Screening for Dyslipidemia in Children

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Learning Objectives

• At the end of this session the participant will be able:
  – To describe dyslipidemia in children
  – To understand the usefulness of screening for dyslipidemia
  – To define the acceptable target values used for the basis of treatment.
Topics

- Primary and secondary causes of dyslipidemia in children
- Brief overview of the AAP guidelines for screening
- Target values for lipids in children.
Dyslipidemia

- Disorders of lipoprotein metabolism
- ↑TC, LDL-C, TG and ↓HDL-C
- Lipid levels correlate with that of family members
- Children of parents with CHD may have an increased prevalence of dyslipidemia
**Genetic Dyslipidemia**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Parameter(s)</th>
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</thead>
<tbody>
<tr>
<td>Familial Hypercholesterolemia Homozygous (rare)</td>
<td>LDL-C (&gt; 500mg/dL/12.95mmol/L)</td>
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<tr>
<td>Heterozygous (1:500)</td>
<td>LDL-C (154-386 mg/dL/4.0-10.0mmol/L)</td>
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<tr>
<td>Familial combined hyper-lipidemia</td>
<td>↑LDL-C, apo-B, TG</td>
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<tr>
<td>Hyper-triglyceridemia/chylomicronemia (LPL deficiency)</td>
<td>↑TG</td>
</tr>
</tbody>
</table>
Obesity

- Familial obesity
  - $\uparrow$TG, $\downarrow$HDL-C

- Usually clustered with other CVD risk factors
  - Hypertension, dysglycemia

- 14 fold increased risk of CVD by 50y
• Overweight 85\textsuperscript{th}-94\textsuperscript{th} percentile

• Obese >95 percentile
Secondary causes of dyslipidemia

These include:

• Diabetes
• Hypothyroidism
• Renal disease
• Liver disease
• Medications (retinoids, glucocorticoids, etc)
Evidence for Screening

• Evidence

  – Lipid and Lipoprotein results in childhood are predictive of future adult lipoprotein levels, especially between late childhood and 3rd and 4th decades of life.
Screening

• 1992 - Screen children at risk,
  – + Family history of hyper-lipidemia or premature CVD
  – Obese

• 2008- Screen at risk children after 2y but before 10y
  – Also screen overweight children

• 2011- universal screening of 9-11y and again 17-19y (controversial)
Lipid profile

• **Fasting**
  - TC, LDL-C, HDL-C, and TG are usually measured.
    - LDL-C is a significant marker and is used as basis for treatment

• **Non-Fasting**
  - TC, HDL-C and non-HDL-C
  - Non-HDL-C is identified as a significant predictor of future atherosclerosis events
Lipid measurements

• Measurements for TC, HDL-C and LDL-C are certified through the CDC cholesterol reference methods
• TC          direct quantitation
• HDL-C       direct method
• TG          direct quantitation
• Non HDL-C     calculated
  ▸ LDL-C     calculated,
    ▸ (Friedwald equation except when TG is high)
Apolipoproteins

• Apo B - useful for predicting risk
  – Standardization of methods still required.

• Its use is still discretionary and currently non-HDL-C is considered equally useful.
# Lipoprotein Classification

<table>
<thead>
<tr>
<th>Lipoprotein</th>
<th>Apo-lipoprotein</th>
<th>Lipid</th>
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</thead>
<tbody>
<tr>
<td>LDL-C</td>
<td>ApoB-100</td>
<td>Cholesterol</td>
</tr>
<tr>
<td>HDL-C</td>
<td>ApoA-1, ApoA-II</td>
<td>Cholesterol</td>
</tr>
<tr>
<td>Chylomicron</td>
<td>ApoB-48</td>
<td>Triglyceride</td>
</tr>
<tr>
<td>VLDL</td>
<td></td>
<td>Triglyceride</td>
</tr>
</tbody>
</table>
## Target values—children and adolescents

<table>
<thead>
<tr>
<th></th>
<th>Low mg/dL (mmol/L)</th>
<th>Acceptable mg/dL (mmol/L)</th>
<th>Borderline-high mg/dL (mmol/L)</th>
<th>High mg/dL (mmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TC</strong></td>
<td></td>
<td>170-199 (4.4-5.15)</td>
<td>≥200 (5.15)</td>
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<tr>
<td><strong>LDL-C</strong></td>
<td>&lt;110 (2.85)</td>
<td>110-129 (2.85-3.34)</td>
<td>≥130 (3.34)</td>
<td></td>
</tr>
<tr>
<td><strong>Non-HDL-C</strong></td>
<td>&lt;120 (3.18)</td>
<td>120-144 (3.18-3.73)</td>
<td>≥145 (3.74)</td>
<td></td>
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<tr>
<td><strong>Apo-B</strong></td>
<td>&lt;90 mg/dL</td>
<td>90-109 mg/dL</td>
<td>≥110 mg/dL</td>
<td></td>
</tr>
<tr>
<td><strong>TG 0-9y</strong></td>
<td>&lt;75 (0.86)</td>
<td>75-99 (0.86-1.13)</td>
<td>≥100 (1.13)</td>
<td></td>
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<tr>
<td><strong>10-19y</strong></td>
<td>&lt;90 (1.02)</td>
<td>90-129 (1.02-1.48)</td>
<td>≥130 (1.48)</td>
<td></td>
</tr>
<tr>
<td><strong>HDL-C</strong></td>
<td>&lt;40 (1.04)</td>
<td>&lt;45 (1.17)</td>
<td>40-45 (1.04-1.27)</td>
<td></td>
</tr>
<tr>
<td><strong>Apo-A1</strong></td>
<td>&lt;115 mg/dL</td>
<td>&lt;120 mg/dL</td>
<td>115-120 mg/dL</td>
<td>Pediatrics 2011:128S6,S1-8</td>
</tr>
</tbody>
</table>
Summary

• Identification of dyslipidemia is important for reducing CVD risk later in life.
References

• Pediatrics 2011;128(Suppl 5) S213-256
• Pediatrics 2008;122, 198-208
Self Assessment

• True or False
  • Heterozygous FH is associated with High LDL-C, > 200 mg/dL (5.18mmol/L) and high TG >500mg/dL (5.6mmol/L)

• True or False
  – Non HDL-C requires a fasting blood sample