Relationship Between Lipoprotein(a) and Other Lipids in Children

Dr. Fatime Merdan

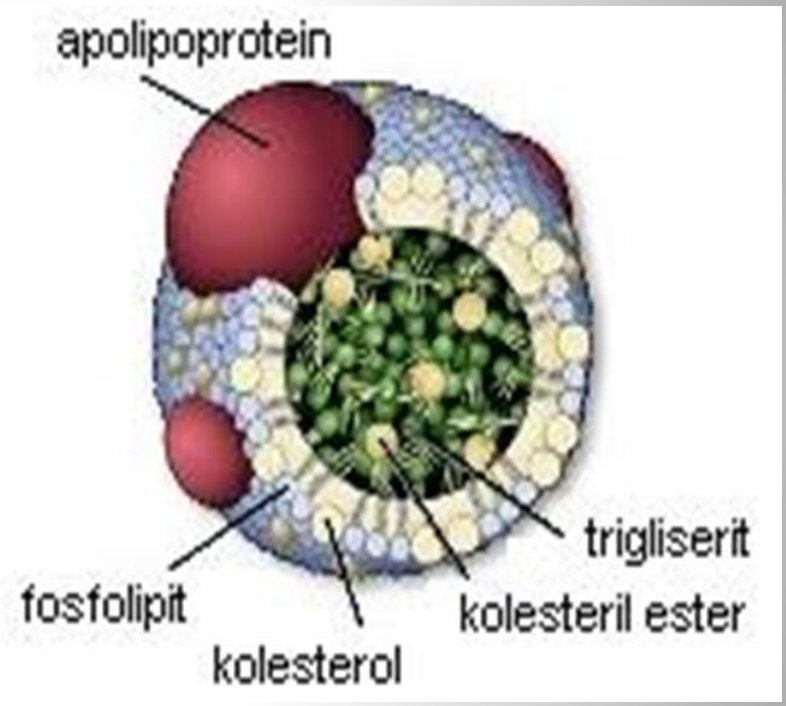
Dr. Sami Ulus Obstetrics, Child Health and Diseases Training and Research Hospital

OBJECTIVES

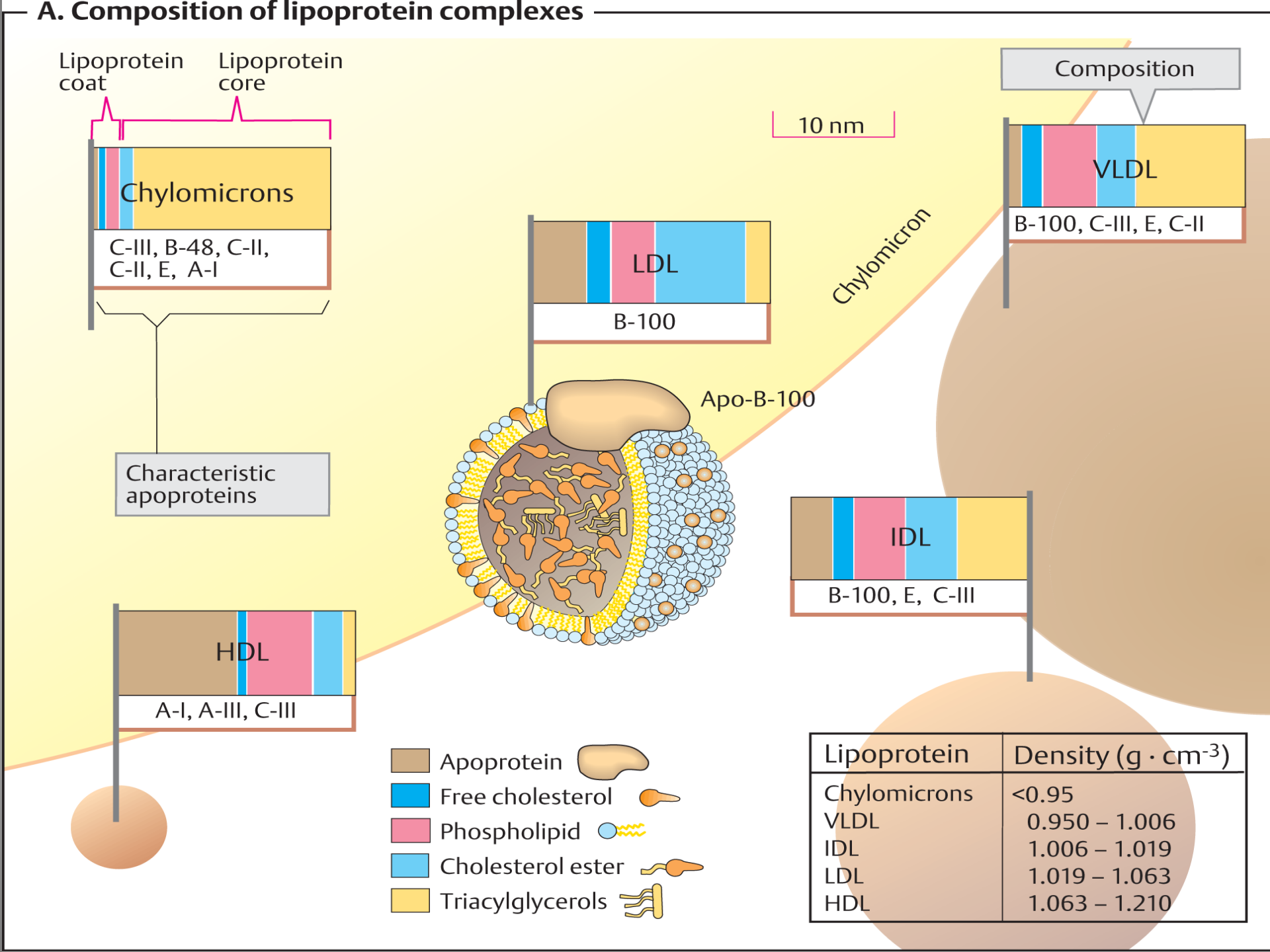
LIPOPROTEINS

- **Lipids are hydrophobic structures and are transported in lipoproteins.**

- **Lipoproteins are composed of lipids and proteins (apolipoproteins).**

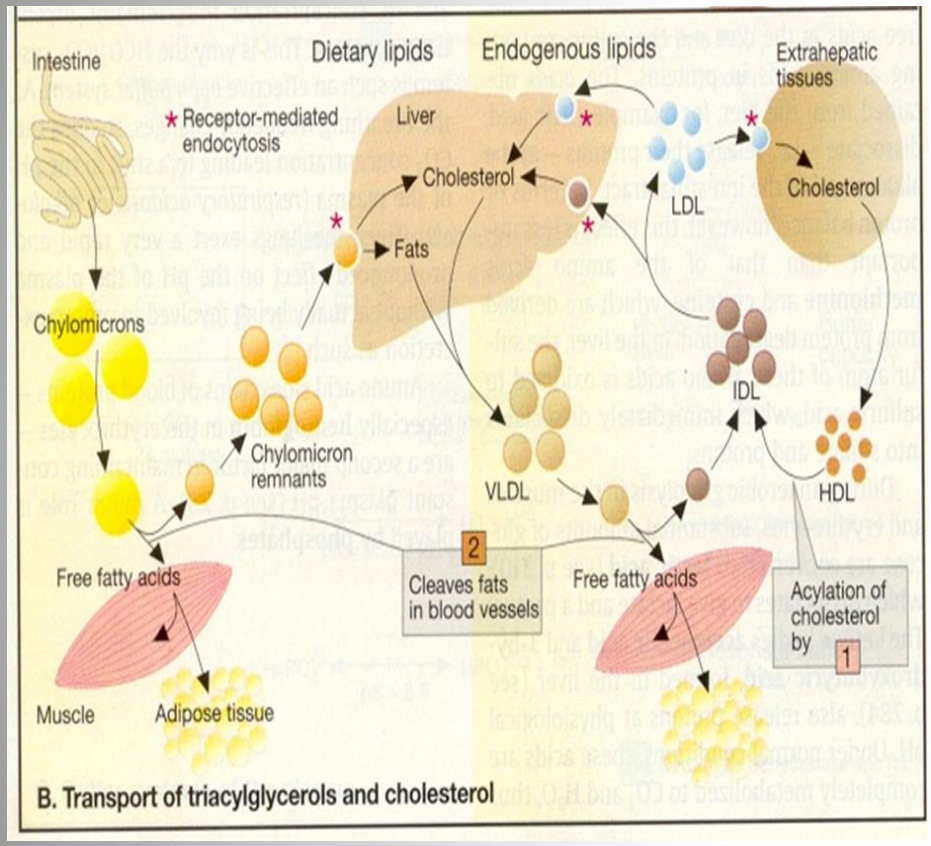


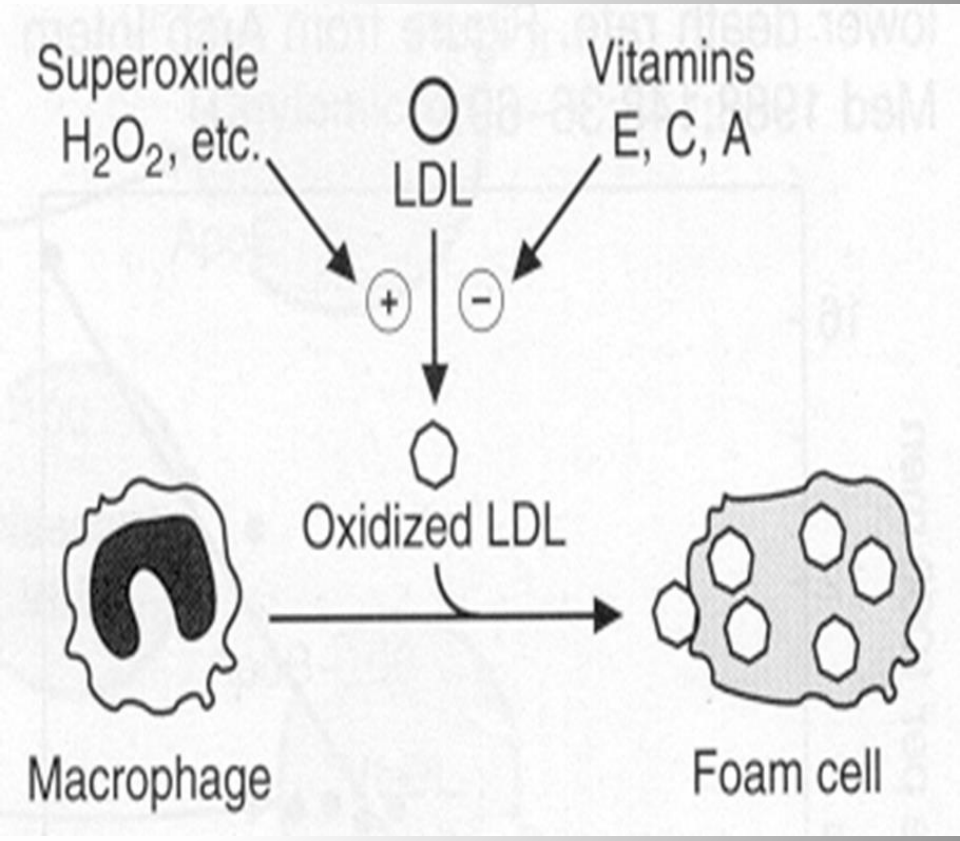
A. Composition of lipoprotein complexes



Lipoprotein	Density ($g \cdot cm^{-3}$)
Chylomicrons	<0.95
VLDL	0.950 – 1.006
IDL	1.006 – 1.019
LDL	1.019 – 1.063
HDL	1.063 – 1.210

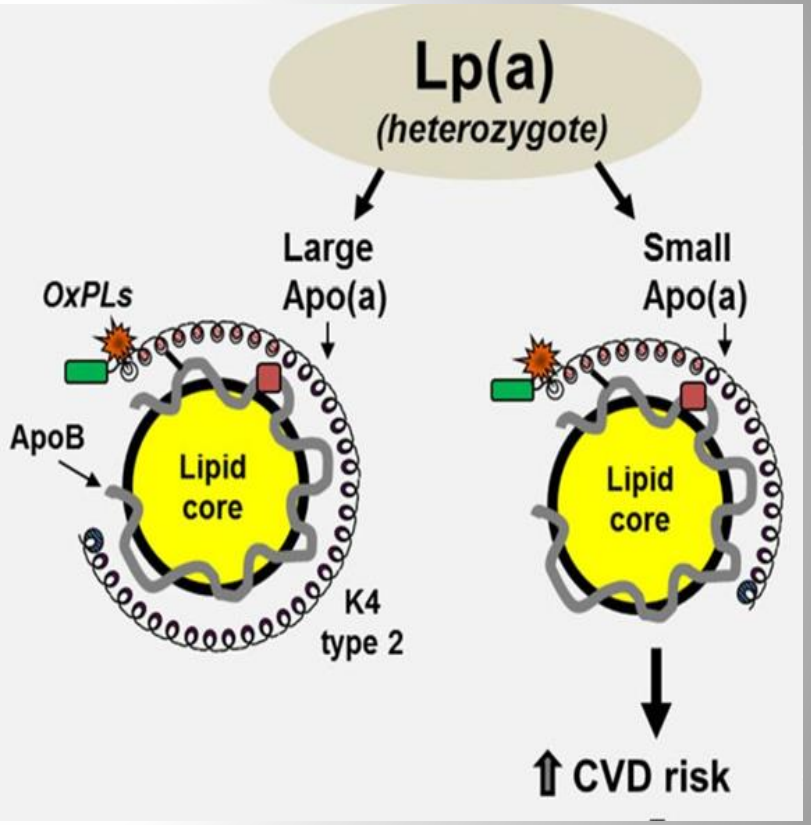
LIPOPROTEIN METABOLISM





Lipoprotein(a)

- **Lipoprotein(a) ((Lp(a)) was discovered by Berg in 1963.**
- **Lp(a) levels are hereditary (autosomal dominant) and essentially depend on the Apo(a) gene located on chromosome 6.**
- **The size of the Apo(a) molecule determines plasma Lp(a) levels.**



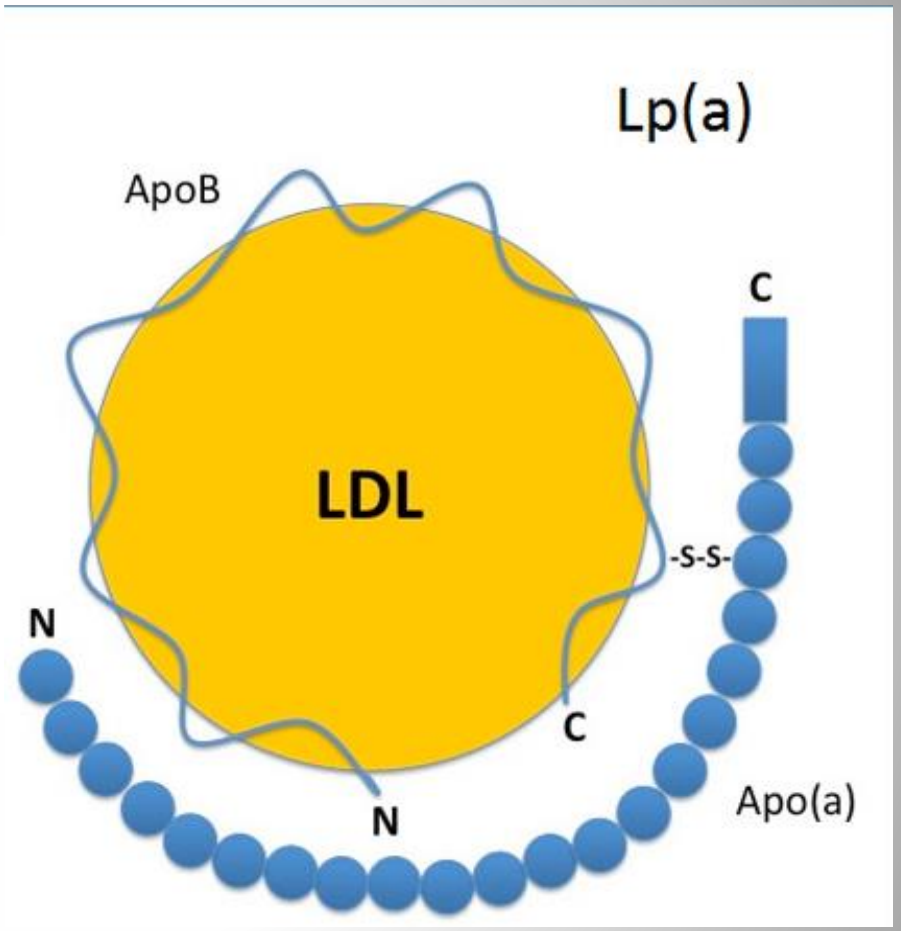
Nongenetic Factors

- **Hormones:**
- **Estrogens ↓**
- **Anabolic steroids ↓**
- **Insulin-like growth factor ↓**
- **Thyroid hormone replacement therapy ↓**
- **Growth hormone ↑**

- **Diseases:**
- **Chronic kidney disease ↑**
- **After kidney transplantation ↑**
- **In nephrotic syndrome ↑**
- **Inflammatory conditions (SLE, RA) ↑**
- **In pregnant women with preeclampsia ↑**

Structure of Lp(a)

- **The structure of Lp(a) is the similar to LDL-C.**
- **The only difference is the presence of Apo(a).**
- **Apo (a) is attached to apo B-100 by a single disulfide bond.**



- **Lp(a) is structurally similar to LDL and plasminogen. Its role in the pathogenesis of coronary artery disease is proaterogenic or prothrombotic.**

- **High level Lp(a) may cause inflammation, oxidative stress, fibrinolysis and plaque instability.**

- **The aim of this study was to determine the correlation of Lp(a) with total cholesterol (TC), HDL-cholesterol (HDL-C), LDL-cholesterol (LDL-C) and triglycerides (TG) in children**.

MATERIALS AND METHODS

- **The patients whose Lp(a) levels were measured in 2014-2019 years were selected in this retsrospective study.**
- **The age of patients was under 18 years.**
- **We selected children with metabolic syndrome for the patients groups and divided them into 3 groups according to Lp(a) levels.**
- **The control group was selected among children without metabolic syndrome.**
- **Each groups had 25 children (Lp(a) >100, 50-100, 30-50, <30 mg/dL).**
- **Chronic kidney disease patients, oncology patients and patients receiving hormone replacement therapy were excluded.**

- **Fasting blood Lp(a) was measured by immunoturbidimetric method in Beckman Coulter AU5800.**
- **TC, TG, HDL-C was measured by photometric method in Beckman Coulter AU5800.**
- **LDL-C was calculated by the Friedewald formula.**
- **Institutional Review Board approved the study.**

Results

- **We compared groups which had different Lp(a) levels in this study**
- **TC, LDL-C, TG were significantly higher in all patient groups compared to the control group ($p < 0.001$).**
- **There was no significant difference in HDL-C ($p > 0.05$).**
- **No significant difference was found in lipid profile patients different groups ($p > 0.05$).**
- **In all groups Lp(a) showed a weak positive correlation with TC, LDL-C and TG ($r = 0.340$, $p < 0.001$; $r = 0.326$, $p < 0.001$; $r = 0.275$, $p < 0.001$).**

Grup	Lp(a) Median (min-max)	Cholesterol Median (min-max)	HDL-C Median (min-max)	LDL-C Median (min-max)	Triglyceride Median (min-max)
I	10 (1-26)	155 (109-204)	51 (31-83)	88 (35-103)	84 (41-128)
II	40 (31-49)	218 (94-317)	45 (32-79)	151 (33-250)	105 (32-408)
III	60 (51-99)	227 (143-441)	49 (28-100)	139 (73-320)	151 (54-638)
IV	127 (101-226)	223 (134-294)	42 (27-70)	144 (68-203)	137 (40-782)

Discussion:

- **Palmeira et al, reported that a positive correlation between Lp(a) and LDL-C, TC, and Apo B levels in children and adolescents.**

- **Glowinska et al, reported that significant difference in TC, LDL-C, TG, Lp(a), Apo A and Apo B levels in young obese, hypertensive and diabetic patients.**

- **Sharma et al, found that Lp(a) is not considered an independent risk factor for CVD. Dietary habits, genetic factors, lifestyle and race are important factors that affect diseases of multifactorial origin, such as CVD.**

Conclusions:

- **Lp(a) is an independent risk factor for premature cardiovascular disease.**
- **But also it shows a correlation with other cardiovascular risk factors such as TC, LDL-C and TG.**
- **When first-line lipid profile is abnormal, Lp(a) test can be use for CVD risk categorization.**

THANKS FOR LISTENING