SINDROME CORONARIO AGUDO

ANGINA INESTABLE
INCIDENCIA Y PREVALENCIA
FISIOPATOLOGIA

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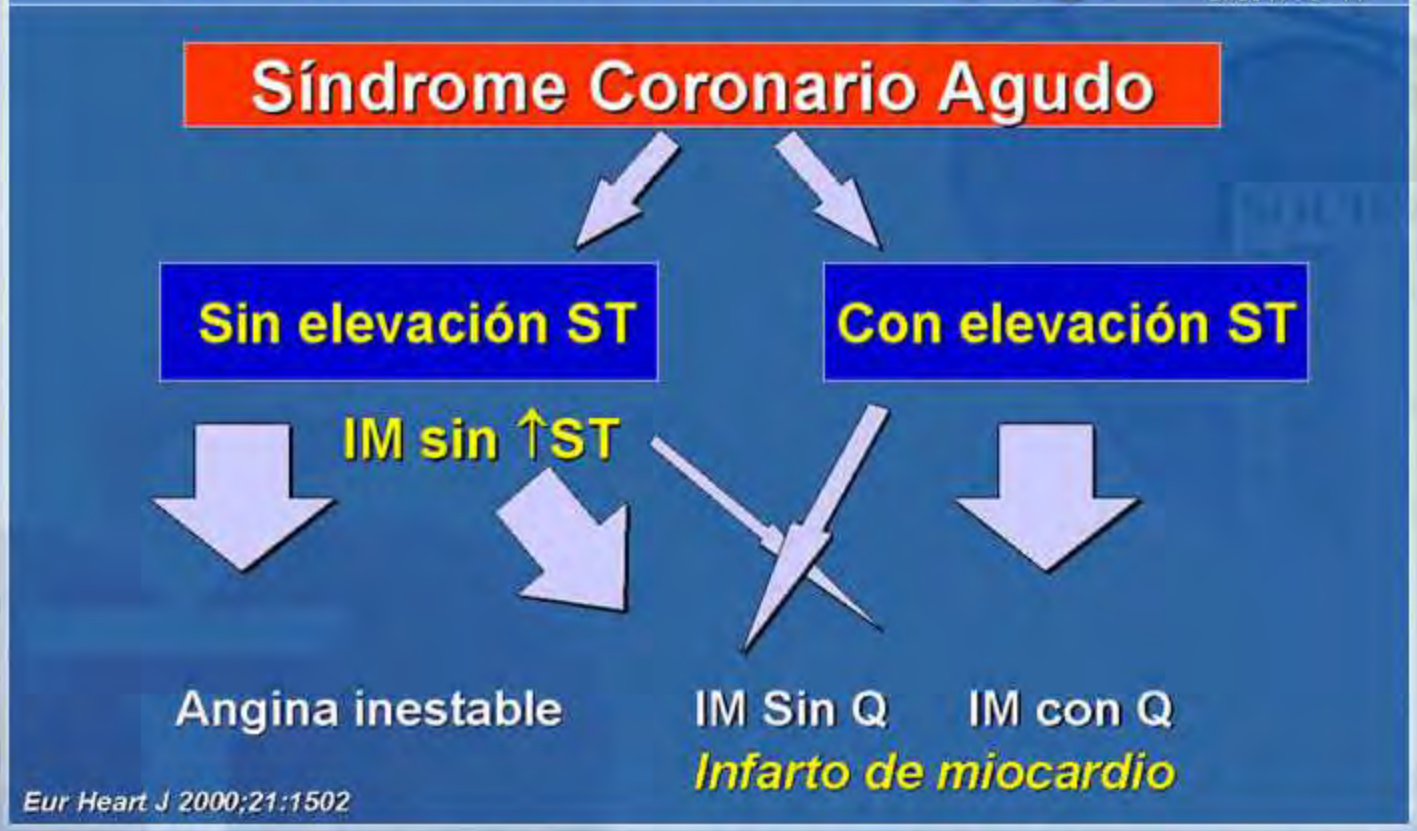
Hospital Nacional Rosales.
Profesor Facultad Medicina Universidad Nacional de El Salvador

INFARTO AGUDO DE MIOCARDIO

DEFINICION DE INFARTO AGUDO DE MIOCARDIO



Clasificación clínica de los síndromes coronarios agudos de acuerdo con las anormalidades electrocardiográficas, en el momento de su presentación y durante la evolución.

Los términos "Síndromes coronarios agudos sin elevación del segmento ST y con elevación del segmento ST" son los

CV disease: a need for preventive strategies

American Heart Association. Heart Disease and Stroke Statistics - 2003 Update.
Ford ES, et al. JAMA. 2002;287:356-9. Mokdad AH, et al. JAMA 2003;289:76-9.
American Diabetes Association, Diabetes Care 2003;26(suppl 1):S5-S20

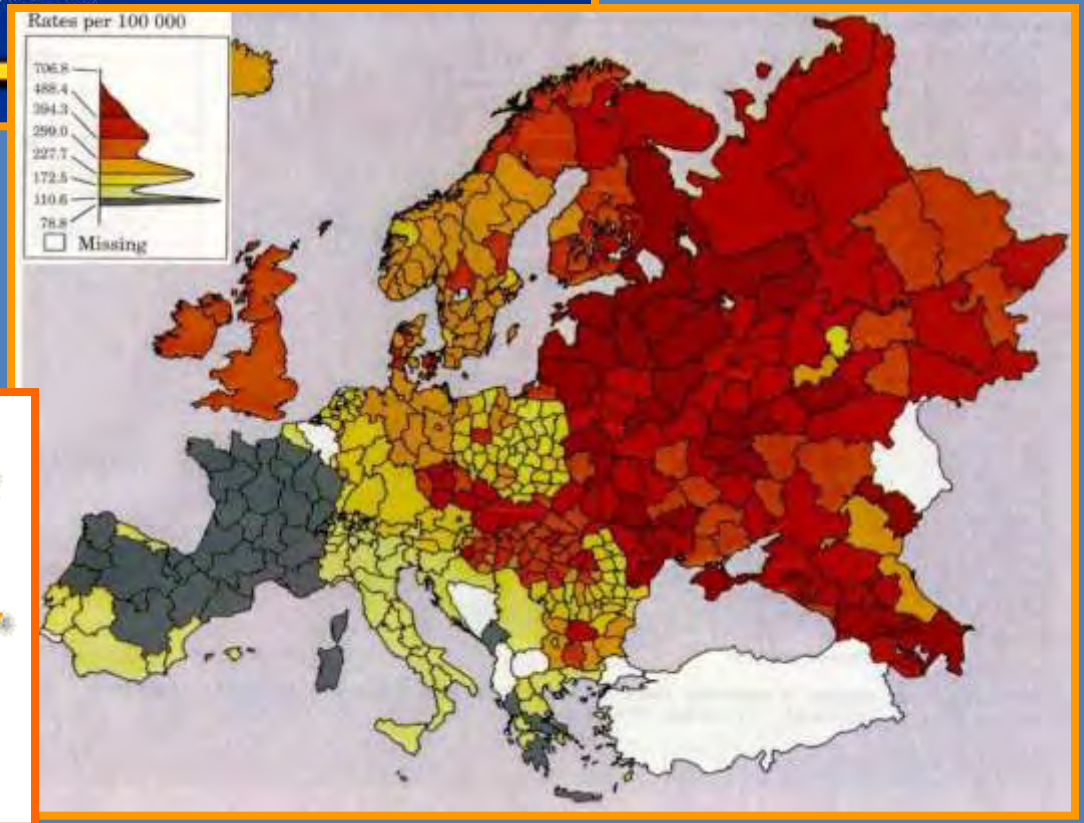
- 105 million with high cholesterol
- 50 million with hypertension
- 47.7 million with cardiovascular metabolic syndrome
- 18 million with diagnosed diabetes + 8 million undiagnosed

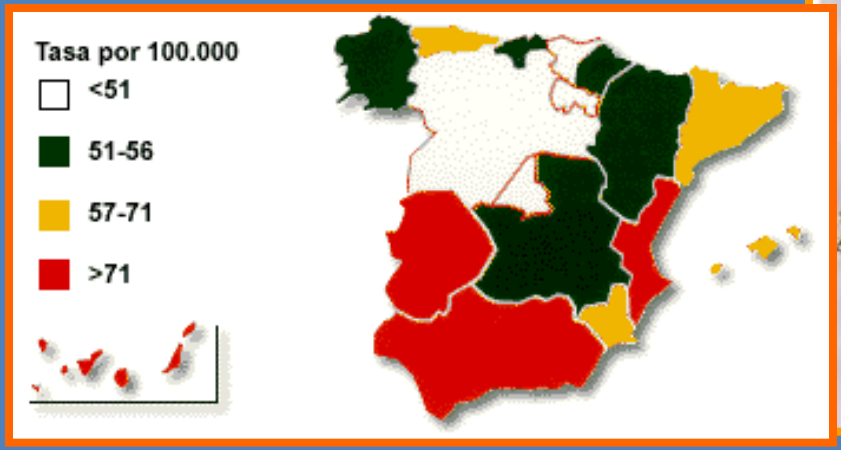
One death every 33 seconds

R.W. Timmers, M.D.

- La cardiopatía isquémica es la causa de muerte más frecuente en el mundo (7,4 millones de muertes/año), lo que supone el 13,7% de las muertes
- Una reducción de un 1% en la mortalidad por cardiopatía isquémica supondría > 73.000 vidas salvadas al año

World Health Organization.
1999 World Health Organization Report on Leading Causes of Mortality and Burden of Disease.





Incidencia y prevalencia

- Según la Asociación Americana del Corazón 71.3 millones de americanos sufrieron alguna forma de enfermedad cardiovascular en el 2003.

- Cuando se analizan las altas hospitalarias en el 2004 en EE.UU., 1.565.000 correspondieron a SCA y de estas, 896.000 a IAM . Para finales del 2007, unos 700.000 americanos sufrieron un nuevo evento coronario y cerca de 500.000 tuvieron uno recurrente.

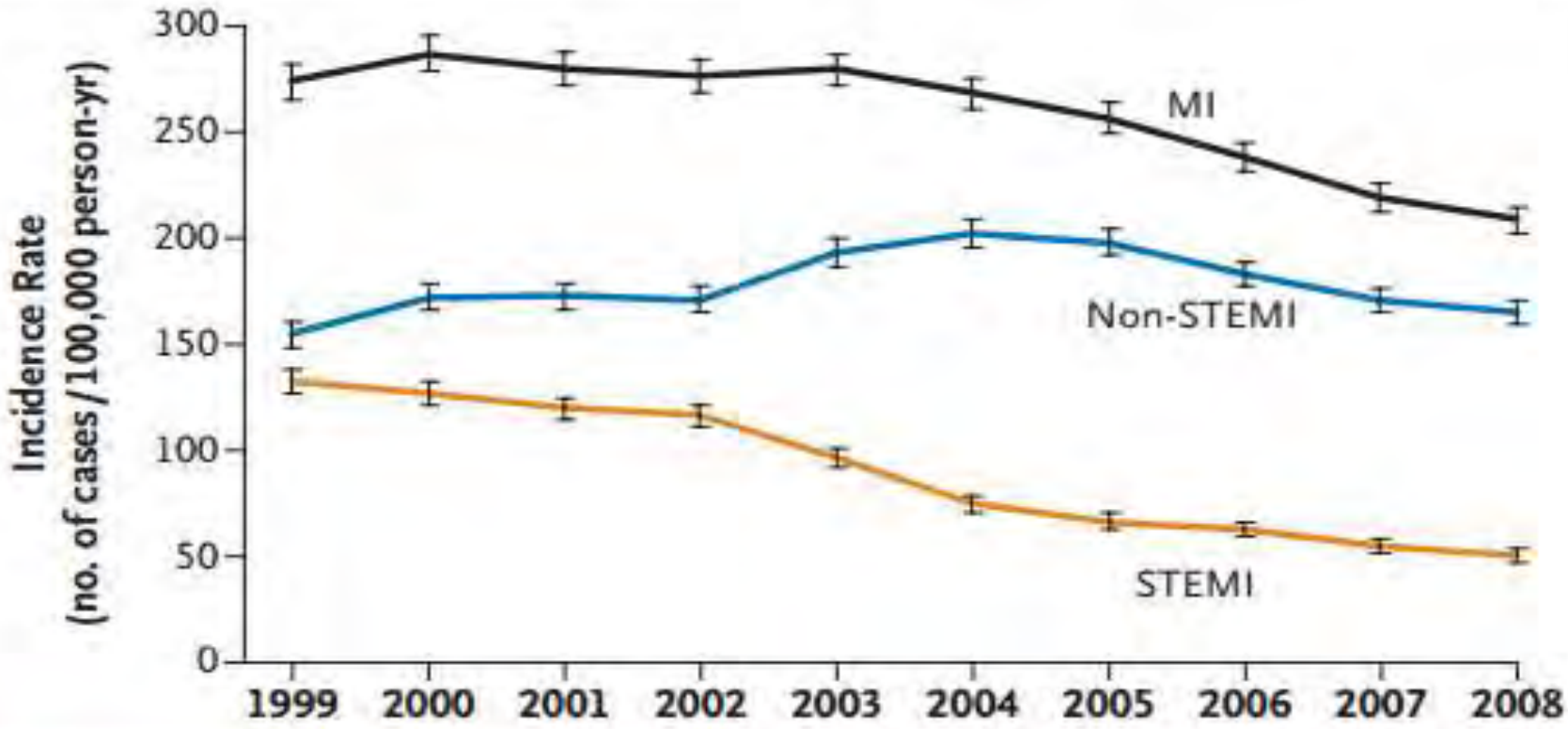
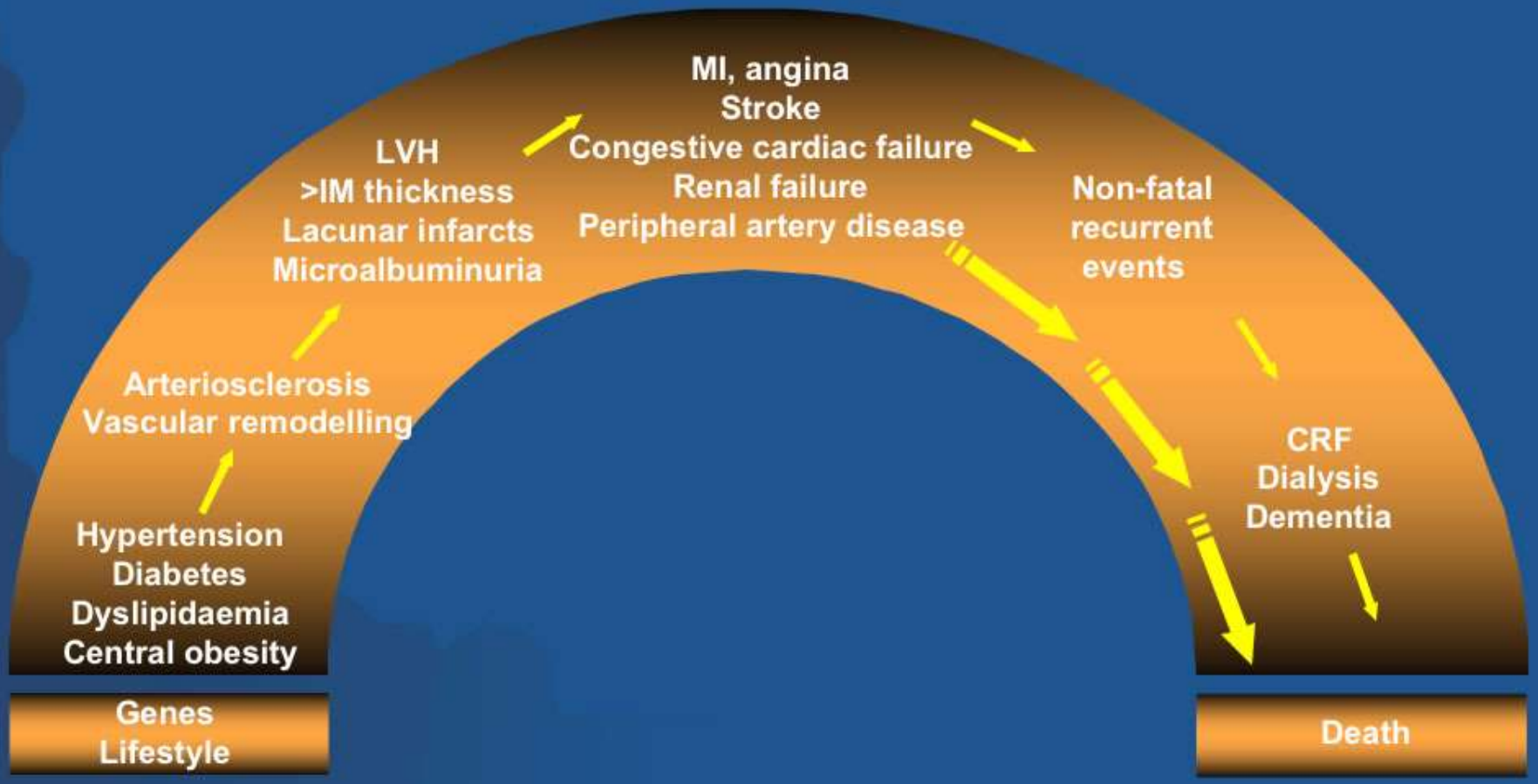


Figure 1. Age- and Sex-Adjusted Incidence Rates of Acute Myocardial Infarction, 1999 to 2008.

I bars represent 95% confidence intervals. MI denotes myocardial infarction, and STEMI ST-segment elevation myocardial infarction.

N ENGL J MED 362;23 NEJM.ORG JUNE 10, 2010

Natural history of cardiovascular disease



El continuum cardiovascular

Historia Natural de la Enfermedad Panvascular

6. Consecuencias

Discapacidad Muerte Prematura Costos Económicos

5. Complicaciónes

Miocardicas

Cerebrovasculares

Arteriales Periféricas

Horizonte Clínico

4. Enfermedad

Obesidad Hipertensión Arterial Diabetes Mellitus Dislipidemia

Aterosclerosis

3. Mecanismo de daño

Remodelación vascular

Inflamación Disfunción Endotelial ↑ Estrés oxidativo

2. Desarrollo

Peso Distribución de la grasa corporal Talla

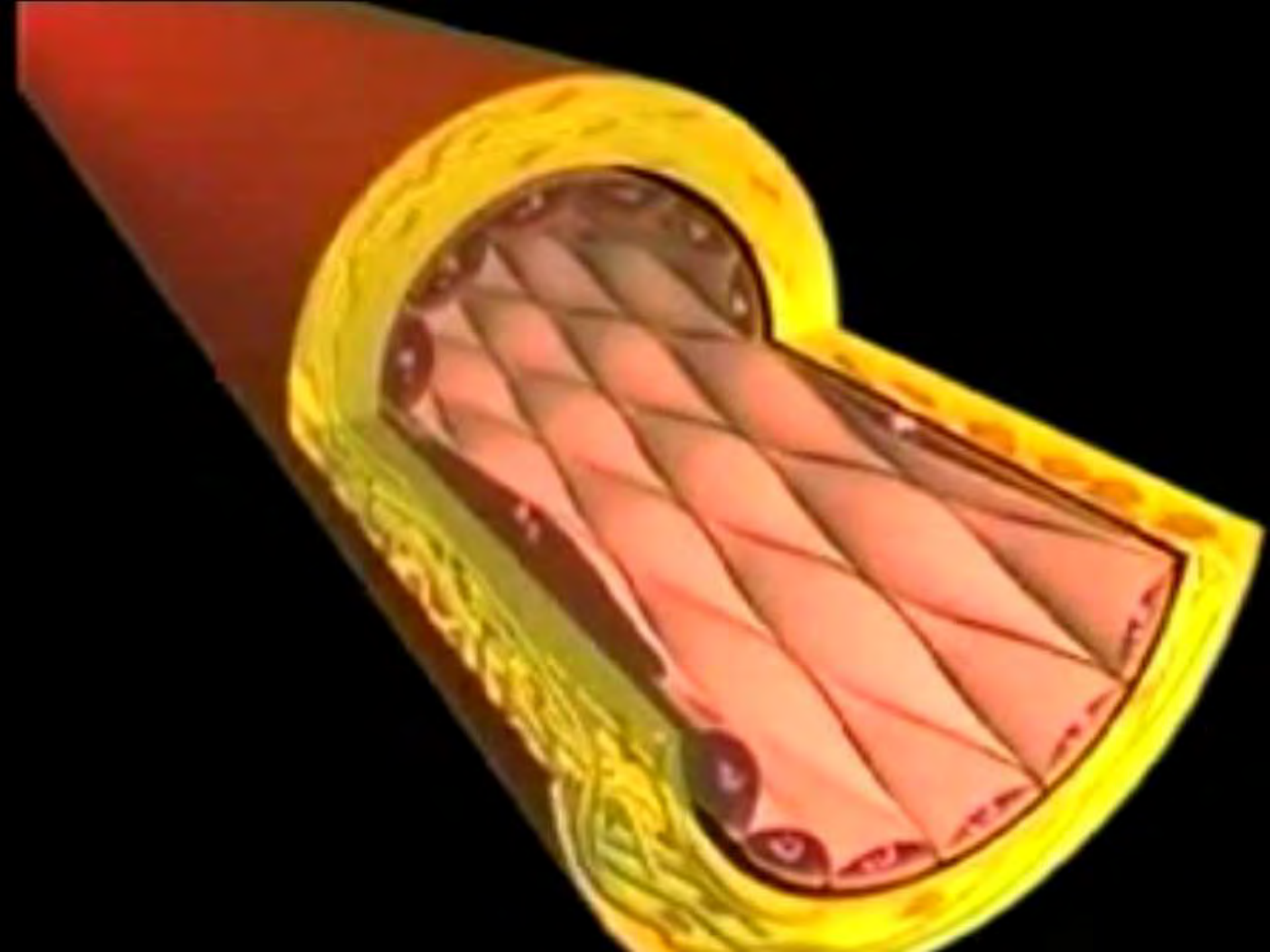
Alimentación Sedentarismo Estres

1. Orígen

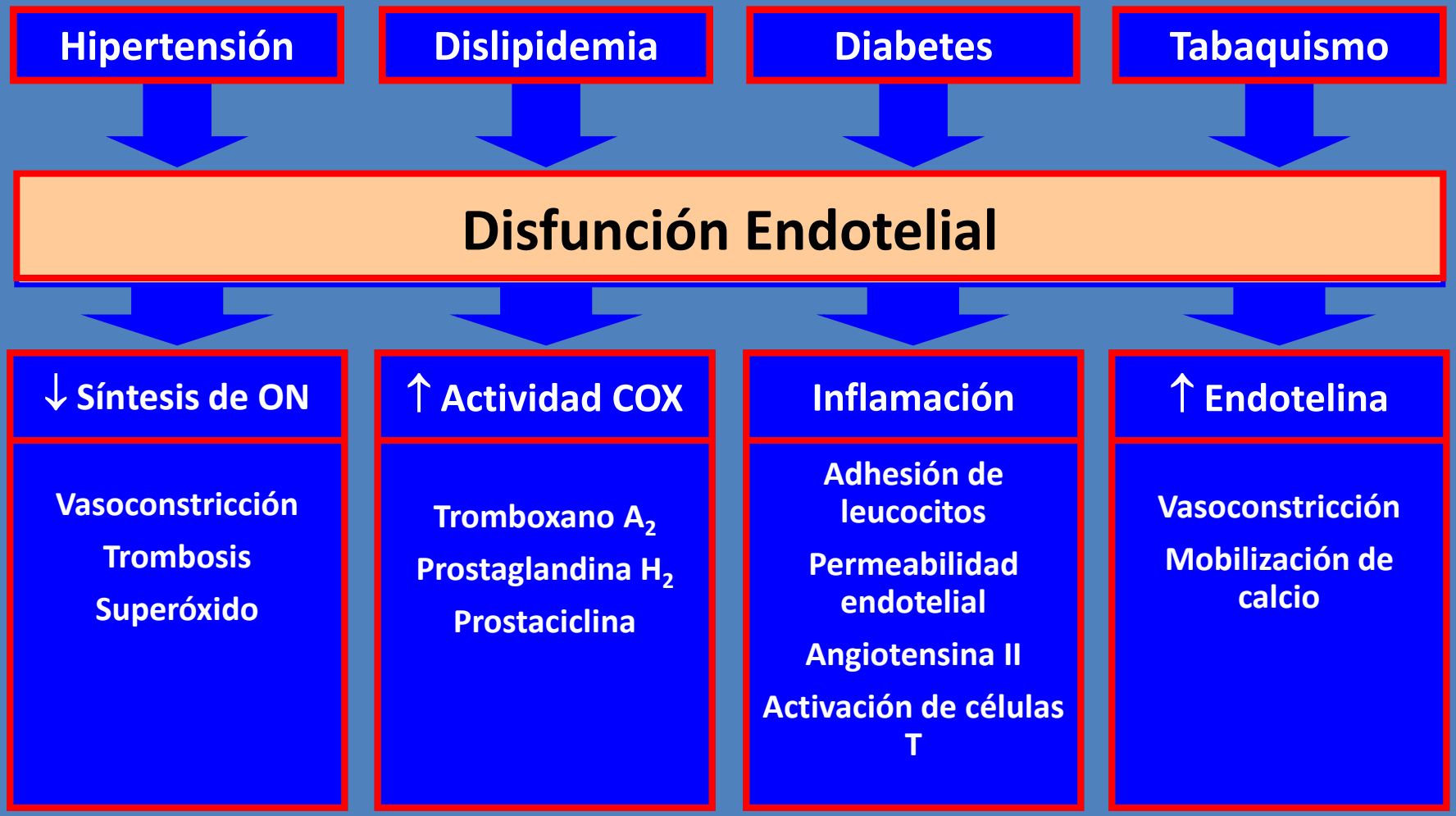
Ambiente Ocupación Educación Cultura Economía

Aterosclerosis: Modelo Tradicional

La acumulación de colesterol en el ateroma lleva al estrechamiento luminal progresivo desde el inicio del proceso

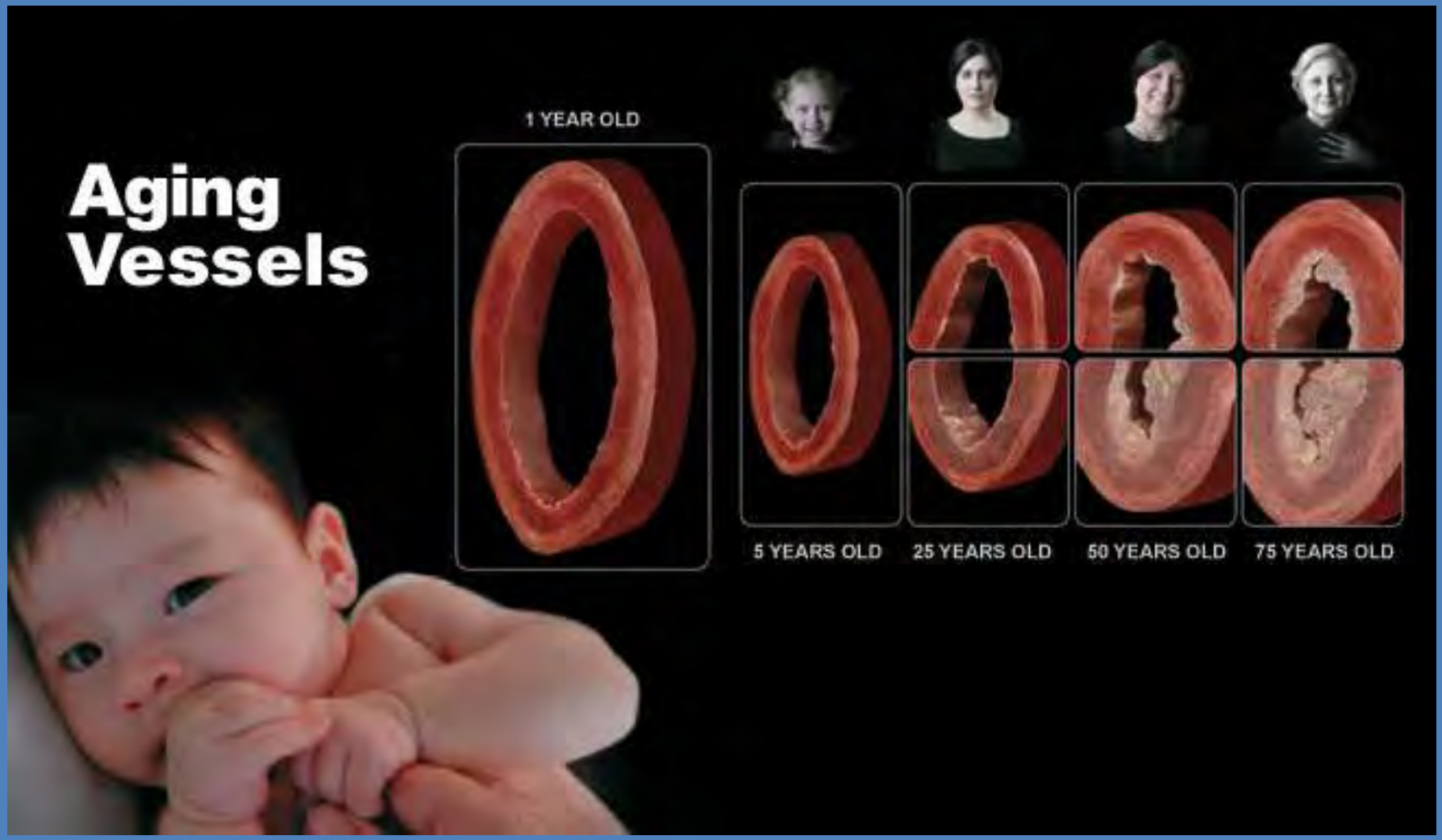


Mecanismos celulares integrados en la Enfermedad Cardiovascular



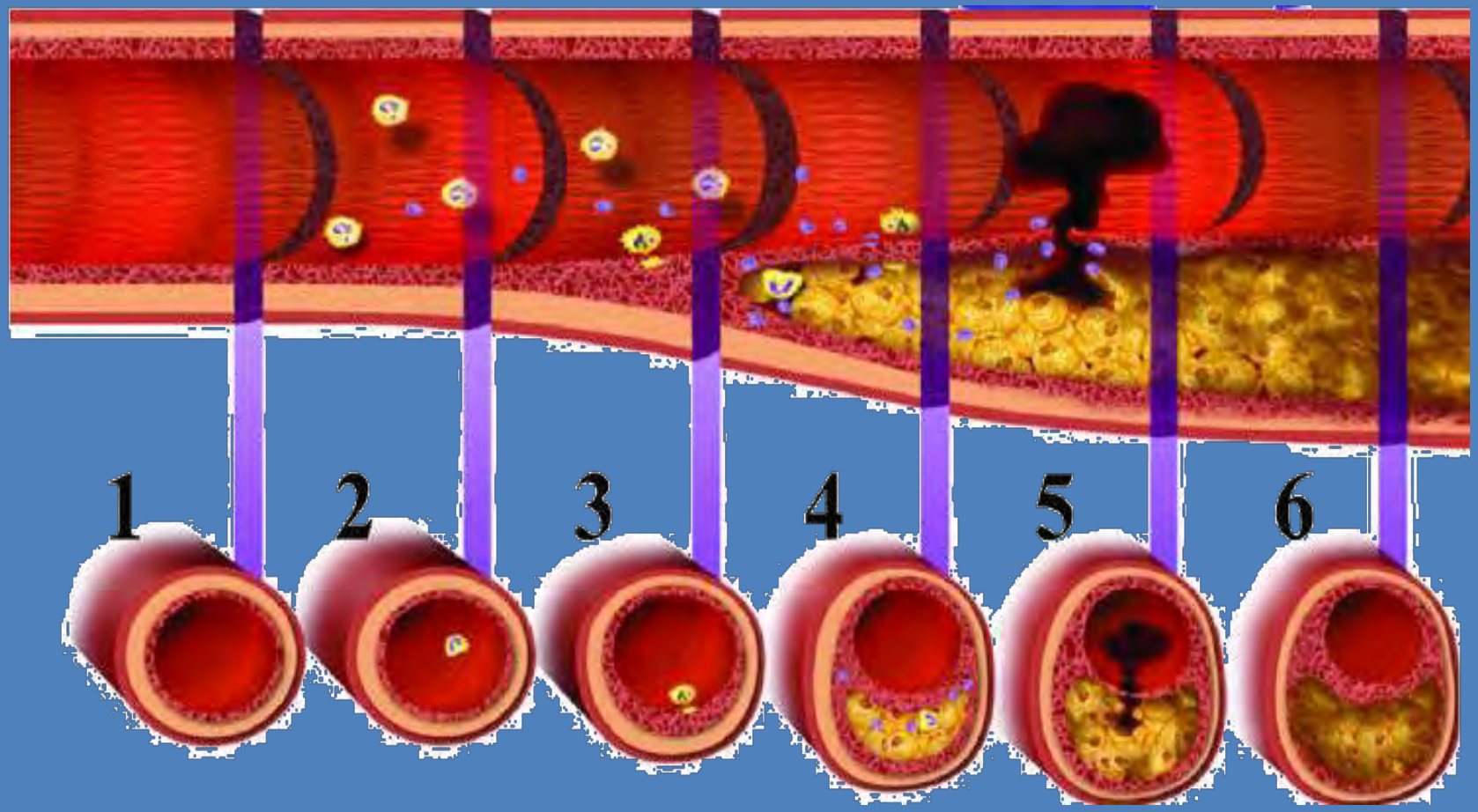
ON=óxido nítrico; COX=ciclooxigenasa

Liao. *Clin Chem*. 1998:44:1799-1808; adapted from Mason. *Cerebrovasc Dis.* 2003;16(suppl 3):11-17.

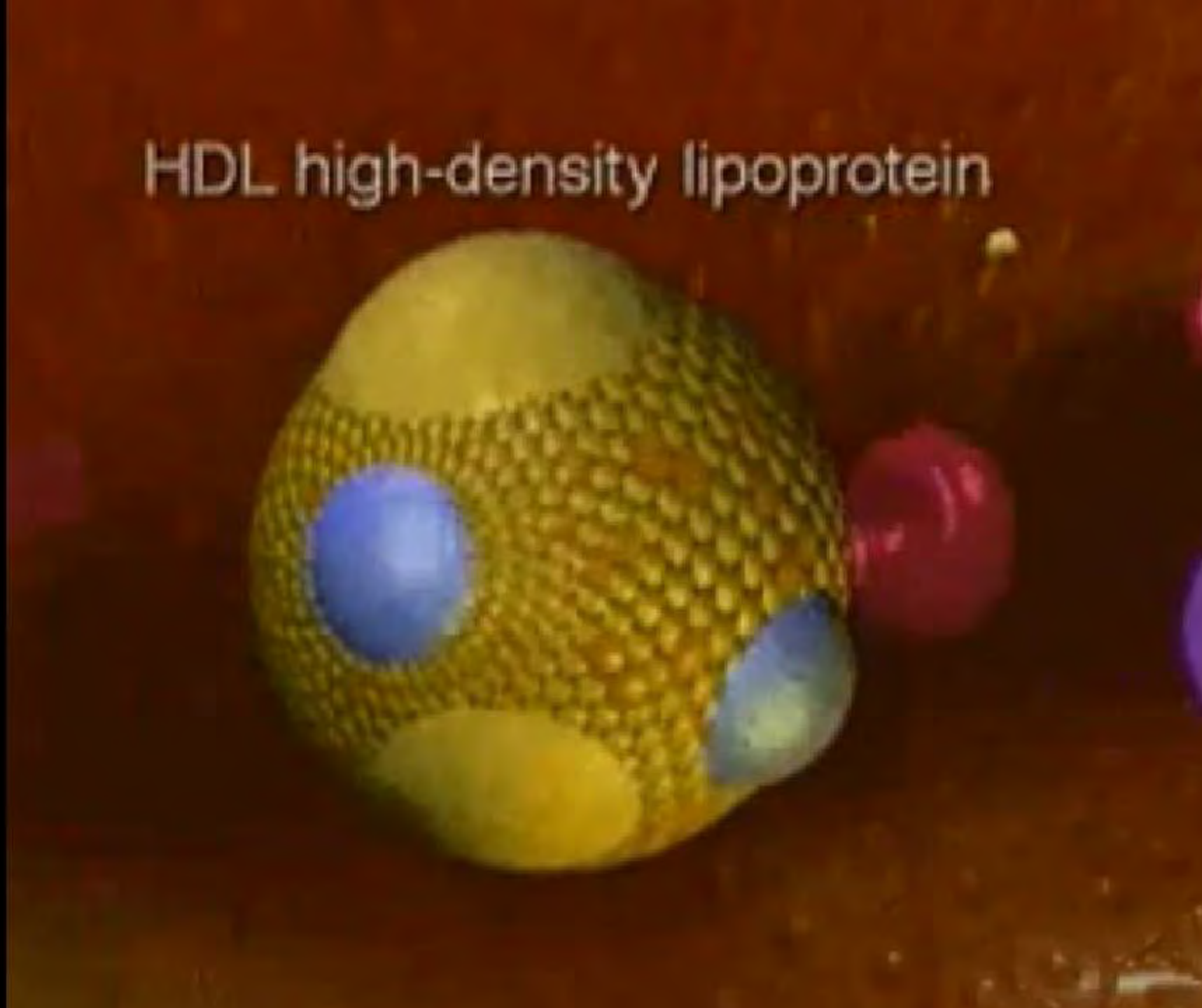

Aging Vessels
1 YEAR OLD
5 YEARS OLD
25 YEARS OLD
50 YEARS OLD
75 YEARS OLD

FISIOPATOLOGÍA

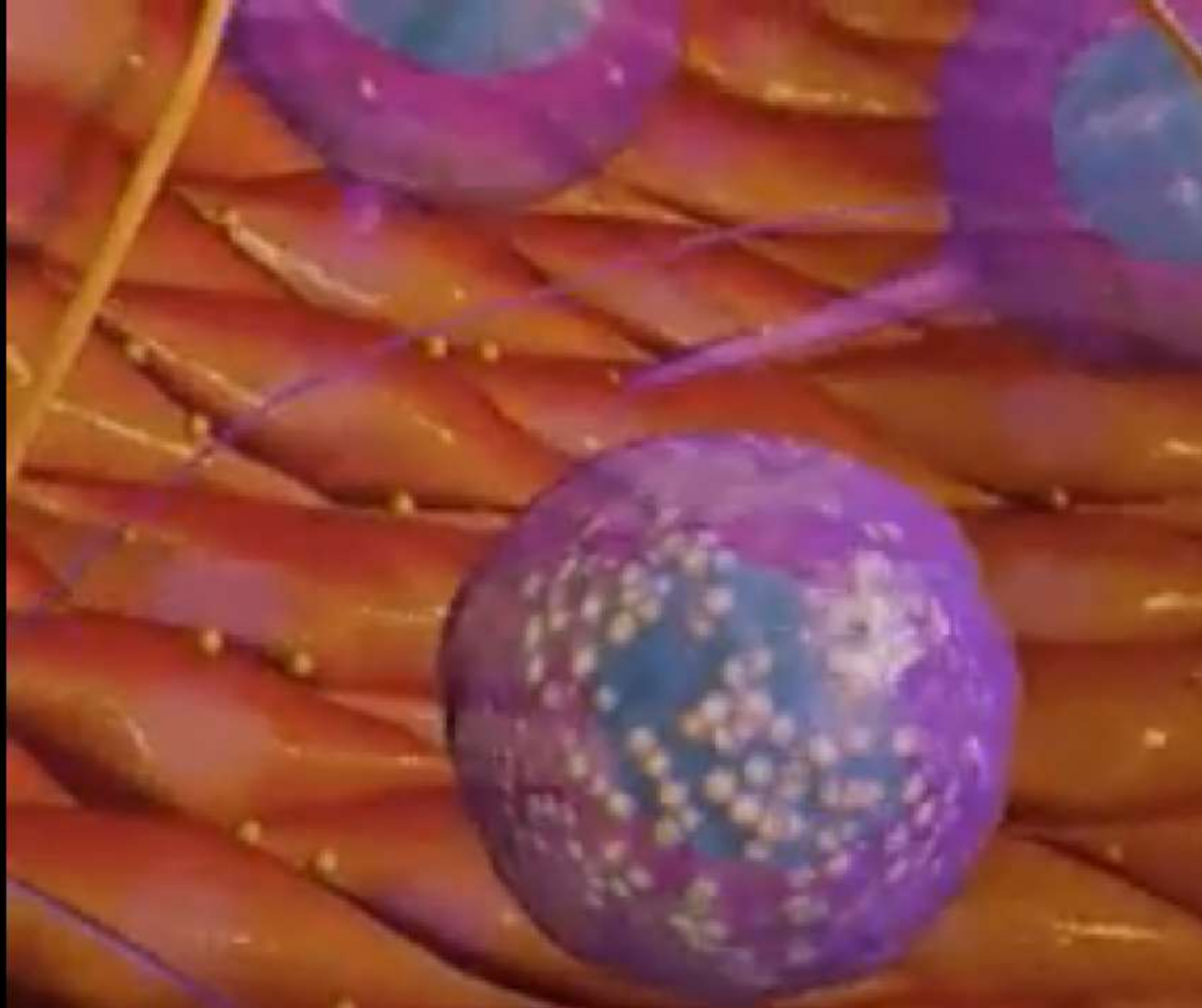
ROL DE LA RUPTURA AGUDA DE LA PLACA ATEROMATOSA



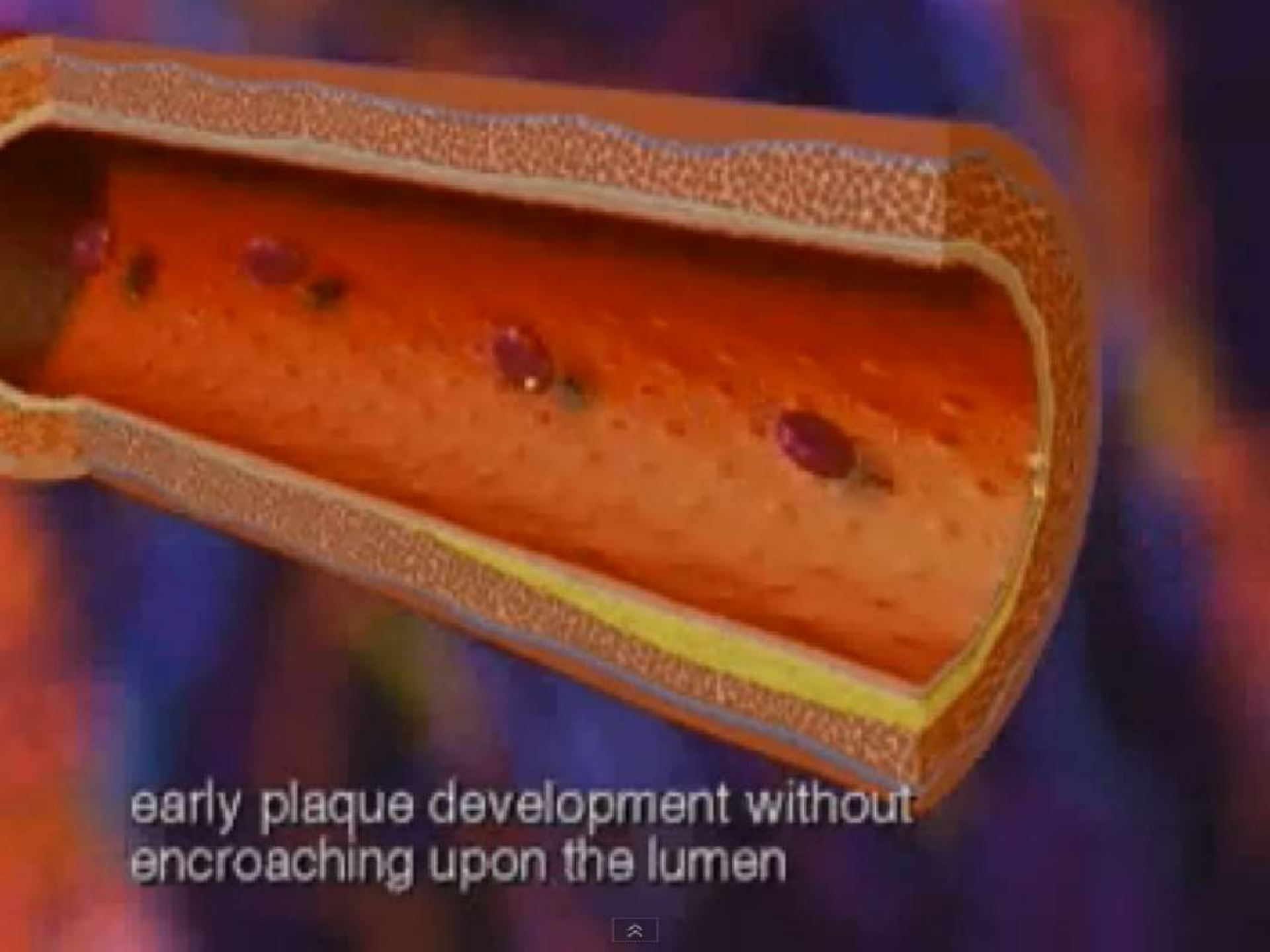
LDL low-density lipoprotein

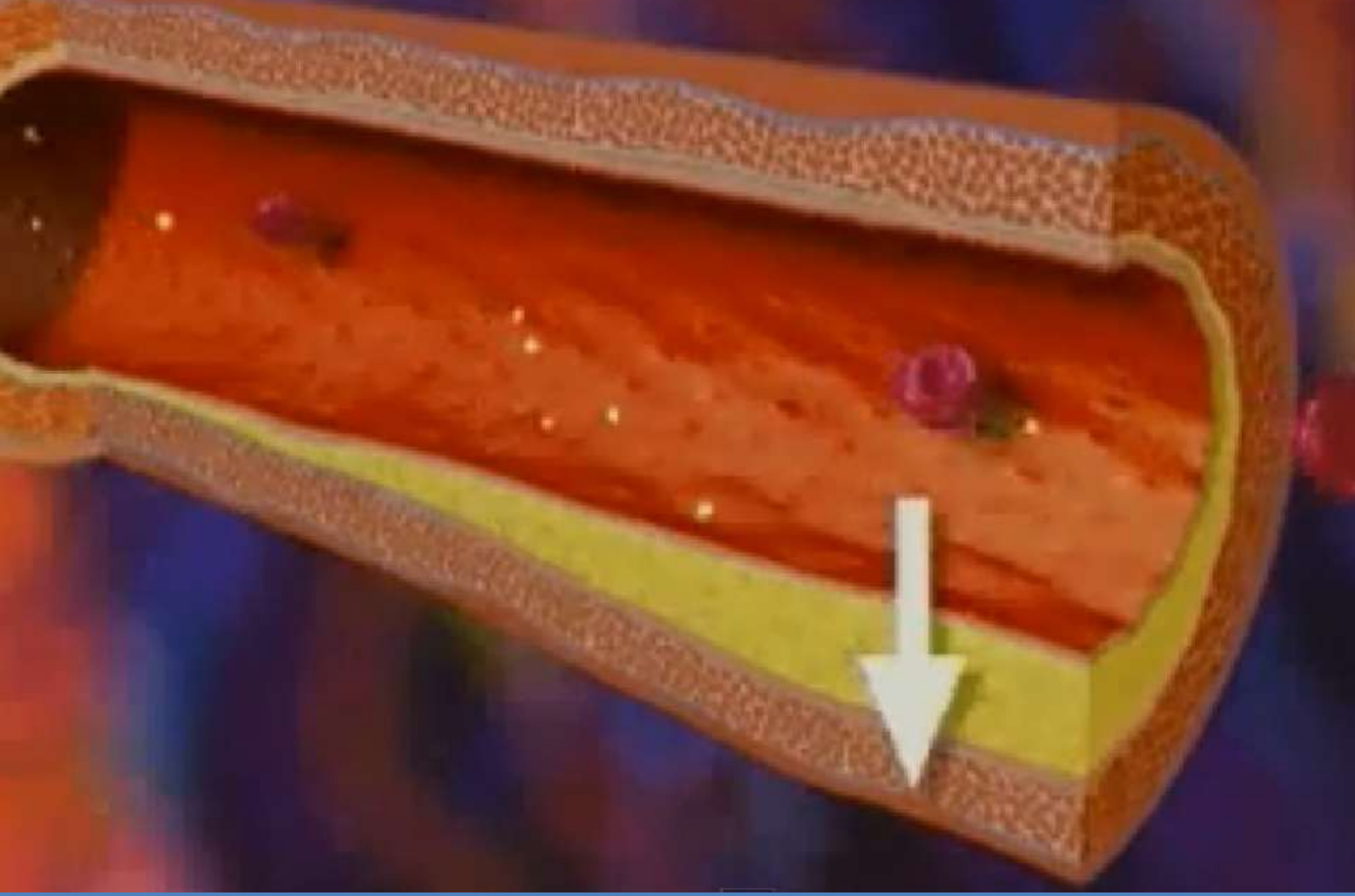

HDL high-density lipoprotein

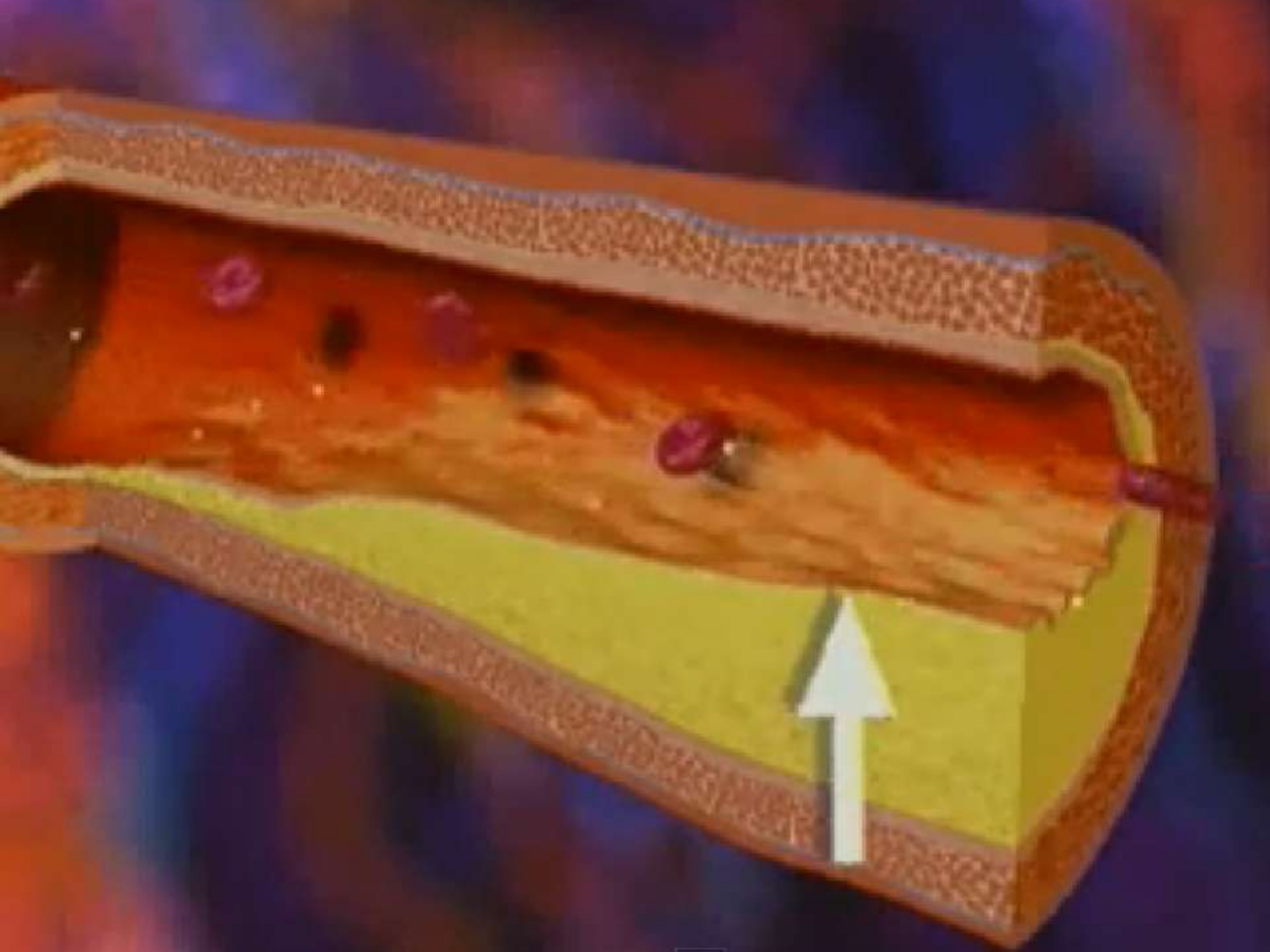
Biology of progression of atherosclerosis



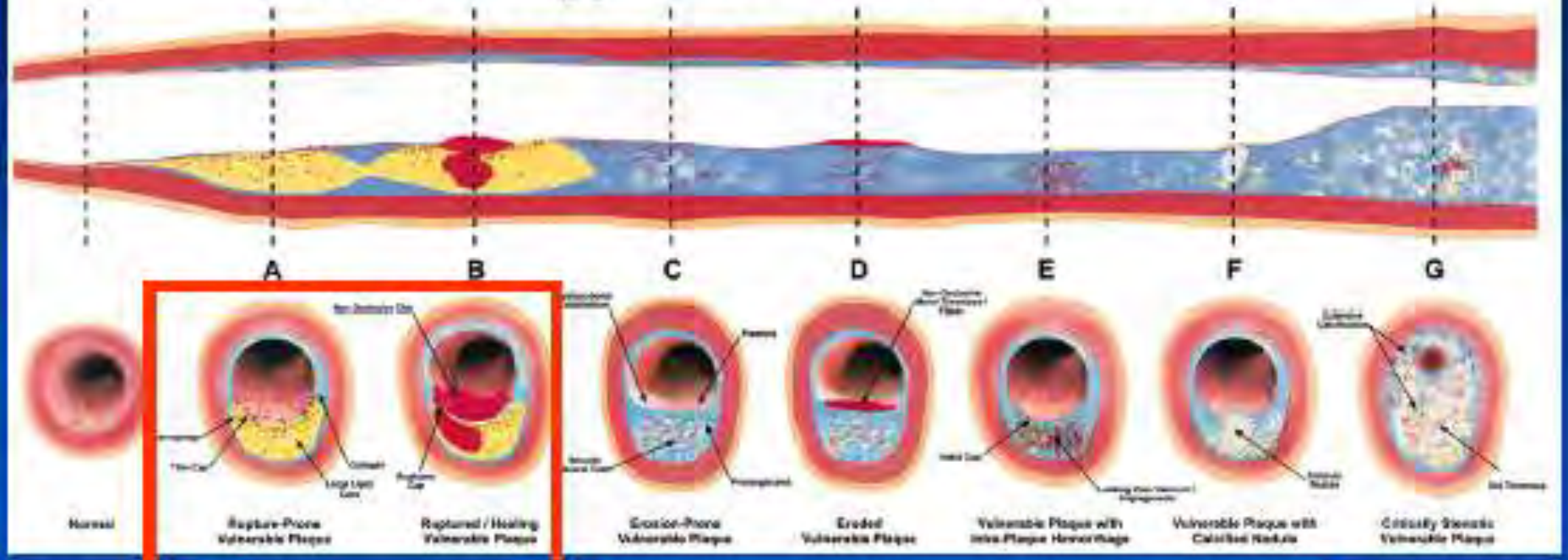
thin fibrous cap
lipid core


early plaque development without
encroaching upon the lumen





Different Types of Vulnerable Plaque

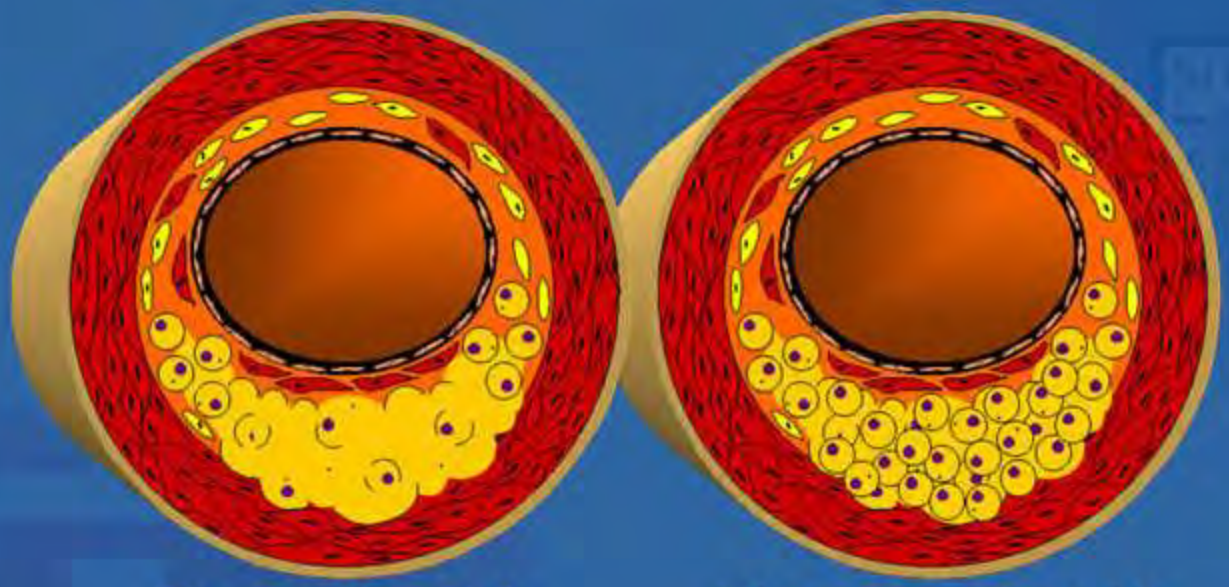


70% of ACS culprit lesions

30% of ACS culprit lesions

Naghavi et al. Circulation 2003;108:1664–72

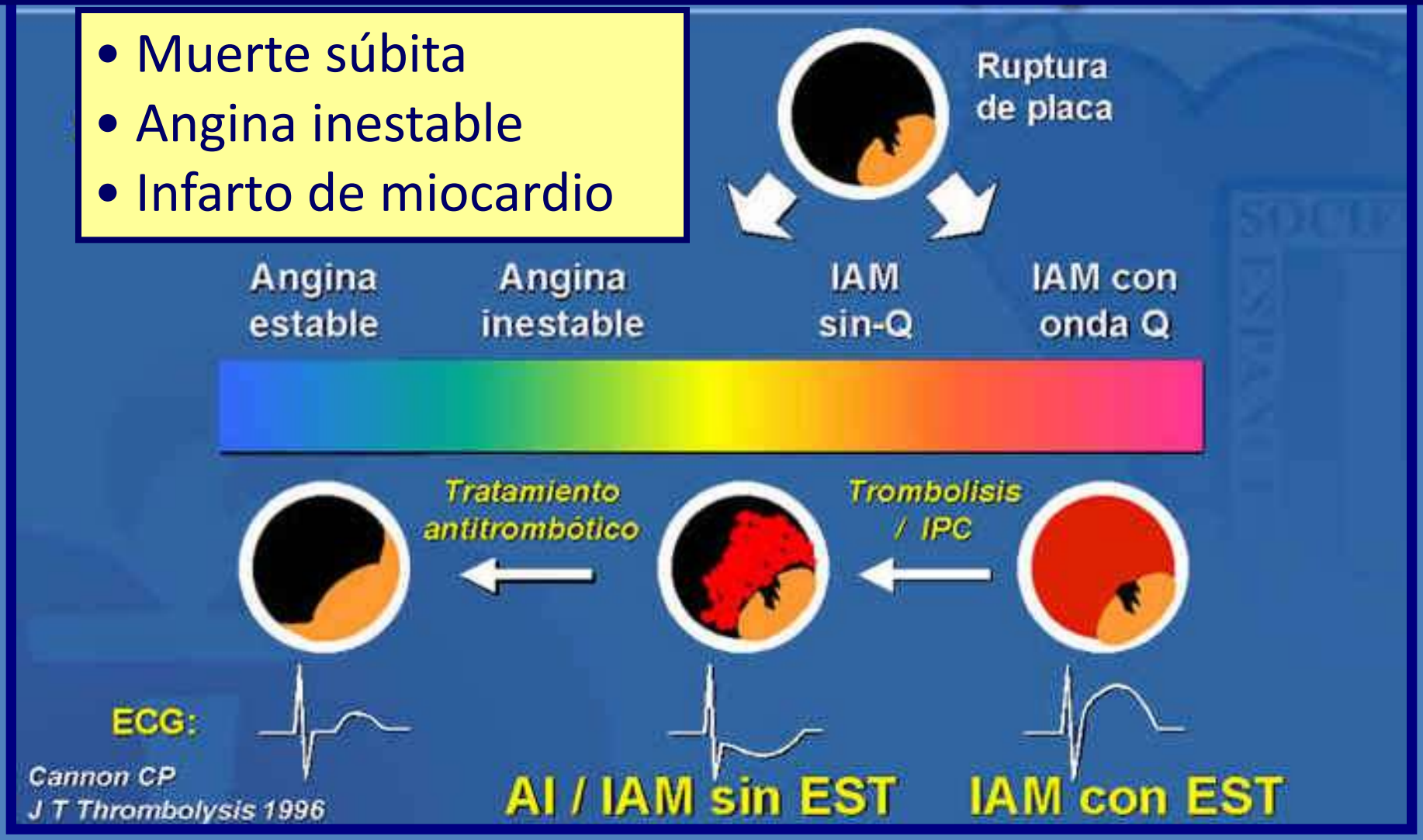
PLACA ATEROMATOSA



Las placas vulnerables se caracterizan por 1) un gran centro formado por lípidos; 2) una cápsula fibrosa fina, y 3) una abundante población de macrófagos, situados en los bordes de la placa..
Por el contrario, las placas no vulnerables contienen pocas partículas lipídicas extracelulares y son más fibrosas, por lo que su rotura es menos frecuente.

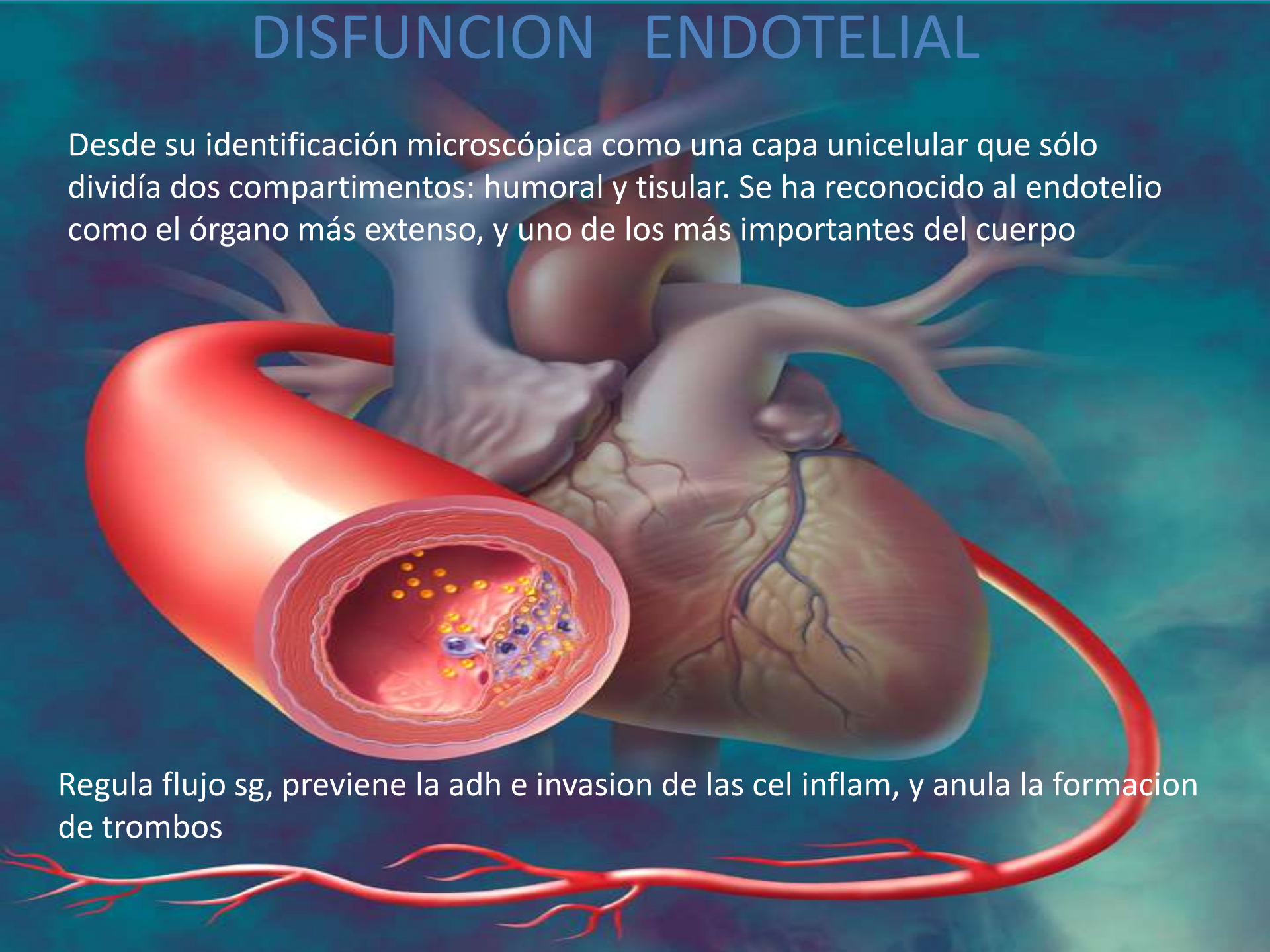
SCA: las consecuencias de la complicación trombótica de una placa de ateroma

- Muerte súbita
- Angina inestable
- Infarto de miocardio



DISFUNCION ENDOTELIAL

Desde su identificación microscópica como una capa unicelular que sólo dividía dos compartimentos: humoral y tisular. Se ha reconocido al endotelio como el órgano más extenso, y uno de los más importantes del cuerpo

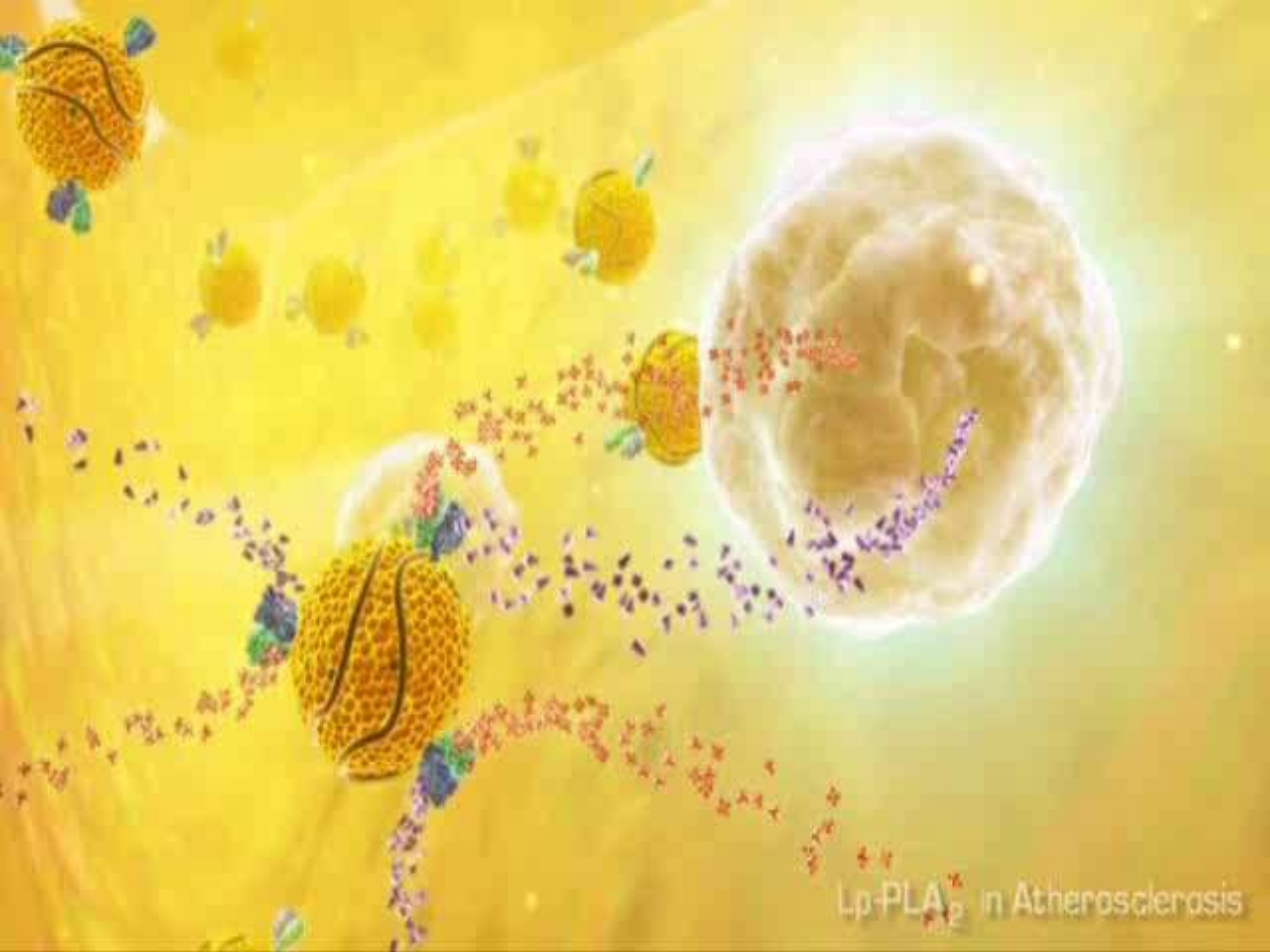


Regula flujo sg, previene la adh e invasion de las cel inflam, y anula la formacion de trombos

Una premonición al estilo de Leonardo Da Vinci

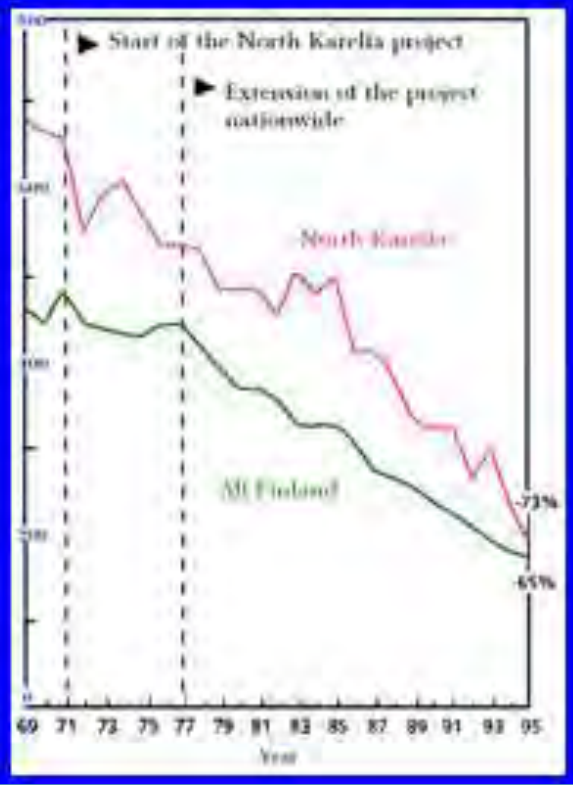
"…Envejecemos en la misma medida que lo hace nuestro endotelio…"

Dr. R. Altschul., 1954.
Endothelium. The MacMillan Company, NewYork, pp. 1–155.


Lp-PLA2 in Atherosclerosis

Age-adjusted mortality rates of coronary heart disease in North Karelia and the whole of Finland among males aged 35-64 years from 1969 to 1995.

Mortality per 100 000 population



REDUCCION :

68% MORTALIDAD CARDIOVASCULAR

73% POR ENFERMEDAD CORONARIA

41% CANCER EN GENERAL

71% CANCER DE PULMON

49% MORTALIDAD GENERAL

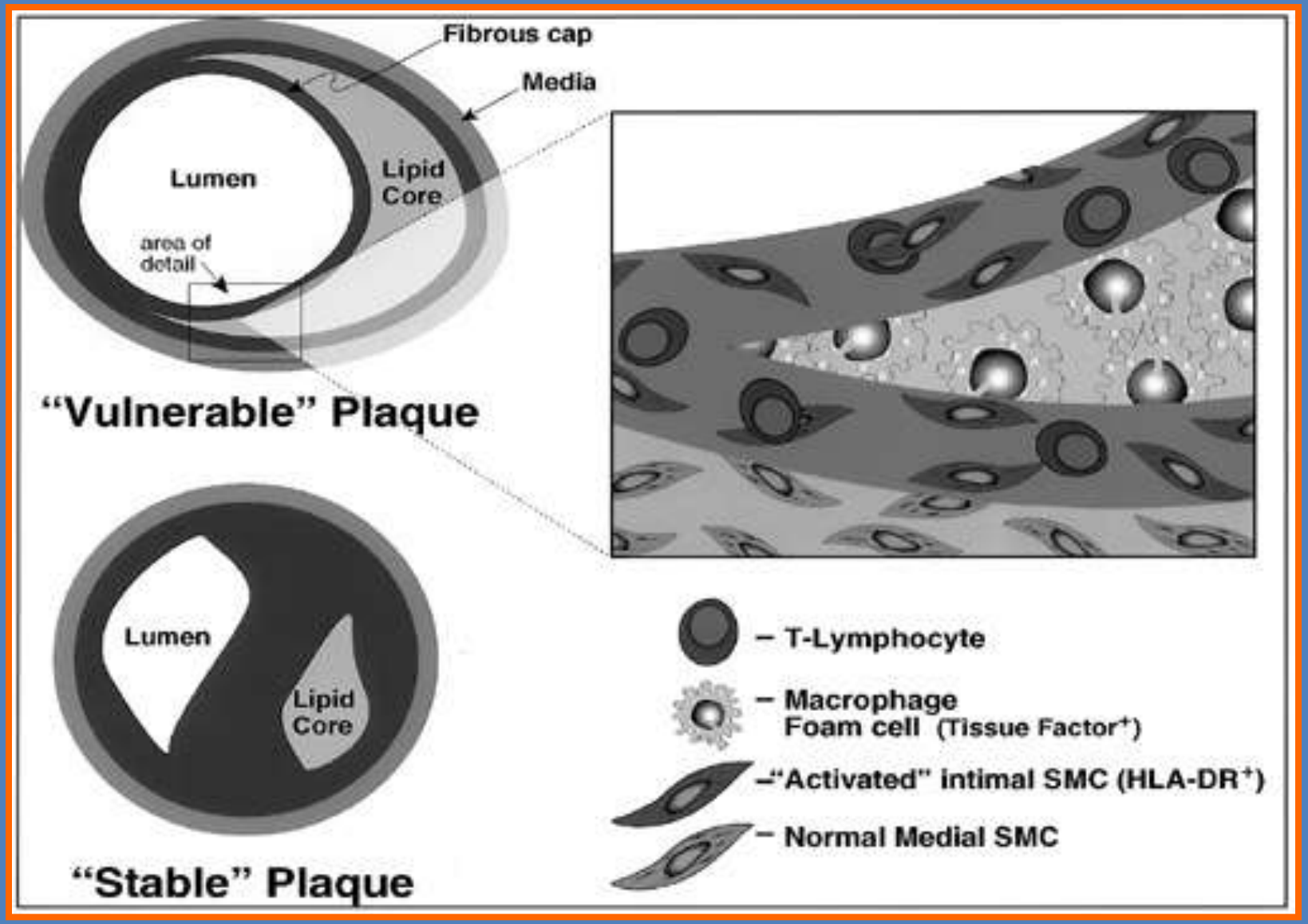
上医医未病之病

中医医将病之病

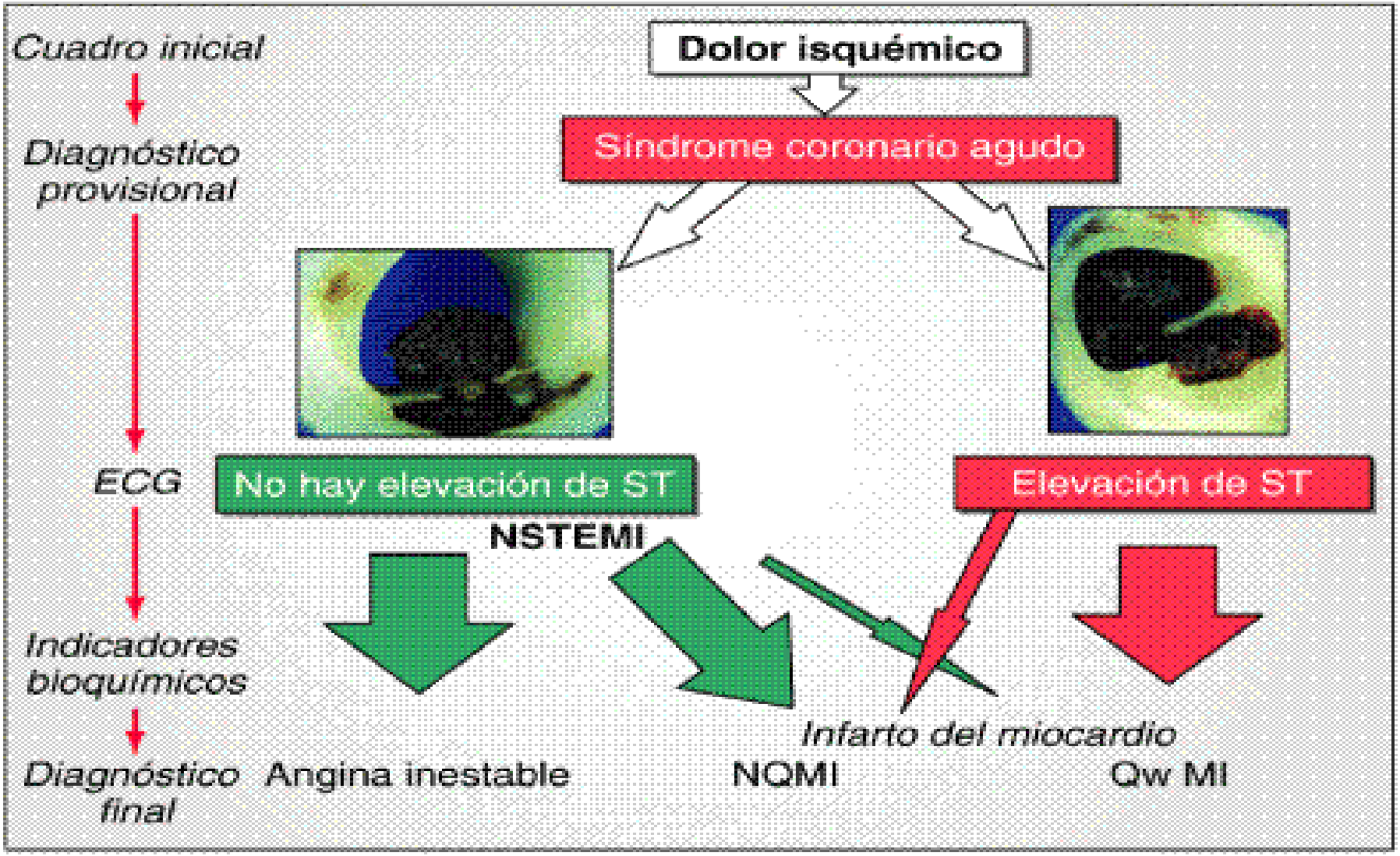
下医医已病之病

～黄帝内経～

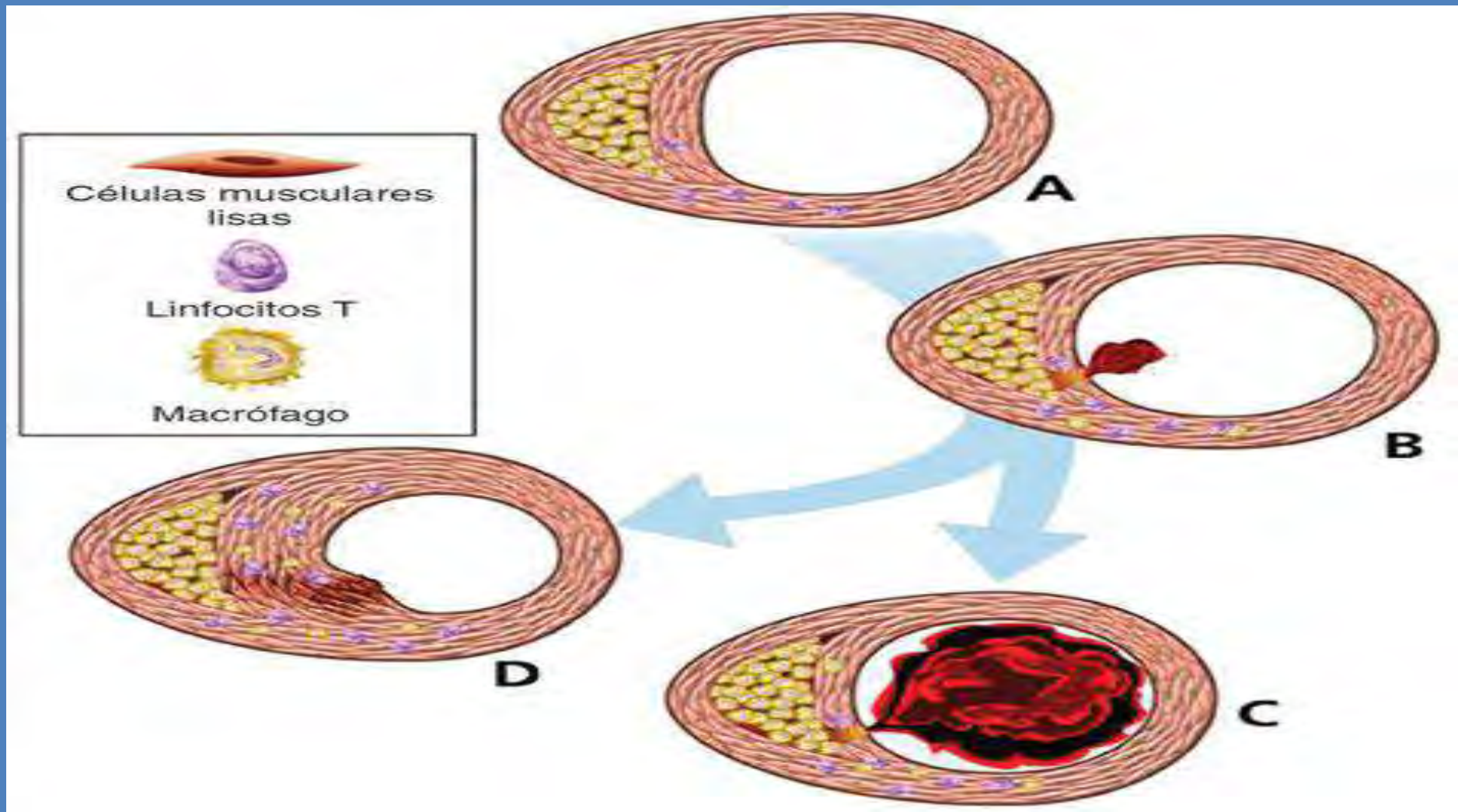
Superior doctors prevent the disease.
Mediocre doctors treat the disease before evident.
Inferior doctors treat the full blown disease.
–Huang Dee: Nai-Ching (2600 B.C. 1st Chinese Medical Text.)

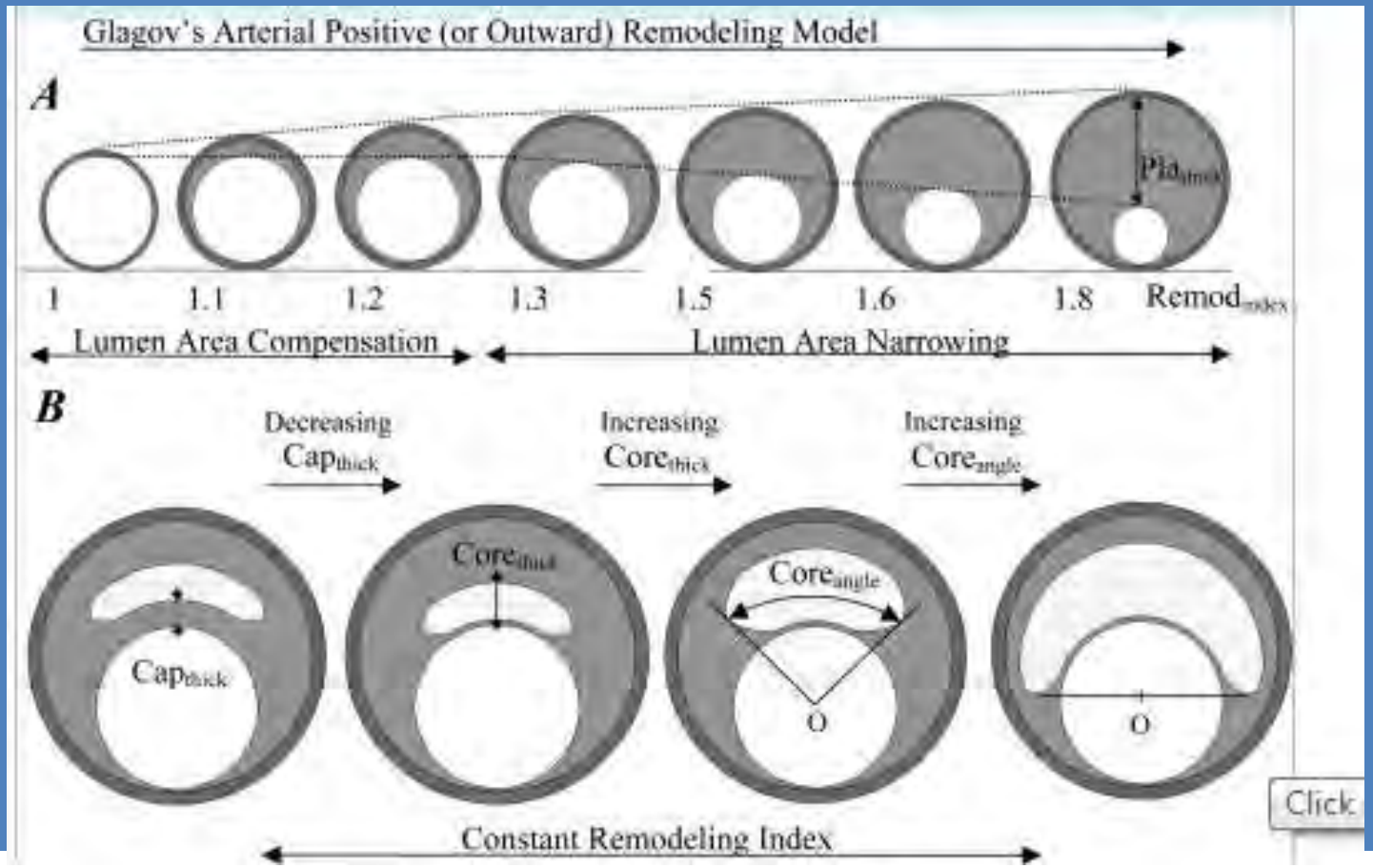

Fibrous cap
Media
Lumen
Lipid Core
area of detail
"Vulnerable" Plaque
Lumen
Lipid Core
"Stable" Plaque
– T-Lymphocyte
– Macrophage Foam cell (Tissue Factor+)
–"Activated" intimal SMC (HLA-DR+)
– Normal Medial SMC

Fisiopatología.



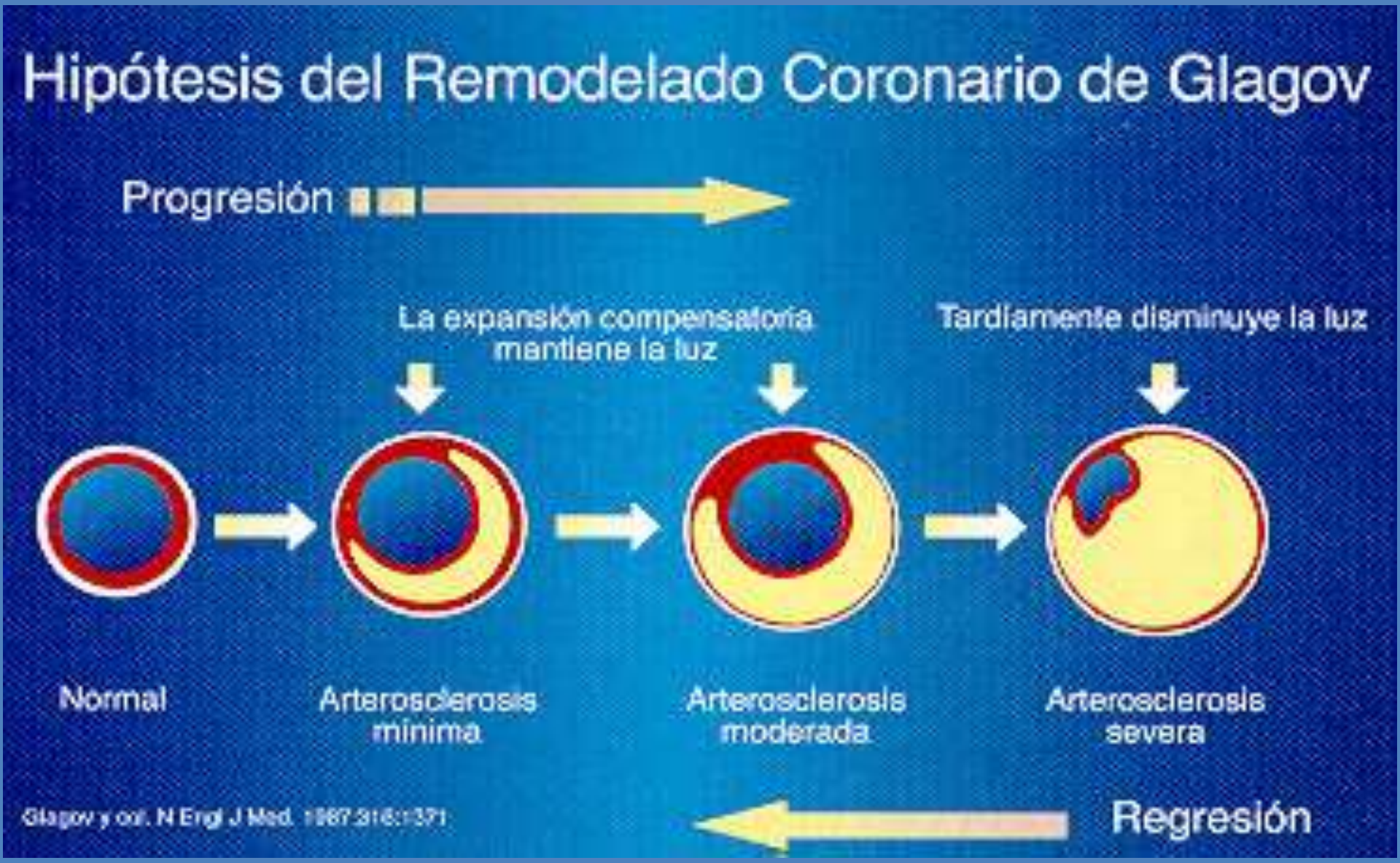
Rotura, trombosis y cicatrización.



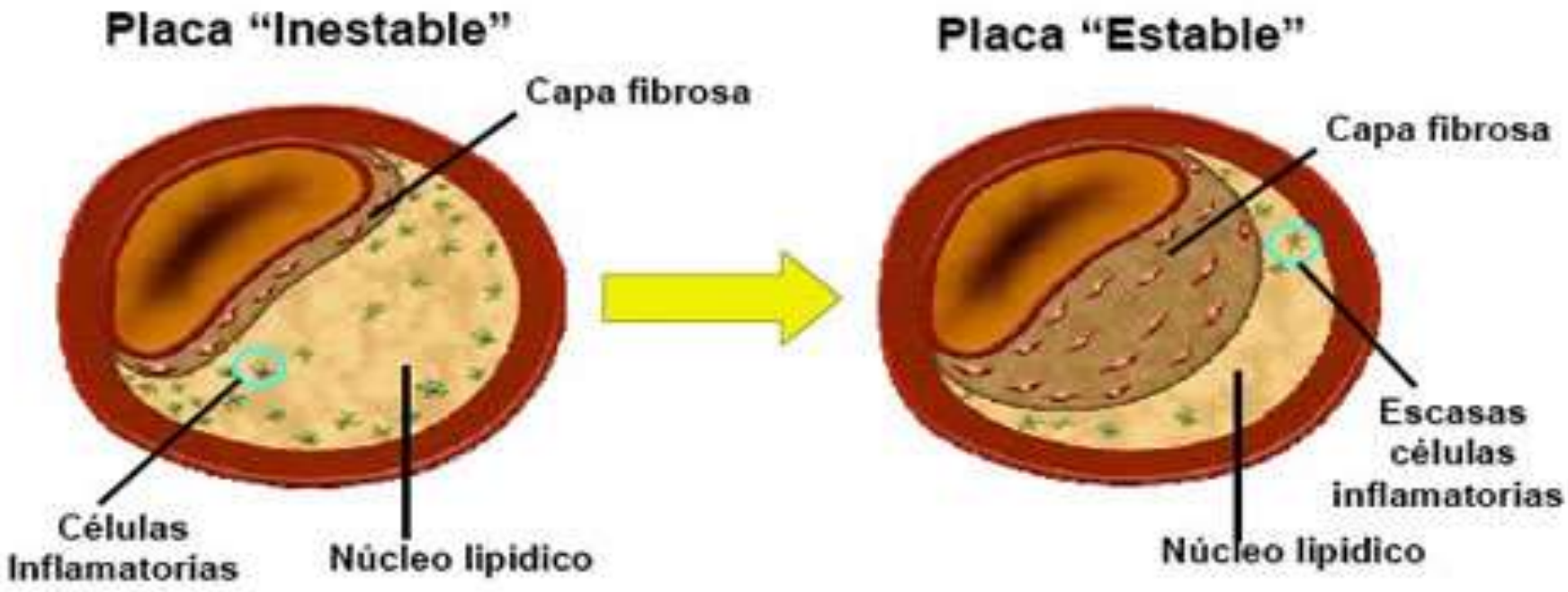


Atherosclerotic vessel growth model used in the computational simulations. *A*: schematic description of the positive coronary remodeling described by Glagov et al. (14) and included in our model. Pla_{thick}, plaque thickness; $Remod_{index}$, arterial remodeling index. *B*: for a given remodeling index, the main parameters describing plaque morphology, i.e., cap thickness (Cap_{thick}), necrotic core thickness ($Core_{thick}$), and necrotic core arc angle ($Core_{angle}$), were varied. A total of 5,500 distinct plaque geometries were considered. Dark gray, arterial wall; gray, fibrosis; light gray, necrotic core.

Hipótesis del Remodelado Coronario de Glagov

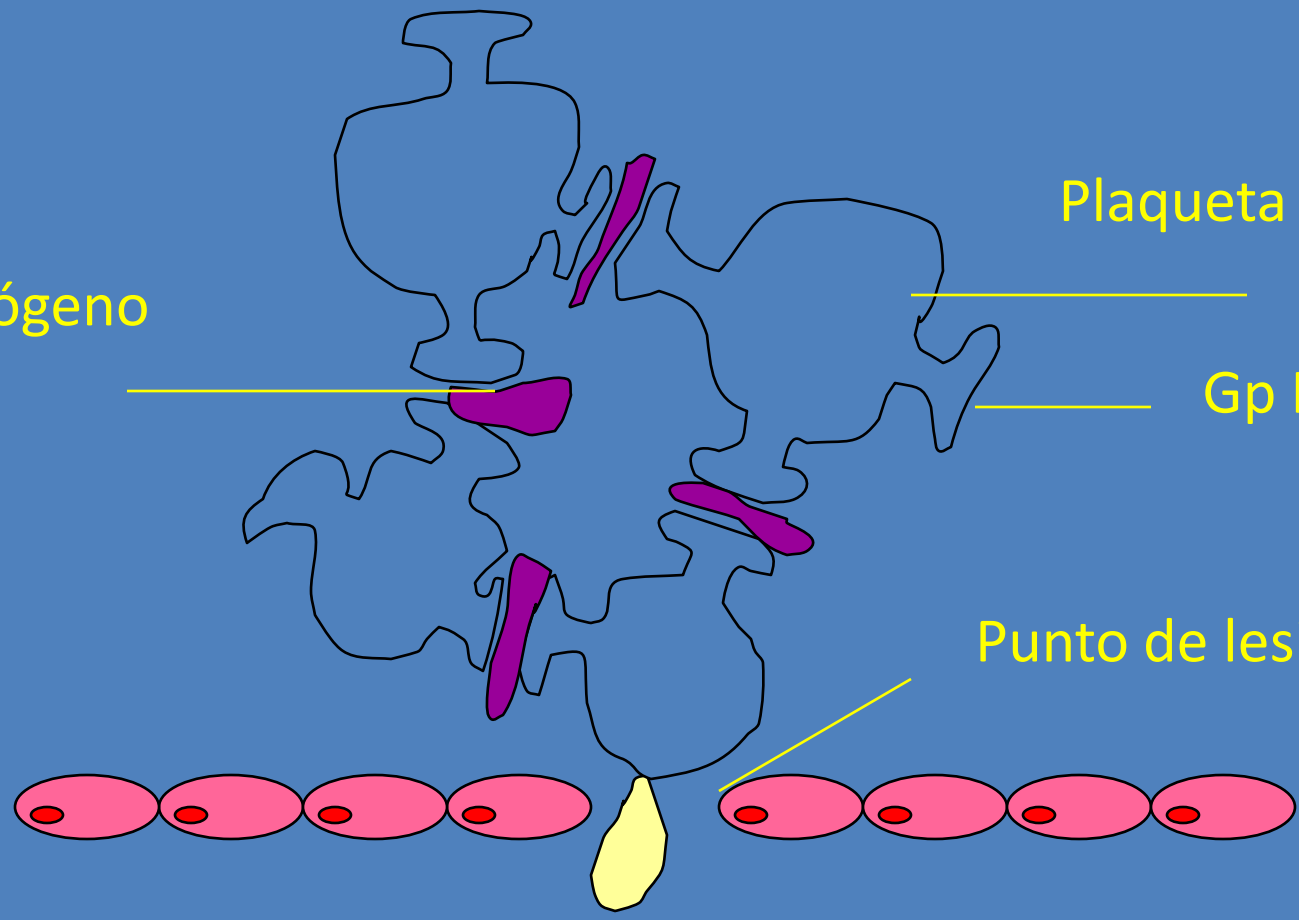


Placa Aterosclerótica.

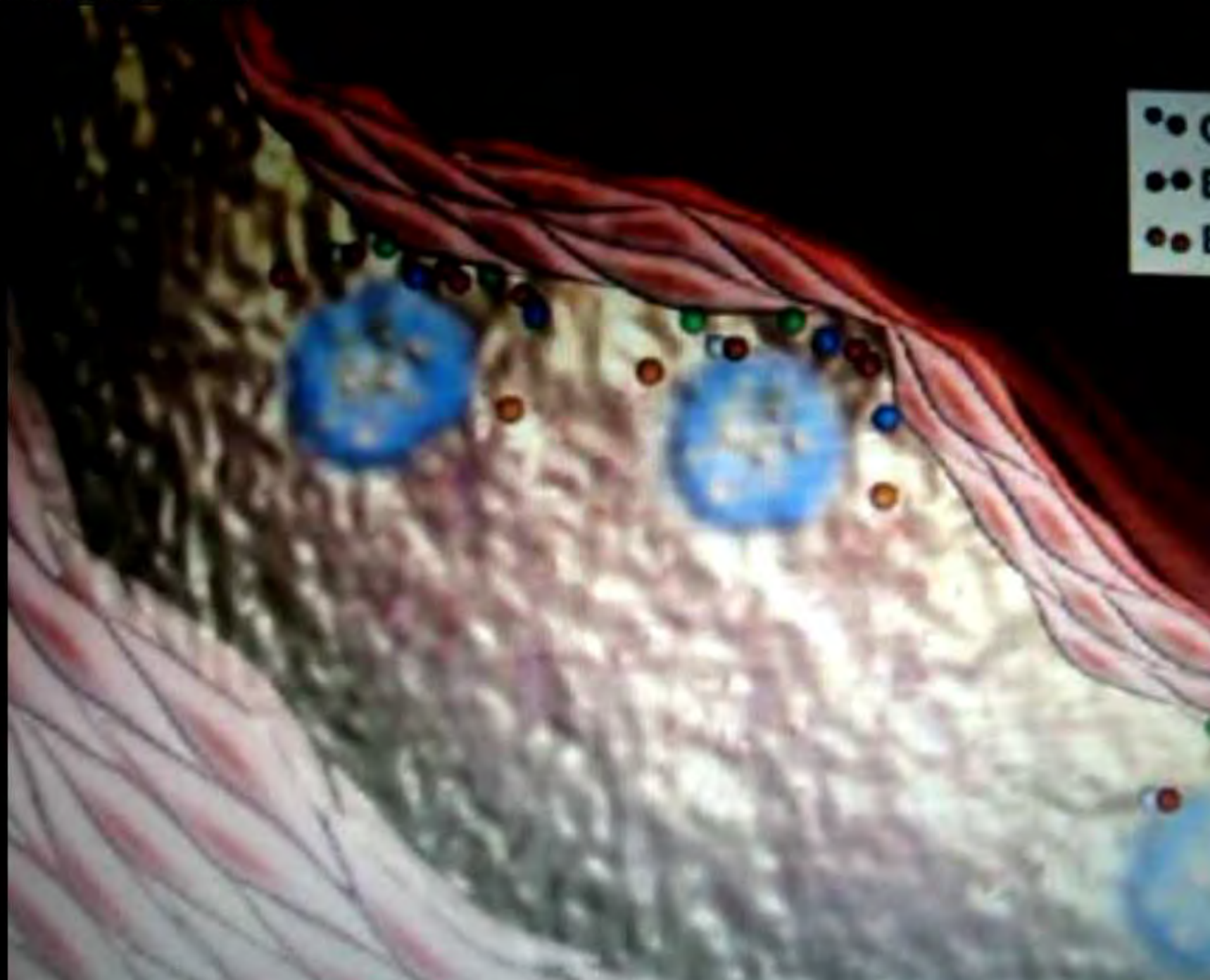


ACTIVACIÓN PLAQUETAR

Adhesión → Agregación

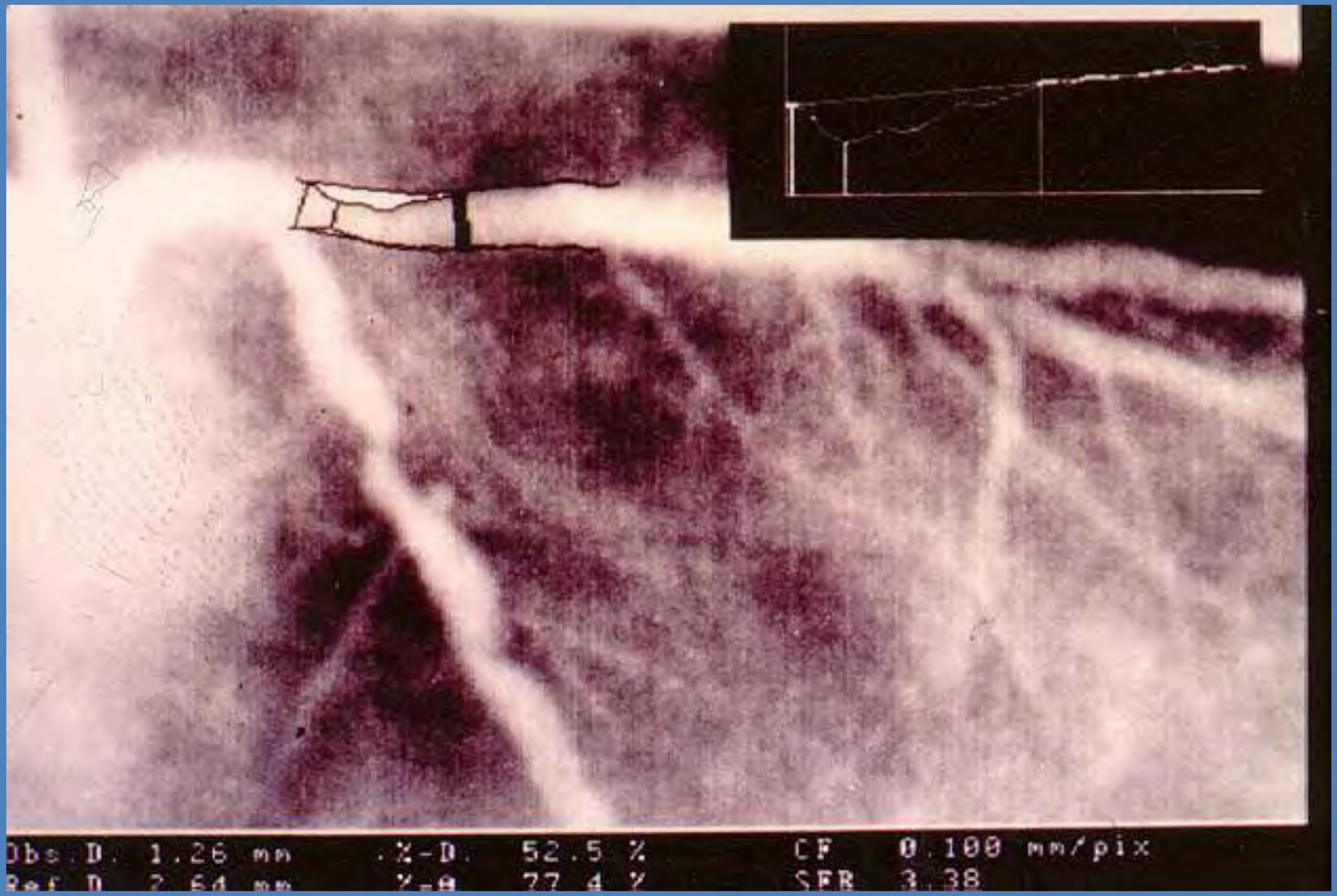


ATEROSCLEROSIS FISIOPATOLOGIA

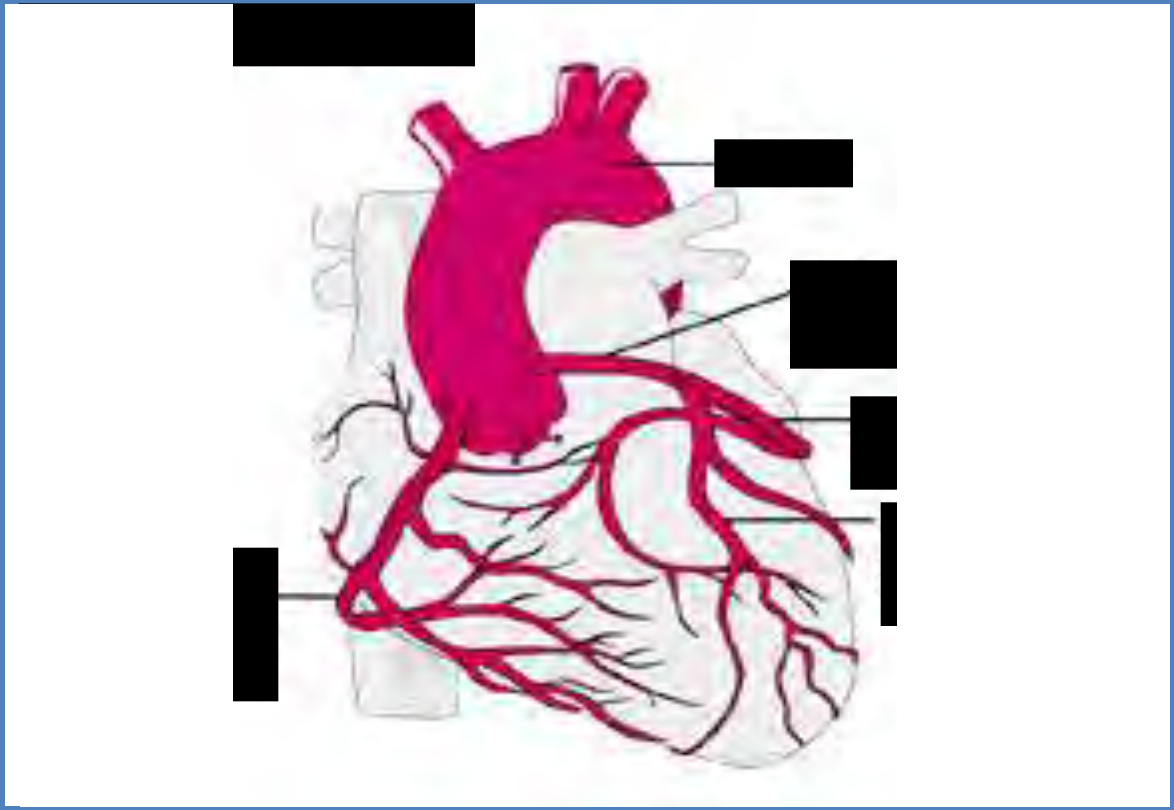


ATEROSCLEROSIS FISIOPATOLOGIA

Plaquetas

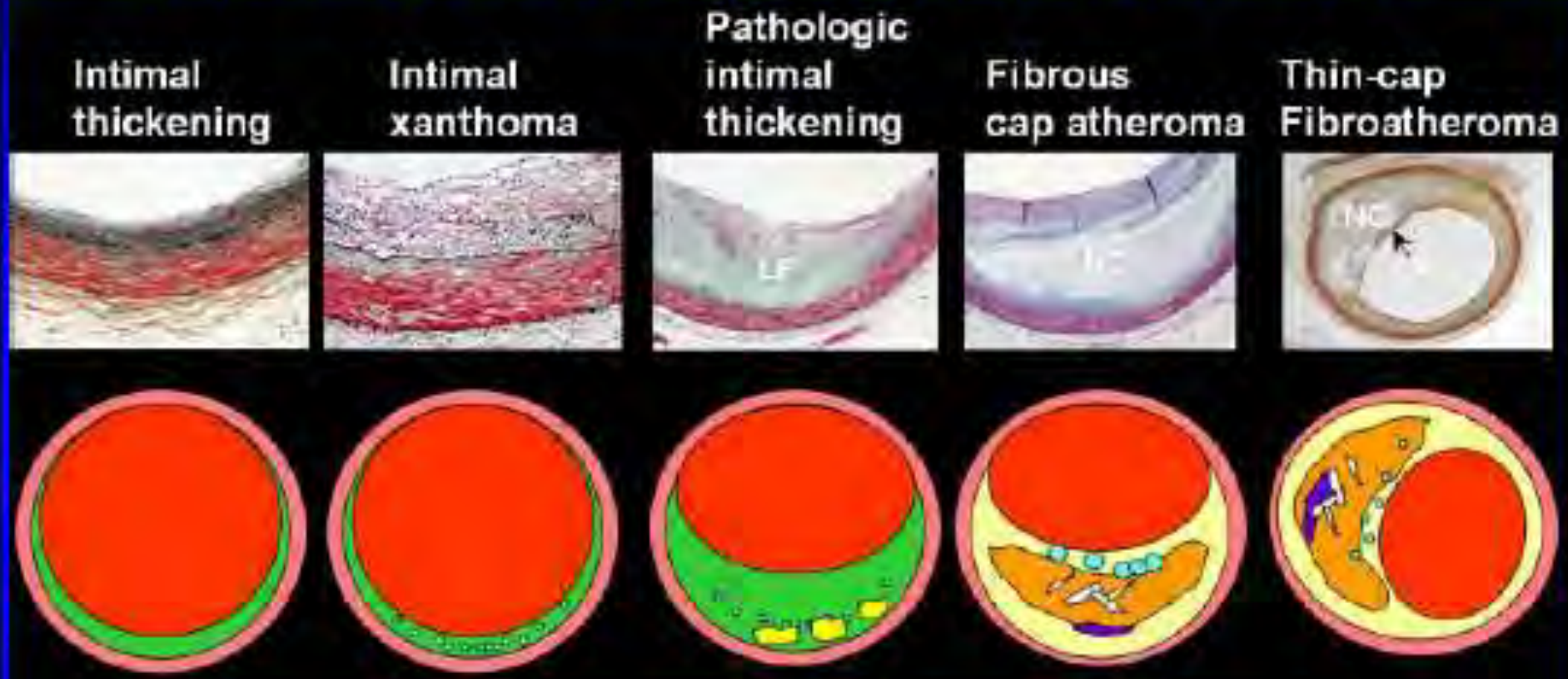

Obs.D. 1.26 mm
%-D. 52.5 %
CF 0.100 mm/pix
Ref.D. 2.64 mm
%-A 77.4 %
SFR 3.38

Fisiopatología de la Enfermedad Coronaria



Dr Alejandro Martínez
2006

Development of Human Coronary Atherosclerosis



- Smooth muscle cells
- Macrophage foam cells
- Extracellular lipid
- Cholesterol clefts
- Necrotic core
- Calcified plaque
- Hemorrhage
- Thrombus
- Healed thrombus
- Collagen

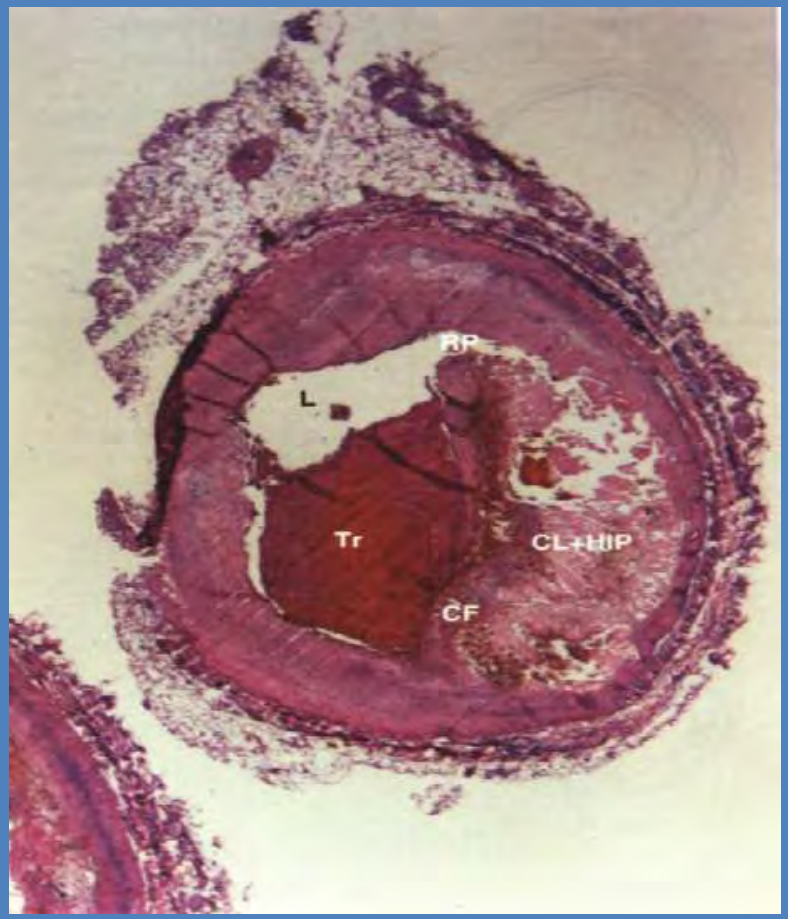
Fisiopatología:

La disrupción de la placa ateromatosa se considera hoy en día como el sustrato fisiopatológico de los SCA

↓

ACCIDENTE DE PLACA

ACCIDENTE DE PLACA



Placa vulnerable

Factores precipitantes

Formación de un trombo

ACCIDENTE DE PLACA

PLACA BLANDA VULNERABLE O INESTABLE

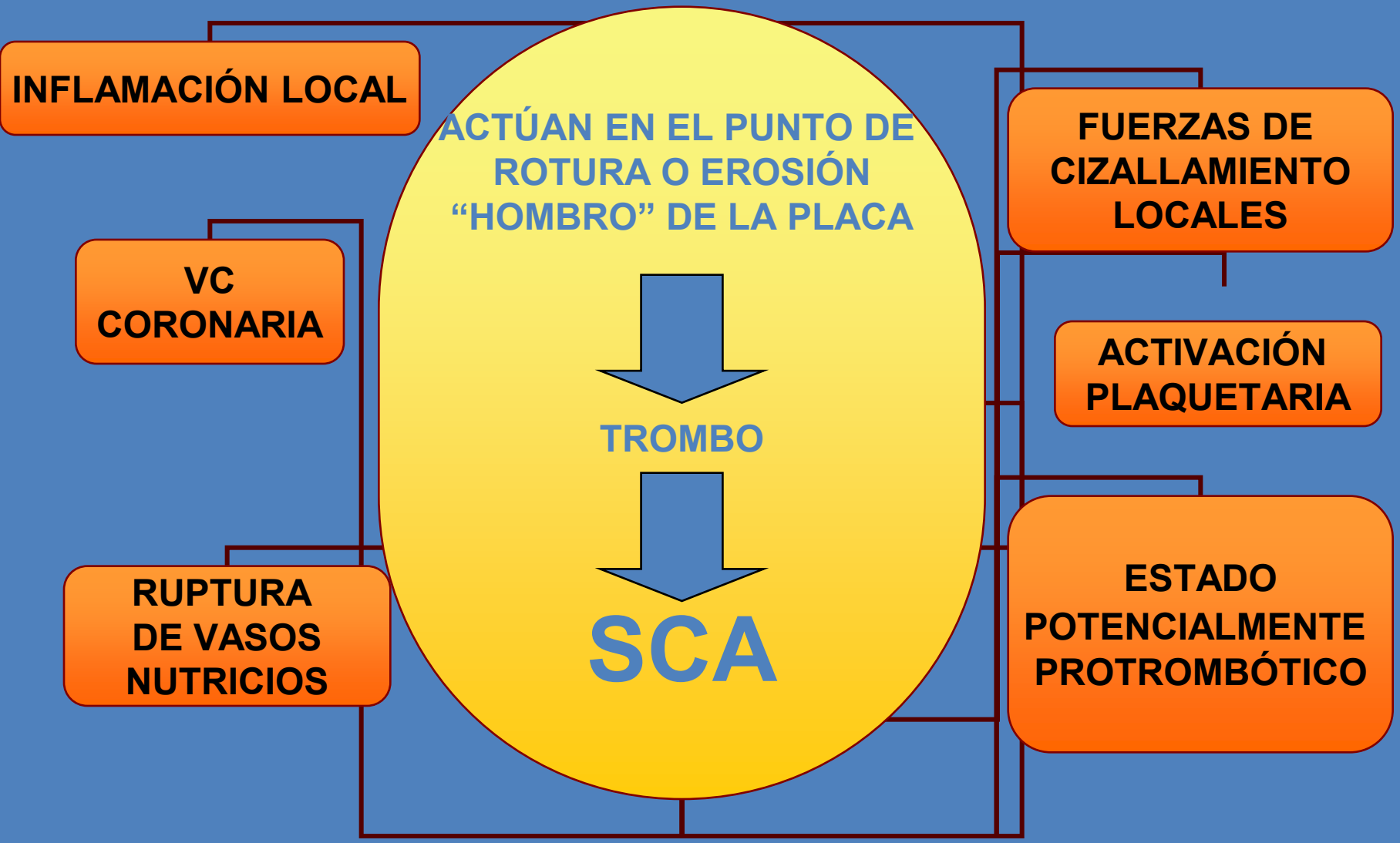
PLACAS “JÓVENES “ CARGADAS DE LÍPIDOS (COLESTEROL)

LESIONES QUE PRODUCEN UNA ESTENOSIS < 50%

CONTENIDO DE MACRÓFAGOS Y FACTOR TISULAR

CONTENIDO DE ENZIMAS METALOPROTEINASAS QUE DEGRADAN COMPONENTES DE LA MATRIZ INSTERTICIAL PROTECTORA

Múltiples factores que precipitan la ruptura de la placa



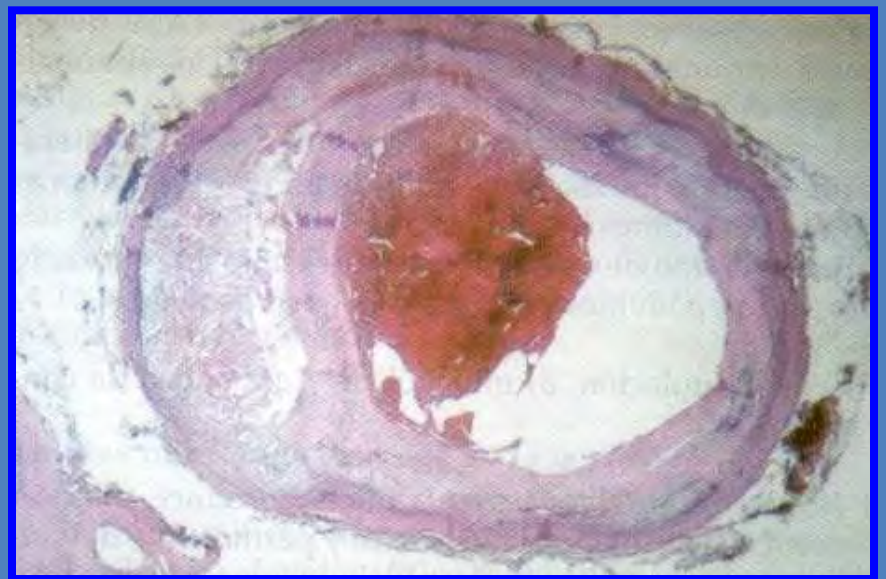
Oclusión coronaria

I.A.M.

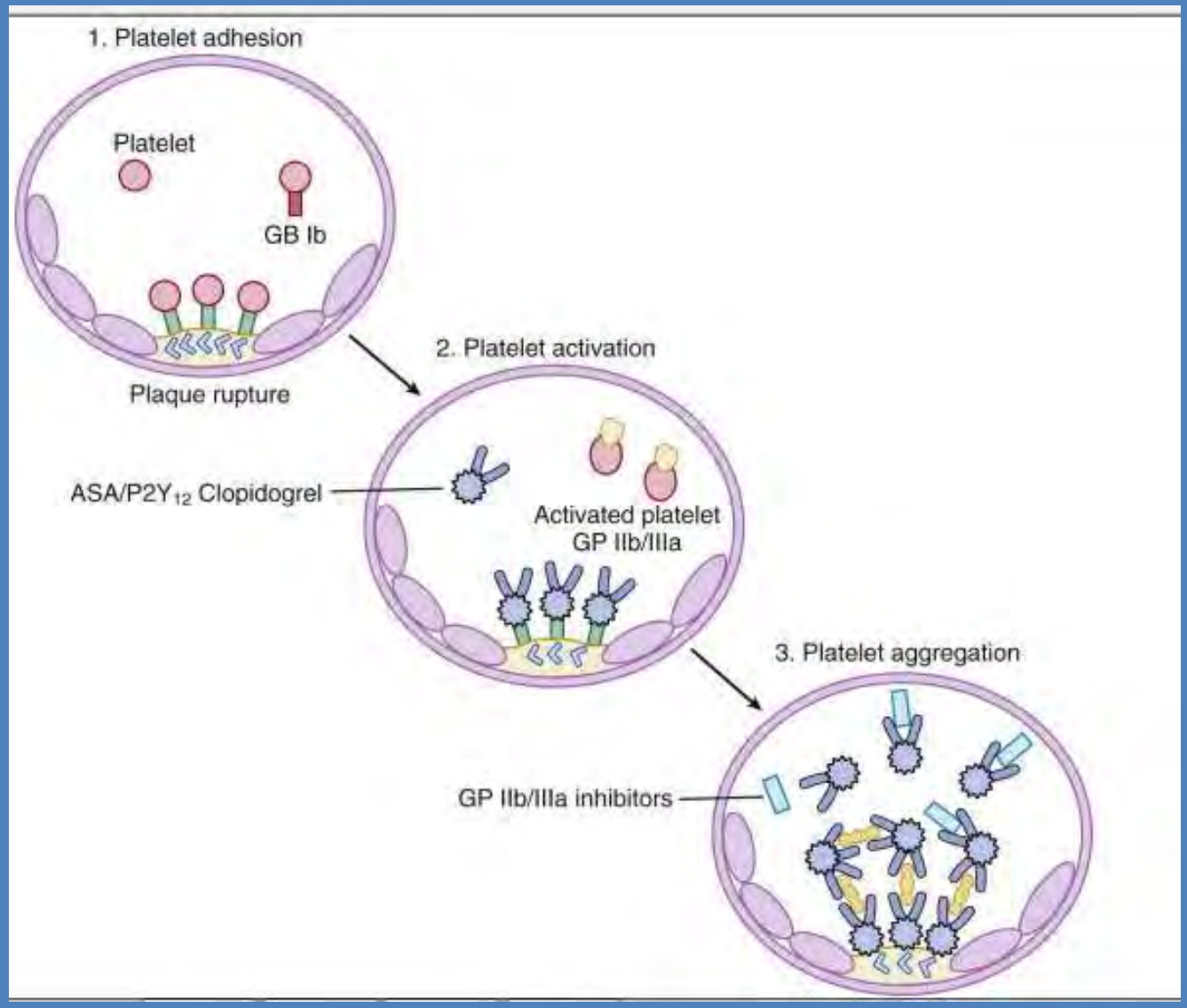
PLACA
RUPTURA
TROMBOSIS
NECROSIS

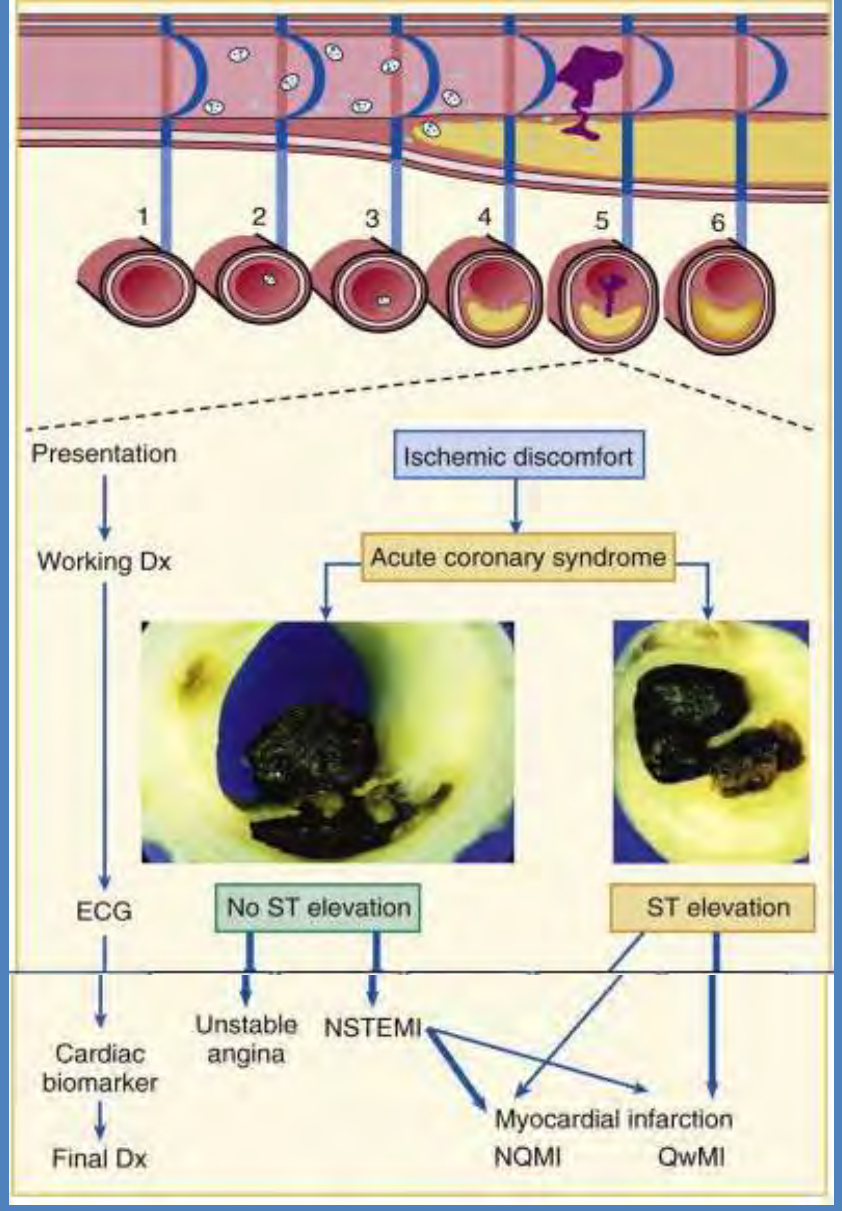
ANGINA INESTABLE

PLACA
RUPTURA
TROMBOSIS
LISIS
REPERFUSION



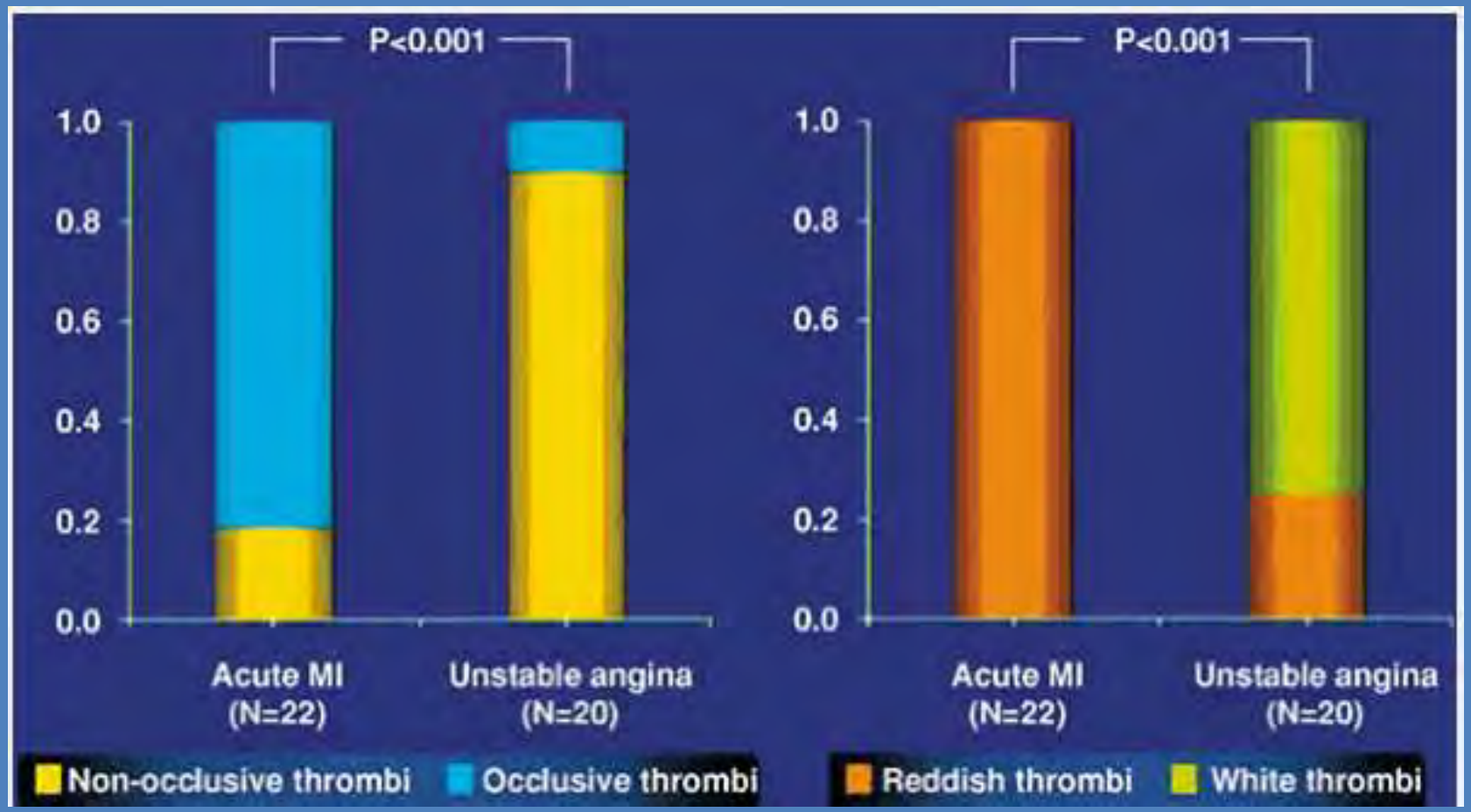
Participación Plaquetaria





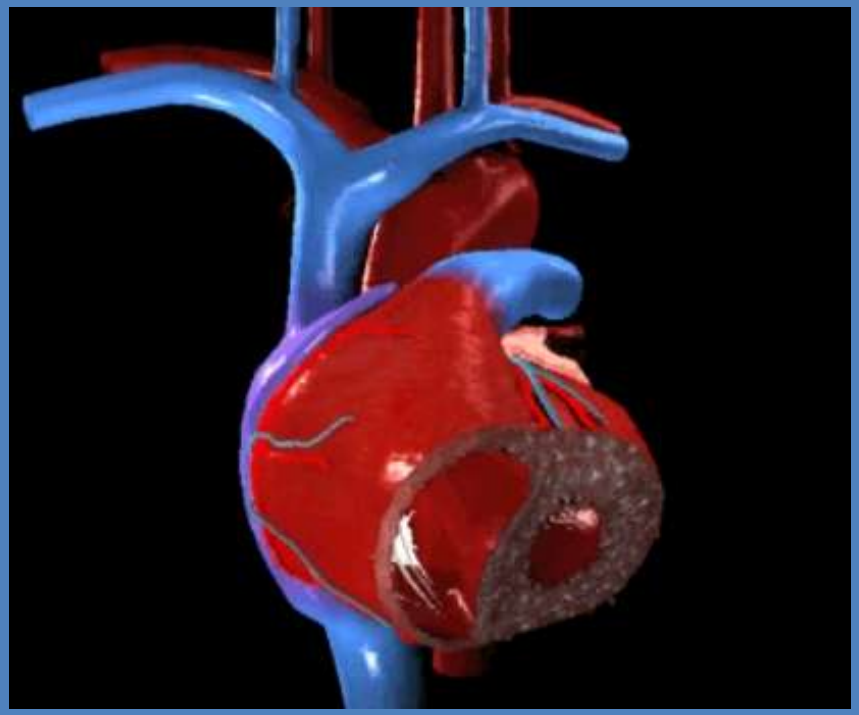
(Modified Antman EM, Anbe DT, Armstrong PW, et al: ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines [Committee to Revise the 1999 Guidelines for the Management of Patients with Acute Myocardial Infarction]. Circulation 110:e82, 2004.)

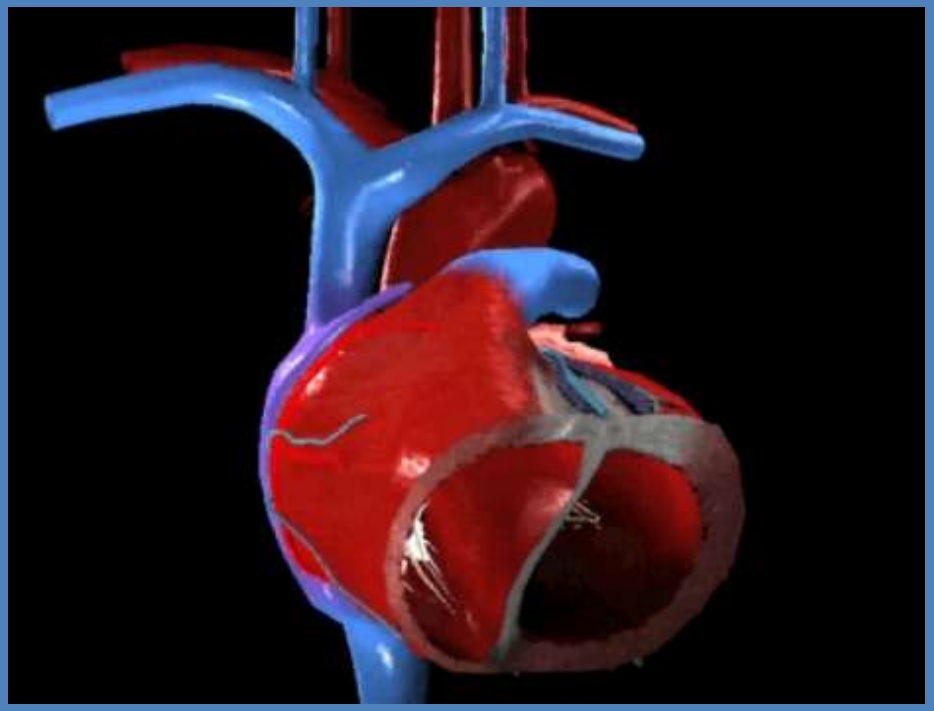
Trombo Oclusivo vs Trombo No Oclusivo



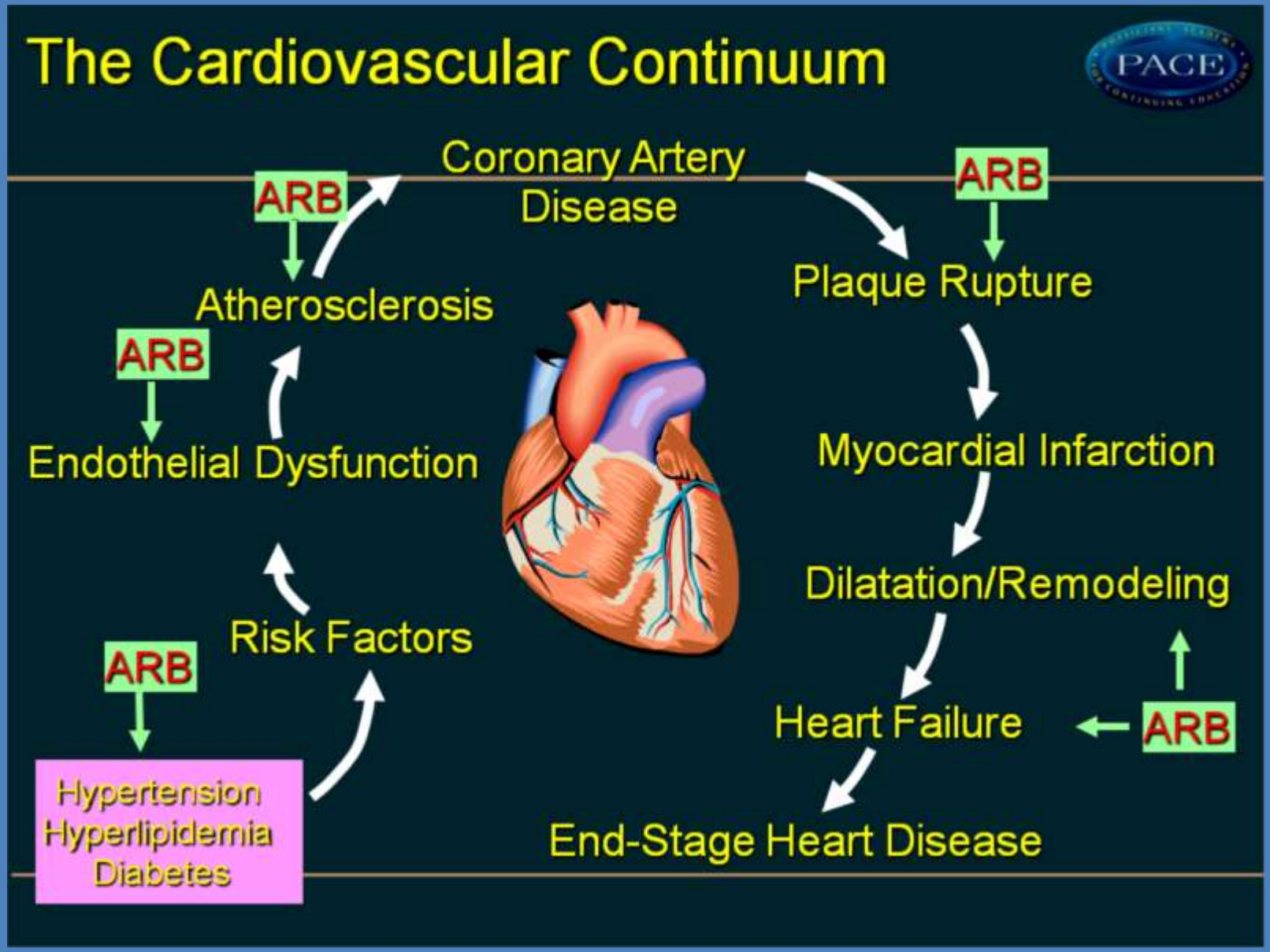
Redrawn from Mizuno K. Angioscopy in acute coronary syndromes. Cardiology Today 1992;20:1

Disfunción Diastólica - Sistólica





The Cardiovascular Continuum

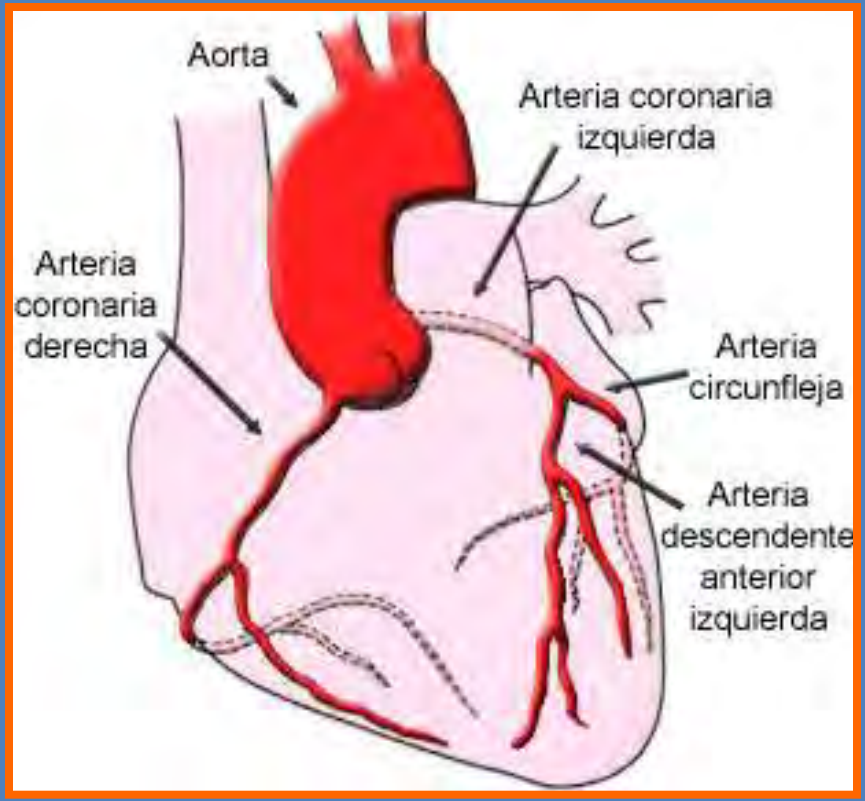


Fisiopatología: ATEROTROMBOSIS

- Un proceso de lesión mecánica, inflamación, reparación y cicatrización, desequilibrada por factores de riesgo.

- Ese proceso tiene lugar en un territorio delicado: ese desequilibrio tiene importantes consecuencias

El Arbol Coronario



Daño en la Cápsula de

PLACA VULNERABLE

(mecánico, inflamatorio)

- Contacto de factor tisular con la sangre

Capa de plaquetas, mínimo trombo

Progresión de la lesion

REPARACION (cicatrización) o PLACA ESTABLE

Gran daño en la cápsula o factores trombogenicos

TROMBO OCLUSIVO

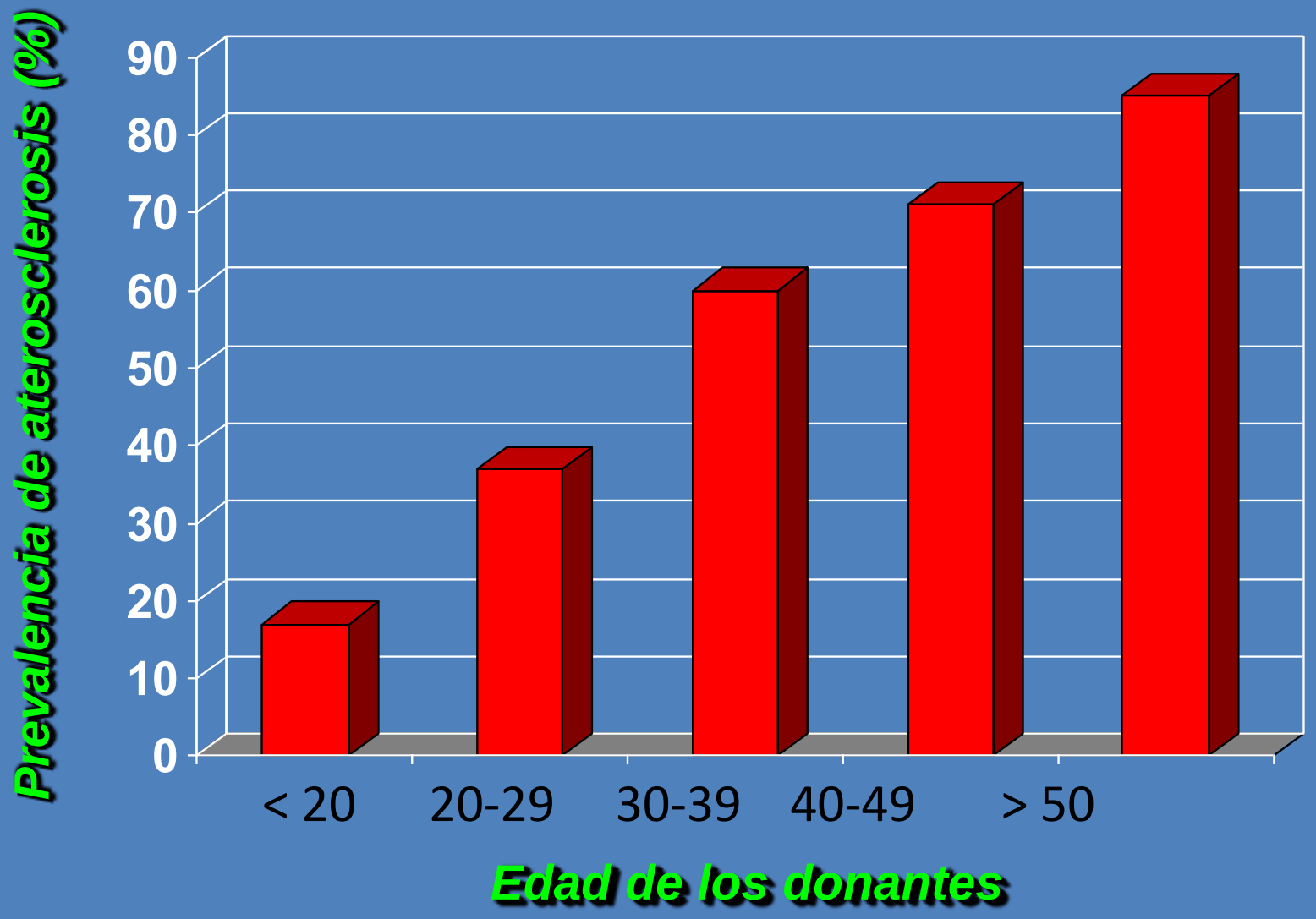
Plaquetas+ trombina+fibrina y hematies

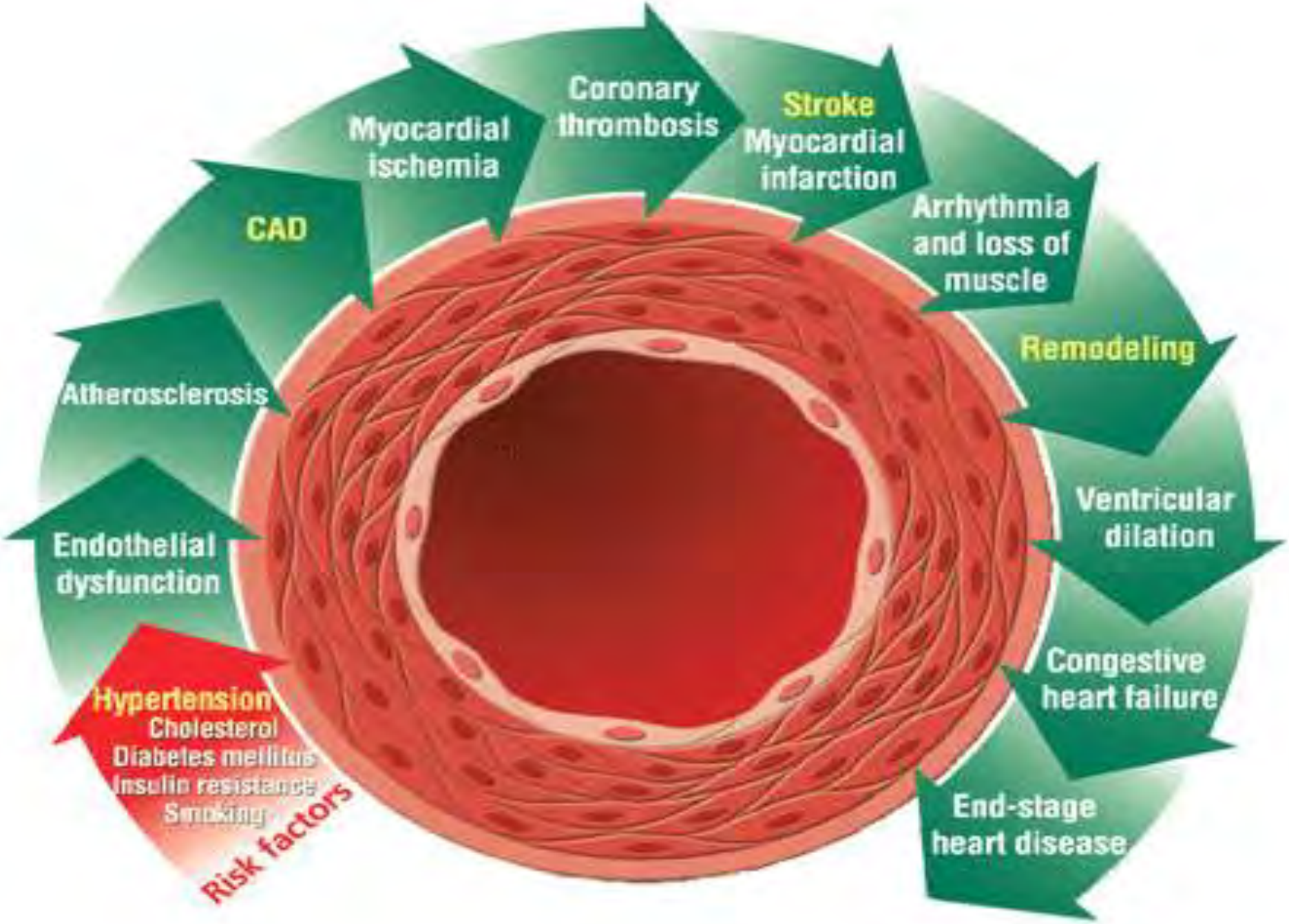
TROMBO MURAL O LABIL.

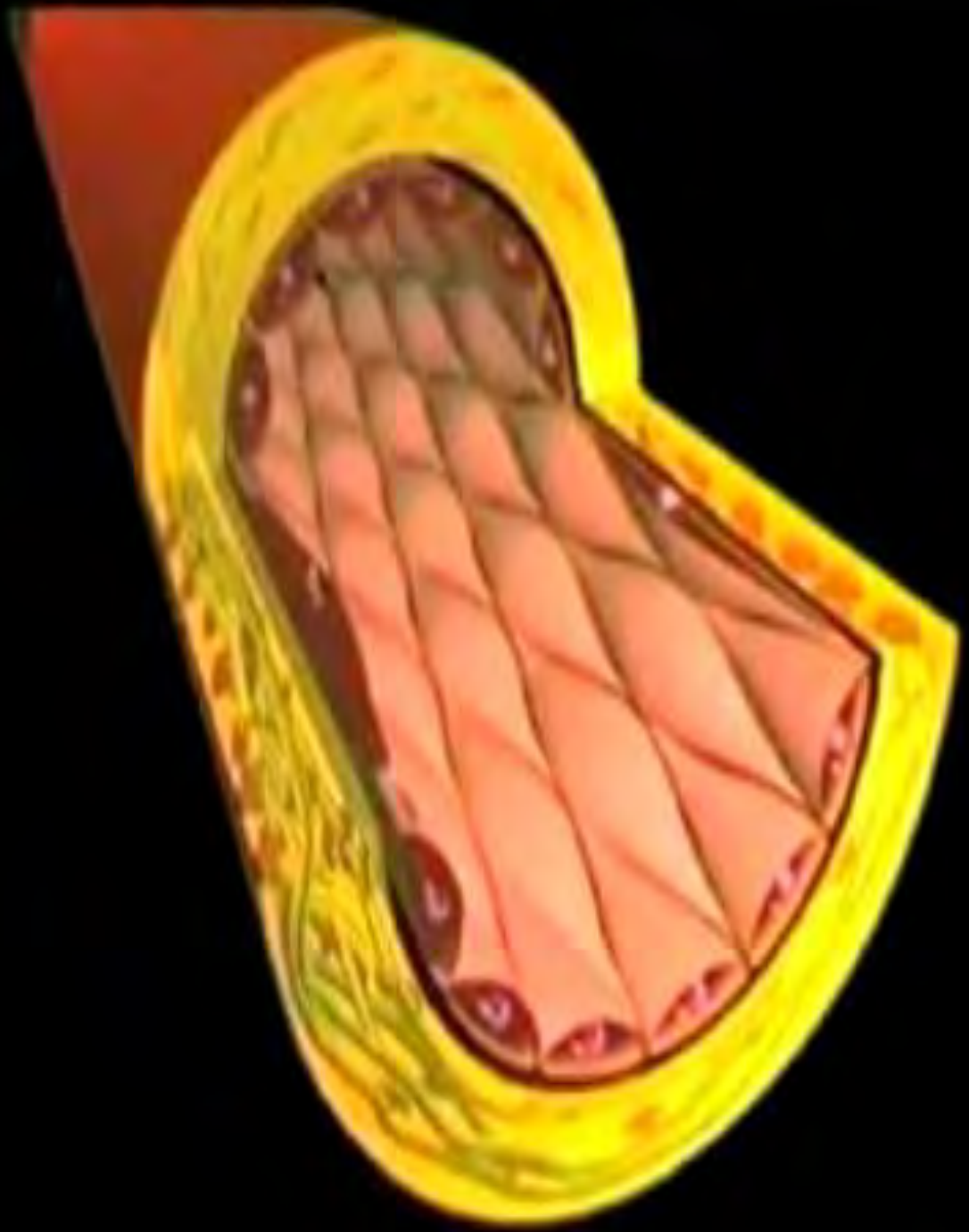
Isquemia. Gran crecimiento de la placa,

Posible isquemia continuada. Puede seguir **vulnerable**, Puede embolizar

Prevalencia de la aterosclerosis según la edad



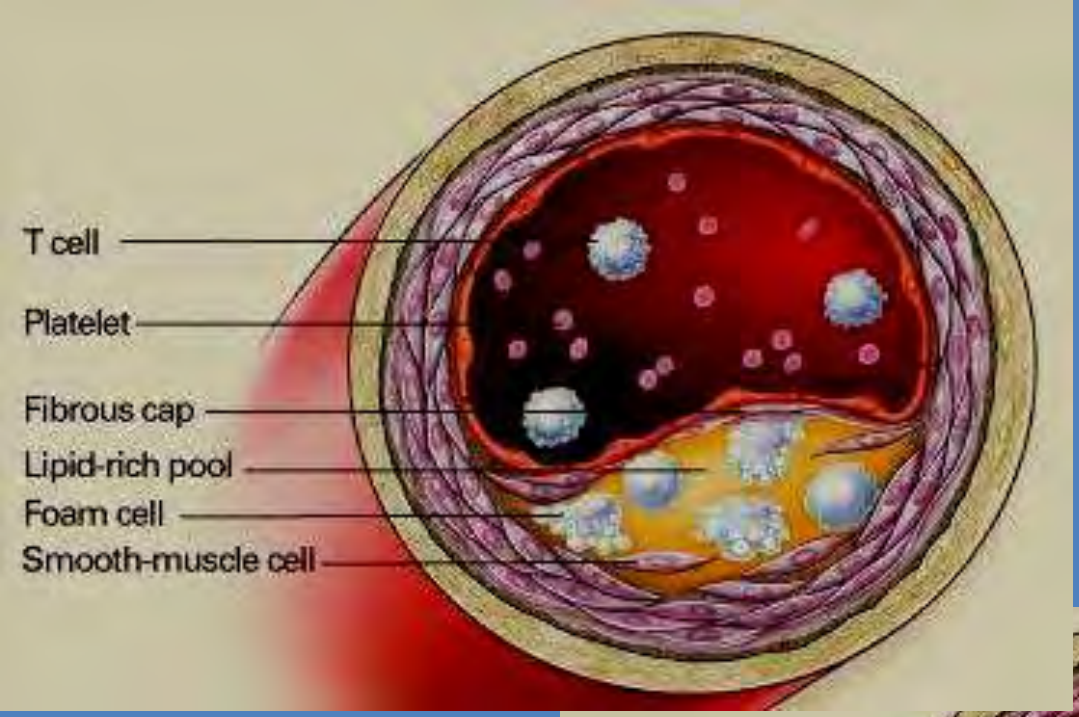

Coronary thrombosis
Stroke
Myocardial infarction
Myocardial ischemia
CAD
Arrhythmia and loss of muscle
Remodeling
Atherosclerosis
Ventricular dilation
Endothelial dysfunction
Congestive heart failure
Hypertension
Cholesterol
Diabetes mellitus
Insulin resistance
Smoking
Risk factors
End-stage heart disease

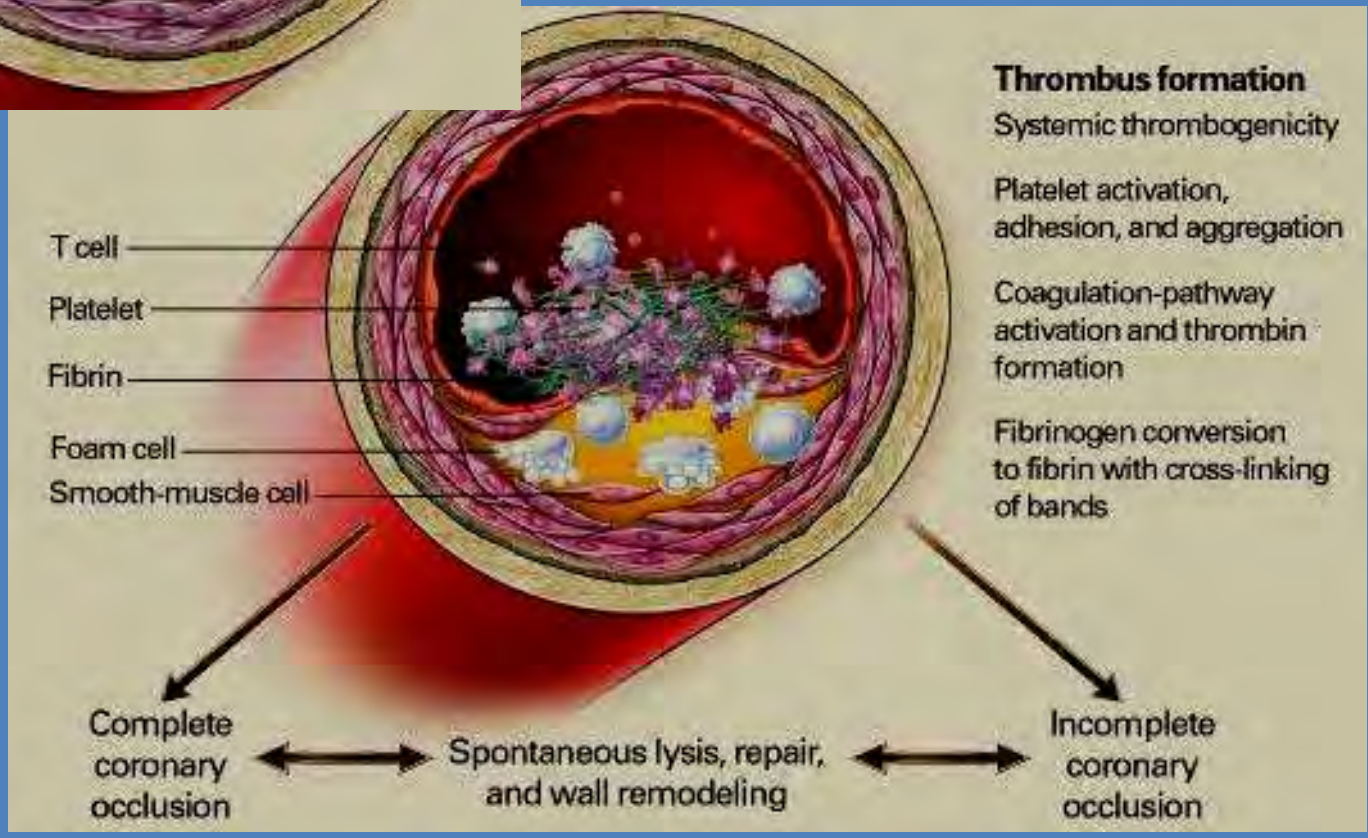


Aterosclerosis avanzada
Foco necrótico

thick fibrous cap

PLACA COMPLICADA



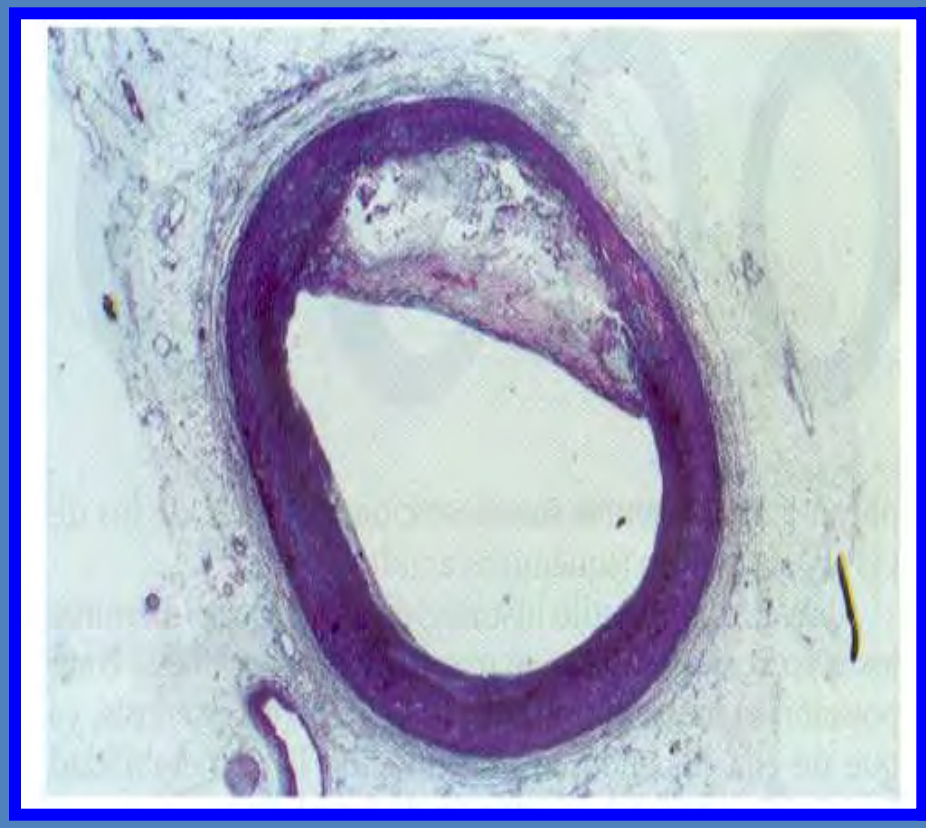


LÍPIDOS

INFLAMACIÓN

CÉLULAS ML

SS MATRIZ COLÁGENA



PLACA BLANDA

PLACA DURA