

Lipoprotein Composition

Thomas Dayspring, MD, FACP, FNLA, NCMP

Diplomate American Board of Clinical Lipidology

Fellow of the National Lipid Association

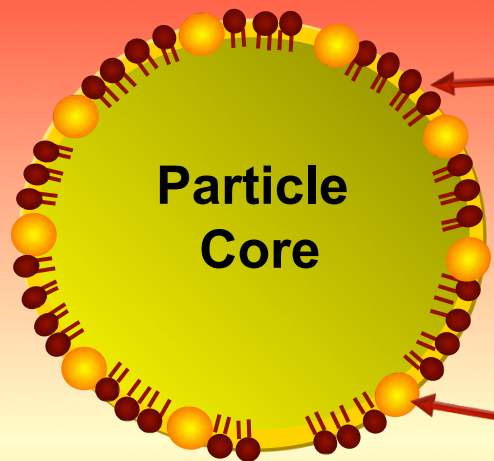
North American Menopause Society Certified Menopause Practitioner

Director: North Jersey Institute of Menopausal Lipidology
Wayne, New Jersey

Lipoprotein Surface Compositions

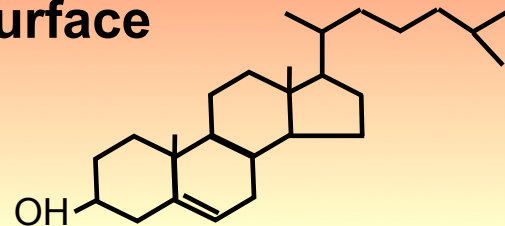
VLDL, IDL, LDL

Surface phospholipid



Fatty acid tail

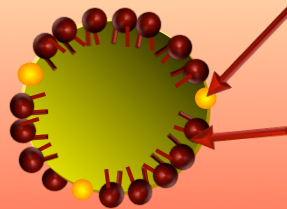
Particle Surface



Terminal methyl groups

Surface free (unesterified) cholesterol

HDL



Surface phospholipid

Phospholipids



Cholesterol



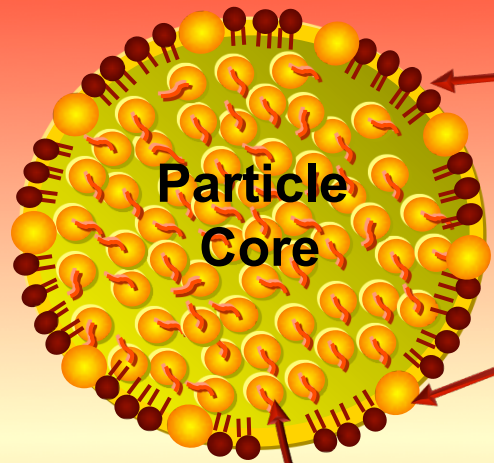
Triglyceride



Lipoprotein Core

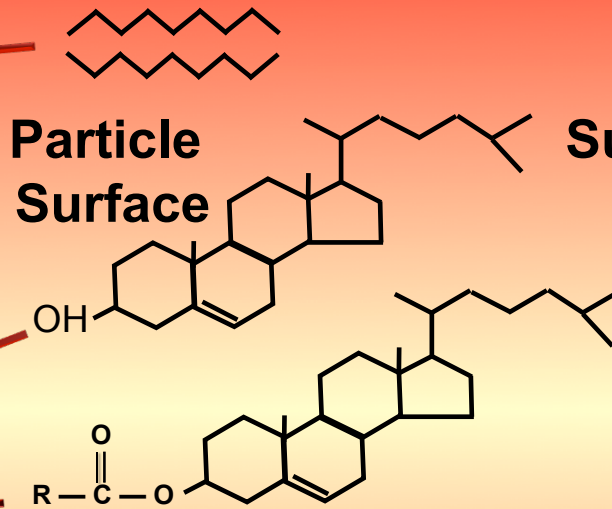
VLDL, IDL, LDL

Surface phospholipid



Particle Surface

Surface free cholesterol



HDL



Core cholesteryl ester (CE)

often cholesteryl oleate or palmitate

Phospholipids



Cholesterol



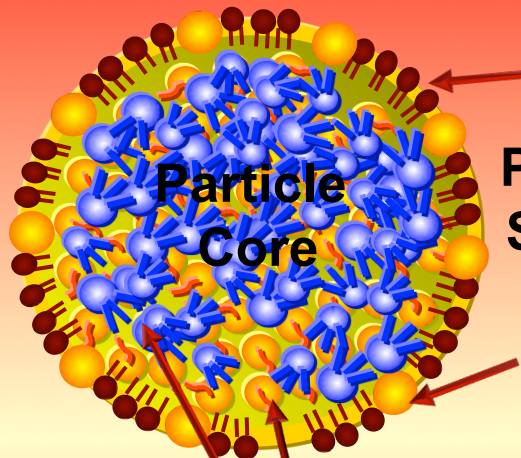
Triglyceride



Lipoprotein Core

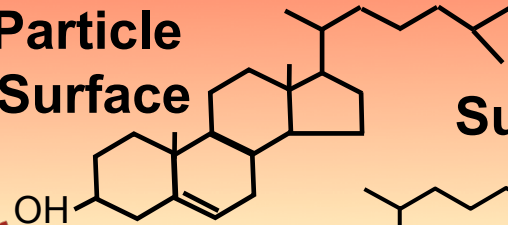
VLDL, IDL, LDL

Surface phospholipid



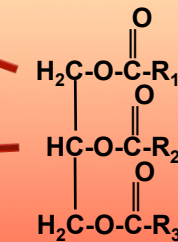
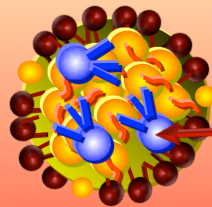
Particle Surface

Surface free cholesterol



Core cholesteryl ester (CE)

HDL



Core triglycerides (TG)

Phospholipids



Cholesterol

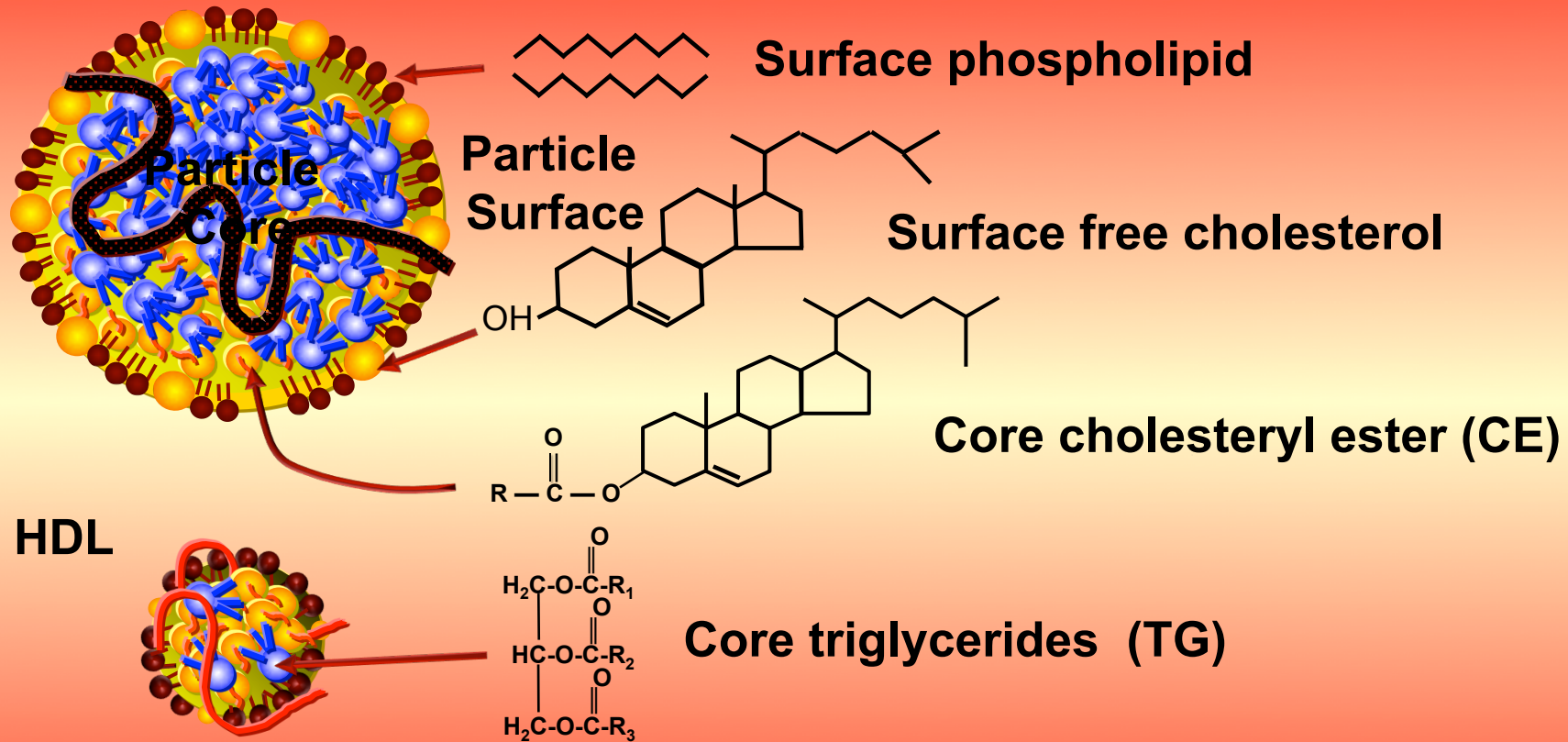


Triglyceride



Lipoprotein Surface

VLDL, IDL, LDL **Apolipoprotein B** (one molecule)



HDL

Apolipoprotein A-I (two to four molecules)

Phospholipids



Cholesterol

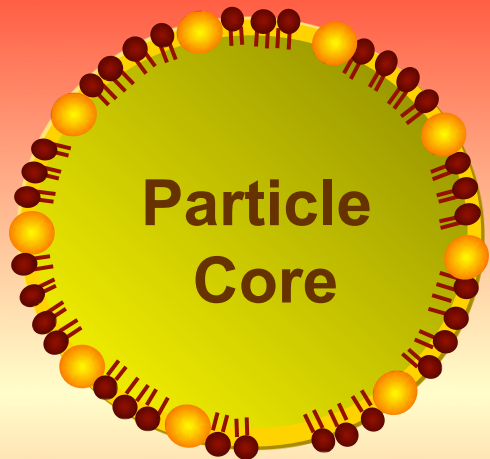


Triglyceride

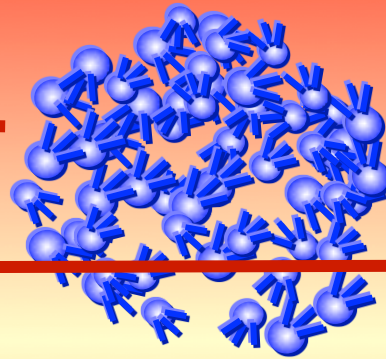


Lipoprotein Makeup

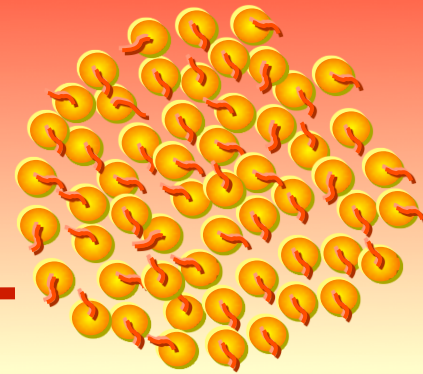
Apolipoprotein B (one molecule)



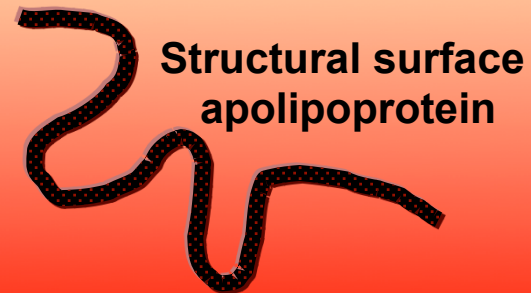
Phospholipid surface
Free cholesterol surface



Core triglycerides
(TG)



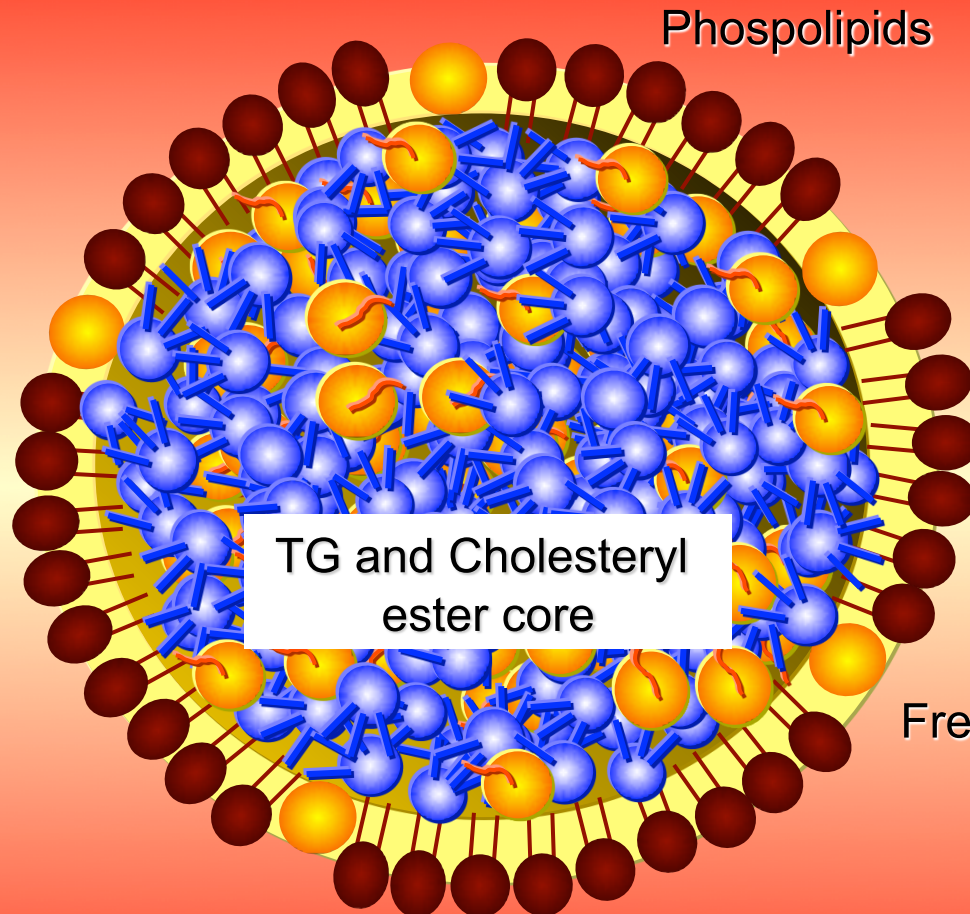
Core cholesteryl
ester (CE)



Structural surface
apolipoprotein

Volume of the particle = $\frac{4}{3}\pi r^3$ r = radius

Very Low Density Lipoprotein (VLDL)



- ◆ The primary TG transporting lipoprotein
- ◆ Size, depending on TG content varies from 350 Å (35 nm) to 700 Å (70 nm)
- ◆ Normal particle composition is 80% TG and 20% cholesterol (or a 5 to 1 ratio)
- ◆ VLDL-C ~ TG/5

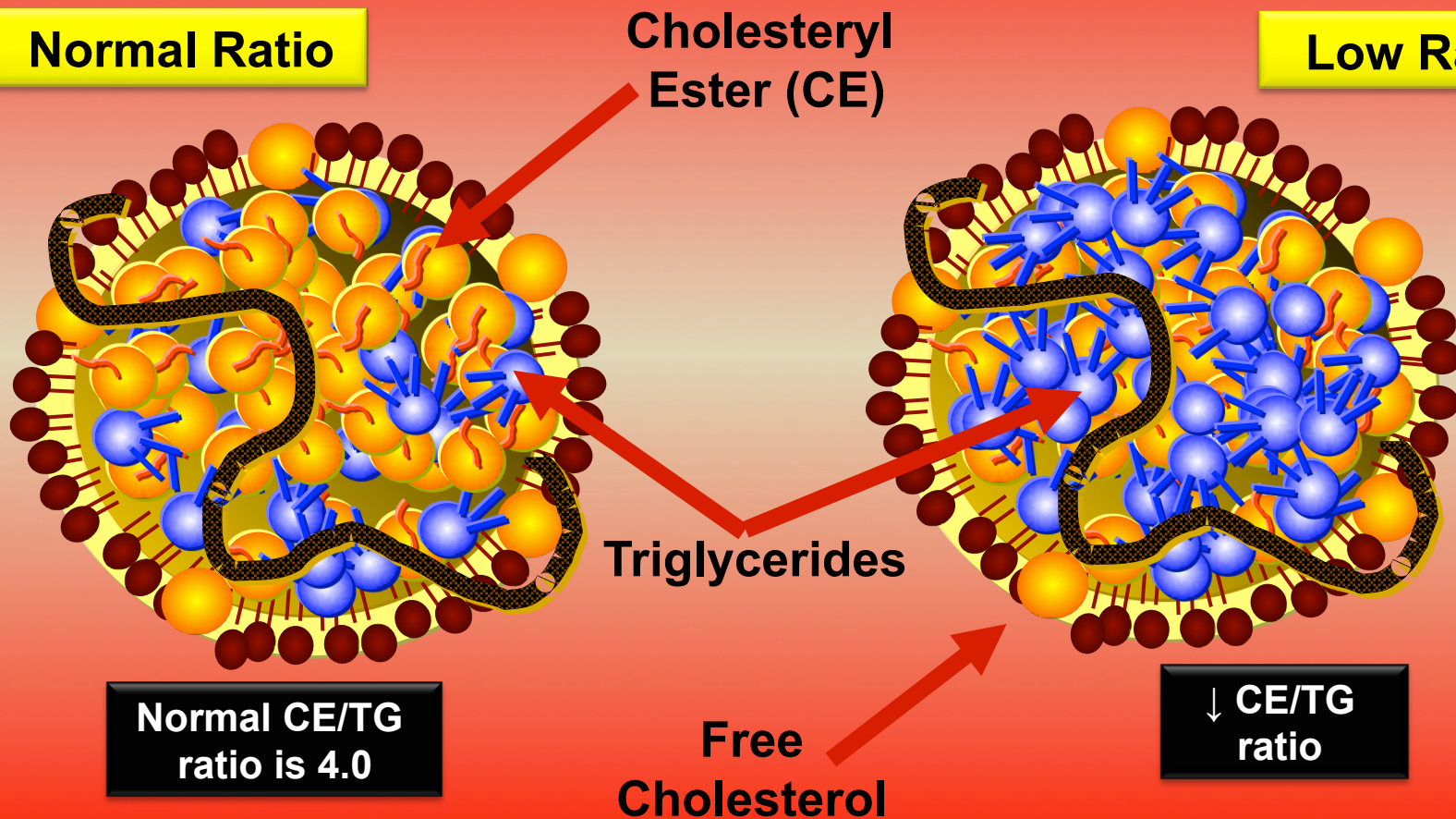
Free cholesterol

LDL Particle Composition

LDL Particle CE/TG composition differences

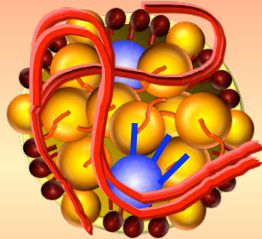
Normal Ratio

Low Ratio



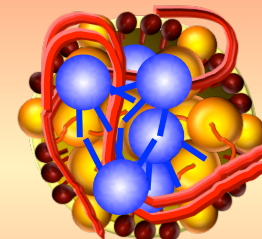
Effect of Triglycerides on High Density Lipoprotein Core Composition

TG-poor, Cholesterol-rich mature α -HDL



Normally composed HDL particle

TG-rich, cholesterol-poor mature α -HDL



Patients with TG-rich HDL particles have reduced HDL-C. Such HDLs also tend to be dysfunctional