Clinical Chemistry Trainee Council
Pearls of Laboratory Medicine
www.traineecouncil.org

TITLE: Management of Dyslipidemia: The European Approach

PRESENTER: Michel R. Langlois

Slide 1:

Hello, my name is Michel Langlois. I am a Professor at the Department of Laboratory Medicine, AZ St-Jan Hospital Bruges, and University of Ghent, Belgium. Welcome to this Pearl of Laboratory Medicine on "Management of Dyslipidemia: The European Approach."

Slide 2:

This presentation is based on the consensus guideline document published by the Joint Task Force of the European Society of Cardiology and the European Atherosclerosis Society, which is used in clinical practice in European countries.

Slide 3:

The management of dyslipidemia and cardiovascular risk requires close interactions between laboratory professionals and clinicians in five major steps:

1. Initial investigations
2. Risk classification
3. Risk adjustment
4. Choice of preventive strategy
5. Follow-up of lipid-lowering therapy

Slide 4

The first step includes laboratory testing of total cholesterol, triglycerides, HDL- and LDL-cholesterol (measured or calculated), and glycemia. It is recommended to take the average of measurements in at least two fasting samples. Lipid testing is indicated in patients with cardiovascular disease, diabetes, obesity, family history of cardiovascular disease or familial dyslipidemia, chronic inflammatory disease, chronic kidney disease, and in healthy men above the age of 40 or women above the age of 50.

Slide 5:

In the second step, risk is calculated using the SCORE model based on age, gender, blood pressure, total cholesterol, and smoking status. SCORE calculates the 10-year risk of fatal cardiovascular event. It can be calculated using the SCORE charts in the guideline document or the website calculator.

Slide 6:
After SCORE calculation, subjects are classified into a risk category. “Very high-risk” patients are those with documented cardiovascular disease, complicated diabetes, severe chronic kidney disease, or a SCORE of 10% or higher. “High-risk” patients are those with familial dyslipidemia, hypertension, or a SCORE between 5 and 10%. Persons have “moderate risk” when their SCORE is between 1 and 5% but risk can be modified by HDL-cholesterol in the next step. Persons with SCORE below 1% are at low risk.

Slide 7:
The third step is particularly important in persons who have been assigned a moderate risk category but may have a higher risk which is not detected with the SCORE model. For example, a family history of cardiovascular disease doubles the SCORE in men. Those with obesity, unhealthy lifestyle, impaired renal function, familial hypercholesterolemia, or elevated risk markers such as Lp(a) and CRP may be considered to be at high risk.

Slide 8:
Multipliers of SCORE have been developed for different HDL concentrations in men and women. HDL data of the patient can be easily included in the website calculator.

Slide 9:
The choice of therapeutic intervention is made in the fourth step. The choice is based on two variables: SCORE and LDL cholesterol. Lifestyle modifications such as physical activity and diet are recommended at all levels of risk. Immediate drug intervention is recommended if LDL is above 70 mg/dl in very high-risk patients and above 100 mg/dl in high-risk patients. Drug therapy may be considered if LDL remains uncontrolled, persistent above 115 mg/dl in persons at moderate risk.

Slide 10:
The primary target of drug therapy is LDL cholesterol, depending on the level of risk. The appropriate statin type and dose must be prescribed by the clinician in order to reach the target. For guidance of clinical practice, it is important for laboratories to display the risk-dependent targets on the lipid test reports.

Slide 11:
In more than 70% of treated patients, LDL goal is not reached or there is a residual dyslipidemia showing low HDL, high triglycerides, or both. Therefore, two secondary targets are proposed in the European guidelines. The first one is non-HDL cholesterol. It represents the cholesterol not only in LDL but also in VLDL and Lp(a) and can be simply calculated by subtracting HDL from total cholesterol. The alternative target is apoB concentration, which reflects the number of atherogenic lipoprotein particles.

Slide 12:
In fact, LDL cholesterol can be very misleading in several conditions of hypertriglyceridemia. Analytical errors relate to direct LDL method bias or inaccurate LDL calculation due to invalid Friedewald equation or HDL method bias. Biological factors may cause underestimation of LDL-based risk, such as combined dyslipidemia or the presence of a small dense LDL phenotype.

Slide 13:
The LDL fraction comprises a family of subclasses that differ in size and density. In this example, we consider two patients with the same and apparently normal LDL concentration. However, they differ in LDL subclass profile. The first patient shows a low risk profile of predominantly large LDL particles. The second patient, with the same LDL concentration, shows an excess of small dense LDL particles and is associated with high risk.

Slide 14:
ApoB is a better marker than LDL to identify the small dense LDL phenotype. Regardless of the size and cholesterol content, every LDL particle carries only one apoB molecule. Therefore, apoB measurement reflects the total number of atherogenic particles, while LDL measurement reflects the cholesterol content of the LDL fraction.

Slide 15:
To illustrate the different interpretation, we again consider two patients with the same and normal LDL concentration. The first patient has a normal apoB, reflecting a predominance of large LDL particles, while the second patient has elevated apoB concentration due to a high number of small LDL particles with low cholesterol content.

Slide 16:
Risk-dependent non-HDL cholesterol or apoB goals are proposed as a secondary target after reaching LDL goal in patients with combined dyslipidemia or associated conditions such as metabolic syndrome, diabetes and kidney disease. In case of unavailable LDL cholesterol data, such as invalid Friedewald equation, non-HDL cholesterol or apoB can be considered the primary target.

Slide 17:
The fifth and subsequent steps in the management of a patient with dyslipidemia relate to the follow-up of statin therapy and its side effects, including the monitoring of liver enzymes and creatine kinase to detect myopathy. Guidelines are clearly described in the consensus paper of the European Task Force.

Slide 18:
In conclusion, the European approach of a patient with dyslipidemia using the SCORE model differs from other risk assessment models such as Framingham. However, regardless of the model used, it is clear that high risk patients can be missed by just measuring and treating LDL cholesterol.

In case of hypertriglyceridemia, non-HDL-cholesterol or apoB are better markers to avoid analytical errors of LDL cholesterol measurement and to reduce residual risk of cardiovascular disease. The clinical laboratories play a crucial role in these prevention strategies and must proactively provide clinical added value in the pre- and post-analytical phase: appropriate test request, tests to rule-out secondary causes of dyslipidemia such as TSH, test reporting with appropriate cutpoints, and interpretative guidance of clinicians.

Slide 18: References

Slide 19: Disclosures

Slide 20: Thank You from www.TraineeCouncil.org

Thank you for joining me on this Pearl of Laboratory Medicine on "Management of Dyslipidemia: The European Approach." My name is Michel R. Langlois.