NARENDRA YADAV

BIOCHEMISTRY
(LIPIDS)

PAPER1

UNIT 3

HIGH-DENSITY LIPOPROTEIN

INTRODUCTION

- *Major group of* LIPOPROTEIN.

- *HDL is the smallest lipoprotein particle. It is the densest because of contains the highest portion of protein to lipids.*

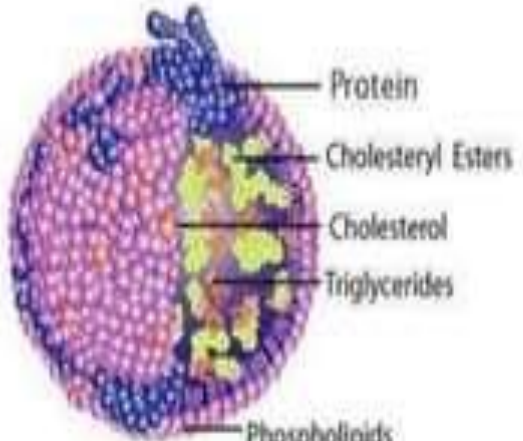
- LIPOPROTEIN *are complex particles composed of multiple proteins which transport all fat molecules (lipids) around the body within the water outside cells.*

COMPONENT OF HDL

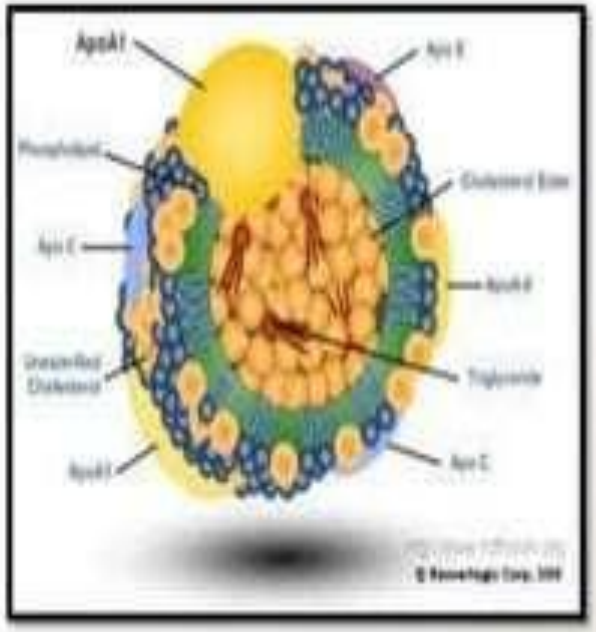
- *HDL are typically composed of 80-100proteins/particles.*

- *Apolipoproteins components (principle protein 70%)*
  - *ApoA-1,ApoA-2,ApoC and ApoE*

- *Phospholipids,*
- *Free cholesterol,*
- *Cholesterol Ester,*
- *Triglyceride.*



STROCTURE OF HDL



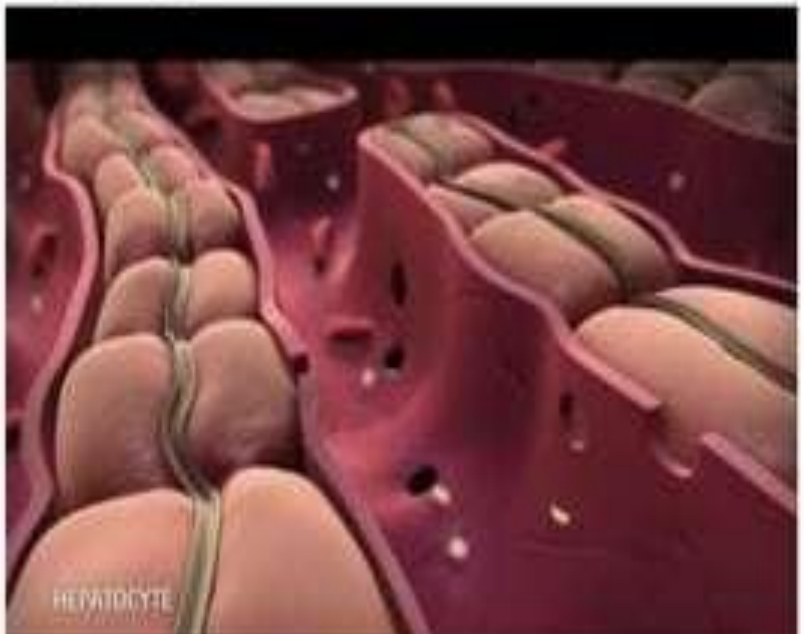
- *HDL particle consist of an outer amphipathic layer of free cholesterol, phospholipids, and several Apolipoprotein.*
- *Triglyceride and cholesterol ester rich in hydrophobic core.*
- *HDL particels also carry enzymes, such as lecithin cholesterol acyltransferase(LCAT),and cholesterly ester transfer protein(CETP).*

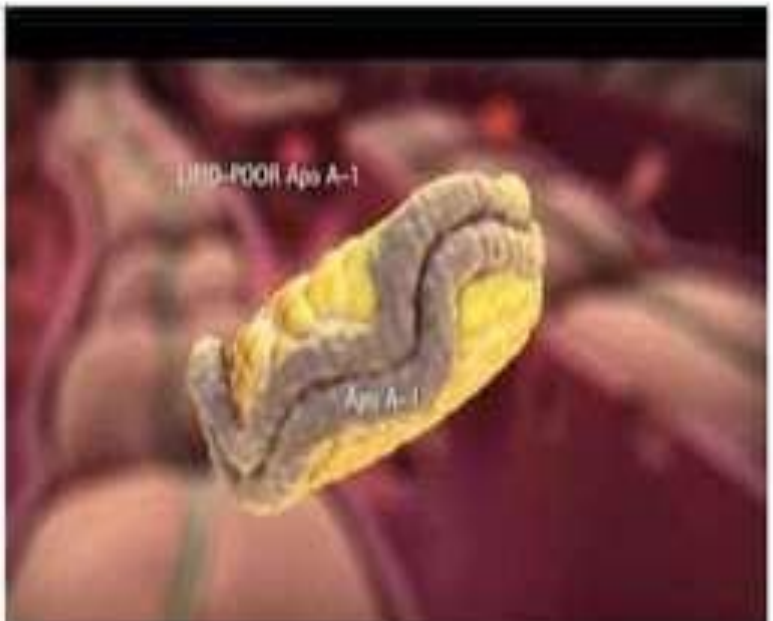
HOW IT IS A GOOD CHOLESTEROL?

WORKING OF HDL

[DIRECT METHOD]

- *The liver synthesizes these lipoproteins as complexs of apolipoprotein and phospholipids.*

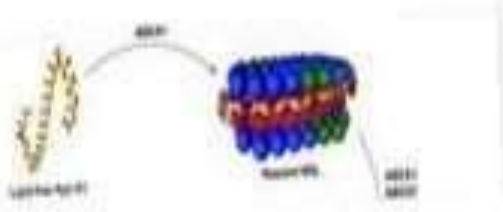


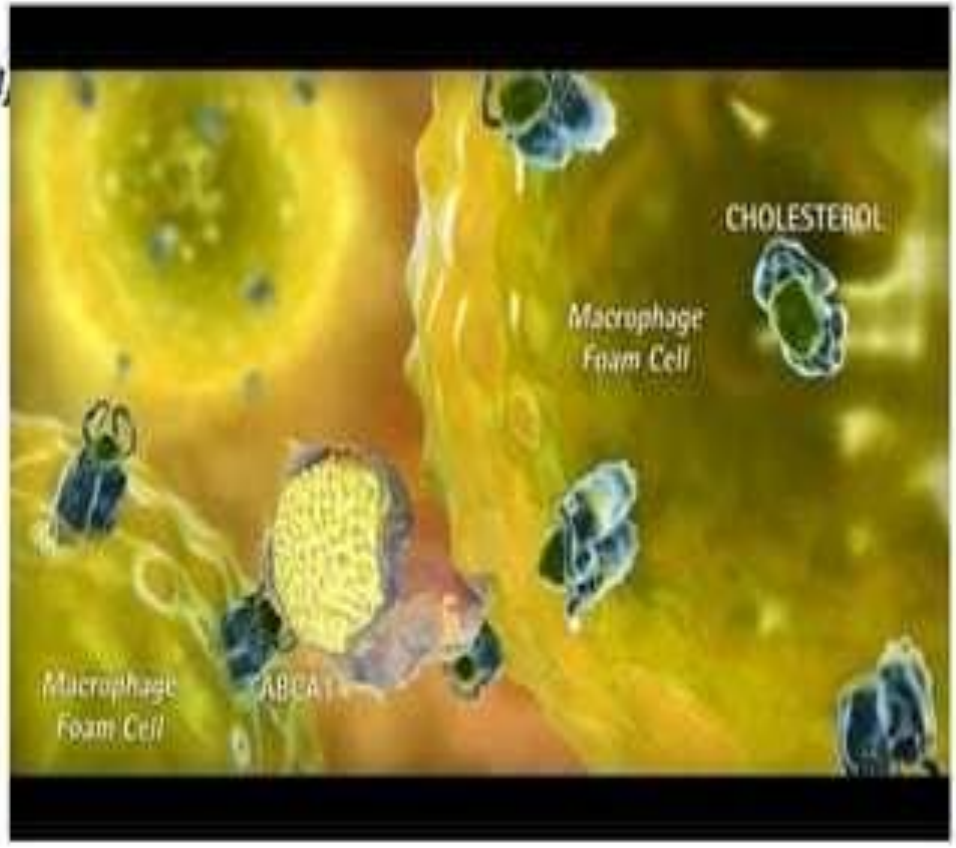


BINDING ON RECEPTOR

- *These complex are capable of picking u*
  the cholesterol, carried internally,
  macrophage foam cell by interaction
  with the ATP-binding cassette
  transporter A1(ABCA1).

- *Which forms nascent high density*
  lipoprotein.



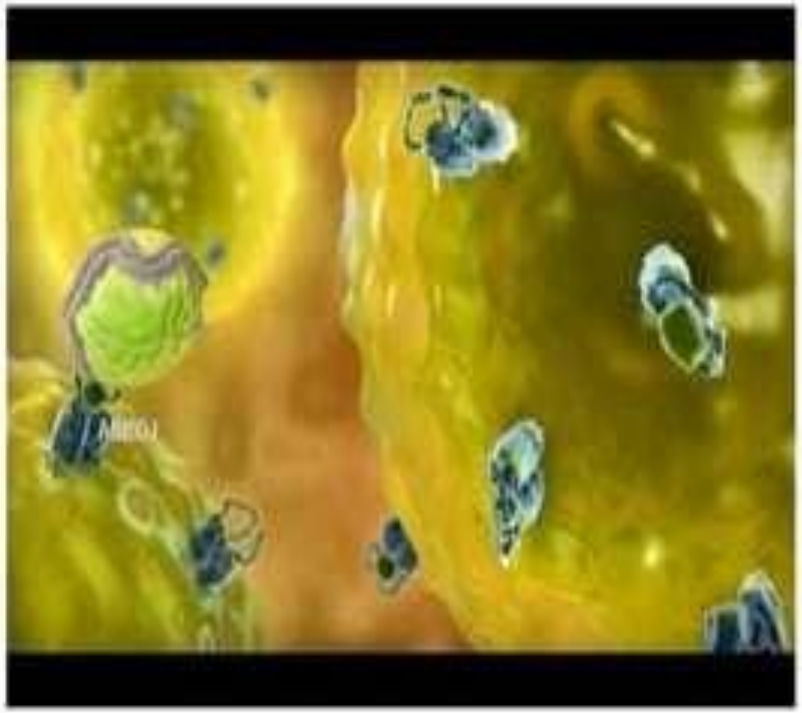


- *Nascent HDL then interact with ABCAI and ABCG1 receptor.*

- *ABCA1 mediates the efflux of cholesterol to lipid pooor apolipoprotein(nascent hdl).*

- *Interaction of the apolipoprotein and ABCA1 activate multiple signalling pathway, including JAK-STAT, PKA and PKC pathway.*

- *Through the receptor, cholesterol are carried into the Nascent HDL and*



- *A Plasma enzymes called lecithin cholesterol acyltransferase(LCAT) converts the free cholesterol into cholesteryl ester.(more hydrophobic form of cholesterol).*

- *These cholesteryl ester is then sequestered into core of lipoprotein particle, eventually causing the newly synthesized HDL to assume a spherical shape.*

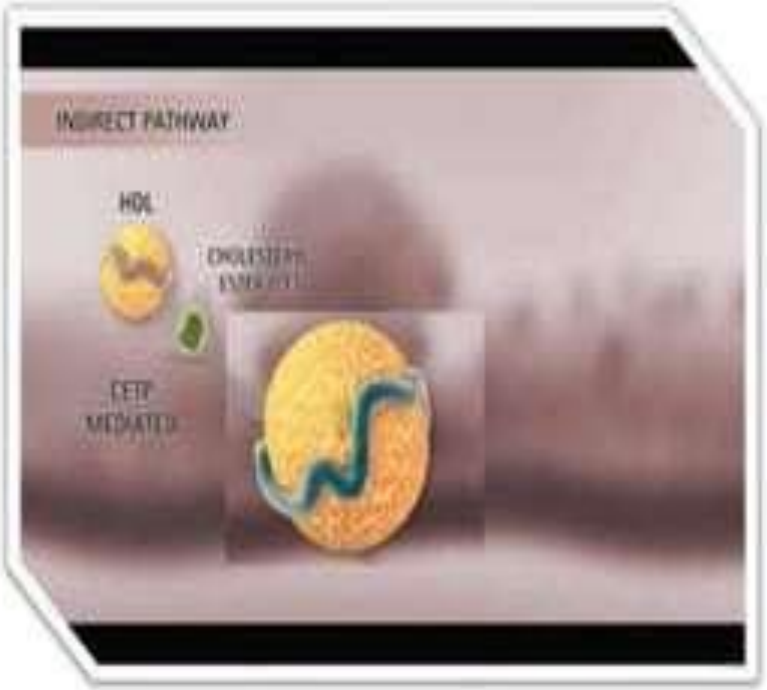
- *HDL particles increase in size(MATURE HDL) as they circulate through the bloodstream and incorporate more cholesterol and phospholipids molecules from cells and other lipoprotein,for example :*

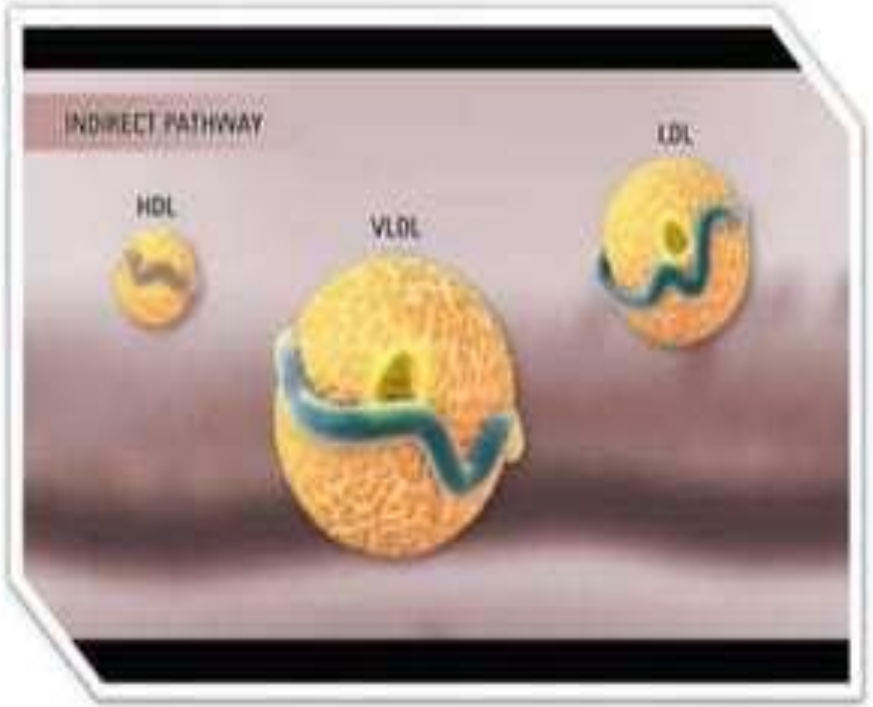
❑ *ABCG1 Transporter and the Phospholipids transport protein(PLTP).*

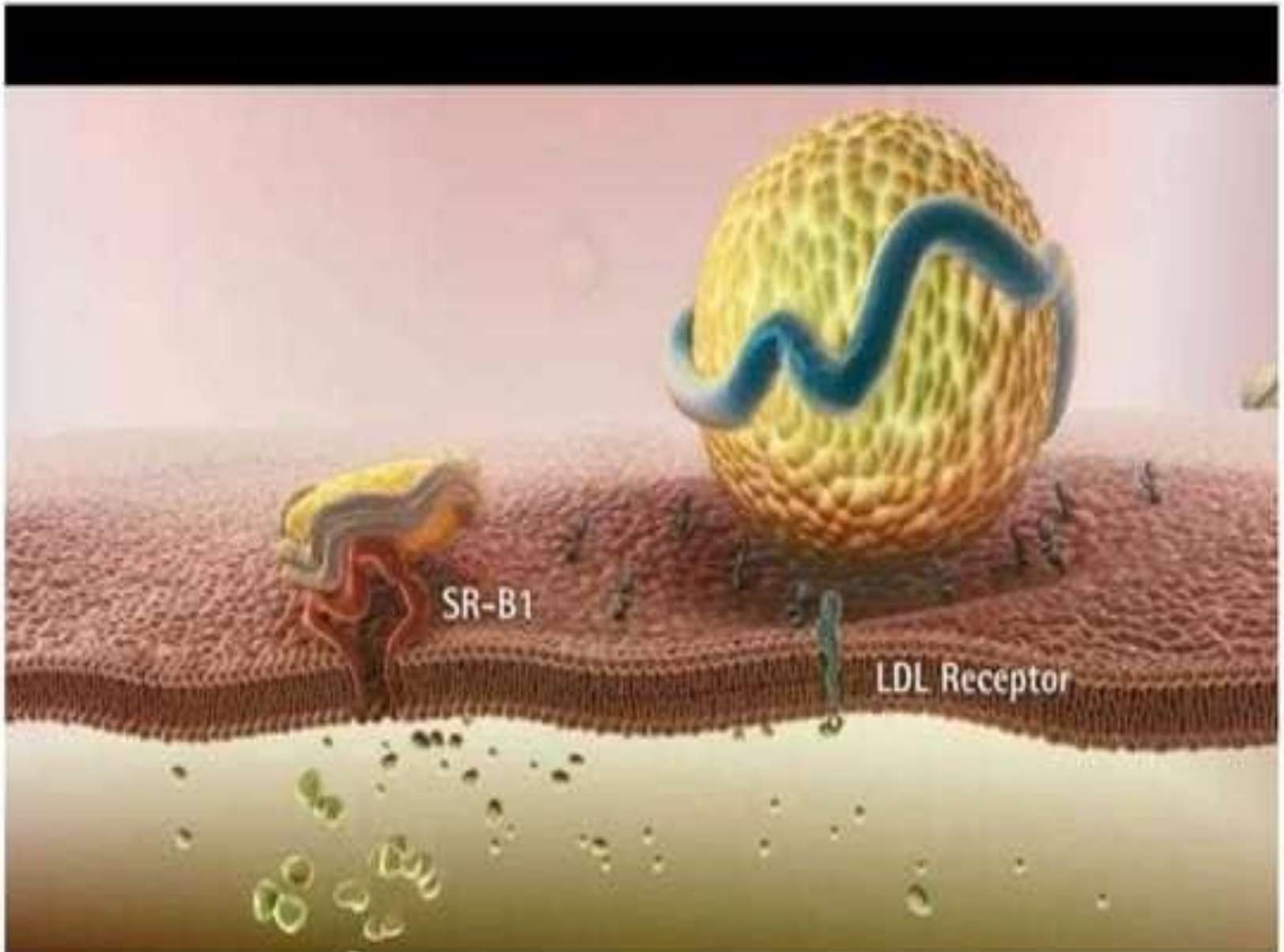
- *Now, these mature HDL moves again in the liver and interact with the receptor SR-B1.*
- *MATURE HDL empties in the liver through the SR-B1 receptor.*
- *The size of the HDL decreases.*
- *Small HDL particels are left, which restart the uptake of cholesterol from cell.*

INDIRECT METHOD

- *This pathway is mediated by cholesteryl ester transfer protein(CEPT). This protein exchanges triglycerides of VLDL against cholesteryl ester of HDL.*
- *VLDL processed to LDL, which are removed from the circulation by the LDL receptor pathway.*
- *LDL are endocytosis and all proteins are degraded in proteins and cholesterol are used up for formation of cell membrane.*
- *The triglycerides are not stable in HDL, but degraded by hepatic lipase so that only small HDL particels are left, which restart the uptake of cholesterol from cell.*


INDIRECT PATHWAY
HDL
CETP
MEDIATED


INDIRECT PATHWAY
HDL
VLDL
LDL


SR-B1
LDL Receptor

- *The cholesterol delivered to the liver for the synthesis of bile, and directly or indirectly goes in the intestine for degradation of fats.*

- *Delivery of HDL cholesterol to adrenals, ovaries, and testes are important for the synthesis of steroid hormones.*

FONCTION & OSES OF HDL

- *Antiatherogenic i.e. Protecting against heart disease via reverse cholesterol transport.*
- *Plaque reduction.*
- *So, it is also known as a* ***GOOD CHOLESTEROL***

- *Also a part of an innate immune system due to ability to bind a number of toxic substances in blood.*
- *HDL are used as a therapy against sepsis(deadly blood-borne infection).*
- *It also have antioxidant, anti-inflammatory, and antithrombotic.*

ANY QUERIE

BIBLIOGRAPHY

- Google - images
- Wikipedia - informations
- Science direct.

THANK YOU