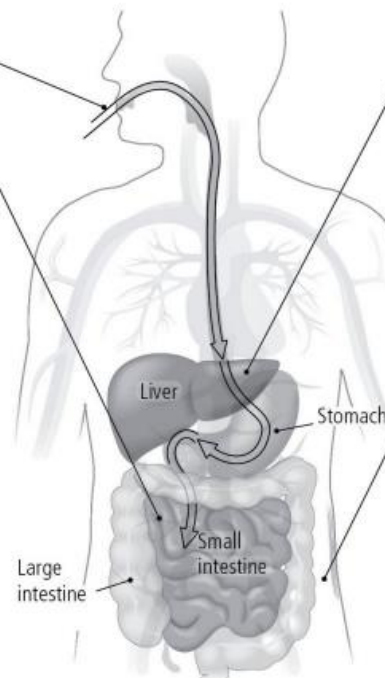
Cholesterol production is so important that our liver and intestines make about 80% of the cholesterol we need to stay healthy. Only about 20% comes from the foods we eat.

Cholesterol's path through the body

Eating. The food you eat contains fats, carbohydrates, and proteins.

Digesting. Your intestine breaks down some of these nutrients. It takes fats and reassembles them into triglyceride molecules, and then adds a small amount of cholesterol and repackages them into chylomicrons. It sends carbohydrates and proteins to the liver for processing.

The particles. Chylomicrons and VLDLs course around the bloodstream, sometimes sticking to blood vessels or fatty tissue, which take their triglycerides into the cells. The resulting particles are known as remnant particles (if from chylomicrons) or IDLs (if from VLDLs). As the IDLs circulate in the bloodstream and undergo further changes, they become LDLs.

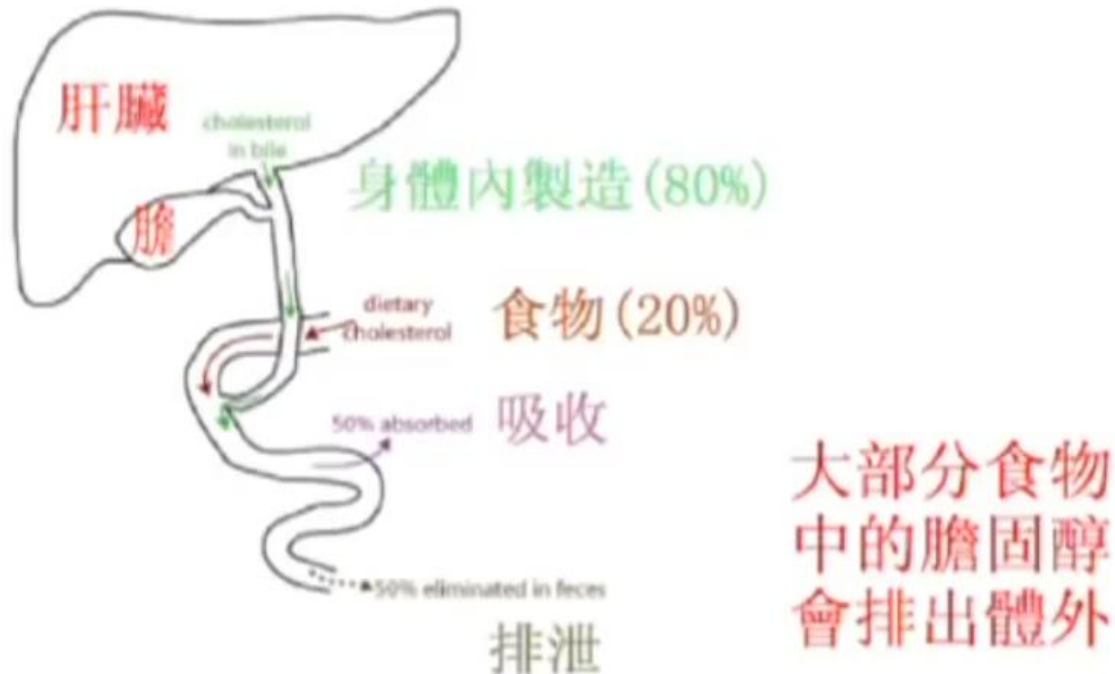


The liver. Here, some carbohydrates and proteins get changed into triglyceride molecules, and then put together with apolipoproteins and cholesterol. This combination results in VLDL particles, which the liver then sends into the bloodstream.

Storing energy. Some of the fats from these particles are not immediately used by cells, but are stored inside cells for later use.

CHOLESTEROL

膽固醇的合成, 吸收和排泄決定血清膽固醇的含量



<http://courses.washington.edu/conj/bess/fats/fats.html>

CHOLESTEROL

Since cholesterol is a fat, it can't travel alone in the bloodstream. It would end up as useless globs. To get around this problem, the body packages cholesterol and other lipids into minuscule protein-covered particles that mix easily with blood. These tiny particles, called lipoproteins (lipid plus protein), move cholesterol and other fats throughout the body.

Cholesterol and other lipids circulate in the bloodstream in several different forms. Of these, the one that gets the most attention is low-density lipoprotein— better known as LDL, or "bad" cholesterol. But lipoproteins come in a range of shapes and sizes, and each type has its own tasks. They also morph from one form into another.

CHOLESTEROL

These are the five main types of cholesterol:

Chylomicrons are very large particles that mainly carry triglycerides (fatty acids from our food). They are made in the digestive system and so are influenced by what we eat.

Very-low-density lipoprotein (VLDL) particles also carry triglycerides to tissues. But they are made by the liver. As the body's cells extract fatty acids from VLDLs, the particles turn into intermediate density lipoproteins, and, with further extraction, into LDL particles.

Intermediate-density lipoprotein (IDL) particles form as VLDLs give up their fatty acids. Some are removed rapidly by the liver, and some are changed into low-density lipoproteins.

Low-density lipoprotein (LDL) particles are even richer in pure cholesterol, since most of the triglycerides they carried are gone. LDL is known as "bad" cholesterol because it [delivers cholesterol to tissues](#) and is strongly associated with the buildup of artery-clogging plaque.

High-density lipoprotein (HDL) particles are called "good" cholesterol because they [remove cholesterol from circulation and from artery walls and return it to the liver for excretion](#).

– By Julie Corliss Executive Editor, Harvard Heart Letter

CHOLESTEROL

膽固醇和飽和脂肪都是對人體健康有益的

- In Framingham (Massachusetts, USA), “the more saturated fat one ate, the more cholesterol one ate, the more calories one ate, **the lower the person's serum cholesterol...**people who ate the most cholesterol, ate the most saturated fat, ate the most calories weighed the least and were **the most physically active**” (William Castelli, *Arch Intern Med* **152**: 1371, 1992)
- Women's Health Initiative Dietary Modification Trial (largest NIH-funded clinical trial): “over a mean of 8.1 years, a dietary intervention that **reduced total fat intake** and increased intakes of vegetables, fruits, and grains **did not significantly reduce the risk of CHD, stroke, or CVD in postmenopausal women**” (Barbara Howard et al., *JAMA* **295**: 655, 2006)

CHOLESTEROL

膽固醇和飽和脂肪都是對人體健康有益的，
特別是在腦功能方面

- “Higher serum levels of total cholesterol were associated with a significantly decreased risk of Parkinson’s disease (帕金森病) with evidence for a dose-effect relation” (Lonneke de Lau et al., *Am J Epidemiology* 164: 998, 2006)
- “Risk of dementia (癡呆症) was elevated in subjects with high carbohydrate consumption, but was reduced in subjects with high fat consumption. A dietary pattern with relatively high caloric intake from carbohydrates and low caloric intake from fat and proteins may increase the risk of mild cognitive impairment or dementia in elderly persons” (Rosebud Roberts et al., *J Alzheimers Dis* 32: 329, 2012)

CHOLESTEROL

問題不在膽固醇, 而是不正常的脂蛋白
(被氧化的脂蛋白 OxLDL = 被氧化的ApoB)

“In all ethnic groups and both sexes, the ApoB/ApoA1 ratio was a better risk marker of myocardial infarction 心肌梗塞 than was the ratio of total cholesterol/HDL cholesterol”.

Lancet 372: 224-233. 2008

ApoA deliver excessive cholesterol from brain to liver

ApoB deliver cholesterol produced by liver to brain

CHOLESTEROL

Myths vs. Facts (The Great Cholesterol Myth (2012))

Myth – High cholesterol is the cause of heart disease.

Fact – Cholesterol is only a minor player in the cascade of inflammation which is a cause of heart disease.

Myth – High cholesterol is a predictor of heart attack.

Fact – There is no correlation between cholesterol and heart attack.

Myth – Statin drugs are safe.

Fact – Statin drugs can be extremely toxic including causing death.

Myth – Statin drugs are useful in men, women and the elderly.

Fact – Statin drugs do the best job in middle-aged men with coronary disease.

CHOLESTEROL

Myths vs. Facts (The Great Cholesterol Myth (2012))

Myth – Saturated fat is dangerous,

Fact – Saturated fats are not dangerous. The killer fats are the trans-fatty acid from partially hydrogenated oils.

Myth – The higher the cholesterol, the shorter the lifespan.

Fact – Higher cholesterol protects you from gastrointestinal disease, pulmonary disease and hemorrhagic stroke

Myth – A high carbohydrate diet protects you from heart disease.

Fact – Simple processed carbs and sugars predispose you to heart disease.

CHOLESTEROL

Myths vs. Facts (The Great Cholesterol Myth (2012))

Myth – Fat is bad for your health.

Fact – Monounsaturated and saturated fats protect you from metabolic syndrome. Sugar is the foe in cardiovascular disease.

Myth – There is good (HDL) cholesterol and bad (LDL) cholesterol.

Fact – This is over-simplistic. We must fractionate LDL and HDL to assess the components.

Myth – Cholesterol causes heart disease.

Fact – Cholesterol is only a theory in heart disease and only the small component of LP or LDL predisposes one to oxidation and inflammation.

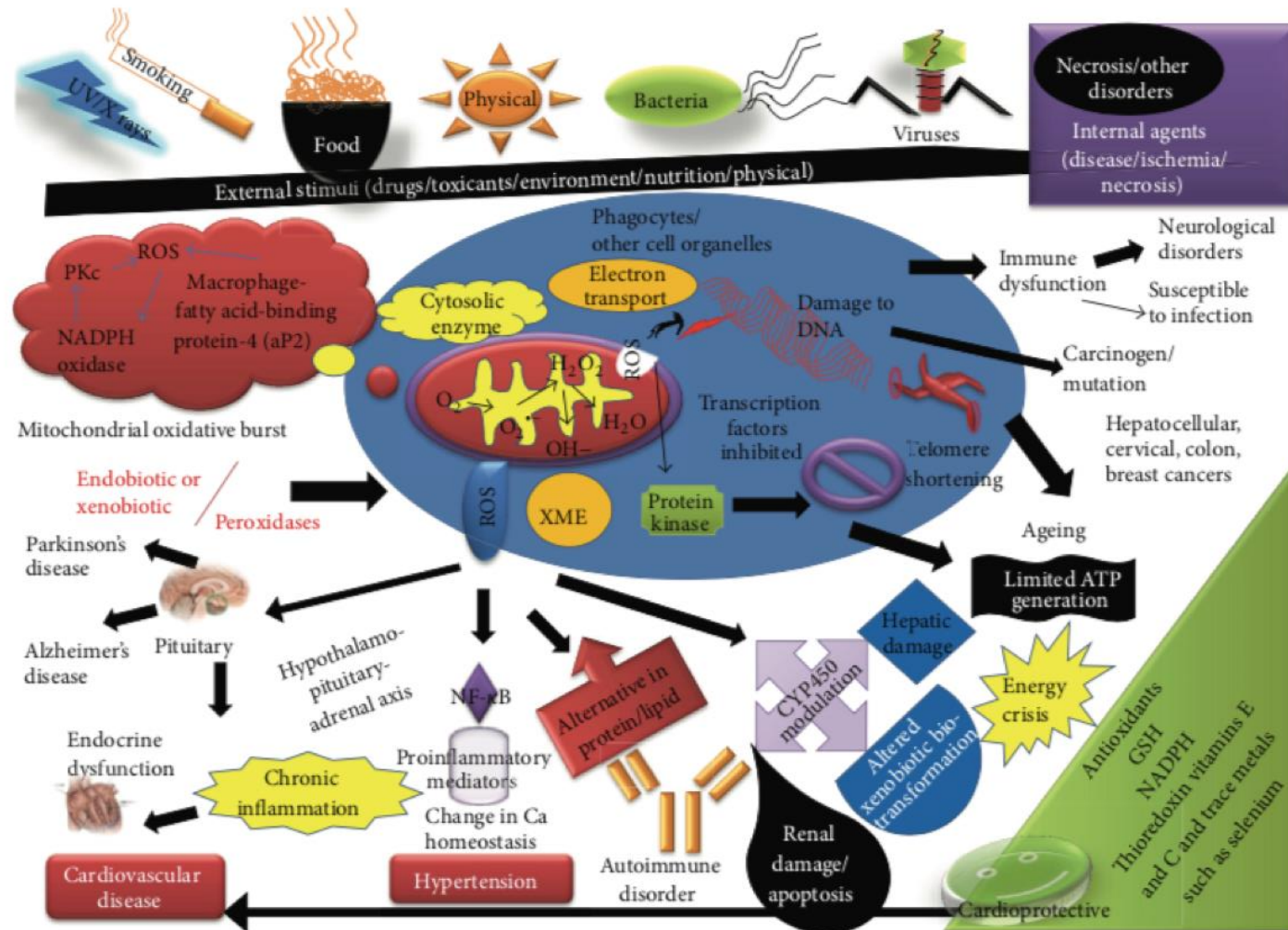
CHOLESTEROL

The real culprits of heart disease, including:

- Inflammation
- Fibrinogen
- Triglycerides
- Homocysteine
- Belly fat
- Triglyceride to HCL ratios
- High glycemic levels

CHOLESTEROL

Oxidative stress and disease development (source: BioMed Research International)



CHOLESTEROL

抗高血脂药statins (他汀類藥物) 減少膽固醇和CoQ10的製造



預防動脈硬化
形成最有效的
的抗氧化成份

細胞膜
類固醇
Vitamin D

Chart by Michelle Weston. The Great Cholesterol Myth (2012) p102

CHOLESTEROL

It's time to question the new guidelines on cholesterol drugs **The Globe and Mail (Nov. 24, 2013)**

“According to new guidelines published by the American Heart Association (美國心臟病協會) and the American College of Cardiology (美國心臟病學院), every Caucasian male over the age of 62, every African-American man over 65, every white female over 70, and every black female over 69 should be taking statin medications. Not to mention a whole bunch of younger people.”

“The new U.S. guidelines would actually result in more than doubling the number of people taking statins (他汀類藥物)—from about 15 per cent adults currently to about one-third.”

CHOLESTEROL

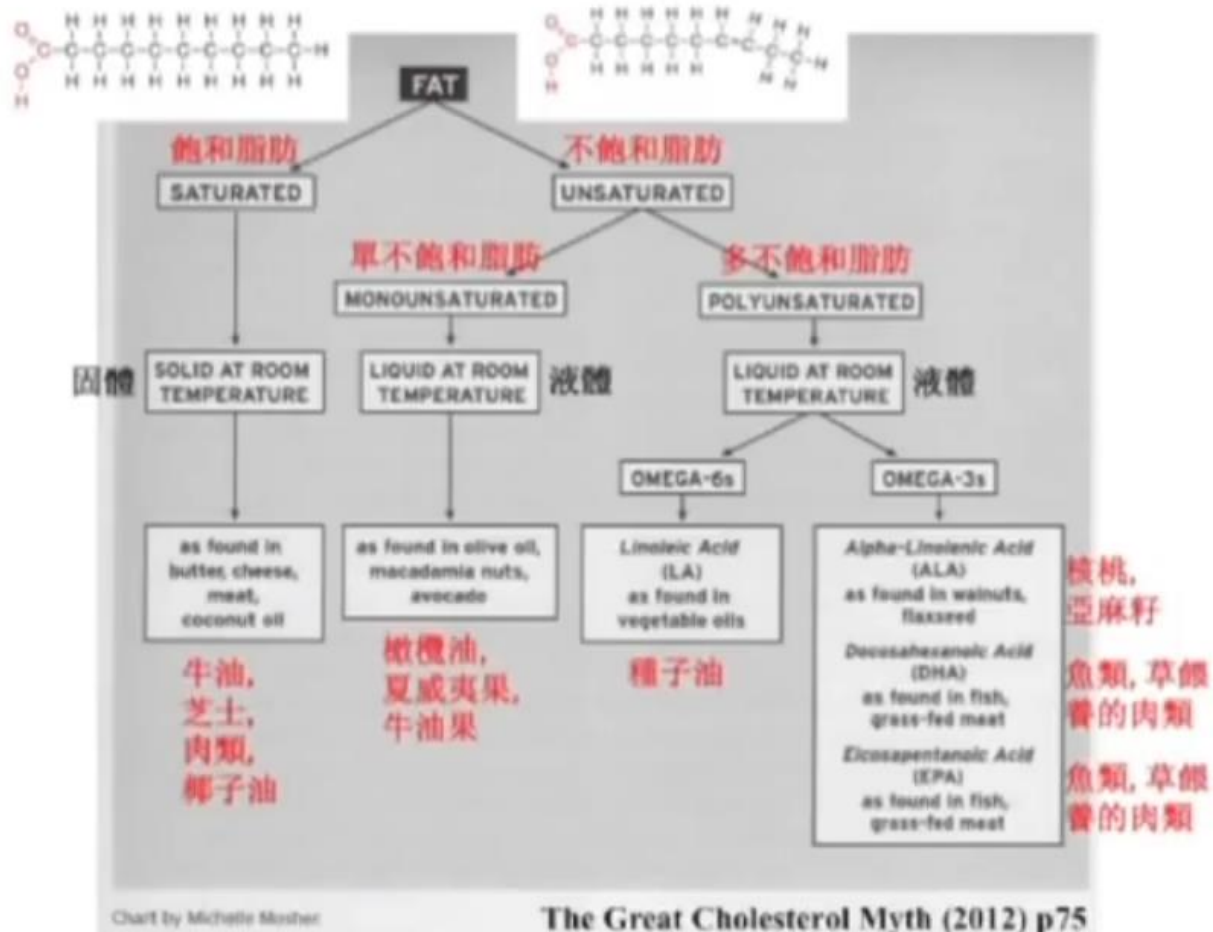
他汀類藥物是否適合您？

“They (他汀類藥物) are not effective in women. And they don't provide much benefit, if any, to healthy people without a history of heart disease – regardless of their cholesterol levels.”

“About 18 per cent of those taking statins suffer significant side effects, which include diabetes (糖尿病), cataracts (白內障), liver damage (肝功能異常) and sexual dysfunction (性功能減退).”

FAT

雞蛋和飽和脂肪都是健康的



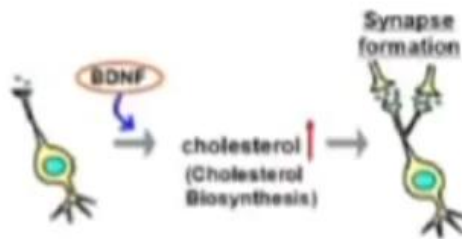
FAT

- Omega-3 和 Omega-6 不飽和脂肪酸都是人體必須的(人體內不能自行合成)
- Omega-3 脂肪酸是抗發炎(anti-inflammatory), 而Omega-6脂肪酸是促炎性的 (pro-inflammatory)
- 最佳Omega-3:Omega-6多不飽和脂肪酸的比值= $\sim 1:1-2$
- 現代人飲食的比值= $\sim 1:15-20$ (高促炎性狀況)

FAT

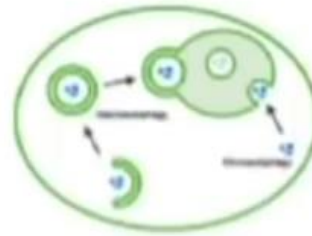
過量多不飽和脂肪酸會影響許多細胞正常功能

Synapse formation



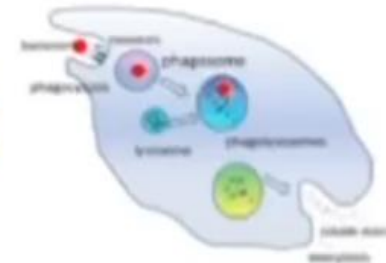
http://www.tmd.ac.jp/mri/mtt/c/fellows_c/2007/fellow01.html

Autophagy



wikimedia.org

Phagocytosis



www.wikipedia.org

FAT

少用/不要用種子油 (excessive Omega-6 will cause body pain/ache, such as 五十肩)



食
牛
油

2014 June 23 cover story: Scientists were wrong about saturated fats. They did not cause heart disease after all.

Fat - Butter, Coconut Oil, Olive Oil, Lard, Poultry Oil

FOOD FOR THOUGHT

Myth and truth:

“For the great enemy of the truth is very often not the lie - deliberate, contrived, and dishonest - but the myth - persistent, persuasive, and unrealistic. Too often we hold fast to the clichés of our forebears. We subject all facts to a prefabricated set of interpretations. **We enjoy the comfort of opinion without the discomfort of thought.”**

John Fitzgerald Kennedy
Yale University Commencement (June 11, 1962)

ATTRIBUTION

許志忠教授

- 多倫多病童醫院發育及幹細胞生物學系主任
- 多倫多大學醫學院分子遺傳學教授
- 香港大學客座生物化學系教授
- 上海生物化學與細胞生物學研究所導師



•2000許教授獲得加拿大國安大略政府頒發的，年 Premier's Research Excellence Award 及加拿大國家癌症研究所頒發的Terry Fox Young Investigator Award。

•四肢和皮膚的胚胎發育，心臟，研究中樞神經系統，許教授的研究利用實驗小鼠為模型心臟疾病和代謝、癌症、研究先天性畸形綜合症，他的研究小組已經建立了許多小鼠模型。並發，他的研究小組最近發現了能量平衡的幾個關鍵調控基因，有關這次講座。謝性疾病。現這些基因的表达水平是影響人類肥胖的重要因素

•許博士發表了超過，迄今為止130他的工作被引用超過，同行評審的研究文章和評論13000。次

REFERENCE

