

Hyperlipidemia
Arteriosclerosis
高血脂及動脈硬化症


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Outline

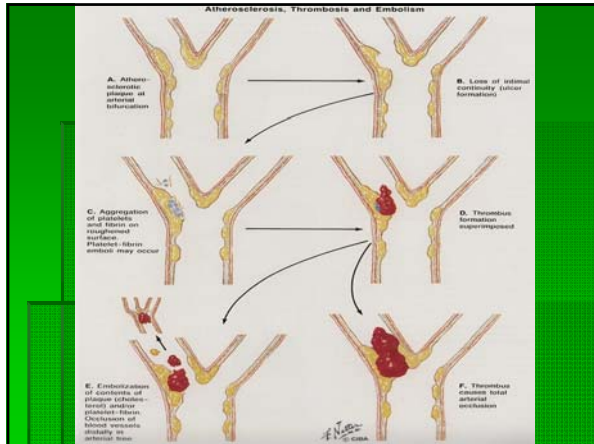
1. Physiological Functions of Lipids
2. Metabolism of the Artery
3. Atherosclerosis & Arteriosclerosis
4. Cholesterol: HDL & LDL
5. Hyperlipidemia & Hypercholesterolemia
6. Risk Factors & Complications
7. Treatment Guideline
8. Acupuncture Treatment
9. Herbal Treatment



Introduction

- **Arteriosclerosis:** Thickening and hardening of the arterial walls.
“動脈硬化”為動脈血管，管壁增厚與變硬的現象。
- **Atherosclerosis:** The major type of arteriosclerosis.
動脈硬化的主要病理形式為“粥狀硬化”。





Atherosclerosis 粥狀硬化

- Closely related to the causation of coronary heart disease, aneurysm, arterial disease of lower extremities, and cerebrovascular disease
 粥狀硬化與冠心病，主動脈瘤，下肢血管病，和腦血管病的發病有很密切的關係。
- The leading cause of death in the United States, around age 65 in both sexes.
 粥狀硬化是美國65歲左右兩性，佔死亡原因的首位。

Lipids 脂肪類 Functions 功能

- Energy: 9 cal/gm
 能源：脂肪每克能產生9卡路里的能量。
- Structure: Phospholipids and cholesterol required for cell membrane
 細胞構造：磷脂和膽固醇為細胞膜的構成要素。

Lipids 脂肪類 Functions 功能

- Vitamins: Fat-soluble vitamin A, D, and K
維他命: 脂溶性維他命A, D, K。
- Protection: Surrounding organs
保護作用: 脂肪包裹並保護器官。
- Insulation: Preventing heat loss, insulating nerves
絕緣作用: 避免熱量耗散; 也包裹神經, 使之相互絕緣。

Lipids 脂肪類 Functions 功能

- Regulation: 調節作用
Estrogen and testosterone: Females & males.
雌情激素和男性激素調節兩性的發育。
Prostaglandin: Inflammation and tissue repair.
前列腺素調理發炎與組織的復原。

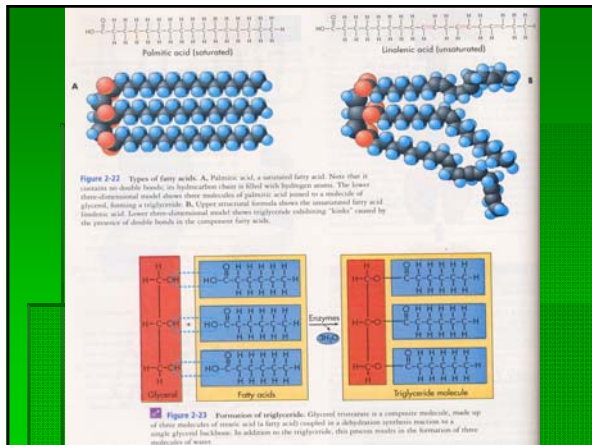
Lipids 脂肪類 Classification 分類

- (1) Triglycerides 三酸甘油
- (2) Phospholipids 磷脂
- (3) Steroids: Cholesterol 類固醇 (膽固醇)

Lipids 脂肪類

(1) Triglycerides 三酸甘油

- Body's most common source of energy.
三酸甘油是人體最主要的能源。
- 1 glycerol + 3 fatty acids.
三酸甘油由一分子甘油和三分子脂肪酸所構成。



Lipids 脂肪類

(2) Phospholipids 磷脂

- Similar to triglycerides in structure.
磷脂構造與三酸甘油相似。
- One fatty acid is replaced by a chemical structure containing phosphorus and nitrogen.
三分子脂肪酸中，有一個脂肪酸被含磷氮的結構所取代。

Lipids 脂肪類

(2) Phospholipids 磷脂

- 2 fatty acids attached to glycerol as the “tail”; Phosphate group attached to the other side as the “head”.

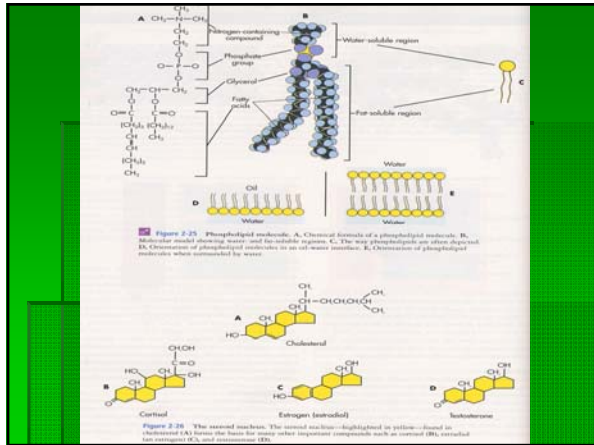
連接到甘油的兩個脂肪酸，形成磷脂的“尾部”，磷氮分子連接到甘油的另一端，形成磷脂的“頭部”。

- “Head” end: Water-soluble (hydrophilic).

磷脂“頭部”為水溶性(親水性)。

- “Tail” end: Fat-soluble (hydrophobic).

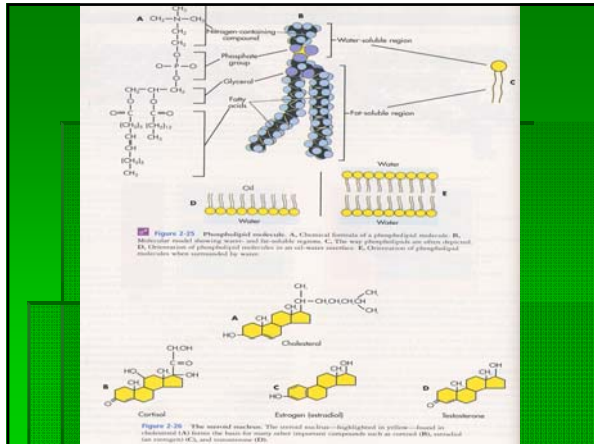
磷脂“尾部”為油溶性(畏水性)。



Lipids 脂肪類

(3) Steroids 類固醇

- Steroid nucleus as the principal component.
類固醇以類固醇核為其主要構成部分。
- Cholesterol: One of the steroids.
膽固醇: 為一類固醇。



Lipids 脂肪類

(3) Cholesterol 膽固醇

- Plasma membrane of all body cells
膽固醇存在於全身所有細胞的細胞膜。
- Constituents of important hormones: estrogen, testosterone, corticosteroids
雌情激素，男性激素，和腎上腺素的構成要素。
- Bile salts needed for digestion
膽固醇也存在於膽汁中，幫助消化。

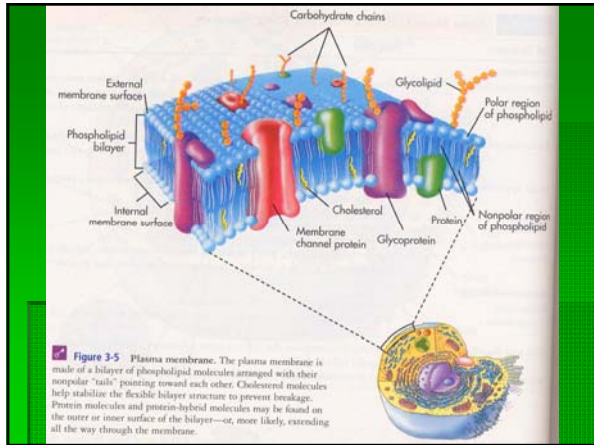
Cell Membrane 細胞膜

- Structure: Double layers of phospholipids molecules.
細胞膜為雙層的磷脂分子所構成。
- Hydrophilic "head" facing the water;
Hydrophobic "tail" facing away from the water.
親水性的磷脂"頭部"面向水液，畏水性的"尾部"背向水液。

Cell Membrane 細胞膜

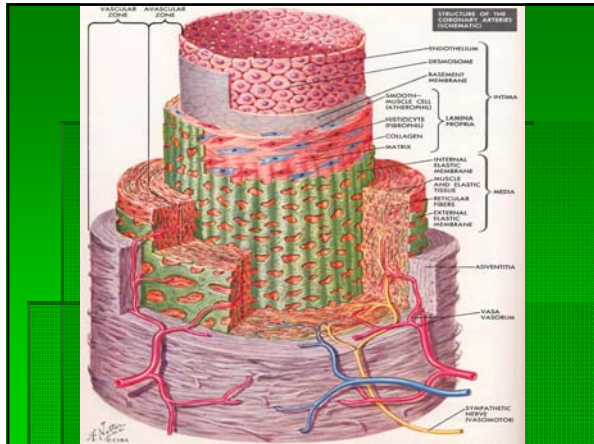
- Cholesterol and phospholipids form blend fats within the membrane, so as to keep the tails tightly joined together. Without cholesterol, cell membrane would break far too easily.

膽固醇和磷脂形成混合性的油脂，使雙層磷脂的尾部永遠相接而不分開。若無膽固醇，細胞膜將很容易破裂。



Normal Artery 正常動脈

- Intima: Single layer of endothelial cells
動脈內層: 由單層內皮細胞所構成。
- Media: Smooth muscle cells
動脈中層: 由平滑肌細胞所構成。
- Adventitia: Vasa vasorum and nerves
動脈外層: 由血管和神經所構成。



Metabolism of the Artery 動脈的新陳代謝

- Arterial wall is a metabolically active “organ”.
動脈管壁是俱有積極代謝作用的“器官”。
- Maintenance of the endothelial cell lining is critical.
維持動脈管壁內皮細胞的完整性具有關鍵性的作用。

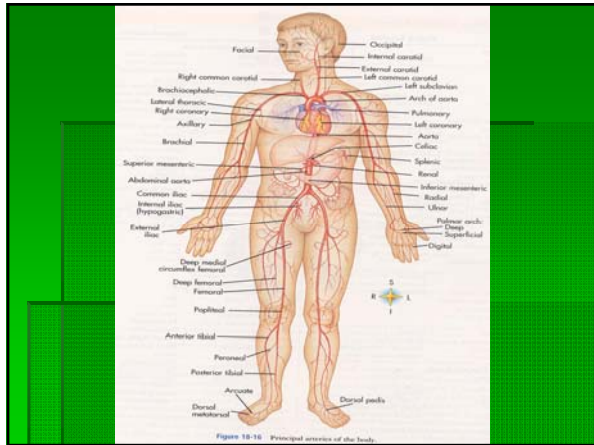
Metabolism of the Artery 動脈的新陳代謝

- Intact endothelial cells elaborate Prostacycline (PGI₂) to inhibit platelet function and then to prevent clotting, thereby enhancing unimpeded flow of blood.
完整無缺的內皮細胞會分泌一種前列腺素PGI₂，以阻止血小板凝結，從而避免血液凝固，使動脈的血流暢通無阻。

Metabolism of the Artery 動脈的新陳代謝

- Endothelial cells turnover at a slow rate.
內皮細胞的更新一般都很緩慢。
- Endothelial cell turnover may be accelerated by changing pattern of blood flow. Shear or friction stresses are especially prominent near the entrance regions of branches.

但血液流速的變動，會使局部管壁內皮細胞的更新加速。在動脈分叉處，由於血流變動所造成的局部撕裂或磨擦壓力特別明顯。



Metabolism of the Artery 動脈的新陳代謝

- When the endothelial lining is damaged, platelets adhere to it, as the result of thromboxane (a different class of prostaglandin) and form a clot. Meanwhile, the damaged endothelial lining is also undergoing tissue replenishment.

當內皮細胞受損時，血小板會分泌 Thromboxane (另一種前列腺素)，促使血小板黏結在動脈管壁，形成血凝塊。受損的動脈管壁內皮細胞也同時進修補工作。

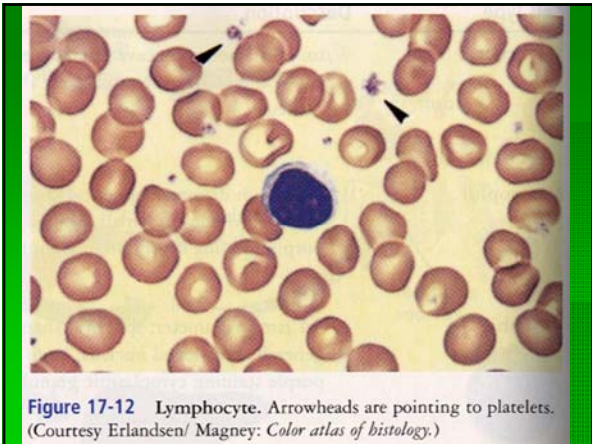
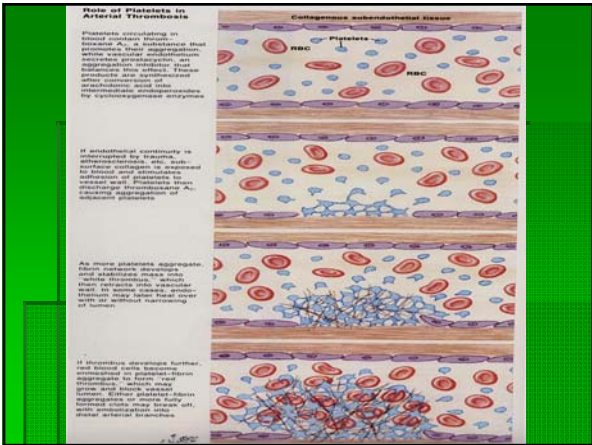


Figure 17-12 Lymphocyte. Arrowheads are pointing to platelets. (Courtesy Erlandsen/ Magney: *Color atlas of histology*.)



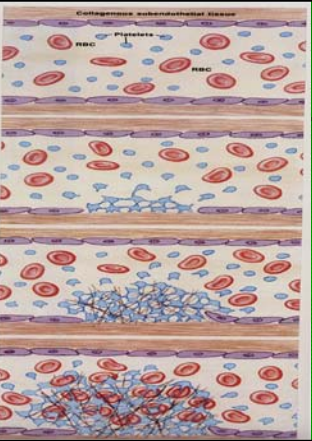
Role of Platelets in Arterial Thrombosis

Platelets circulating in blood plasma form a primary hemostatic plug in response to vascular endothelial injury. This plug is stabilized by the release of platelet-derived substances, including ADP, epinephrine, and thromboxane. These substances stimulate the release of additional platelets from the vessel wall.

If endothelial continuity is interrupted by trauma, as in a laceration, the release of collagen is enhanced. This collagen is exposed to blood and stimulates the release of platelets from the vessel wall. Platelets then aggregate to form a primary hemostatic plug.

As more platelets aggregate, their surface receptors, which carry calcium ions, activate. Calcium ions activate thrombin, which may cause platelets to release additional substances.

If thrombin develops further, and more platelets aggregate, secondary hemostasis is enhanced. Thrombin causes the release of fibrinogen, which binds to fibrin fibers. This causes the primary hemostatic plug to be organized into a secondary hemostatic plug. The secondary hemostatic plug is stabilized by the release of fibrinogen, which binds to fibrin fibers.



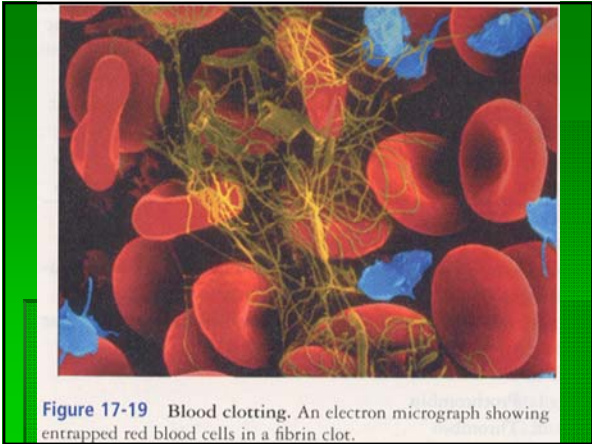
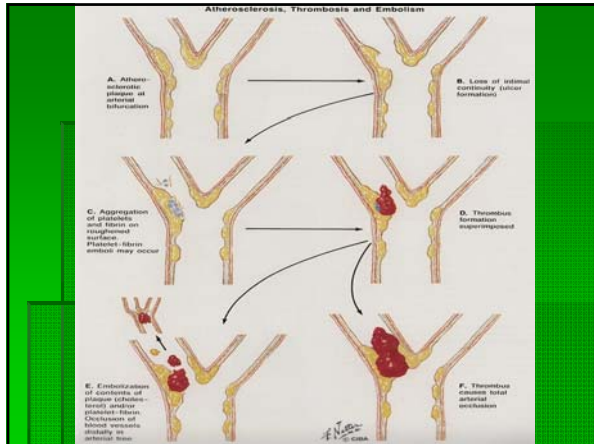


Figure 17-19 Blood clotting. An electron micrograph showing entrapped red blood cells in a fibrin clot.



Metabolism of the Artery 動脈的新陳代謝

- Endothelial cells can synthesize fatty acids, cholesterol, and phospholipids from endogenous substances to satisfy structural needs, i.e. membrane replenishment.

動脈壁的內皮細胞能利用本身自有的物質來合成脂肪酸，膽固醇，和磷脂，以滿足細胞結構的需要，亦即細胞膜的修補功能。

Metabolism of the Artery 動脈的新陳代謝

- Smooth-muscle cells prefer to utilize lipids from plasma lipoproteins transported into the wall, potentially causing cholesterol accumulation.


但是動脈管壁的平滑肌細胞卻偏好取用血漿的脂蛋白，來滿足細胞膜結構上的需要，因而很可能引起膽固醇的存積。

Metabolism of the Artery
動脈的新陳代謝

- Critical determinants in arteriosclerotic process:
 1. Maintain the integrity of its endothelium.
 2. Prevent platelet aggregation.

造成動脈硬化的關鍵性決定因素:

1. 維持內皮細胞的完整無損。
2. 避免血小板的凝集。




Metabolism of the Artery
動脈的新陳代謝

- Critical determinants of arteriosclerotic process:
 3. Prevent smooth-muscle cell proliferation.
 4. Prevent cholesterol accumulation.

造成動脈硬化的關鍵性決定因素:


3. 避免平滑肌細胞的增生。
4. 避免膽固醇的存積。



Arterial Changes with Aging
動脈的老化現象

- The major change with normal aging in the arterial wall is a slow, continuous, and symmetrical increase in the thickness of the intima.

動脈壁隨年齡增長所引起的正常老化現象，主要是在動脈內層呈緩慢但持續性的均勻增厚。



Arterial Changes with Aging

動脈的老化現象

- In the non-diseased artery wall, the lipid content, mainly cholesterol and phospholipids, progressively increases with age.

在沒有病變的動脈壁上，膽固醇和磷脂等主要脂肪類的含量，也隨著年齡的增長而不斷的增加。



Arterial Changes with Aging

動脈的老化現象

- In the normal artery wall, most of the phospholipids appears to be derived from endogenous synthesis, while the cholesterol that accumulates with aging appears to be derived from plasma.

在正常的動脈壁上，大部分的磷脂有細胞本身合成；但隨年齡增長而不斷的存積的膽固醇，則取自血液。



Arterial Changes with Aging

動脈的老化現象

Cholesterol levels: 膽固醇

- At birth (出生時): 60 mg/dl
- 1 month of age (滿月時): 120 mg/dl
- 1 year of age (週歲時): 175 mg/dl
- Increase mainly in low density lipoprotein (LDL)

增加的膽固醇主要為低密度膽固醇。



Arterial Changes with Aging 動脈的老化現象

Cholesterol levels: 膽固醇

- Between 2nd and 6th decade, the normal intima accumulates approximately 10 mg cholesterol per gram of intimal tissue.

20歲至60歲之間，在正常的動脈內層，每克內層組織大約存積10毫克的膽固醇。



Arterial Changes with Aging 動脈的老化現象

- As the normal artery ages, smooth-muscle cells accumulate cholesterol diffusely in the arterial wall, leading to progressive thickening. These changes with aging result in gradually increasing rigid of arteries.

當正常的動脈隨年齡而老化時，平滑肌細胞會在細胞內層廣泛的存積膽固醇，導致管壁不斷的增厚。這些隨年齡老化引起的變化，會使動脈逐漸變得僵硬。



Arterial Changes with Aging 動脈的老化現象

- Aneurysms may form in areas with degenerative arteriosclerotic lesion due to "wear-and-tear" changes of the arteries.

由於“舊損開裂”的變化，會使動脈在變硬退化的區域，產生動脈瘤。



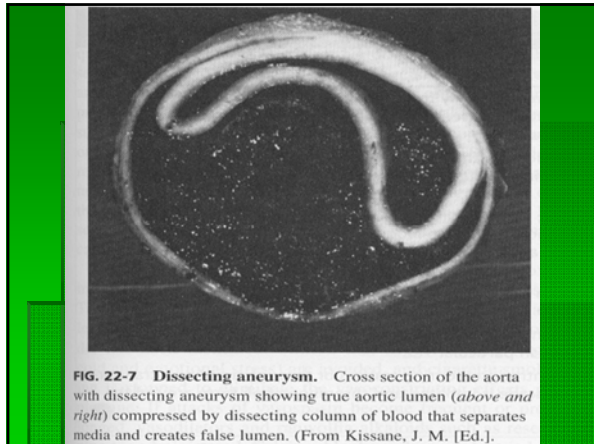


FIG. 22-7 Dissecting aneurysm. Cross section of the aorta with dissecting aneurysm showing true aortic lumen (*above and right*) compressed by dissecting column of blood that separates media and creates false lumen. (From Kissane, J. M. [Ed.].)

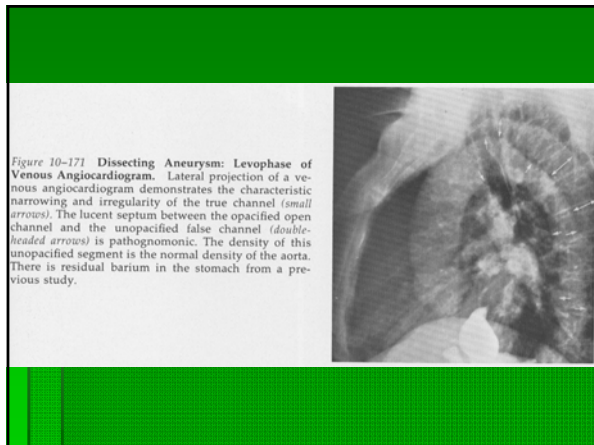


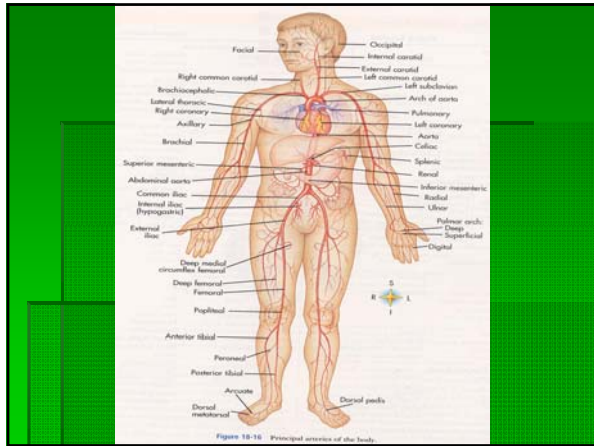
Figure 10-171 Dissecting Aneurysm: Levophase of Venous Angiocardiogram. Lateral projection of a venous angiocardiogram demonstrates the characteristic narrowing and irregularity of the true channel (*small arrows*). The lucent septum between the opacified open channel and the unopacified false channel (*double-headed arrows*) is pathognomonic. The density of this unopacified segment is the normal density of the aorta. There is residual barium in the stomach from a previous study.

Atherosclerosis

Localization 病變部位

Sites of predilection: 好發部位

- Abdominal aorta 腹部大動脈
- Coronary arteries 冠狀動脈
- Aortic arch 大動脈弓
- Bifurcation into iliac arteries 腸動脈分叉處
- Carotid arteries 頸動脈
- Basilar arteries 基底動脈
- Vertebral arteries 脊椎動脈
- Femoral arteries 股動脈



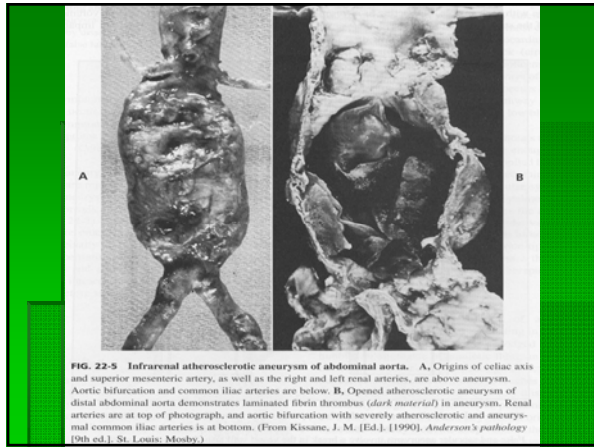


FIG. 22-5 Infrarenal atherosclerotic aneurysm of abdominal aorta. A, Origins of celiac axis and superior mesenteric artery, as well as the right and left renal arteries, are above aneurysm. Aortic bifurcation and common iliac arteries are below. B, Opened atherosclerotic aneurysm of distal abdominal aorta demonstrates laminated fibrin thrombus (*dark material*) in aneurysm. Renal arteries are at top of photograph, and aortic bifurcation with severely atherosclerotic and aneurysmal common iliac arteries is at bottom. (From Kissane, J. M. [Ed.], [1990]. *Anderson's pathology* [9th ed.]. St. Louis: Mosby.)

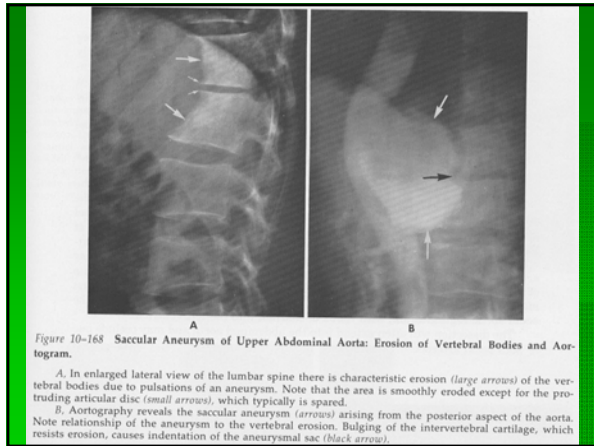
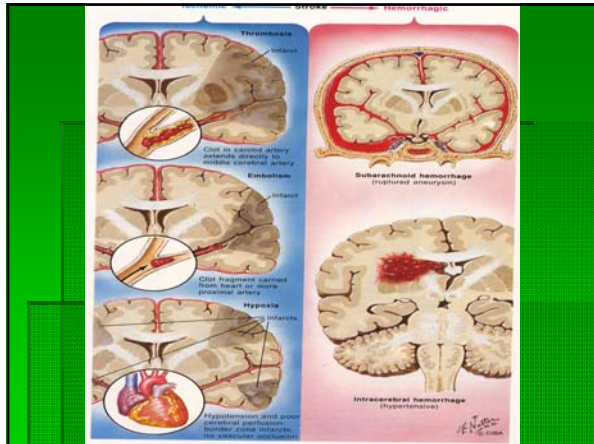
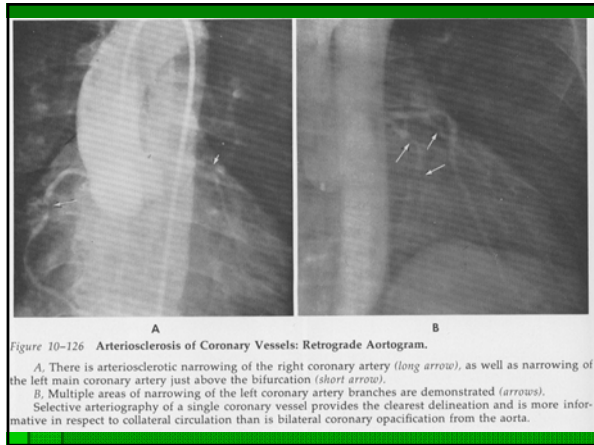


Figure 10-168 Saccular Aneurysm of Upper Abdominal Aorta: Erosion of Vertebral Bodies and Aortogram.
 A. In enlarged lateral view of the lumbar spine there is characteristic erosion (*large arrows*) of the vertebral bodies due to pulsations of an aneurysm. Note that the area is smoothly eroded except for the protruding articular disc (*small arrows*), which typically is spared.
 B. Aortography reveals the saccular aneurysm (*arrows*) arising from the posterior aspect of the aorta. Note relationship of the aneurysm to the vertebral erosion. Bulging of the intervertebral cartilage, which resists erosion, causes indentation of the aneurysmal sac (*black arrow*).





Atherosclerosis Incidence 發病率

- 5 million in US: Ischemic heart disease (IHD) or coronary heart disease (CHD).
大約有五百萬的美國人患有冠狀動脈缺氧性心臟病(冠心病)。
- IHD: Leading cause of deaths in males >35 yrs and all persons >45 yrs.
冠心病是35歲以上的男人，或45歲以上的所有人的死亡首因。
- IHD: Cause of premature deaths in US males
冠心病是全美男性早死的主因。

Atherosclerosis Incidence 發病率

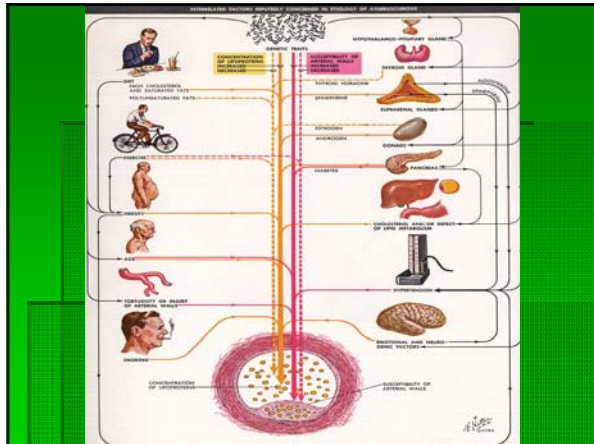
- Areas with lowest death rate of IHD:
冠心病死亡率最低的兩個國家是
 1. Latin America 拉丁美洲
 2. Japan 日本

Atherosclerosis Risk Factors 高危因素

- Male gender 男性。
- Family history of premature IHD (before age 55 in a parent or sibling)
有冠心病早死的家族史(父母或兄弟在55歲前去世)。
- Hyperlipidemia 高血脂。
- Cigarette smoking (>10 cigarettes/day)
吸菸(每天吸十根香菸以上者)。

Atherosclerosis Risk Factors 高危因素

- Hypertension 高血壓。
- Low HDL cholesterol (<35 mg/dl)
高密度(好)膽固醇過低(低於35mg/dl)。
- High LDL cholesterol (>130 mg/dl)
低密度(壞)膽固醇過高(高於130mg/dl)。
- Diabetes mellitus 糖尿病。
- Abdominal obesity 腹部肥胖。
- Family history of cerebrovascular disease
有腦血管病的家族史。



Atherosclerosis Risk Factors 高危因素

- Irreversible risk factors: 不可逆高危因素
 1. Age 年齡
 2. Gender 性別
 3. Genetic factor 基因遺傳
- Potent risk factors in US: 在美國最大的高危因素
 1. Hypercholesterolemia 高膽固醇
 2. Hypertension 高血壓
 3. Cigarette smoking 吸菸


Hyperlipidemia 高血脂

- Hypercholesterolemia and hypertriglyceridemia are most important risk factors in atherosclerosis.
血中膽固醇過高和三酸甘油過高，為引發粥狀硬化最重要的高危因素。
- The increases in cholesterol are mainly in low-density lipoprotein (LDL).
血中膽固醇的增加以低密度脂蛋白(壞膽固醇)為主。

Hypercholesterolemia
血中膽固醇過高

- Hypercholesterolemia is associated unequivocally with increase incidence of premature IHD. Cholesterol levels in men below age 40 are closely related to the future development of IHD.


血中膽固醇過高與冠心病發病率的增加有很明顯的關係。40歲以下男人的膽固醇，其血中濃度的高低，與未來是否發生冠心病，有很密切的關係。



Hypercholesterolemia
血中膽固醇過高

- Men with cholesterol levels above 240 mg/dl have more than threefold increase in risk of IHD death compared to men with cholesterol levels below 200 mg/dl.


血中膽固醇濃度高過240mg/dl的男人，比膽固醇濃度低於200mg/dl的男人，其冠心病死亡率高出三倍之多。



Low-density Lipoprotein (LDL)
低密度脂蛋白

- LDL delivers cholesterol to cells for use in synthesizing steroids and stabilizing the plasma membrane. Most cells have LDL receptors embedded in the plasma membrane. These receptors attract cholesterol-bearing LDL (LDL-Cholesterol).

LDL輸送膽固醇到細胞內，以便合成類固醇和鞏固細胞膜。大多數細胞的細胞膜都具有LDL的接受器，這些接受器會吸引載有膽固醇的LDL(簡稱低密度膽固醇)。



LDL-Cholesterol 低密度膽固醇

- Once the LDL molecule binds to the receptor, cholesterol is released into the cell. Excess cholesterol is stored near the center of the cell.

一旦LDL分子與接受器相結合，膽固醇就被釋放出來，進入細胞內。過剩的膽固醇就儲存在細胞的中心處。

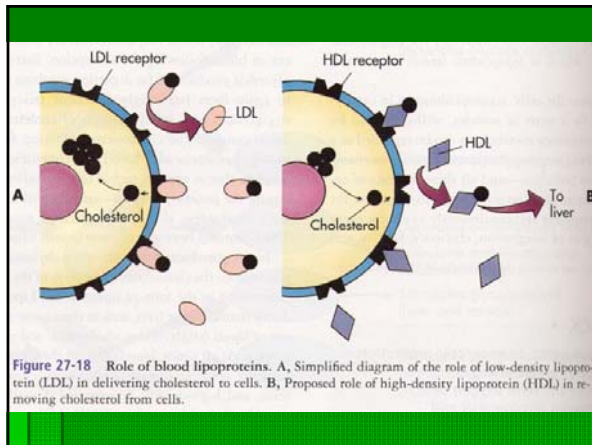


Figure 27-18 Role of blood lipoproteins. A, Simplified diagram of the role of low-density lipoprotein (LDL) in delivering cholesterol to cells. B, Proposed role of high-density lipoprotein (HDL) in removing cholesterol from cells.

LDL-Cholesterol 低密度膽固醇

- It seems that cells have so few LDL receptors that they accumulate too much cholesterol in the blood. The endothelial cells may move this excess LDL into the arterial wall.

細胞似乎沒有足夠的LDL接受器，致使血中存積過多的膽固醇。動脈內皮細胞會將血液中過多的膽固醇移入動脈壁。

HDL-Cholesterol 高密度膽固醇

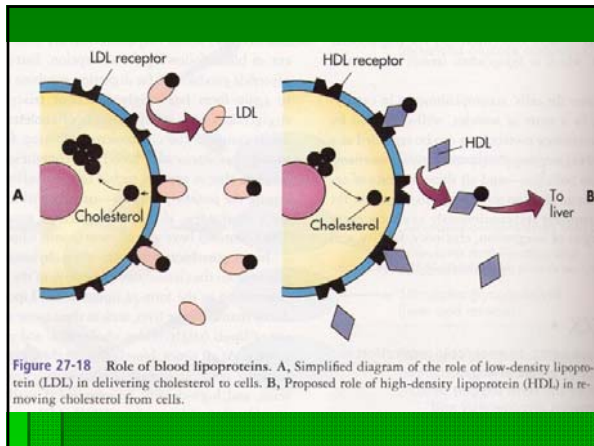
- Cholesterol-bearing high-density lipoprotein (HDL-Cholesterol).
- 載有膽固醇的高密度脂蛋白，簡稱為高密度膽固醇。
- 20% of total cholesterol.
- 高密度膽固醇佔總膽固醇的20%。

HDL-Cholesterol 高密度膽固醇

- HDL is inversely associated with the development of atherosclerosis and is considered as the “anti-risk factor”. Individuals with higher HDL cholesterol are less likely to develop IHD.
- HDL與粥狀硬化的發病呈反作用的關係，被視為“抗危因素”。高密度膽固醇較高者，較少發生冠心病。

HDL-Cholesterol 高密度膽固醇

- HDL molecules are attached to HDL receptors at the plasma membrane. Once they bind to the receptors, the cell is stimulated to release some of its cholesterol from storage.
- HDL分子會附著在細胞膜的HDL接受器上。一旦HDL分子與接受器相結合，細胞就受到刺激而將一部分儲存在細胞內的膽固醇從細胞中心處釋放出來。



HDL-Cholesterol 高密度膽固醇

- The released cholesterol migrates to the plasma membrane where it may attach to the HDL molecules and be whisked away to the liver for excretion in the bile.

被釋放出來的膽固醇移到細胞膜，附在HDL分子上，然後被挾帶到肝臟，從膽汁排出。



HDL-Cholesterol 高密度膽固醇

- Individuals whose HDL cholesterol is elevated are less likely to develop IHD; Conversely, low HDL cholesterol is associated with increased risk of IHD.

高密度膽固醇較高者，較少發生冠心病；反之，高密度膽固醇過低，則會增加冠心病發病的危險性。



HDL-Cholesterol 高密度膽固醇

- In the Framingham study, low HDL cholesterol was a more potent risk factor of IHD than was high total cholesterol or LDL cholesterol.

據Framingham研究報告，與總膽固醇過高或低密度(LDL)膽固醇相比，高密度(HDL)膽固醇過低反而是較強的高危因素。

HDL-Cholesterol 高密度膽固醇

- HDL cholesterol averages about 35% higher in women than in men. Estrogen tends to raise and androgen tends to lower HDL levels.

♀的高密度膽固醇平均比男性高出35%。雌性激素會升高HDL，而雄性激素則會降低HDL。

HDL-Cholesterol 高密度膽固醇

- Octogenarians tend to have high HDL.
八十歲以上的人會有較高的HDL。
- Cigarette smoking decreases HDL.
抽菸會降低HDL。
- Regular strenuous exercise increases HDL.

常規性的用力運動有助於增高HDL。

HDL-Cholesterol 高密度膽固醇

- A small daily intake of alcohol has been associated with both reduced risk of IHD and high HDL levels.

每天少量飲酒可減低罹患冠心病的危險性，並能增高HDL的量。

Hypertension 高血壓

- High blood pressure is an important risk factor for atherosclerosis, mainly IHD and cerebrovascular disease.

高血壓是粥狀硬化的高危因素，主要引發冠心病和腦血管疾病。

Hypertension 高血壓


- The risk increases progressively with increasing blood pressure. IHD incidence in men with BP exceeding 160/90 is more than five times that in men with BP 140/90.

高血壓的致病危險性會隨著血壓的升高而增高。一個男人血壓超過160/95時，冠心病的發病率比血壓在140/90時，高出五倍之多。

Hypertension 高血壓

- Elevated diastolic pressure is perhaps more important risk for arteriosclerosis. The risk for atherosclerosis appears diminished by therapeutic reduction of BP.


與收縮壓相比，舒張壓升高可能是動脈硬化較重要的高危因素。治療降低血壓顯然可減低引發動脈硬化的危險性。



Hypertension 高血壓

- Reduction of diastolic pressure that had been greater than 105 mmHg significantly reduces the incidence of strokes, IHD, and congestive heart failure.


使高於105mmHg的舒張壓降低，很明顯也會減低中風，冠心病，及充血性心臟衰竭的發病率。



Cigarette Smoking 吸菸

- Ample statistical evidence supports a mean increase of about 70% in the death rate and a threefold to fivefold in risk of IHD in men who smoke 1 pack per day compared to nonsmokers.


大量統計顯示，一個男人每天抽一包菸，引發冠心病的危險性，比不吸菸者高出三到五倍之多。



Cigarette Smoking 吸菸

- There is an impressive accentuation of IHD mortality in women over age 35 taking oral contraceptives who in addition smoke cigarettes.

年過35的♀，服用避孕藥又抽菸者，其冠心病死亡率會有令人驚奇的增加。



Cigarette Smoking 吸菸

- Those who stop smoking show a prompt decline in risk and may reach the risk level of nonsmokers as early as 1 year of abstinence.


戒菸者能使冠心病的危險性急速下降，並可在一年內，使致病的危險性降到與不吸菸者相同的標準。



Diabetes Mellitus 糖尿病

- In known diabetics, there is at least a twofold increase in incidence of myocardial infarction compared to non-diabetics. There is also an increased tendency toward cerebral thrombosis in diabetics.

糖尿病患者罹患心肌梗塞的發病率，比非糖尿病患者高出兩倍。糖尿病患者也有增高罹患腦栓塞的傾向。



Diabetes Mellitus 糖尿病

- The risk of IHD is markedly increases in young diabetics; recent data indicate that about 1/3 of diabetics die of IHD by age 55.

年青糖尿病患者罹患冠心病的危險性有很顯著的增加；最近的報告顯示，有三分之一的糖尿病患者在55歲前，就死於冠心病。

Obesity 肥胖

- Morbidity and mortality from IHD are higher in direct relation to the degree of overweight beyond 30%. It appears that obesity may accelerate atherosclerosis; its effect is more apparent before age 50.

當體重超過30%以上，冠心病的患病率及死亡率的增加，與體重成正比。肥胖顯然也會加速粥狀硬化的病變，這種效应在50歲前更為明顯。

Obesity 肥胖

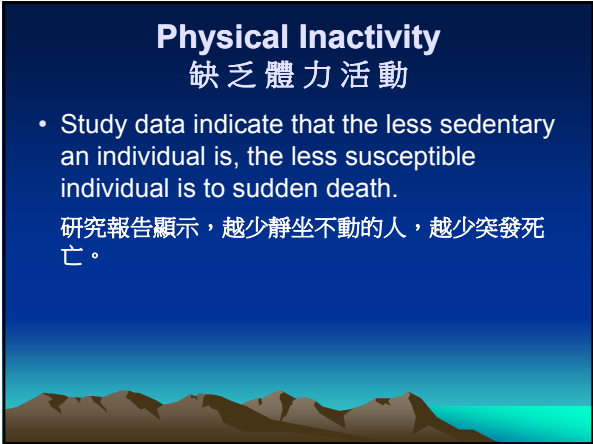
- A close relation between abdominal obesity and IHD has been identified. Abdominal obesity is also closely associated with hypertension, hypertriglyceridemia, hypercholesterolemia, and hyperglycemia.

腹部肥胖與冠心病的密切關係業經證實。腹部肥胖也與高血壓，高三酸甘油，高膽固醇，和高血糖有密切關係。

Physical Inactivity
缺乏體力活動

- Study data indicate that the less sedentary an individual is, the less susceptible individual is to sudden death.

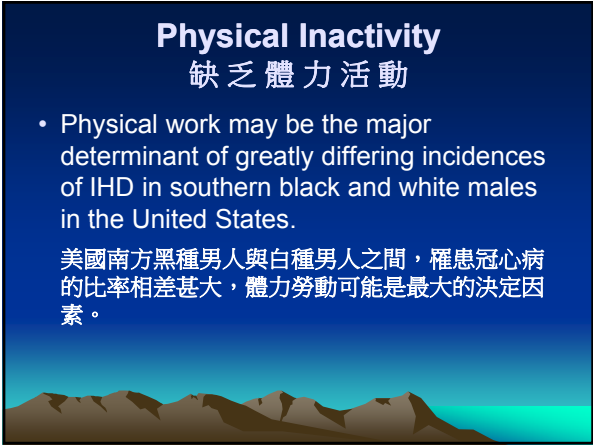
研究報告顯示，越少靜坐不動的人，越少突發死亡。



Physical Inactivity
缺乏體力活動

- Physical work may be the major determinant of greatly differing incidences of IHD in southern black and white males in the United States.

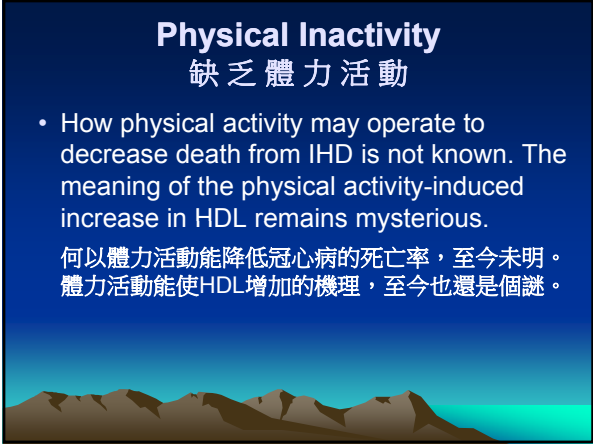
美國南方黑種男人與白種男人之間，罹患冠心病的比率相差甚大，體力勞動可能是最大的決定因素。



Physical Inactivity
缺乏體力活動

- How physical activity may operate to decrease death from IHD is not known. The meaning of the physical activity-induced increase in HDL remains mysterious.

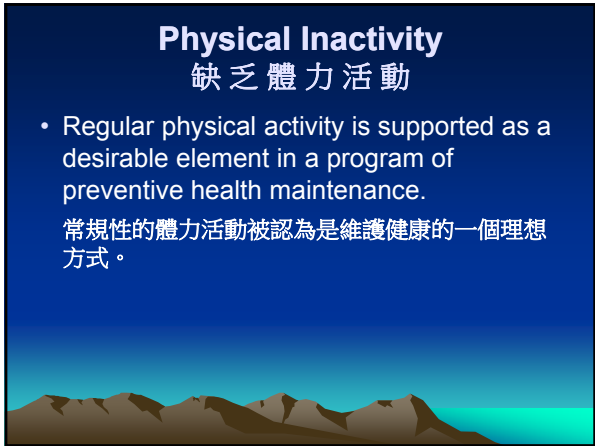
何以體力活動能降低冠心病的死亡率，至今未明。體力活動能使HDL增加的機理，至今也還是個謎。



Physical Inactivity
缺乏體力活動

- Regular physical activity is supported as a desirable element in a program of preventive health maintenance.

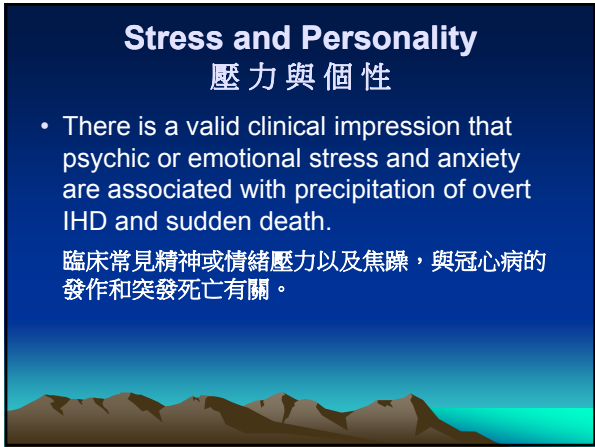
常規性的體力活動被認為是維護健康的一個理想方式。



Stress and Personality
壓力與個性

- There is a valid clinical impression that psychic or emotional stress and anxiety are associated with precipitation of overt IHD and sudden death.

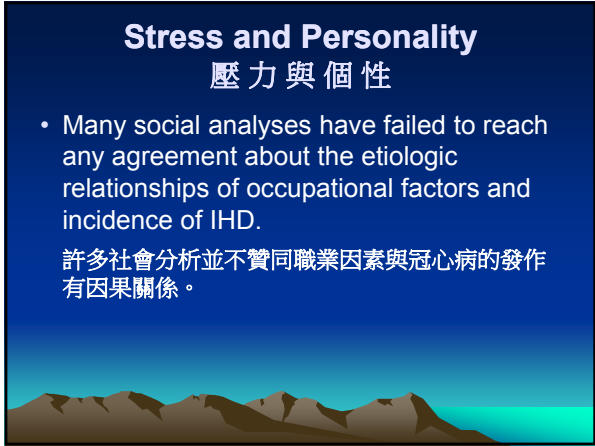
臨床常見精神或情緒壓力以及焦躁，與冠心病的發作和突發死亡有關。



Stress and Personality
壓力與個性

- Many social analyses have failed to reach any agreement about the etiologic relationships of occupational factors and incidence of IHD.

許多社會分析並不贊同職業因素與冠心病的發作有因果關係。



Genetic Factors 基因遺傳因素

- Premature atherosclerosis often appears to be familial.
早發性的粥狀硬化顯然屬於家族因素。

Genetic Factors 基因遺傳因素

- Family history is one of the important factors to be weighed in assessment of risk, thereby helping the physician to avoid missing treatable risk factors and in institution of appropriate preventive measures.
家族史是評估致病的重要因素之一，可幫助醫生免於忽略可治的高危因素，以及設定適當的預防措施。

Diet 飲食

- No population habitually subsisting on a diet low in saturated fat and cholesterol has an appreciable amount of IHD. These populations also tend to have lower plasma lipid concentrations.
慣於食用低飽和脂肪和低膽固醇的民族，比較沒有顯著的高冠心病病例。這些民族也會有較低的血脂濃度。

Diet 飲食

- There is a general upward shift of average cholesterol and triglyceride levels in highly developed countries, which is an effect of changes in total culture and life-style as well as in diet.

在高度開發的國家中，膽固醇和三酸甘油的平均值有上升的趨勢，這是文化，生活方式，以及飲食習慣改變的結果。

Diet 飲食

- In average, US adult male eats 140 gm fat and 400 mg cholesterol per day. If a healthy young adult switches from this diet to one containing 300 mg/day of cholesterol, the cholesterol level will drop by 10-15%.

美國男性成人平均每天食用140克脂肪和400毫克膽固醇。如果一個健康的年青人改為每天食用300毫克膽固醇，則其血中膽固醇的濃度可在兩週內下降10%至15%。

Diet 飲食

- The average cholesterol level in most populations is most closely related to the amount of animal fats (meat, egg, and milk-products) in the diet.

大部分民族的膽固醇平均值，與飲食中動物性脂肪(即肉類，蛋類，奶製品)的多寡有最密切的關聯。

Diet 飲食

- Recommendations of the nutrition council:

營養協會建議食物的攝取

1. Fat: 30-50% of total calories

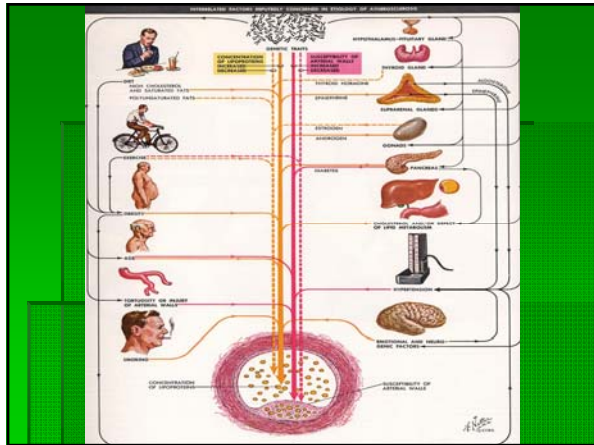
脂肪佔總熱量的30-50%。

2. Saturated fat: <10% of total calories

飽和脂肪應少於總熱量的10%。

3. Cholesterol: <300 mg/day

膽固醇應少於300毫克。



Management of Hyperlipidemia

高血脂的處理方法

- In adults <65 y/o, a total cholesterol (C) >240 mg/dl or a triglyceride (TG) >250 mg/dl clearly indicates hyperlipidemia sufficient to require medical attention.

年齡65歲以下的成人，如果總膽固醇高於240 mg/dl或三酸甘油高於250mg/dl，即表明患有高血脂症，並需要醫療上的照顧。

Management of Hyperlipidemia

高血脂的處理方法

- National Cholesterol Education Program (NCEP) suggests:

國立膽固醇教育計劃(NCEP)建議

1. Total cholesterol (C) >240 mg/dl:

In “high risk”, prompt careful evaluation indicated.

總膽固醇高於240mg/dl屬“高危群”，需儘快給予仔細評估。

Management of Hyperlipidemia

高血脂的處理方法

- National Cholesterol Education Program (NCEP) suggests:

國立膽固醇教育計劃(NCEP)建議

2. Cholesterol 200-239 mg/dl:

In “borderline high”; but two or more additional risk factors become high risk

膽固醇介於200與239mg/dl之間屬“臨界高危群”。
但如出現兩種以上的高危因素，則應屬“高危群”。

Management of Hyperlipidemia

高血脂的處理方法

- LDL cholesterol (LDL-C) can be estimated as $LDL = C - HDL - TG/5$

低密度膽固醇的計算公式:

低密度膽固醇

=總膽固醇(減)高密度膽固醇(再減)三酸甘油的1/5

Management of Hyperlipidemia 高血脂的處理方法

- If C <200 mg/dl, the tests need not to be repeated for couple years in an adult who maintains body weight and does not other change in health or life-style.

如總膽固醇低於200mg/dl，而病人保持適當體重，也沒有改變健康情況或生活方式的話，在數年內不必重複測試膽固醇。



Management of Hyperlipidemia 高血脂的處理方法

- Severe hyperlipidemia (C >300 mg/dl or TG >500 mg/dl) usually reflects a genetic disorder; when xanthomas are present, it practically always does.

嚴重的高血脂(總膽固醇高於300mg/dl或三酸甘油高於500mg/dl)通常出於基因遺傳，當有黃瘤(Xanthomas)出現時，更可確定屬基因遺傳。

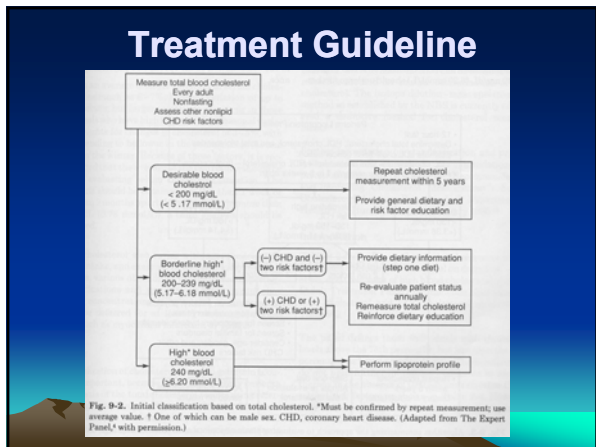




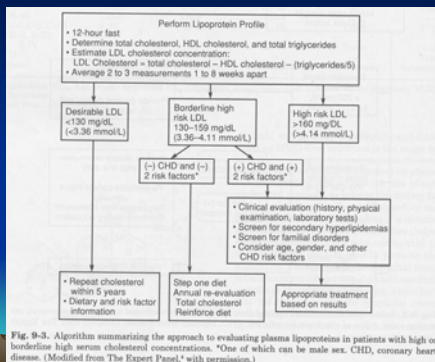


Treatment Guideline

	Cholesterol Desirable	Cholesterol Borderline	Cholesterol High	Decision
Total C mg/dl	< 200	200-239	> 240	Estimate LDL-C if total C borderline or high
LDL-C mg/dl	< 130	130-159	>160	Diet treatment if LDL-C borderline or high
LDL-C mg/dl			> 190	Drug treatment if LDL-C exceeds after diet
LDL-C mg/dl			> 160 + 2 risks	Drug treatment
LDL-C mg/dl			>130 + past IHD	Drug treatment



Treatment Guideline



Treatment Guideline

- Drug therapy is recommended by NCEP for any patient whose LDL-C remains $> 190 \text{ mg/dl}$ or $> 160 \text{ mg/dl}$ in the presence of 2 or more risk factors after a trial of 3 months of dietary therapy alone.

國立膽固醇教育計劃(NCEP)建議：經過三個月的飲食治療，如低密度膽固醇依然維持在 190 mg/dl 以上，或高於 160 mg/dl 外加有兩種高危因素者，應給予西藥治療。


Treatment Guideline

- There is no agent proven to have value in “treatment” of atherosclerosis. In fact, there is no treatment of atherosclerosis, only of its complications.

目前還沒有任何治療方法被證實對粥狀硬化有治療價值。事實上，根本沒有粥狀硬化的治療法，只是治療它的併發症而已。


Acupuncture Treatment
A. For Arteriosclerotic Arteries

1	Basilar and vertebral artery 基底動脈，脊椎動脈	GB 20	風池
2	Carotid artery 頸動脈	ST 9 SI 17	人迎 天容
3	Aortic arch, coronary artery 主動脈弓，冠狀動脈	Ren 17 KI 25	膻中 神藏




Acupuncture Treatment
A. For Arteriosclerotic Arteries

4	Abdominal aorta 腹部大動脈	Ren 12 Ren 9	中脘 水分
5	Common iliac artery 總腸動脈	Ren 6 ST 28	氣海 水道
6	Femoral artery 股動脈	LV 9 LV 10	陰包 五里
7	Popliteal artery 膕動脈	UB 40 UB 57	委中 承山



Acupuncture Treatment
B. For Qi and Blood Circulation

1	Qi circulation	ST 36 Ren 17	足三里 膻中
2	Blood circulation	SP 10 UB 17	血海 膈俞
3	Essence nourishment	KI 3 UB 23 UB 52	太溪 腎俞 志室



Acupuncture Treatment C. For Atherosclerosis

1	Damp-phlegm 痰濕	ST 40 SP 9	豐隆 陰陵泉
2	Blood stagnation 血瘀	SP 6 KI 9 SP 10	三陰交 筑賓 血海

Acupuncture Treatment D. For IHD/CHD & Hypertension

1	Ischemic heart disease	Ren 17	膻中
	Coronary heart disease	KI 25	神藏
	IHD/CHD 冠心病	PC 4	郄門
2	Hypertension 高血壓	KI 2	然谷
		LV 8	曲泉
		SI 6	養老
		SJ 2	液門
		SJ 11	清冷淵

Herbal Treatment

丹參	Dan Shen	田七	Tian Qi
毛冬青	Mao Dong Qing	鬱金	Yu Jin
山楂	Shan Zha	延胡索	Yan Hu Suo
川芎	Chuan Xiong	砂仁	Sha Ren
赤芍	Chi Shao	石菖蒲	Shi Chang Pu
紅花	Hong Hua	淫羊藿	Yin Yang Huo
降香	Jiang Xiang	天花粉	Tian Hua Fen
檀香	Tan Xiang	玄參	Xuan Shen
瓜蒌仁	Gua Lou Ren	大黃	Da Huang
決明子	Jue Ming Zi		

Arteriosclerosis of Cerebral Arteries
Gou Teng San 鉤藤散

鉤藤	Gou Teng	防風	Fang Feng
陳皮	Chen Pi	菊花	Ju Hua
半夏	Ban Xia	生薑	Sheng Jiang
麥門冬	Mai Men Dong	石膏	Shi Gao
茯苓	Fu Ling	甘草	Gan Cao *
人參	Ren Shen		

Coronary Arteriosclerosis
Gua Lou Zhi Shi Tang 瓜蒌枳實湯

瓜蒌仁	Gua Lou Ren	梔子	Zhi Zi
枳實	Zhi Shi	黃芩	Huang Qin
當歸	Dang Gui	陳皮	Chen Pi
生薑	Sheng Jiang	桔梗	Jie Geng
砂仁	Sha Ren	茯苓	Fu Ling
木香	Mu Xiang	浙貝母	Zhe Bei Mu
甘草	Gan Cao		

Abdominal Obesity
Fang Feng Tong Shen San 防風通聖散

防風	Huang Feng	大黃	Da Huang
荊芥	Jing Jie	桔梗	Jie Geng
梔子	Zhi Zi	麻黃	Ma Huang**
黃芩	Huang Qin	川芎	Chuan Xiong
赤芍	Chi Shao	石膏	Shi Gao

Arteriosclerosis in Lower Limbs
Di Huang Yin Zi 地黃飲子

生地黃	Sheng Di Huang	附子	Fu Zi
山茱萸	Shan Zhu Yu	石菖蒲	Shi Cang Pu
茯苓	Fu Ling	五味子	Wu Wei Zi
肉蓯蓉	Rou Cong Rong	遠志	Yuan Zhi
巴戟天	Ba Ji Tian	肉桂	Rou Gui
石斛	Shi Hu	生薑	Sheng Jiang
麥門冬	Mai Men Dong	大棗	Da Zao
薄荷	Bo He		

Hypertension
Qi Ju Di Huang Wan 杞菊地黃丸

熟地黃	Shu Di Huang	茯苓	Fu Ling
山藥	Shan Yao	牡丹皮	Mu Dan Pi
山茱萸	Shan Zhu Yu	枸杞子	Gou Qi Zi
澤瀉	Ze Xie	菊花	Ju Hua

Hypertension
Qi Wu Jiang Xia Tang 七物降下湯

熟地黃	Shu Di Huang	鉤藤	Gou Teng
當歸	Dang Gui	黃芪	Huang Qi
白芍	Bai Shao	黃柏	Huang Bai
川芎	Chuan Xiong		

Hypertension
Tian Ma Gou Teng Yin 天麻鉤藤飲

天麻	Tian Ma	臭梧桐	Chou Wu Tong
鉤藤	Gou Teng	地龍	Di Long
白蒺藜	Bai Ji Li	生牡蠣	Sheng Mu Li
菊花	Ju Hua	石決明	Shi Jue Ming
夏枯草	Xia Ku Cao	珍珠母	Zhen Zhu Mu
豨薟草	Xi Xian Cao		



Hypertension
Tian Ma Gou Teng Yin 天麻鉤藤飲

天麻	Tian Ma	杜仲	Du Zhong
鉤藤	Gou Teng	桑寄生	Sang Ji Sheng
石決明	Shi Jue Ming	益母草	Yi Mu Cao
黃芩	Huang Qin	夜交藤	Ye Jiao Teng
梔子	Zhi Zi	茯神	Fu Shen
川牛膝	Chuan Niu Xi		



Softening of Blood Vessels
Hai Dai Tang 海帶湯

海帶	Hai Dai**	阿膠	E Jiao
海藻	Hai Zao**	川芎	Chuan Xiong
昆布	Kun Bu**	當歸	Dang Gui
生地黃	Sheng Di Huang	白芍	Bai Shao
龜板	Gui Ban	連翹	Lian Qiao
牡蠣	Mu Li	甘草	Gan Cao



Case 1 Hyperlipidemia
by Dr. Jing-liang Shi 石景亮醫師

- Male, 41 yrs, 174 cm, 86 Kg (189 lb)
- Vertigo for 3 months and worsened by anxiety and exhaustion, chest discomfort, shortness of breath, excessive appetite, and constipation. Too tired to work for full time job. BP 128/90 mmHg
- Tongue: Dark red
- Pulse: Thready wiry

Case 1 Hyperlipidemia
by Dr. Jing-liang Shi 石景亮醫師

- Lab tests:
 1. Cholesterol: 320 mg/dl
 2. β -Lipoprotein (LDL): 1578 mg/dl**
 3. Triglyceride: 96 mg/dl
- Diagnosis: Hyperlipidemia
- OM Diagnosis:
 1. Yin deficiency of liver and kidney
 2. Qi and blood stagnation

Case 1 Hyperlipidemia
by Dr. Jing-liang Shi 石景亮醫師

- Treatment plan:
 1. Strengthen yin
 2. Resolve stagnation
- Herbal formula: 降脂飲
Jiang Zhi Yin (Lipid-lowering Tea)

Case 1 Hyperlipidemia Jiang Zhi Yin 降脂飲

枸杞子	Gou Qi Zi	10 gm
何首烏	He Shou Wu	15 gm
決明子	Jue Ming Zi	15 gm
山楂	Shan Zha	15 gm
丹蔘	Dan Shen	20 gm

Case 1 Hyperlipidemia by Dr. Jing-liang Shi 石景亮醫師

- Progression in 3 months:
 1. BW: 86 Kg → 74 Kg
 2. BP: 129/90 → 116/78 mmHg
 3. Cholesterol: 320 → 289 mg/dl
 4. β -Lipoprotein (LDL): 1578 → 460 mg/dl
 5. Triglyceride: 96 → 75 mg/dl
 6. Vertigo, chest discomfort, and SOB subsided. Enable to work for full-time.

Case 1 Hyperlipidemia by Dr. Jing-liang Shi 石景亮醫師

- Follow-up in 7 months:
 1. Almost asymptomatic all the times
 2. BP: 118/72 mmHg
 3. Cholesterol: 180 mg/dl
 4. β -Lipoprotein (LDL): 218 mg/dl
 5. Triglyceride: 64 mg/dl

Case 1 Hyperlipidemia
by Dr. Jing-liang Shi 石景亮醫師


- Clinical study on the effectiveness of Jiang Zhi Yin (降脂飲) in 31 cases of hyperlipidemia

After taking Jiang Zhi Yin for 2 months, all patients have significantly decreased in weight and cholesterol levels.




Case 2 Hyperlipidemia
by Dr. Qi-Lian Yang 楊其廉醫師

- Female, 46 yrs
- CC: Numbness of 4 extremities
- PE:
 1. BW: 3 Kg overweighted
 2. BP: 138/90 mmHg
 3. Heart/Lung: unremarkable
 4. Liver/Spleen: Impalpable



Case 2 Hyperlipidemia
by Dr. Qi-Lian Yang 楊其廉醫師

- Lab tests:
 1. Cholesterol: 300 mg/dl
 2. β -Lipoprotein (LDL): 670 mg/dl
 3. EKG: Normal
 4. Liver function tests: Unremarkable
 5. Urinalysis: Unremarkable
- Diagnosis: Hyperlipidemia



Case 2 Hyperlipidemia
by Dr. Qi-Lian Yang 楊其廉醫師

- OM Diagnosis:
Yin deficiency of liver and kidney
- Treatment plan:
Nourish liver and kidney
- Herbal formula: 降脂湯
Jiang Zhi Tang (Lipid-lowering Decoction)

Case 2 Hyperlipidemia
Jiang Zhi Tang 降脂湯

丹蔘	Dan Shen	15 gm
何首烏	He Shou Wu	15 gm
黃精	Huang Jing	15 gm
澤瀉	Ze Xie	15 gm
山楂	Shan Zha	15 gm

Case 2 Hyperlipidemia
by Dr. Qi-Lian Yang 楊其廉醫師

- One month later:
 1. Cholesterol: 300 → 212 mg/dl
 2. β -Lipoprotein (LDL): 670 → 423 mg/dl

Case 3 Hyperlipidemia by Dr. Qi-Lian Yang 楊其廉醫師

- Male, 52 yrs
- CC: Dizziness, insomnia, dreaminess, and decreased memory for one year. Diagnosed as hyperlipidemia at a medical college.
- Lab tests:
 1. Cholesterol: 235 mg/dl
 2. β -Lipoprotein (LDL): 725 mg/dl
 3. Triglyceride: 120 mg/dl

Case 3 Hyperlipidemia by Dr. Qi-Lian Yang 楊其廉醫師

- Treated by Jiang Zhi Tang (降脂湯) for 30 days.
- Clinical outcome:
 1. Cholesterol: 235 \rightarrow 180 mg/dl
 2. β -Lipoprotein (LDL): 725 \rightarrow 363 mg/dl
 3. Triglyceride: 120 \rightarrow 78 mg/dl

Hyperlipidemia by Dr. Qi-Lian Yang 楊其廉醫師

- Clinical study on the effectiveness of Jiang Zhi Tang (降脂湯) in 100 cases of hyperlipidemia
 1. 78% lowered the cholesterol levels
 2. 94% lowered the β -Lipoprotein (LDL) levels

**Hyperlipidemia
Arteriosclerosis**

Thank You

Dr. San Hong Hwang