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Growth Curves for Cardio-Metabolic Risk Factors in Children and Adolescents

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Abstract

Objective—This study developed percentile curves for anthropometric (waist circumference) and cardiovascular (lipid profile) risk factors for U.S. children and adolescents.

Study design—A representative sample of U.S. children and adolescents from the National Health and Nutrition Examination Survey from 1988–1994 (NHANES III) and the current national series (NHANES 1999–2006) were combined. Percentile curves were constructed, nationally weighted, and smoothed using the LMS method. The percentile curves included age- and sex-specific percentile values that correspond with and transition into the adult abnormal cut-off values for each of these anthropometric and cardiovascular components. To increase the sample size, a second series of percentile curves was also created from the combination of the 2 NHANES databases, along with cross-sectional data from the Bogalusa Heart Study, the Muscatine Study, the Fels Longitudinal Study and the Princeton Lipid Research Clinics Study.

Results—These analyses resulted in a series of growth curves for waist circumference, total cholesterol, LDL cholesterol, triglycerides and HDL cholesterol from a combination of pediatric data sets. The cutoff for abnormal waist circumference in adult males (102cm) was equivalent to the 94th (Table I, C) percentile line in 18 year olds, and the cut-off in adult females (88cm) was equivalent to the 84th (Table I, C) percentile line in 18 year olds. Triglycerides were found to have a bimodal pattern among females with an initial peak at age 11 and a second at age 20; the curve for males increased steadily with age. The HDL curve for females was relatively flat, but the male curve declined starting at age 9 years. Similar curves for Total and LDL cholesterol were constructed for both males and females. When data from the additional child studies were added to the national data, there was little difference in their patterns or rates of change from year to year.

Conclusions—These curves represent waist and lipid percentiles for U.S. children and adolescents, with identification of values that transition to adult abnormalities. They could be used conditionally for both epidemiological and possibly clinical applications, although they need to be validated against longitudinal data.

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Recently released obesity expert recommendations suggest testing children and adolescents for a number of complications of excess adiposity.¹ Despite studies showing the association between central fat accumulation and obesity risk, the recommendations did not endorse waist circumference measures because ranges from a representative sample of children and adolescents are not available. The guidelines for the identification of abnormal lipids among children and adolescents have recently been updated but still endorse the use of specific cut-points that fail to reflect age or sex.²

In contrast, pediatric hypertension guidelines recommend tracking blood pressure using age and sex specific percentiles that transition from adolescent values into abnormal values for adults. Percentile ranges and growth curves have been used by pediatricians for a number of anthropometric measures in children and adolescents; for example, current BMI growth curves are designed to transition overweight and obese adolescents into adult BMI ranges.^{3, 4} In addition, some studies have attempted to develop growth curves percentiles for lipids among adolescents,^{5, 6} and waist circumference among children and adolescents.^{5, 7} Although these studies developed growth curve parameters, they were limited either because they excluded adolescents under 12 yrs of age,^{5, 6} or failed to identify transition points into abnormal adult ranges.⁷

The purpose of the study was to combine existing data sets of cardiovascular factors from population studies of children and adolescents, in order to derive curves for obesity risk factors that include preadolescent age groups and also transition adolescent values into adult ranges. To create these growth curve percentiles, we applied a growth curve smoothing technique to data on anthropometric and lipid components of the metabolic syndrome.⁴ The LMS (Lambda, Mu, and Sigma) method was used to derive the growth curves published by the Center for Disease Control and Prevention, and we used the same method to derive age and sex specific percentiles values for waist circumference and lipid components, with values at 18 yrs benchmarked to adult abnormal values.

Methods

This study combined data from the National Health and Nutrition Examination Survey from 1988–1994 (NHANES III) and the current national series (NHANES 1999–2006)^{8, 9} with cross-sectional measures from 4 large longitudinal studies of cardiovascular risk factors in children and adolescents: the Bogalusa Heart Study¹⁰ (1992–94), the Fels Longitudinal Study¹¹ (1976–1996), the Muscatine study^{12, 13} (1970–1981), and the Princeton Lipid Research Clinic Study¹⁴ (1972–1973).

Both NHANES surveys are nationally representative cross-sectional samples of the U.S. population. NHANES data were weighted to provide national estimates, using weights provided by the NHANES database and the US census. These surveys collected demographic information and anthropometric measurements, and reported laboratory results of blood specimens. Results for this study were limited to children and adolescents 20 years of age and younger who completed the medical exam component of the surveys and who were not currently pregnant.

In NHANES, waist circumference was recorded for participants 2 years of age and older by a trained examiner in the mobile examination center. In addition, blood samples were collected and analyzed for lipoproteins, including triglycerides, HDL, LDL, and total cholesterol. Triglycerides and LDL cholesterol were measured in participants examined in the morning only. Lipoprotein outcomes were also limited to those who had fasted for at least 6 hours. Assay methods were similar for the duration of NHANES data collection, except for HDL cholesterol,

which changed from the heparin manganese precipitation method to the direct method in 2003. A correction factor was applied to HDL cholesterol to adjust for these different methods.

The plan for these analysis were to combine these existing data sets to develop growth curves and percentile tables for future application in studies and analyses of the Pediatric Metabolic Syndrome Working Group and other investigators to assess for their usefulness in tracking of these lipid and adiposity measures. The results from the lipid analysis were conducted on a database that included both the NHANES III and NHANES 99-06 data and are presented here. A larger database, which included all the NHANES data and the lipid values from the Fels, the Bogalusa, the Muscatine, and the Princeton study, was also analyzed with the LMS method. The tables are presented here but figures for these values have not been included. Ford et al., showed minimal differences in median values of lipid components from the NHANES III to the NHANES 99-00 data bases, suggest a limited influence by the current obesity epidemic.¹⁵

The combination of databases for the waist circumference required more consideration. The waist circumference data was analyzed with 3 databases: 1) NHANES III only (Table I, A), 2) NHANES III, NHANES 99-06, Fels and Bogalusa studies (Table I, B), and 3) NHANES III, Bogalusa and Fels data (Table I, C). The data for all these tables are presented here and figures are included. The NHANES III only database had the smallest sample size, the NHANES III and NHANES 99-06 database was the largest but also demonstrated the most skewness to the percentile lines by including a modern sample with a significant influence of the current obesity epidemic. Although this is part of an approach previous reported by Joliffe et al, this paper only reported the values for the adult cut-offs when set at 20 years of age.⁵ The entire distribution of the percentiles is not presented and should be noted that the percentile lines for female IDF definition was passing through the 50th percentile, or the median, for the sample they created. The final database represented a composite of the earliest available waist circumference from national and regional studies, thus providing a larger sample size than NHANES III only data base, and yet less influence of the current obesity epidemic seen with the addition of the NHANES 99-06 data and reported by others.⁵

The age range and study years that were analyzed varied for each outcome, with the goal of including youth from as many ages as possible. Waist circumference percentile curves included youth 2–20 years of age and were based on data from NHANES III and from NHANES 99-06. Triglyceride and LDL cholesterol curves were based on data from youth 4–20 years of age in NHANES III and NHANES 99-04. Data from 2005–2006 were not available for all measures at the time of these analyses, triglycerides and LDL cholesterol were measured only in adolescents those 12 years of age and older. HDL and total cholesterol curves were based on youth 6–20 years of age in NHANES III and NHANES 99-06.

Details of the methods for the anthropometric and biochemistry measures from the Fels Longitudinal Study, the Bogalusa Heart Study, the Muscatine Study, and the Lipid Research Clinics Prevalence Study have previously been reported. Waist circumference measures were available in the Fels Longitudinal Study and the Bogalusa Heart Study. Fasting serum lipids were collected for all four studies. Data from these four studies are not weighted to reflect a national distribution of informants.

Smoothed percentile curves that were age and sex specific were calculated for waist circumference and each lipoprotein outcome, using the LMS method.^{3, 16} Age specific curves known as Lambda (L), Mu (M), and Sigma (S) were computed separately for males and females. The L curve accounts for the skewness of the distribution of the data, the M curve represents the median, and the S curve represents the coefficient of variance. Values for L, M, and S were computed for each age and used to plot the percentile curves. The LMS method assumes that after a Box-Cox power transformation, the data at each age are normally

distributed. Curves were calculated that pass through a particular cut point at a specific age. We used abnormal lipid and waist circumference cut points from the Adult Treatment Panel (ATP) for each outcome at 18 years of age. These values included waist circumference of 102 cm for males and 88 cm for females; triglycerides of 150 mg/dL for both males and females; HDL cholesterol of 40 mg/dL for males and 50 mg/dL for females; total cholesterol of 200 mg/dL for both males and females; and LDL cholesterol of 130 mg/dL for both males and females. From these values, we calculated the z-score that corresponded to the adult cut point at 18 years of age with the following formula: $z \text{ score} = [(Y/M)^L - 1]/(LS)$ where Y was the adult cut point value and L, M, S, were the respective values at 18 years of age. Points on the curve were then calculated for each age incorporating this z score: $\text{point on curve} = M(1 + LSz)^{1/L}$. The normal cumulative distribution function of the z-score equates to the corresponding percentile curve that passes through the cut point at 18 years of age.

Results were weighted to be nationally representative when analyzing the NHANES data. The Bogalusa Heart Study, the Muscatine study, the Fels Longitudinal Study, and the Princeton Lipid Research Clinic Study data were unweighted and therefore, results from the inclusion of these data were not weighted. The datasets were managed in SAS 9.1. LMSChartMaker Pro 2.3 was used to create the smoothed growth curves.

Results

The waist circumference data presented here was from analyses of 3 different combinations of databases with waist circumference measures. Table I, A shows the age- and sex-specific waist circumference percentile values for boys and girls from just the NHANES III sample and these values span ages from 2 to 20 years. Table I, B includes data from NHANES III, NHANES 99-006, the Bogalusa Heart study, and the Fels Longitudinal study, and Table I, C has the data from just the NHANES III, the Bogalusa study, and the Fels study (n=11,825). These data represents the both the oldest data, with the least amount of influence from the current childhood obesity epidemic. The ATP III cut-off for abnormally high waist circumference for men is 102 cm and this was identified on all tables and figures. The LMS method provides the age-specific values and percentile lines when the abnormal adult value of 102 cm was assigned to boys at 18 yrs of age, and 102 cm represents the 94th percentile line on Table I, C. The high waist circumference value for adult women of 88cm for girls at 18 yrs of age represented the 84th percentile line on Table I, C. When the analysis were repeated using only NHANES III data (Table I, A), which allows for national weighting, the resulting growth curve percentiles were similar to those obtained from the larger pooled analyses in Table I, C. In the NHANES only subset, the abnormal cut-off for adults was equivalent to the 93rd percentile for 18-year-old boys, and the 86th percentile for 18-year-old girls (compared with 94th and 84th percentile, respectively, in the combined analysis). The analysis from the combination of all 4 data sets revealed approximately 2 cm difference between same percentile lines between data in Tables I, A or C when compared with Table I, B. So as not to suggest that any one Table is preferred, all data are presented here and we ask to be contacted to share our data with other groups for testing in other populations. Figures 1, 2, and 3 show the results of the waist circumference analyses from both the large analysis and the NHANES only subset analysis.

Table II shows the results of analyzing triglyceride data for 4 to 20-year-olds from the two NHANES surveys combined with the Bogalusa, Fels, Muscatine, and Princeton datasets. (n=10,633) The abnormal adult cut-off value for both males and females is 150mg/dl, which represents the 85th percentile line for boys and the 90th percentile line for girls of 18 years. Figures 4, B and 5, B show that the percentiles and curves for girls demonstrated a noticeable bimodal pattern, with a peak at 11 years of age which bottomed out at 15 years of age and then began to rise again. In contrast, for boys, the curve in Figure 4 reveals only a slight leveling pattern from 12 to 15 years of age.

Table III, A shows the weighted percentile values for HDL cholesterol in children and adolescents from 6 to 20 years of age from the NHANES surveys, and Table III, B has the un-weighted percentiles from the NHANES III, NHANES 99-06 data combined with the Bogalusa, Fels and Princeton studies (n =16,063). For boys, the adult abnormal cut-off value for low HDL of 40 mg/dl was assigned to 18-year-olds, and this corresponded to the 32nd percentile line across ages. For girls, the adult HDL value of 50 mg/dl was assigned, and this resulted in the 42nd percentile line for low HDL (Table III, A). Figure 6 and 7 show that boys had higher 50th percentile values than girls until the age of 11 years, when the boys' curve started to dip down. At 18 year of age, the median HDL values were 44.8 and 52.5 mg/dl for boys and girls, respectively.

Table IV shows the age- and sex-specific total cholesterol percentile values for boys and girls, 6 to 20 years of age. Table IV, A is from NHANES only surveys, and Table IV, B is from the NHANES surveys, combined with the Bogalusa, Fels, Muscatine, and Princeton studies (n=16,133). The adult value of 200mg/dl for abnormally high total cholesterol was assigned to both boys and girls at age 18 years of age, which represents the 88th percentile line for boys and the 84th percentile line for girls (Table IV, A). Figures 8 and 9 show that the boys' curve had a low peak from ages 8 to 11 years and then dropped with age until sloping upward again at 16 years of age. The girls' curve had a similar, but more muted pattern.

Table V reports the age- and sex-specific LDL cholesterol percentile values for boys and girls 4 to 20 years of age, using data from the NHANES surveys, combined with the Bogalusa, Fels and Princeton studies (n=8,471). The adult value of 130 mg/dl for abnormally high LDL cholesterol was assigned to both boys and girls at 18 years of age, and in both groups this value represents the 88–89th percentile lines. Figures 10 and 11 show a similar pattern to the curves for total cholesterol in Figure 8 and 9: a slight peak around 8 to 11 years of age dipped to a low at 15–16 years of age, and then started to rise again. The pattern appears somewhat less prominent for females than males.

In addition to the combined analyses of the two NHANES datasets and the 4 longitudinal studies of cardiovascular risk factors, a parallel set of analyses to derive growth curves were conducted using only data from the NHANES III and NHANES 99-06 databases. The resulting growth curve percentiles did not appear to differ appreciably from the larger pooled analyses, despite the application of the national weights to the NHANES results. These data are available by request from the authors.

Discussion

This study combined data from NHANES and major existing U.S. childhood studies to create age- and sex-specific cut-points for abnormal waist circumference and lipids in the form of growth curves. We applied the LMS method to create specific percentile lines in childhood and adolescence that corresponded to currently accepted abnormal cut-off values for each variable for adults. We also developed Tables and Figures showing low and high percentile rankings. These data provide one approach to the measurement and longitudinal tracking of risk factors for cardio-metabolic disease in children and adolescents. However, the significance of these percentile curves as potential predictors of future disease warrants further research.

Longitudinal studies have shown that cardiovascular risk factors related to obesity and insulin resistance cluster together to a greater degree than expected by chance in adults, and possibly also in children.^{17–23} These clustering patterns also have been shown to track together over time.^{17, 24} However, studies have shown that risk status is not entirely stable over time²⁵ (see Li et al in this issue). Some of the instability described may be the result of analyzing cardio-

metabolic risk factors without accounting for naturally occurring age-related or pubertal fluctuation in some components of the lipid profile.

The percentiles and growth curves generated with the LMS data depict an almost bi-modal distribution of total cholesterol and triglycerides which has been noted in previous cross-sectional studies of lipid profiles among children and adolescents.^{26–28} A study by Hickman et al, using NHANES data, demonstrated a rise in total cholesterol and to a lesser degree in LDL cholesterol around early adolescence. Data from the Lipid Research Clinics Prevalence study also showed a rise in total cholesterol and triglycerides. These findings are likely attributable to insulin resistance in early puberty.^{29, 30} US data have shown that girls have more hyper-insulinemia than boys and have a similar peak of insulin concentration around this age.³¹ Regional studies show strong correlations between these components of the lipid profile and both insulin resistance and excess central fat distribution.^{10, 32–34}

The question of whether the current rise in childhood obesity might have an impact on “normal” values for serum cholesterol markers is not clear. In this study, we derived Tables from NHANES III only (Table I, A), from NHANES III, Bogalusa and Fels (Table I, C), and from NHANES III, NHANES 99-06, Bogalusa and Fels studies (Table I, B) for derivation of waist circumference values and presented all three here but felt the data in Table I, C, offered the most optimal distribution, reasonable sample size and had the least amount of influence from the current obesity epidemic. We also presented data from the NHANES III and current NHANES data sets for the cholesterol components rather than just the NHANES III dataset, because of the results of a study by Ford et al.,¹⁵ who compared median values for a number of cardiovascular risk factors between NHANES III and the NHANES 99-00 samples. They showed no change in the mean concentration of total cholesterol, LDL or HDL cholesterol across datasets. The triglycerides had actually decreased by 8.8mg/dl among teens, $p = 0.036$. On the other hand, they found that the mean value of waist circumference among children and adolescents aged 2–18 years had increased from 64.2cm to 66.2cm from NHANES III to NHANES 99-00 ($p < 0.01$). The changes at specific years of age were not significant when compared by sex.¹⁵ Our study compared medians when the LMS method was applied and only detected minimal differences between the large sample and the NHANES III only sub-sample.

Our study did not apply LMS analysis to blood pressure parameters, because current guidelines for hypertension in children and adolescents already specify age/sex-specific percentile ranges that transition into the adult abnormal criteria.³⁵ We also omitted glucose measures, because previous work has shown that glucose to be relatively stable in the adolescent age group of NHANES when LMS was applied.⁵

The obesity guidelines published by the American Academy of Pediatrics did not recommend the use of waist circumference measures as diagnostic of obesity because at the time of their publication, because no national reference data were available.¹ The age- and sex-specific tables in this paper offer an opportunity to measure and track waist circumference in epidemiological and clinical settings. However, the close correlation between BMI and waist circumference suggests that measuring waist circumference may only add slightly to the clinical evaluation of overweight or obesity among children and adolescents.

The use of waist circumference measurements should be tested for their clinical utility. They might be useful as an adjunct to measuring BMI by confirming that a child or teen with a high BMI and high waist circumference actually has excess body fat. Conversely, measuring a low waist circumference in a normal or overweight youth might help to confirm normal percent body fat and a low risk for cardio-metabolic abnormalities. Use of waist circumference as a confirmatory measure might also help to reduce unnecessary laboratory testing. Finally, measurement of waist circumference in addition to BMI might help to persuade doubting

parents or providers of a child's overweight status.^{36–42} Waist circumference percentiles or growth curves should be studied, using both quantitative and qualitative methods, to assess these potential advantages.

This study does not represent a consensus statement of the PMSWG or NIH, and the results should not be used as clinical guidelines for medical professionals to diagnose children with dyslipidemia or central obesity. Additional research is needed to determine whether values presented by these growth curves confer future disease risk on their own or in conjunction with BMI. Given that BMI alone often does not provide definitive clinical interpretations for clinicians^{41–43} or parents, the determination of risk thresholds for waist circumference and lipids may offer additional tools to identify children who are metabolically at risk and increase opportunities for early lifestyle intervention.

This study reported waist circumference data from 3 to 20 yrs of age and lipids down to the age of 4 years, and identified the transition points to adult abdominal obesity, whereas previous studies have reported data on a more limited range of ages,⁵ and without reference to abnormal adult values.⁷ This study used nationally representative data from the NHANES databases, but also increased the sample size substantially in key age groups by combining the national data with other pediatric data from four additional, similar cohorts of US children. Although some of the set of curves and tables derived from these combined datasets could not be nationally weighted to the US census, as NHANES data can, they provided very similar patterns and values.

Values estimated in this paper have not been fully validated in longitudinal studies of children and adolescents transitioning into adulthood. The waist circumference values may include children who were partially influenced by the early phase of the obesity epidemic. However, NHANES III is oldest national data available for waist circumference. In addition, the HDL cholesterol data from the two most recent NHANES series (2003–04, 2005–06) were analyzed with a different technique from previous surveys, and a coefficient of variance >4% was documented. Even though we applied the correction factor recommended from NHANES, the impact of this methodological issue on the current HDL percentile curves is uncertain.

In conclusion, these we report a collection of growth curves and percentiles that may provide additional tools and insights for research studies designed to track obesity-related cardiovascular risk factors in children and adolescents. These values need to be applied to longitudinal data, to assess their validity and utility. We invite other investigators to contact our team so we can share our results and to further test the application of the tables created here.

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Figure 1.

Figure 2.

Figure 3.

Figure 4.

Figure 5.

Figure 6.

Figure 7.

Figure 8.

Figure 9.

Figure 10.

Figure 11.

Table I

	Age, y	Percentiles				ATP cut-points		
		10th	25th	50th	75th	90th	95th	86th
Males	2	44.1	45.8	47.7	49.7	51.7	52.9	52.4
	3	46.0	47.6	49.7	52.1	54.7	56.5	55.8
	4	47.3	49.0	51.3	54.1	57.4	59.9	58.9
	5	48.3	50.2	52.8	56.1	60.1	63.4	62.0
	6	49.4	51.5	54.4	58.3	63.2	67.2	65.5
	7	50.8	53.1	56.4	60.9	66.7	71.7	69.5
	8	52.4	55.0	58.7	63.7	70.4	76.3	73.7
	9	54.1	57.0	61.0	66.5	74.0	80.8	77.7
	10	55.9	59.0	63.3	69.3	77.5	84.8	81.5
	11	57.7	61.0	65.6	72.1	80.8	88.5	85.1
	12	59.6	63.0	67.9	74.7	83.8	92.0	88.4
	13	61.4	65.0	70.1	77.2	86.7	95.1	91.4
	14	63.1	66.9	72.2	79.5	89.2	97.8	94.0
	15	64.8	68.6	74.1	81.6	91.5	100.2	96.3
	16	66.3	70.2	75.8	83.5	93.5	102.2	98.4
	17	67.7	71.8	77.5	85.3	95.4	104.1	100.3
	18	69.1	73.2	79.0	86.9	97.2	105.8	102.0
Females	2	43.8	45.7	47.9	50.3	52.6	54.0	51.8
	3	45.0	47.0	49.5	52.3	55.3	57.4	54.2
	4	46.5	48.5	51.1	54.4	58.1	60.8	56.8
	5	47.5	49.6	52.5	56.2	60.6	64.1	58.9
	6	48.4	50.7	53.9	58.1	63.4	67.7	61.4
	7	49.7	52.3	55.9	60.7	66.8	71.9	64.4
	8	51.3	54.2	58.1	63.5	70.3	76.1	67.7
	9	53.1	56.2	60.6	66.4	73.8	80.0	71.0
	10	55.1	58.5	63.2	69.4	77.2	83.5	74.2
	11	57.3	60.9	65.8	72.4	80.4	86.8	77.3
	12	59.4	63.1	68.3	75.0	83.3	89.9	80.2
	13	61.3	65.1	70.4	77.4	85.9	92.7	82.7
	14	63.0	66.8	72.2	79.2	87.9	95.0	84.6
	15	64.2	68.0	73.4	80.5	89.4	96.6	86.0
	16	65.0	68.9	74.2	81.4	90.4	97.8	87.0
	17	65.6	69.4	74.8	82.0	91.1	98.7	87.6
	18	66.0	69.8	75.1	82.3	91.6	99.4	88.0

	Age, y	Percentiles				ATP cut-points		
		10th	25th	50th	75th	90th	95th	75th
Males	44.3	45.8	47.8	50.1	52.5	54.1	52.6	
	45.8	47.5	49.8	52.4	55.3	57.3	55.4	
	47.2	49.1	51.5	54.6	58.1	60.7	58.3	
	48.4	50.5	53.2	56.8	61.0	64.4	61.3	
	49.6	51.9	55.0	59.2	64.4	68.7	64.7	
	51.0	53.7	57.4	62.3	68.7	74.2	69.1	
	52.5	55.6	60.0	65.9	73.5	79.9	74.0	
	53.8	57.5	62.6	69.4	78.0	85.0	78.6	
	55.4	59.6	65.4	73.0	82.6	90.2	83.2	
	57.4	61.8	68.1	76.5	87.0	95.5	87.6	

Table I, A. Sample size and percentage values of percentiles of weighted waist circumference by age/sex, NHANES III

Age, y	Percentiles					ATP cut-points		
	10th	25th	50th	75th	90th	95th	93rd	86th
Females	59.8	64.4	70.9	79.7	91.1	100.6	91.8	50.4
	62.2	66.8	73.4	82.3	94.2	104.4	94.9	52.6
	64.4	69.0	75.5	84.5	96.4	106.8	97.1	54.8
	66.3	70.8	77.3	86.3	98.1	108.4	98.9	56.6
	67.8	72.4	78.9	87.7	99.5	109.6	100.2	58.8
	69.1	73.6	80.1	88.9	100.5	110.4	101.2	62.0
	70.1	74.6	81.1	89.8	101.3	111.0	102.0	65.6
	43.8	45.5	47.8	50.4	53.2	55.1	51.8	69.3
	45.4	47.3	49.7	52.7	55.9	58.2	54.6	73.4
	46.9	48.9	51.5	54.9	58.7	61.5	57.6	77.6
	47.9	50.0	52.9	56.7	61.1	64.5	59.9	81.0
	49.0	51.4	54.6	58.9	64.1	68.3	61.5	83.4
	50.6	53.3	57.0	62.1	68.6	74.1	66.9	85.0
	52.2	55.3	59.7	65.7	73.4	79.9	71.6	86.7
	53.9	57.5	62.6	69.4	77.9	84.9	75.4	87.4
	56.1	60.3	66.0	73.5	82.7	89.8	79.9	88.0
	58.9	63.5	69.7	77.7	87.3	94.6	81.4	
	61.7	66.4	72.8	81.1	91.1	98.9	86.7	
	63.9	68.5	75.0	83.5	94.0	102.2	91.0	
	65.2	69.9	76.5	85.2	95.9	104.6	93.4	
	66.1	70.8	77.4	86.2	97.2	106.1	95.0	
	66.6	71.3	78.0	86.8	98.1	107.2	96.7	
	67.0	71.8	78.5	87.5	98.9	108.3	97.4	
	67.5	72.3	79.0	88.1	99.7	109.3	98.0	

Table I, C. Sample size and percentage values of percentiles of unweighted waist circumference by age/sex from NHANES III, Bogalusa, and Fels

Age, y	Percentiles					ATP cut-point		
	10th	25th	50th	75th	90th	95th	94th	84th
Males	44.1	45.7	47.7	49.8	51.8	53.0	52.8	51.5
	46.1	47.6	49.7	52.0	54.6	56.4	56.1	53.9
	47.4	49.0	51.3	54.0	57.2	59.7	59.2	56.2
	48.3	50.2	52.7	55.9	59.9	63.0	62.4	58.2
	49.4	51.5	54.3	58.2	63.0	66.9	66.1	60.3
	50.8	53.1	56.4	60.9	66.7	71.6	70.6	
	52.4	55.0	58.7	63.8	70.6	76.6	75.4	
	54.0	56.9	61.0	66.7	74.4	80.0	80.0	
	55.8	58.9	63.4	69.6	78.1	85.8	84.2	
	57.6	61.0	65.7	72.4	81.4	89.6	87.9	
	59.5	63.0	68.0	75.0	84.5	93.0	91.3	
	61.4	65.1	70.3	77.4	87.1	95.8	94.0	
	63.2	67.0	72.3	79.6	89.4	98.3	96.3	
	64.9	68.7	74.2	81.6	91.3	99.8	98.1	
	66.5	70.4	75.8	83.3	92.9	101.2	99.5	
	67.9	71.8	77.4	84.8	94.4	102.4	100.8	
	69.2	73.2	78.8	86.2	95.7	103.6	102.0	
Females	43.7	45.5	47.6	50.2	52.8	54.6	51.8	51.5
	45.3	47.1	49.5	52.4	55.5	57.7	55.9	53.9
	46.6	48.6	51.2	54.5	58.1	60.8	57.7	56.2
	47.7	49.8	52.6	56.2	60.5	63.8	60.5	58.2
	48.6	50.8	53.9	58.0	63.0	67.0	63.0	60.3

Table I, A. Sample size and percentage values of percentiles of weighted waist circumference by age/sex, NHANES III

Age, y	Percentiles					ATP cut-points		
	10th	25th	50th	75th	90th	95th	93rd	86th
7	49.9	52.4	55.9	60.6	66.6	71.6		63.3
8	51.4	54.3	58.3	63.7	70.8	76.9		66.9
9	52.9	56.0	60.5	66.6	74.4	81.0		70.1
10	54.9	58.5	63.5	70.1	78.3	84.9		73.9
11	57.7	61.7	67.2	74.2	82.7	89.2		78.2
12	60.2	64.4	70.1	77.5	86.3	93.0		81.6
13	62.2	66.4	72.3	79.9	89.0	96.2		84.1
14	63.6	67.9	73.7	81.5	91.0	98.6		85.9
15	64.5	68.7	74.6	82.4	92.2	100.1		86.9
16	65.0	69.2	75.1	83.0	92.9	101.0		87.5
17	65.2	69.4	75.3	83.2	93.2	101.4		87.8
18	65.4	69.6	75.5	83.4	93.4	101.7		88.0

ATP, Adult Treatment Panel

Waist circumference passes through 102 cm for males and 88 cm for females at 18 years.

Table II

Table II, A. Sample size and percentage values of percentiles of weighted triglycerides by age/sex, NHANES III and NHANES 1999-2004

Age, y	10th	Percentiles				ATP cut-points			
		25th	50th	75th	90th	95th	85th	90th	
Males									
4	33.5	42.1	55.7	76.8	106.9	133.6	93.2		
5	35.3	44.5	59.2	81.8	114.0	142.4	99.4		
6	36.3	45.9	61.2	84.7	118.1	147.5	103.0		
7	37.0	46.8	62.6	86.8	121.1	151.2	105.5		
8	38.1	48.3	64.7	89.8	125.4	156.5	109.3		
9	39.4	50.1	67.3	93.7	130.9	163.3	114.1		
10	40.9	52.2	70.3	98.1	137.4	171.7	119.6		
11	42.3	54.1	73.1	102.4	144.1	180.7	125.2		
12	43.1	55.2	74.8	105.1	148.7	187.2	128.9		
13	43.4	55.7	75.6	106.5	151.2	190.8	130.9		
14	43.6	55.9	76.0	107.2	152.4	192.6	131.8		
15	43.8	56.2	76.4	108.0	153.9	194.9	133.0		
16	44.2	56.8	77.5	109.9	157.2	199.8	135.6		
17	45.2	58.2	79.6	113.6	163.9	209.7	140.8		
18	47.1	60.8	83.6	120.2	175.5	226.8	150.0		
Females									
4	40.8	49.5	62.4	80.7	104.3	123.2		103.9	
5	40.0	48.9	62.5	82.0	107.6	128.5		107.1	
6	40.3	49.8	64.3	85.4	113.5	136.8		113.0	
7	42.4	52.7	68.6	92.0	123.5	149.8		122.9	
8	45.0	56.2	73.6	99.4	134.4	163.8		133.8	
9	47.6	59.6	78.5	106.6	144.9	177.3		144.3	
10	49.6	62.4	82.4	112.3	153.3	187.9		152.6	
11	50.3	63.4	83.9	114.6	156.5	192.0		155.8	
12	49.3	62.1	82.1	112.0	152.8	187.2		152.1	
13	47.5	59.7	78.7	106.9	145.2	177.3		144.6	
14	46.0	57.6	75.8	102.5	138.5	168.5		137.9	
15	45.4	56.8	74.5	100.5	135.3	164.2		134.7	
16	45.7	57.3	75.1	101.2	136.3	165.4		135.7	
17	47.0	59.0	77.6	105.1	142.2	173.1		141.5	
18	48.1	60.8	80.7	110.3	150.7	184.7		150.0	

Table II, B. Values of percentiles of unweighted triglycerides by age/sex, NHANES III, NHANES 1999-2004, Bogalusa, Muscatine, Fels, and Princeton

	10th	Percentiles				ATP cut-points			
		25th	50th	75th	90th	95th	90th	91st	
Males									
	37.8	46.3	59.7	80.2	109.3	135.2	109.6		
	37.9	46.5	60.1	80.8	110.2	136.4	110.6		
	37.9	46.6	60.3	81.2	111.0	137.4	111.3		
	38.0	46.8	60.7	81.9	112.1	138.8	112.4		
	38.3	47.4	61.8	83.8	115.0	142.7	115.4		
	38.6	48.1	63.1	86.1	118.7	147.4	119.0		
	39.0	48.9	64.7	88.7	122.7	152.5	123.0		
	39.8	50.2	66.7	92.0	127.6	158.8	128.0		
	40.4	51.1	68.2	94.3	131.2	163.4	131.6		
	40.7	51.6	68.9	95.5	133.0	165.7	133.4		
	40.9	51.8	69.3	96.1	134.0	167.0	134.4		
	41.2	52.3	70.0	97.2	135.8	169.4	136.2		
	41.5	52.8	70.9	98.6	138.0	172.4	138.4		
	41.9	53.4	71.9	100.4	140.9	176.5	141.4		

Table II. A. Sample size and percentage values of percentiles of weighted triglycerides by age/sex, NHANES III and NHANES 1999-2004

Age, y	Percentiles					ATP cut-points		
	10th	25th	50th	75th	90th	95th	85th	90th
Females	43.7	55.8	75.4	105.8	149.5	188.3	150.0	
	40.2	48.8	62.1	81.6	108.1	130.7		113.1
	40.1	48.9	62.5	82.6	110.4	134.3		115.6
	40.6	49.7	63.9	85.0	114.4	140.0		120.0
	42.1	51.7	66.7	89.3	121.0	148.8		127.1
	44.0	54.1	70.1	94.4	128.7	159.0		135.3
	45.9	56.6	73.6	99.4	136.1	168.7		143.2
	47.3	58.5	76.2	103.3	141.9	176.1		149.3
	47.9	59.4	77.6	105.3	144.9	180.0		152.5
	47.4	58.8	76.9	104.6	144.0	178.9		151.5
	46.1	57.4	75.1	102.2	140.8	174.7		148.1
	44.9	55.9	73.3	99.8	137.4	170.5		144.6
	44.0	54.9	72.1	98.4	135.5	168.1		142.6
	43.6	54.5	71.9	98.2	135.5	168.2		142.6
	44.0	55.1	72.8	99.8	138.0	171.5		145.3
	44.8	56.3	74.7	102.7	142.4	177.3		150.0

ATP, Adult Treatment Panel

Triglycerides pass through 150 mg/dL for males and 150 mg/dL for females at 18 years.

Table III

Table III, A. Sample size and percentage values of percentiles of weighted HDL by age/sex, NHANES S III and NHANES 1999-2004

	Age, y	Percentiles					ATP cut-points	
		5th	10th	25th	50th	75th	90th	32nd 42nd
Males	6	38.0	40.8	46.2	53.2	61.7	70.9	48.1
	7	38.3	41.3	46.9	54.3	63.0	72.4	48.9
	8	38.6	41.7	47.6	55.2	64.2	73.8	49.7
	9	38.5	41.7	47.7	55.5	64.7	74.3	49.9
	10	37.8	41.0	47.0	54.8	63.9	73.4	49.2
	11	36.4	39.5	45.4	52.9	61.7	70.9	47.5
	12	34.8	37.8	43.4	50.7	59.1	68.0	45.4
	13	33.3	36.2	41.6	48.6	56.8	65.3	43.6
	14	32.1	34.9	40.2	47.0	54.9	63.2	42.1
	15	31.3	34.0	39.1	45.8	53.5	61.7	41.0
	16	30.7	33.4	38.5	45.0	52.7	60.8	40.3
	17	30.5	33.1	38.2	44.8	52.5	60.6	40.0
	18	30.4	33.1	38.2	44.8	52.5	60.8	40.0
Females	6	33.5	37.1	43.5	51.1	59.0	66.6	48.7
	7	34.6	38.0	44.2	51.7	59.9	67.9	49.3
	8	35.2	38.5	44.5	52.0	60.3	68.6	49.6
	9	35.2	38.5	44.5	52.0	60.3	68.6	49.6
	10	35.2	38.5	44.4	51.8	60.1	68.5	49.4
	11	34.9	38.1	44.0	51.3	59.6	67.8	49.0
	12	34.6	37.8	43.7	51.0	59.2	67.3	48.7
	13	34.6	37.8	43.7	51.0	59.1	67.3	48.6
	14	34.6	37.8	43.7	51.0	59.2	67.3	48.6
	15	34.6	37.8	43.7	51.0	59.2	67.3	48.7
	16	34.6	37.9	43.8	51.2	59.4	67.6	48.8
	17	34.8	38.1	44.3	51.8	60.2	68.5	49.4
	18	34.9	38.4	44.7	52.5	61.1	69.5	50.0

Table III, B. Values of percentiles of unweighted HDL by age/sex, NHANES III, NHANES 1999-2004, Bogalusa, Fels, and Princeton

		Percentiles					ATP cut-points	
		5th	10th	25th	50th	75th	90th	26th 43rd
Males		38.3	41.6	47.7	55.5	64.5	73.8	48.0
		38.3	41.7	47.9	55.9	65.1	74.6	48.2
		38.2	41.6	48.0	56.1	65.0	75.0	48.3
		37.9	41.3	47.7	55.9	65.3	75.0	48.0
		37.3	40.7	47.1	55.2	64.6	74.2	47.4
		36.3	39.7	45.9	53.9	63.1	72.6	46.2
		35.1	38.3	44.3	52.1	61.0	70.2	44.6
		33.8	36.9	42.7	50.1	58.7	67.6	43.0
		32.8	35.8	41.4	48.6	56.9	65.5	41.7
		32.1	35.0	40.4	47.4	55.5	63.9	40.7
		31.6	34.5	39.8	46.7	54.7	62.9	40.1
		31.4	34.3	39.6	46.5	54.5	62.7	39.9
		31.5	34.4	39.7	46.6	54.7	63.1	40.0
Females		35.7	39.1	45.3	53.0	61.8	70.6	50.8
		35.8	39.1	45.3	53.0	61.8	70.6	50.8
		35.8	39.1	45.2	53.0	61.7	70.5	50.7
		35.6	38.9	45.0	52.6	61.3	70.0	50.4

Table III. A. Sample size and percentage values of percentiles of weighted HDL by age/sex, NHANES S III and NHANES 1999-2004

Age, y	Percentiles					ATP cut-points		
	5th	10th	25th	50th	75th	90th	32nd	42nd
35.4	38.6	38.4	44.6	52.1	60.7	69.3		49.9
35.1	38.4	38.2	44.2	51.7	60.1	68.6		49.5
35.0	38.2	38.0	44.0	51.4	59.7	68.2		49.3
35.0	38.2	38.0	44.0	51.3	59.6	68.0		49.2
35.1	38.3	38.3	44.1	51.5	59.8	68.2		49.3
35.2	38.4	38.4	44.3	51.7	60.2	68.7		49.6
35.2	38.5	38.5	44.5	52.0	60.6	69.2		49.8
35.1	38.4	38.4	44.5	52.2	60.8	69.6		49.9
35.0	38.3	38.3	44.5	52.3	61.0	69.8		50.0

ATP, Adult Treatment Panel.

HDL cholesterol passes through 40 mg/dL for males and 50 mg/dL for females at 18 years.

Table IV

Table IV, A. Sample size and percentage values of percentiles of weighted Total Cholesterol by age and sex NHANES III and NHANES 1999–2004.

Age	Percentiles						ATP cut points	
	10th	25th	50th	75th	90th	95th	88th	84th
Males								
6	131.2	144.8	161.4	179.7	197.7	209.3	194.5	
7	133.4	147.6	164.9	184.1	203.1	215.4	199.7	
8	134.9	149.5	167.4	187.3	207.1	220.0	203.6	
9	135.2	149.9	168.1	188.4	208.7	221.8	205.1	
10	135.2	149.9	168.1	188.5	208.8	221.9	205.1	
11	134.4	149.3	167.6	188.2	208.9	222.3	205.2	
12	130.5	145.2	163.5	184.3	219.1	219.1	201.5	
13	125.5	139.9	158.1	178.9	200.3	214.4	196.4	
14	122.3	136.6	154.8	175.9	197.6	212.1	193.7	
15	121.7	136.1	154.4	175.7	197.7	212.5	193.7	
16	121.6	136.1	154.4	175.8	197.9	212.7	193.9	
17	122.0	136.6	155.3	177.0	199.6	214.7	195.5	
18	123.8	139.0	158.3	180.8	204.3	220.0	200.0	
Females								
6	132.8	147.1	165.1	185.7	206.8	220.8		196.8
7	133.0	147.3	165.4	186.0	207.2	221.3		197.3
8	133.0	147.3	165.4	186.1	207.3	221.4		197.3
9	132.9	147.3	165.3	186.0	207.2	221.3		197.2
10	132.2	146.5	164.5	185.2	206.4	220.4		196.4
11	130.5	144.7	162.6	183.2	204.3	218.3		194.4
12	128.6	142.7	160.5	181.0	202.1	216.1		192.2
13	127.6	141.7	159.6	180.1	201.3	215.4		191.3
14	127.4	141.5	159.5	180.1	201.3	215.5		191.3
15	127.3	141.5	159.5	180.2	201.5	215.7		191.5
16	127.4	141.7	160.0	181.0	202.7	217.1		192.5
17	128.4	143.2	161.9	183.5	206.0	220.9		195.4
18	130.5	145.8	165.2	187.7	211.0	226.6		200.0

Table IV, B. Values of percentiles of unweighted Total Cholesterol by age/sex NHANES III, NHANES 1999–2004, Bogalusa, Muscatine, Fels, and Princeton.

Age	Percentiles						ATP cut points	
	10th	25th	50th	75th	90th	95th	89th	86th
Males								
6	130.4	144.0	160.9	179.7	198.6	210.9	196.3	
7	132.2	146.3	163.7	183.3	202.9	215.6	200.4	
8	133.7	148.2	166.2	186.4	206.6	219.7	204.0	
9	134.3	149.2	167.6	188.3	209.0	222.5	206.4	
10	133.9	149.0	167.7	188.7	209.8	223.5	207.1	
11	132.0	147.1	165.8	187.0	208.3	222.1	205.6	
12	128.8	143.7	162.3	183.4	204.7	218.6	202.0	
13	125.0	139.6	157.9	178.8	200.0	213.9	197.3	
14	121.4	135.7	153.7	174.4	195.5	209.4	192.8	
15	119.4	133.5	151.4	172.1	193.5	207.6	190.7	
16	119.3	133.5	151.6	172.7	194.6	209.2	191.8	
17	120.7	135.1	153.6	175.3	198.0	213.3	195.0	
18	123.1	137.9	157.0	179.4	203.1	219.1	200.0	
Females								
6	131.6	146.1	164.2	184.9	206.1	220.1		198.4
7	133.1	147.6	165.9	186.8	208.1	222.2		200.3
8	133.9	148.5	166.8	187.7	209.1	223.2		201.3
9	133.6	148.2	166.4	187.2	208.5	222.5		200.7

Table IV. A. Sample size and percentage values of percentiles of weighted Total Cholesterol by age and sex NHANES III and NHANES 1999-2004.

Age	Percentiles							ATP cut points	
	10th	25th	50th	75th	90th	95th	88th	84th	
10	132.5	146.9	165.0	185.7	206.7	220.6		199.0	
11	131.1	145.3	163.2	183.7	204.5	218.2		196.9	
12	129.4	143.5	161.3	181.5	202.2	215.8		194.6	
13	127.9	141.9	159.6	179.7	200.3	213.9		192.8	
14	126.6	140.7	158.4	178.5	199.2	212.8		191.6	
15	125.8	139.9	157.7	178.1	198.9	212.7		191.3	
16	125.7	140.0	158.2	178.9	200.3	214.4		192.4	
17	126.9	141.6	160.2	181.6	203.7	218.3		195.6	
18	128.9	144.0	163.3	185.5	208.4	223.6		200.0	

ATP, Adult Treatment Panel

* Total cholesterol passes through 200 mg/dL for males and females at 18 years

Table V

Table V, A. Sample size and percentage values of percentiles of weighted LDL cholesterol by age/sex, NHANES III and NHANES 1999–2004									
Age, y	n	Percentiles				ATP cut-points			
		10th	25th	50th	75th	90th	95th	89th	89th
Males									
4	64.4	76.0	90.0	104.9	119.3	128.2	134.8	118.3	122.3
5	64.6	76.4	90.7	106.2	121.2	130.6	137.7	120.2	124.6
6	64.8	76.8	91.4	107.4	123.0	132.8	140.6	121.9	126.9
7	65.1	77.3	92.3	108.8	125.1	135.4	143.1	124.0	128.8
8	65.6	77.9	93.3	110.4	127.3	138.2	144.6	126.2	130.0
9	65.6	78.1	93.7	111.2	128.7	140.0	145.1	127.6	132.7
10	65.3	77.8	93.5	111.4	129.3	141.0	146.6	128.1	134.8
11	64.7	77.2	93.0	111.0	129.3	141.3	147.7	128.1	136.9
12	63.6	76.0	91.8	109.9	128.4	140.5	148.8	127.1	138.2
13	62.2	74.5	90.2	108.3	126.7	138.8	149.9	125.4	140.6
14	60.8	73.0	88.6	106.6	124.9	136.9	151.0	123.7	143.1
15	60.1	72.5	88.2	106.2	124.6	136.7	152.1	123.4	144.6
16	60.2	72.9	88.9	107.3	125.9	138.1	153.2	124.7	146.6
17	60.8	73.8	90.4	109.2	128.1	140.5	154.3	126.9	148.8
18	61.7	75.4	92.6	111.9	131.3	143.8	155.4	130.0	150.0
Females									
4	66.9	78.2	92.3	108.3	124.3	134.8	145.9	122.3	152.1
5	66.7	78.5	93.3	110.0	126.8	137.7	147.0	124.6	154.3
6	66.5	78.8	94.2	111.6	129.2	140.6	148.1	126.9	156.5
7	66.0	78.8	94.8	112.9	131.2	143.1	149.2	128.8	158.7
8	65.3	78.4	94.9	113.6	132.4	144.6	150.3	130.0	160.9
9	64.4	77.7	94.5	113.6	132.7	145.1	151.4	130.2	163.1
10	63.5	76.9	93.8	112.9	132.1	144.6	152.5	129.7	165.3
11	62.7	76.0	92.8	111.8	130.9	143.2	153.6	128.4	167.5
12	62.2	75.3	91.8	110.4	129.2	141.4	154.7	126.8	169.7
13	61.9	74.8	91.0	109.4	128.0	140.0	155.8	125.6	171.9
14	61.8	74.6	90.8	109.1	127.7	139.7	156.9	125.2	174.1
15	61.9	74.7	90.6	109.6	128.4	140.6	158.0	125.9	176.3
16	61.9	74.9	91.3	110.2	129.5	142.0	159.1	127.0	178.5
17	62.3	75.3	91.9	111.1	130.7	143.6	160.2	128.1	180.7
18	63.3	76.3	93.1	112.6	132.6	145.8	161.3	130.0	182.9
Table V, B. Values of percentiles of unweighted LDL cholesterol by age/sex, NHANES III, NHANES 1999–2004, Bogalusa, Muscatine, Fels, and Princeton									
Age, y	n	Percentiles				ATP cut-points			
		10th	25th	50th	75th	90th	95th	89th	88th
Males									
4	63.5	75.0	89.4	105.6	121.8	132.3	143.4	120.9	128.8
5	63.7	75.5	90.3	107.1	124.0	135.1	144.5	123.1	130.0
6	63.9	75.9	91.1	108.5	126.2	137.9	145.6	125.3	132.7
7	64.1	76.3	91.9	110.0	128.5	140.7	146.7	127.5	134.8
8	64.3	76.7	92.8	111.4	130.7	143.4	147.8	129.6	136.9
9	64.1	76.7	93.0	112.0	131.8	145.0	148.9	130.7	139.0
10	63.5	76.1	92.5	111.8	131.8	145.2	150.0	130.7	141.1
11	62.8	75.4	91.8	111.1	131.2	144.7	151.1	130.1	143.2
12	61.8	74.3	90.6	109.9	130.0	143.4	152.2	128.8	145.3
13	60.5	72.8	88.8	107.7	127.6	140.8	153.3	126.4	147.4
14	59.0	71.0	86.7	105.2	124.6	137.6	154.4	123.5	149.5
15	58.3	70.3	85.9	104.3	123.5	136.3	155.5	122.4	151.6
16	58.7	70.8	86.6	105.2	124.6	137.4	156.6	123.5	153.7
17	59.8	72.4	88.6	107.6	127.3	140.4	157.7	126.2	155.8

Table V. A. Sample size and percentage values of percentiles of weighted LDL cholesterol by age/sex, NHANES III and NHANES 1999-2004

Age, y	Percentiles					ATP cut-points		
	10th	25th	50th	75th	90th	95th	89th	89th
Females	61.4	74.5	91.3	110.9	131.1	144.5	130.0	
	65.5	76.9	91.7	109.3	127.9	140.5		125.1
	66.5	78.3	93.7	111.8	131.0	143.8		128.1
	67.4	79.6	95.6	114.3	133.9	147.1		131.0
	67.9	80.5	96.9	116.1	136.1	149.4		133.1
	67.7	80.6	97.3	116.7	136.8	150.1		133.7
	67.0	80.0	96.8	116.2	136.2	149.4		133.2
	66.0	79.1	95.8	115.1	135.0	148.0		132.0
	64.9	77.9	94.5	113.6	133.2	146.0		130.3
	63.6	76.4	92.7	111.5	130.8	143.5		127.9
	62.4	74.9	91.0	109.5	128.5	141.0		125.7
	61.3	73.7	89.5	107.8	126.7	139.1		123.8
	60.7	72.9	88.6	106.9	125.7	138.1		122.9
	60.6	72.9	88.8	107.2	126.3	138.9		123.4
	61.5	74.0	90.1	109.1	128.8	141.9		125.8
	63.3	76.1	92.8	112.5	133.1	146.9		130.0

ATP, Adult Treatment Panel.

LDL cholesterol passes through 130 mg/dL for males and females at 18 years.