In the obese adolescent, when should you start screening for hyperlipidemia?

Evidence-based answer
The answer is not completely clear. Hyperlipidemia in childhood does not always correlate to elevated cholesterol levels as an adult, and hyperlipidemia in adolescents with an elevated body mass index (BMI) does not directly correlate to hyperlipidemia in adulthood (SOR: C, disease-oriented outcomes). Current National Institutes of Health guidelines recommend universal screening for children between the ages of 9–11 and 17–21 years and in obese children (BMI >85th percentile) aged 12–16 years (SOR: C, expert opinion).

Evidence summary
An aggregate of 3 population-based prospective cohort trials examined the correlation between adolescent serum lipid levels and the development of dyslipidemia as an adult. Data were examined from 1,809 individuals, originally aged 12–18 years, from Australia, Finland, and the United States. Mean follow-up time was 20 years.

The accuracy of predicting dyslipidemia levels as an adult (with adult lipid levels as the gold standard) in adolescents with high-risk lipid levels (total cholesterol >240; low-density lipoprotein [LDL] >160 mg/dL; triglycerides >200 mg/dL) was not very sensitive or specific. Total cholesterol had a sensitivity of 68% and a specificity of 71%; the positive likelihood ratio (LR+) was 2.3 and the negative likelihood ratio (LR−) was 0.45. LDL had a sensitivity of 65% and a specificity of 75% (LR+ 2.6; LR− 0.47). Triglycerides had a sensitivity of 14% and a specificity of 96% (LR+ 4.7; LR− 0.89). A subset study of data from 1,180 Finnish individuals examined the effectiveness of different screening strategies for identifying adolescents who will develop adult dyslipidemia. Universal screening of LDL levels was somewhat predictive of adult LDL levels (sensitivity 74%, specificity 66%; LR+ 2.2, LR− 0.39). There was no improvement in detecting dyslipidemia as an adult when screening adolescents who were overweight (sensitivity 79%, specificity 55%; LR+ 1.8, LR− 0.38).
A systematic review of 11 cohort trials (with nearly 240,000 patients) examined the correlation between childhood obesity and the risk of adult metabolic syndrome, including dyslipidemia.\(^2\) Initial BMI was measured at ages 2–18, and adult outcomes measured at ages 18–71. Data were not pooled because of heterogeneity between trials. No consistent correlation was found between childhood BMI and adult levels of total cholesterol, LDL, or high-density lipoprotein. Four trials (N=6,154) examined the correlation between pediatric BMI and adult total cholesterol. Two had weak to moderate correlations and 1 showed a negative correlation with BMI at 9 years old. The last trial showed no correlation. Three (N=3,708) of these trials evaluated LDL, and 1 trial showed a weak correlation between childhood BMI and adult LDL, but that correlation disappeared after adjusting for adult BMI. The other 2 trials did not show any correlation.

A longitudinal observational study of 678 children in Texas, ages 8–14, examined the efficacy of various screening programs in predicting dyslipidemia in pediatric patients.\(^3\) The screening programs included targeted screening based on BMI or family history of cardiovascular disease, or both. For elevated total cholesterol and LDL, the sensitivity of screening based on family history alone compared with screening based on BMI >85% alone was no different (total cholesterol 38% vs 34%; \(P > .05\); LDL 41% vs 38%; \(P > .05\) ), but screening based on BMI was more specific (total cholesterol 65% vs 78%; \(P < .05\); LDL 65% vs 79%; \(P < .05\) ). However, compared with screening based on BMI >85% and/or family history, screening based on family history alone had less sensitivity (total cholesterol 38% vs 54%; \(P < .05\); LDL 38% vs 54%; \(P < .05\) ) but greater specificity (total cholesterol 65% vs 50%; \(P < .05\); LDL 65% vs 51%; \(P < .05\) ).

The National Heart, Lung, and Blood Institute guidelines recommend, in most cases, against targeted screening of individuals with a significant family history or obese individuals.\(^4\) They recommend universal screening for children aged 9–11 and 17–21 years (Grade B, “diagnostic studies with minor limitations; overwhelmingly consistent evidence from observational studies”). Because of expected changes to the serum lipid profile, they recommend only targeted screening for individuals 12–16 years with obesity, a high-risk family history, known dyslipidemia, diabetes, hypertension, cigarette smoking, or moderate- to high-risk medical conditions (also Grade B).

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REFERENCES

GLOSSARY

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<th>ARR=absolute risk reduction</th>
<th>HR=hazard ratio</th>
<th>OR=odds ratio</th>
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<td>CDC=Centers for Disease Control and Prevention</td>
<td>LOE=level of evidence</td>
<td>RCT=randomized controlled trial</td>
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<tr>
<td>CI=confidence interval</td>
<td>MRI=magnetic resonance imaging</td>
<td>RR=relative risk</td>
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<tr>
<td>CT=computed tomography</td>
<td>NNH=number needed to harm</td>
<td>SOR=strength of recommendation</td>
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<tr>
<td>FDA=US Food and Drug Administration</td>
<td>NNT=number needed to treat</td>
<td>SSRI=selective serotonin reuptake inhibitor</td>
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