NHLBI Evidence Table: MultiRF-OB

PMID	First Author	Title	Year	Study Type	Prospect./ Restrospect.	Study	CVD	RF by CQ	Country	Setting	Main Study Objective	N at Baseline (N at Follow-up)	Target Population	Eligibility Criteria	Patient Characteristics	Study Groups	n at Baseline (n at Follow-up) for Study Groups	Total Follow-up Duration	Outcomes Measured	Results	Main Reported Findings by Critical Question
1529936	Berenson GS	Atherosclerosis of the aorta and coronary arteries and cardiovascular risk factors in persons aged 6 to 30 years and studied at necropsy (The Bogalusa Heart Study)	1992	CrS	Retrospective	Bogalusa	Atherosclerosis	Q1(RF2,3,4,5,8) Q2(RF2,3,4,5,8) Q3(RF2,3,4,5,8) Q5(RF2,3,4,5,8)	USA	Community (other)	To relate C-V RFs measured in life to atherosclerotic extent at autopsy after unexpected death in childhood or young adult life.	66	Pediatric/ Young adult	Since 9/89, 150 individuals have died unexpectedly at 3-31 y of age in Washington county, Bogalusa - 66 of the group had been evaluated previously at least once as part of a Bogalusa screening.	Community-based cohort of B & W children and young adults - originally examined at 5-17 yrs; 52% F, 44% B. For this study, autopsy findings of 150 study subjects are correlated with pre-mortem RFs.	N/A	N/A	N/A	Age, Race, Gender, Ht, Wt, Ponderal index (PI), BMI, SBP, DBP, TC, TG, HDL, LDL, VLDL, TC/HDL, Fasting glucose (FG), Fasting insulin (INS)	Age at death ranged from 6-30y(mean=20y) with 75% occurring between 17 & 27y. Interval from last C-V RF evaluation ranged from 3 wks to 16 yrs. Intimal fatty streaks were common and extensive, more prevalent in males and more in Bs than Ws (32% vs 20%,p=S**), increasing with increasing age. Fibrous plaques were rare but increased with age, with greater extent in males. Fatty streaks and fibrous plaques correlated best in the coronary arteries, less well in the aorta. With all subjects combined, aortic and coronary fatty streaks correlated (+)ly with TC & LDL-C (r=.63,p=S**); (-)ly with TC/HDL(r=.30 and (+)ly with ponderal index (r=.35,p=S). In Ws, coronary fatty streaks correlated (+)ly with TGs(r=.48,p=S), VLDL(r=.36,p=S), SBP(r=.54,p=S*), DBP(r=.47,p=S) & ponderal index(r=.37,p=S); correlations were less strong in the aorta.	Q1,2,3 Atherosclerosis begins in childhood and extent is related to the presence & intensity of known RFs. Q5. There are race & gender differences in the development of atherosclerosis and the impact of C-V RFs.
1529936	Berenson GS	Atherosclerosis of the aorta and coronary arteries and cardiovascular risk factors in persons aged 6 to 30 years and studied at necropsy (The Bogalusa Heart Study)	1992																	In Bs, aortic fatty streaks correlated (+)ly with TC(r=.74,p=S*) & LDL-C(r=.64,p=S); there were no correlations with coronary lesions in Bs. Fatty streak intimal surface involvement increased significantly with increasing quartile of LDL in the aorta & coronary arteries.	
1929690	Wattigney WA	Increasing impact of obesity on serum lipids and lipoproteins in young adults. The Bogalusa Heart Study	1991	CrS	Retrospective	Bogalusa	None	Q5 (RF5,8) Q6 (RF5,8)	USA	Community (other)	Evaluate impact of obesity on serum lipids with increasing age beginning in childhood.	3,311	Pediatric/ Young adult	Subjects from 3 of the Bogalusa CrS surveys were included - 1983 through 1986 - with exclusion of pregnant Fs and those on OCs. 4 age groups: 5-10 y;11-16 y;17-22 y;23-26 y.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% male(M); 44% B. For this study: Age:5-22 yrs.	4 age groups: 5-10 y; 11-16 y; 17-22 y; 23-26 y.	N/A	N/A	Age, Race, Sex, SBP, DBP, Ht, Wt, Tanner stage, Rohrer index (kg/m cubed) (RI), Waist circumference, Skin-fold thicknesses (mean of 7 sites) (SSFs), TC, TG, VLDL, HDL, LDL, HDL/LDL + VLDL, LDL/HDL, Smoking status, Alcohol use, OC use	Prevalence of obesity increased with increasing age, most prominently in black females with 37% of 23-26 y old BFs classified as obese. (+) association of obesity with increasing LDL-C, greater as age increases, especially in white males; no such association in BFs. VLDL levels correlated significantly with RI with r=0.17 to 0.31 for different age & sex groups (p=S-S*) (-) association between ponderosity and HDL-C, maximal in 23-26 y old WMs (r=-0.39,p=S**). Lipid correlations with SSFs inconsistent. Based on NCEP criteria, 28% of WMs were defined as borderline high and 12% as high for LDL-C.	Adiposity in childhood correlates with adverse lipid profile findings, increased as age increases. There are race and sex differences in both fat patterning and lipid profile findings.
2683750	Folsom AR	Relation of body fatness and its distribution to cardiovascular risk factors in young blacks and whites. The role of insulin	1989	CrS	Retrospective	CARDIA	None	Q6 (RF4,5,8,14)	USA	Community (other)	Examine the cross-sectional relation of % body fat and fat distribution to C-V RFs in CARDIA cohort at baseline.	5115	Pediatric/ young adult	All subjects evaluated at baseline in whom complete fasting data and all anthropometric measures were recorded.	Population-based, prospective observational study with participants recruited from 4 metropolitan areas (Birmingham, Ala; Chicago, Ill, Minneapolis, Minn; & Oakland, Calif) in 1985 1986 at 18-30 yrs of age (44.9% black(B), 55.1% white(W); 53.9% female(F),46.1% male(M). Body composition measures and assessment of C-V RFs performed at baseline assessment.	N/A	N/A	N/A	Age, Race, Gender, Ht, Wt, BMI (>25kg/m squared = overweight), Waist circumference (WC), Hip circumference (HC), Waist to hip ratio (WC/HC), Subscapular,triceps & supra-iliac SFs, % body fat (calculated from SFs), SBP, DBP, TC, TG, HDL, LDL, TC/HDL, Fasting glucose (FG), Fasting insulin (INS), Smoking status, Education level, Alcohol use, OC use, Physical activity	WMs were slightly older and taller than BMs and BFs were shorter,fatter & had a greater W/H ratio than WFs. % body fat from SFs was associated significantly with all measured lipids, lipoproteins, apolipoproteins, uric acid & BP. Compared with WMs, BMs had higher INS, HDL and apoA1, & lower FG,TG,apoB & uric acid. Compare with WFs, BFs had higher INS & lower TGs than WFs. WC was strongly associated with % BF(r=0.75-0.8) but the latter was uniformly & more strongly associated with all other RF measures; strongest associations with increased body fat were TGs, HDL (inversely), apoB & uric acid. All these measures were also significantly associated with INS. Waist-to-hip ratio was significantly but more weakly associated with TGs, HDL-C, HDL2-C, apolipoproteins A1 and B, LDL-C (in women only), uric acid and SBP, but was not associated with TC, HDL3-C or DBP. Fasting insulin levels were significantly associated with % body fat, waist to hip ratio and most of the physiologic RFs. With MVA, inclusion of fasting insulin reduced but did not eliminate the associations between waist to hip ratio and	Q6. C-V RFs cluster together and are strongly associated with overall body fatness. They are also associated with W/H ratio suggesting that abdominal obesity confers excess C-V risk. Physiologic effects of fatness are only partially mediated by insulin. Q5. There are racial and gender differences in the physiologic response to increasing adiposity.
2816800	Freedman DS	Relation of body fat patterning to lipid and lipoprotein concentrations in children and adolescents: the Bogalusa Heart Study	1989	CrS	Retrospective	Bogalusa	None	Q6 (RF 5,8)	USA	Community (other)	Correlate serum lipids with anthropometric measures of fat distribution	361	Pediatric/ Young adult	Based on the average of 2 VLDL & LDL measurements from previous surveys in 1973-4 & 1976-77, subjects were placed in 4 groups: Group 1: Low VLDL, low LDL; Group 2: Low VLDL, high LDL; Group 3: High VLDL, high LDL; Group 4: High VLDL, low LDL. High & low cut-offs were based on the 20th& 80th%iles (groups 1 & 3) or the 25th & 75th%iles (groups 2 & 4).	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% female(F),48% male(M); 44% B. For this study: B & W children with extreme measures of VLDL and LDL-C underwent measurement of truncal and peripheral fat. 32% WMs, 28% WFs,21% BMs,19% BFs.	Group 1: Low VLDL, low LDL; Group 2: Low VLDL, high LDL; Group 3: High VLDL, high LDL; Group 4: High VLDL, low LDL	N/A	N/A	Race, Sex, SBP, DBP, Ht, Wt, Tanner stage, Rohrer index (kg/m cubed) (RI), Waist circumference, Skin-fold thicknesses (mean of 7 sites) (SSFs), TC, TG, VLDL, HDL, LDL, HDL/LDL + VLDL, LDL/HDL, Apolipoprotein A1, Apolipoprotein B, Smoking status, Alcohol use, OC use * Mean of WC + subscapular & supra-iliac SFs was used to estimate truncal obesity; mean of triceps, biceps, femoral & calf SFs was used as an index of peripheral obesity.	Anthropometric variables were highly correlated but association decreased after controlling for generalized obesity. Low VLDL/low LDL group had the lowest RI (p=S**), WC(p=S**) and SSFs(p=S**) vs highest for all 3 measures in high VLDL/high LDL group. There was no significant difference in anthropometrics between low VLDL/low LDL goup and low VLDL/high LDL group. High VLDL/low LDL group vs low VLDL/low LDL group had significantly greater WC(p=S*) and SSFs(p=S*) but no difference in RI. Increased truncal fat correlated significantly with higher TGs (r=0.17, p=S*); VLDL(r=0.19,p=S**); LDL(r=0.11,p=S) & apoB(r=0.14,p=S*); and with lower HDL(r=-0.19,p=S**) and apoA1(r=0.25,p=S**). In obese children, higher truncal fat strongly correlated with elevated TGs & VLDL and lower apoA1 while correlations with peripheral fat were less strong. Increasing WC correlated directly wirth lower HDL & apoA1 levels	In children, obesity and truncal distribution of fat are associated with adverse lipid, lipoprotein cholesterol & apolipoprotein levels. Q6. Obesity & adverse lipid profile measurements cluster together.

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3258194	Freedman DS	Black-white differences in aortic fatty streaks in adolescence and early adulthood: the Bogalusa Heart Study	1988	Case series	Retrospective	Bogalusa	Atherosclerosis	Q1 (RF2,4,5,8,10) Q2 (RF2,4,5,8,10) Q3 (RF2,4,5,8,10) Q4 (RF2,4,5,8,10) Q5 (RF2,4,5,8,10)	USA	Community (other)	Evaluate racial differences in the correlation of pre-mortem C-V RFs with post mortem evidence of atherosclerosis	44	Pediatric/ Young adult	Of 104 deaths in individuals eligible to have participated in the Bogalusa study, 44 had participated in at least one C-V RF evaluation. Post-mortem data in these subjects is the basis of this study.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% female(F),48% male(M); 44% B. For this study, 44 subjects with age at death: 6-27 yrs (mean=18 yrs). 25% B. Mean time from last C-V RF measurement = 3.5 yrs(range: <1 y to 12 y)	N/A	N/A	N/A	Race Sex SBP DBP Ht Wt Ponderal index (PI) TC TG VLDL HDL LDL HDL/LDL + VLDL LDL/HDL Smoking status	Bs consistently had more extensive fatty streaks than Ws (31% vs 20%,in both sexes, p=S**) in the aorta independent of sex and age at death; this was not seen in the coronary arteries. By univariate analysis, premortem C-V RFs correlated significantly with aortic fatty streaks with significant differences between Bs & Ws: LDL= 0.49 in Ws, 0.73 in Bs (mean=18 yrs); HDL=-0.29 in Ws, -0.23 in Bs (p=NS); TC=0.46 in Ws,0.59 in Bs(p=S);PI=0-.41 in Ws , 0.14 in Bs (p=S). The extent of aortic fatty streaks increased at adverse levels of each RF and this was strongest for LDL, but B/W difference persisted. Even after controlling for antemortem RFs, Bs had an additional 16% involvement of the aorta with fatty streaks as compared with Ws (p=S**).	Q1. Atherosclerosis begins in childhood. Q2. Presence of RFs in childhood affects the development of atherosclerosis in childhood. Q3. Presence of RFs in childhood affects the development of atherosclerosis in adult life. Q4. Childhood LDL showed the highest correlation with post-mortem fatty streaks; correlation with BP was very low. Q.5 Bs had consistently more aortic fatty streaks than Ws regardless of all other RFs.
3498363	Baumgartner RN	Associations between plasma lipoprotein cholesterols, adiposity and adipose tissue during adolescence	1987	CrS	Retrospective	Fels	None	Q6 (RF5,8)	USA	Community (other)	Evaluate the association of body fat pattern with plasma lipids and BP	214		All subjects between 11 & 18 y who were participants in the Fels study and who were willing to participate in this sub-study were eligible. Each had an average of 3 measurements during this age period.	Longterm serial study of human growth initiated in 1929 in southwestern Ohio. Subjects are enrolled shortly after birth and followed q 3 mos until 2 y, then q.6 mos from 2-18 y of age, q. 3-5 y as adults. For this study, a cross-sectional sample of white males(M) & females(F) aged 11-18 y were evaluated. 108 Ms/106 Fs.	N/A	N/A	N/A	Age Race Gender Ht Wt BMI (>25kg/m^2 = overweight) Waist circumference (WC) Hip circumference (HC) Waist to hip ratio (WC/HC) Subscapular,triceps,biceps, midaxillary,supra-iliac,lateral calf SFs --> 2 ratios of adipose tissue distribution: Subscapular/ Triceps (S/TR)= centripetal fat; Subscapular/Lateral calf = extremity fat (S/LC) % body fat (calculated from hydrostatic weighing)) TC TG HDL LDL TC/HDL	**CrS analysis by age:** % BF decreased with age in Ms but was constant across age groups in Fs. S/LC indicated a dominant peripheral fat pattern until 15 y in Ms and 16 y in Fs. S/TR scores increased with age in Ms & Fs but after age 15, S/TR was (+) in Ms indicating a dominant centripetal pattern. HDL decreased with age in Ms and was constant in Fs. **Longitudinal analysis:** Baseline vs 5 y F/U HDL decreased significantly in Ms(p=S) and was constant in Fs. %BF decreased in Ms & increased in Fs. S/TR increased only in Ms. All variables tracked moderately well (r=0.55-0.70) There was a significant inverse relationship between S/TR (r= - 0.62,p=S)and S/LR(r=0.68,p=S) and HDL, only in Ms In MVA, centripetal fat pattern had a small but significant association with SBP in men. (R2=.02; p=S). (3) In women, centripetal fat pattern had a small but significant (+) association with TGs (R2=.05; p=S*) and a (-) association with HDL (R2=.08; p=S**).	In childhood, there is a predominant peripheral fat pattern until the mid-teens when a centripetal fat pattern develops. Q6. Centripetal obesity and adverse levels of TG and HDL cluster together. There are sex difference for fat patterning and lipids which appear during adolescence.
3544817	Smoak CG	Relation of obesity to clustering of cardiovascular disease risk factors in children and young adults. The Bogalusa Heart Study	1987	Cohort	Prospective	Bogalusa	None	Q6,7 (RF4, RF5, RF6)	USA	Community (other)	Investigate the relationship of obesity to clustering of systolic blood pressure, fasting insulin, and ratio of low and very low density lipoprotein cholesterol to high density lipoprotein cholesterol	3503	Pediatric/ Young adults	Individuals between 5 and 24 years of age Exclusions: No blood drawn Missing height, weight, or skinfold data Nonfasting participants	Community-based cohort of black(B) & white(W) children and young adults - originally male(M); 44% B. For this study: 1664 male 1802 female 2260 white 1206 black	NA	NA	NA	Rohrer index(kg/m cubed) (RI) HDL cholesterol LDL cholesterol VLDL cholesterol Blood pressure(systolic[S] & diastolic [D]) Subscapular SF(SSF)	Comparing the # of individuals with top tertile results for SSF, insulin, LDL-C + VLDL-C/HDL-C and SBP to the expected number, there was strong evidence of clustering (RR=3.1,p=S**). After adjustment for SSF, RR was reduced to 1.3 (p=S*) : In lean subjects, the degree of clustering was less than expected (RR=0.4) while more obese subjects had a greater degree of clustering (RR=3.1;p=S**)	Obesity assessed by SSF correlated strongly with fasting insulin, dyslipidemia (LDL-C + VLDL-C/HDL-C) and SBP. After adjustment for SSF, the correlation was reduced. Strongest effect of obesity was shown in the highest tertile of SSF. Significant clustering was also shown for low levels of CV RFs in primarily lean individuals.
3670988	Harsha DW	Cardiovascular risk factors from birth to 7 years of age: the Bogalusa Heart Study. Tracking of body composition variables	1987	Cohort	Prospective	Bogalusa	None	Q8 (RF8)	USA	Community (other)	Track body composition from early infancy into early childhood.	447/250	Pediatric/ Young adult	Cohort of 440 newborns followed from birth to 7 y of age; 134 children were present at all screenings.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% female(F),48% male(M); 44% B. For this study, 440 infants were examined serially from birth to 7 yrs. 51%M; 62% W.	N/A	N/A	7 yrs	Ht Wt Subscapular SFs Triceps SFs	There was significant correlation between all anthropometric measures from infancy to 7 yrs; ht (r=.42) wt (r=.44), SFs (r=.28). Earlier levels were consistently the best predictors of later levels, beginning at 1 y of age.	Q8. There is a high degree of tracking of anthropometric variables from birth to 7 y of age.
3670991	Rosenbaum PA	Cardiovascular risk factors from birth to 7 years of age: the Bogalusa Heart Study. Predictive value of parental measures in determining cardiovascular risk factor variables in early life	1987	Cohort	Prospective	Bogalusa	None	Q6 (RF4,5,8) Q7 (RF4,5,8)	USA	Community (other)	Correlate serial measures of C-V RFs in children from birth to 7 yrs with parental RF status.	440/ 250	Pediatric/ Young adult	Cohort of 440 newborns followed from birth to 7 y of age; 134 children were present at all screenings and 250 were examined at the 7 y visit.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% female(F),48% male(M); 44% B. For this study: 440 infants examined annually from birth to 7 yrs of age; parents evaluated once when children averaged 2 yrs of age. 51%M; 62% W.	N/A	N/A	7 yrs	Ht Wt Subscapular SFs Triceps SFs TC TG HDL LDL VLDL SBP DBP	Most significant parent child relationship was for height (p<.005 at all ages) and weight (p<.05) from age 1 yr for fathers and at all ages for mothers. Parent -child regression coefficients were generally significant after age 2-3 y for TC. SBP correlated reasonably btwn child and parents but DBP did not.	There is moderate correlation of anthropometric and C-V RF variables within families in the first 7 y of life.
3728436	Clarke WR	Changes in ponderosity and blood pressure in childhood: the Muscatine Study	1986	Cohort	Retrospective	Muscatine	None	Q6 (RF4,8) Q7 (RF4,8) Q10 (RF4,8)	USA	Community (other)	Describe longitudinal changes in BP relative to changes in ponderosity in childhood.	2,925	Pediatric/ young adult	All 2,925 subjects who were screened at 15-18y of age as part of the Muscatine study and who had also participated in at least 1 additional screening in childhood.	Longitudinal cohort study based in Muscatine, IA of children aged 8-18 y at enrollment between 1971 & 1981, followed with biennial school surveys into adult life. A total of 14,066 children have undergone 32,636 evaluations. For this study, baseline age = 6-15 y; F/U age = 15-18 y. 1,530 F/ 1395 M.	4 ponderosity groups based on QI at 2 visits: Upper quintile = High, lower 4 quintiles = low--> High/High(H/H) High/ Low (H/L) Low/ High (L/H) Low/ Low (L/L)	N/A	9-12 y	Ht Wt Quetelet index (Wt/Ht squared) = QI Triceps skin fold SBP DBP	All ponderosity measures correlated at roughly the same level with SBP(r=0.25-0.31) and DBP(r=0.11-0.15). BP is significantly correlated with body size. When 2 measurements taken on the same child from 2-10 y apart are considered, correlations between measurements decrease as the time between measurement increases. (SBP: r=0.44 at 2y --> 0.24 at 10 y; QI: r=0.86 at 2 y--> 0.67 at 10 y). By ANOVA of BP in the 4 ponderosity groups, children whose ponderosity decreased showed a decrease in SBP & DBP while children who gained in ponderosity showed an increase in SBP & DBP, independent of initial BP. The LOW /LOW group showed little change in BP. Magnitude of change over time correlated with change in ponderosity and not to baseline BP.	Q 6,7. BP and body size are significantly and consistently correlated. Q 10. Over the period from 5 yrs to 18 yrs of age, a decrease in ponderosity was associated with a decrease in SBP and DBP and an increase in ponderosity was associated with an increase in SBP and DBP.

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6975474	Siervogel RM	Blood pressure and its relationship to plasma lipids and lipoproteins in children: cross-sectional data from the Fels longitudinal study	1987	CrS	Retrospective	Fels	None	Q6 (RF4,5)	USA	Community (other)	Evaluate the interrelationships of plasma lipids/lipoproteins and BP in children	119	Pediatric/ young adult	Unclear - a sub-sample of the Fels population with lipid profile & BP results collected between the ages of 9 & 18 y.	Longterm serial study of human growth initiated in 1929 in southwestern Ohio. Subjects are enrolled shortly after birth and followed q.3 mos until 2 y, then q.6 mos from 2-18 y of age, q. 3-5 y as adults. For this study, 62 boys, 57 girls, all white; aged 9 -18 y evaluated.	N/A	N/A	N/A	Age Gender Ht Wt BMI (>25kg/m squared = overweight) Waist circumference (WC) Hip circumference (HC) Waist to hip ratio (WC/HC) Subscapular,triceps,biceps,midaxillary, supra-iliac,lateral calf SFs--> 2 ratios of adipose tissue distribution: Subscapular/ Triceps (S/TR)= centripetal fat; Subcapular/Lateral calf = extremity fat (S/LC) % body fat from SFs TC TG HDL LDL TC/HDL	In both Ms & Fs, body size and fatness accounted for a substantial proportion of the variation in SBP. In MVA, girls in the lowest HDL quartile had higher mean SBP than those in the top HDL quartile after controlling for age and body size (p=S*). There was a significant (-) correlation between SBP and HDL in girls, after adjustment for age, fatness & body size (r=-.31; p=S). There were no significant associations in boys.	There are gender differences for the relationship between BP and lipids. Interaction between BP and lipid levels appears to be primarily mediated by fatness & body size but there is a significant association between lower HDL and higher SBP in girls, even after adjustment for age, fatness & body size. There were no significant lipid/ BP associations in boys.
7494678	Nicklas TA	Dietary Fiber Intake of Children: The Bogalusa Heart Study	1995	Cohort	Prospective	Bogalusa	None	Q8 (RF9)	USA	Community (other)	Examine age and secular trends in dietary fiber intake and the impact of fiber intake on lipid levels	2827 (NR)	Pediatric/ Young adults	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% female(F),48% male(M); 44% B. Participants in the Bogalusa Heart Study aged 10, 13, 15, or 17 years.	Five 10 year-old cohorts: 1976,'78,'81,'84'87.n=1254 66% white 51% female Two 13 year-old cohorts: l976,'87. n=360 58% white 48% female 10 year-old (age comparison group): 64% white 50% female 13 year-old (age comparison group): 59% white 51% female 15 year-old (age comparison group): 58% white 45% female 17 year-old (age comparison group): 58% white 51% female	10 year-old cohort 13 year-old cohort 10 year-old (age comparison) 13 year-old (age comparison) 15 year-old (age comparison) 17 year-old (age comparison)	1254 360 940 360 108 86	Up to 7 yr	Serum lipids and lipoproteins Dietary fiber intake Serum insulin Ponderal index	Average fiber intake was 12 g/d or 5 g/1000 kcal with no change from 1976 to 1988 and no difference by age or gender. Black children had higher fiber intake per 1000 kcal than white children at all age groups and time periods. Major fiber food sources were vegetables and breads. When 10 y olds were stratified into quartiles by fiber intake, energy intake was similar across quartiles but higher fiber intake was associated with lower fat and sat fat consumption (Q 1 vs Q4; p=S**); lower sucrose consumption (Q1 vs Q4,p=S*); and lower cholesterol intake (Q 1 vs Q4; p=S**). Sodium intake was significantly lower in the low fiber group (Q1 vs Q4; p=S) There was no association between fiber intake and serum lipids, insulin or ponderal index.	Overall fiber consumption in children is low compared with recommended intake. Higher fiber intake is associated with lower fat, sat fat and cholesterol intake. There is no difference in measured CV risk variables relative to fiber intake.
7572972	Myers L	Prediction of adult cardiovascular multifactorial risk status from childhood risk factor levels. The Bogalusa Heart Study	1995	Cohort	Retrospective	Bogalusa	None	Q6 (RF4,5,8) Q7 (RF4,5,8) Q8 (RF4,5,8)	USA	Community (other)	Correlation of C-V RFs (Ponderal index/ SBP/ TC) measured in childhood in 1973 and again 15 yrs later.	1,457	Pediatric/ Young adult	Two groups: 1,864 young adults aged 19-32 y, screened in 1988-91 & at least once in childhood = young adult sample; 68.2% W, 55.4% F. Among 3,633 subjects screened at 5-15 y of age in 1973-4, 1,457 were screened as adults in 1988-91 = longitudinal sample; 45% M, 33.7% B.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% female(F),48% male(M); 44% B.	N/A	N/A	15 yrs	Age Race Gender Ht Wt Ponderal index (PI) BMI SBP DBP TC TG HDL LDL TC/HDL Fasting glucose (FG) Fasting insulin (INS) * 3 RFs defined as criteria = TC,SBP,PI - adverse level defined as ≥ 75th%ile for age/ race/sex. * Clustered = All 3 RFs ≥ 75th%ile	In children, there was a significant (+) relationship between PI & TC (p=S**) and between PI & SBP (p=S**) but not between TC & SBP. In adults, all 3 RFs were significantly correlated (all,p=S**). 3.7% of children were clustered vs 4.1% of young adults. Of children who were in the top quartile for 3 RFs, 21.8% were clustered as adults. Of children with no RFs in the top quartile, only 1.1% were clustered as adults. In the longitudinal sample, 4% were clustered as adults and in this group, not only TC, SBP & PI were significantly higher but also TGs, LDL, VLDL, DBP & INS. Individuals who clustered were also significantly more obese by PI (p=S**), BMI & SFs. Strong (+) correlations were demonstrated between childhood & young adult levels of the 3 RF variables (SBP: r=0.41; PI: r = 0.62; TC:r = 0.53; all, p=S***). Among clustered adults, all RF levels were significantly higher in childhood. A model was developed to predict adult cluster status from childhood RF levels with best-fitting model including all 3 variables: as levels for any one of the 3 RF variables increase in childhood, the risk of adult clustering increases in a multiplicative manner.	Q6,Q7,Q8 RFs cluster in childhood and clustering persists from childhood into young adult life. Presence of RF clustering predicts adverse levels of other RFs and therefore, a more adverse overall risk profile. RF clustering in childhood predicts a clustered & adverse RF profile in adult life.
7749853	McGill HC, Jr.	Relation of glycohemoglobin and adiposity to atherosclerosis in youth. Pathobiological Determinants of Atherosclerosis in Youth (PDAY) Research Group	1995	CrS	Retrospective	PDAY	Atherosclerosis	Q1,2,4,9 (R5,6, 8, 10)	USA	Clinical	Assess the association of hyperglycemia, as indicated by glycohemoglobin levels, and adiposity with the extent and severity of atherosclerosis at autopsy in 15 - 34 y old subjects after death from external causes.	1692 (1532)	Pediatric/ Young adults	Participants in the PDAY study: young persons 15-34 yr who died of external causes and were autopsied in medical examiners' laboratories. Exclusions: Persons of race other than black or white, presence of congenital heart disease, Down's syndrome, acquired immunodeficiency syndrome, or hepatitis.	NR	NA	NA	NA	Estimation of intimal surface invloved with fatty streaks, fibrous plaques, complicated lesions, and calcified lesions. Glycohemoglobin levels. BMI Thickness of panniculus adiposus Serum cholesterol,HDL-C, VLDL-C Thiocyanate levels	Elevated glycohemoglobin levels are substantially and significantly associated with more extensive and more advanced atherosclerosis in the aorta and right coronary artery in persons 25 - 34 y of age. Adiposity, as measured by either BMI or thickness of the panniculus adiposus, is associated with more extensive and more advanced atherosclerosis of the right coronary artery in persons aged 15-34 y. Association of lesions with adiposity is not explained by serum lipoprotein cholesterol levels or smoking exposure.	Q1,2,4,9: Elevated glycohemoglobin levels are associated with accelerated atherogenesis in the third and fourth decades of life. Q1,2,4,9: Adiposity is associated with more extensive and advanced atherosclerosis at 15 - 34 y of age. Association of lesions with adiposity is not explained by serum lipoprotein cholesterol levels or smoking exposure.
7811129	Jiang X	Association of fasting insulin level with serum lipid and lipoprotein levels in children, adolescents, and young adults: the Bogalusa Heart Study	1995	CrS	Retrospective	Bogalusa	None	Q5 (RF5,8,14) Q6 (RF5,8,14) Q7 (RF5,8,14) Q8 (RF5,8,14)	USA	Community (other)	Correlate insulin levels with lipid profile results in children and young adults.	4,136	Pediatric/ Young adult	Findings from a CrS survey of 3,256 children, age 5-17y, from the Bogalusa study evaluated in 1987-88 and 1,881 young adults, age 19-30 y, evaluated in 1988-91.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% female(F),48% male(M); 44% B. For this study: Age: 5-30 yrs; 63.9% W; 52% F.	5-11 y : n= 1650 12-17 y: n=968 19-24 y: n=679 25-30 y: n=839	N/A	N/A	Age Race/ Ethnicity Gender Ht Wt BMI Subscapular Skinfolds (SSFs) SBP DBP TC TG VLDL HDL LDL TC/HDL ApoA1 ApoB Fasting glucose (FG) Fasting insulin (INS) HOMA-IR Smoking status Alcohol use OC use	In general, marked increases in TC, LDL & TGs occurred with increasing age in all race/ sex groups while HDL decreased, most strikingly in WMs. In univariate analysis, INS correlated strongly and (+)ly with TG & VLDL-C levels and (-)ly with HDL-C levels in all age groups. An increasing association with LDL was seen in young adults. In MVA, INS was significantly associated with VLDL-C for most age grps independent of age/sex/glucose/obesity/ smoking & alcohol intake. In MVA, INS correlated inversely with HDL in WMs and WFs aged 5-17 y and in Bs and Ws aged 19-24 y. In analysis stratified by INS and SSFs, WMs and WFs had lower HDL & higher VLDL and LDL levels than did B subjects at the same level for obesity & INS. The magnitude of the association between insulin and lipoprotein fractions was stronger in obese than lean subjects.	Obesity, elevated INS and adverse levels of TG, VLDL and HDL cluster together. There are race and sex differences in the interaction between INS and lipids. The adverse association between lipid levels and INS increased with increasing levels of obesity.

NHLBI Evidence Table: MultiRF-OB

PMID	First Author	Title	Year	Study Type	Prospect./ Restrospect.	Study	CVD	RF by CQ	Country	Setting	Main Study Objective	N at Baseline (N at Follow-up)	Target Population	Eligibility Criteria	Patient Characteristics	Study Groups	n at Baseline (n at Follow-up) for Study Groups	Total Follow-up Duration	Outcomes Measured	Results	Main Reported Findings by Critical Question
8557894	Mahoney LT	Coronary risk factors measured in childhood and young adult life are associated with coronary artery calcification in young adults: the Muscatine Study	1996	Cohort	Prospective	Muscatine	Coronary Ca	Q3 (RF4,5,8) Q4 (RF4,5,8) Q9 (RF4,5,8)	USA	Community (other)	Correlate prevalence of CAC in young adults with RFs for coronary disease measured in childhood.	197 men, 187 women	Pediatric/ young adult	Subjects who had participated during childhood in one of the Muscatine School Surveys and in one Muscatine Young Adult Follow-up Survey between the ages of 20 & 34 y. Of 284 M & 272 eligible F subjects, 197 M & 187 Fs participated.	Longitudinal cohort study based in Muscatine, IA of children aged 8-18 y at enrollment between 1971 & 1981, followed with biennial school surveys into adult life. A total of 14,066 children have undergone 32,636 evaluations. For this study, subjects were 29-37 y old and had participated during childhood in one of the Muscatine School Surveys and in one Muscatine Young Adult Follow-up Survey between the ages of 20 & 34 y. 50% M; all W.	N/A	N/A	20-30 y	Ht Wt BMI (>25kg/m squared = overweight) Waist circumference (WC) Hip circumference (HC) Waist to hip ratio (WC/HC) Triceps SFs SBP DBP TC TG HDL LDL TC/HDL Apolipoprotein A Apolipoprotein B Lp(a) Homocysteine EBCT assessment of CAC - read as (+) or (-)	Subjects had C-V RFs measured at mean ages of 15 y, 27 y & 33 y. EBCT/CAC was performed at a mean age of 33 yrs. Prevalence of CAC was 31% in Ms & 10% in Fs(p=S**) In Ms, childhood wt, BMI & TSFs were significantly higher in CAC (+) group; there was no difference in childhood RFs for Fs. Among young adult & current RF measures, wt, BMI, TSFs , SBP, DBP, apoB, LDL/HDL & TC/HDL were consistently higher and apoA and HDL consistently lower in the CAC(+) group. Significant ORs for CAC relative to upper decile of the RFs: In childhood: 2.9 for wt in Ms; In young adults: 4.9 and 13.6 for wt in Ms & Fs, 6.5 & 4.7 for BMI in Ms & Fs; 2.9 & 6.8 for TSFs in Ms & Fs; 4.4 & 4.2 for SBP in Ms & Fs; 3.4 & 4.5 for DBP in Ms & Fs; 2.7 for TC in Ms; 4.7 for TGs in Fs; 8.9 for HDL in Fs; 3.7 for LDL At CAC: 8.7 & 19.6 for wt in Ms& Fs; 6.4 & 13.6 for BMI in Ms & Fs; 2.9 for WC/HC in Ms; 6.4 & 6.4 for SBP in Ms & Fs; 2.9 for TC in Ms; 4.3 & 4.7 for lowest decile of HDL in Ms & Fs. 62% of Ms & 31% of Fs who were in the upper tertile for both BMI & SBP had (+)CAC vs 10% of Ms & 0% of Fs in the lower tertile for both variables.	Q3. Increased childhood wt, BMI & TSFs in Ms are significant predictors of early atherosclerosis assessed by CAC in young adult life. Measures of obesity, BP & decreased HDL in early young adult life are significantly associated with (+) CAC on EBCT. Q4. In all age groups, measures of obesity are the most consistent & strongest predictors of (+) CAC.
8686692	Folsom AR	Increase in fasting insulin and glucose over seven years with increasing weight and inactivity of young adults. The CARDIA Study. Coronary Artery Risk Development in Young Adults	1996	Cohort	Prospective	CARDIA	None	Q5 (RF 8,10,11,14) Q6 (RF 8,10,11,14) Q7 (RF 8,10,11,14) Q8 (RF 8,10,11,14)	USA	Community (other)	Characterize 7 yr changes in fasting insulin & glucose.	5,115/ 4,086	N/A	All subjects from the original CARDIA cohort who returned for year 7 examination.	Population-based , prospective observational study with participants recruited from 4 metropolitan areas (Birmingham, Ala; Chicago, Ill, Minneapolis, Minn; & Oakland, Calif) in 1985 1986 at 18-30 yrs of age (44.9% black, 53.9% women). Insulin & glucose measurements from baseline & 7 yr F/U data.			7 yrs	Age Race Gender Ht Wt BMI (>25kg/m squared = overweight) Waist circumference (WC) Hip circumference (HC) Waist to hip ratio (WC/HC) Subcapular,triceps & supra-iliac SFs % body fat (calculated from SFs) Fasting glucose (FG) Fasting insulin (INS) Diet Smoking status Education level Alcohol use OC use Physical activity	Mean fasting insulin increased substantially over all race/sex groups, from 10% in WFs to 25% in BMs. FG increased across all race/sex groups from 7% in WFs to 10% in BMs. BMI increased in all groups, from 7% in WFs to 12% in BFs. Persons who lost weight had decreased insulin levels. Those with baseline W/H ratio above the median and highest BMI exhibited greater change in INS with wt change than did those with W/H ratio/BMI below the median. Greater wt gain was asst'd with greater increase in FG & INS. Decreases in activity were associated with greater wt gain, increase in W/H ratio and rise in FG/INS. By MVA, strongest predictor of both increase in fasting insulin & in FG was an increase in BMI and in W/H ratio. Insulin decreased longitudinally with age in the youngest members of the cohort.	In all race/sex groups, an individual's level & changes in INS & FG were linked strongly and (+)ly to level and change in BMI. There is clustering of adverse RFs with obesity and with increase in obesity. Decrease in activity is associated with higher INS levels.
9388151	Bao W	Longitudinal changes in cardiovascular risk from childhood to young adulthood in offspring of parents with coronary artery disease: the Bogalusa Heart Study	1997	Cohort	Retrospective	Bogalusa	None	Q5 (RF 1,3,4,5,8,14) Q6 (RF 1,3,4,5,8,14) Q8 (RF 1,3,4,5,8,14)	USA	Community (other)	Examine the association btwn parental CAD and longitudinal changes in RF profile from childhood to young adulthood in offspring.	1,524	Pediatric/ Young adult	From the sample of young adults evaluated in Bogalusa in 1988-1991, history of parental CAD was verified --> identification of 271 individuals with verified parental hx of CAD in 1 (n=230) or both (n=41) parents. Their RF results were compared with those of 1253 subjects with no hx of parental CAD on serial evaluations beginning at mean age of 10 y.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% female(F),48% male(M); 44% B. For this study: 271 subjects with (+) parental hx for early CAD; 1,253 subjects with (-) parental hx. Mean age at first CAD event was 50 yrs in fathers and 52 yrs in mothers.	(+) CAD hx = 271 (-) CAD hx = 1253	N/A	18 y - serial CrS evaluations with 56-86% participation in 5 previous surveys.	Age Race Gender Ht Wt BMI SBP DBP TC (>240 mgm/dl = dyslipidemia) TG HDL LDL TC/HDL Fasting glucose (FG) Fasting insulin (INS) Family hx of CAD	Offspring of parents with CAD were overweight beginning in childhood, significantly different from a mean age of 10 y (p=S*). Levels of TC, LDL-C, glucose & insulin became significantly higher at older ages (TC at 15y, LDL & FG at 18y, INS at 21 y). The earlier the age of onset of parental CAD, the greater the RF levels at younger ages in offspring. Rates of increase in TC & LDL were significantly higher in (+) parental hx group even after adjustment for age/ race/ BMI. In adulthood, offspring with a (+) family hx had a higher prevalence of obesity (35% vs 26%, p=S**); elevated TC (8.4% vs 4.8%, p=S); elevated LDL-C (12.4% vs 4.7% (p=S*); and hyperglycemia (2.7% vs 0.4%,p=S**). Subjects with parental CAD were significantly more likely to have multiple RFs. Prevalence of dyslipidemia of any kind was significantly higher in adult offspring with (+) parental hx for CAD. By logistic regression, higher LDL in Ws, higher DBP in Bs and higher INS in Bs were most associated with hx of parental CAD. In both Bs & Ws, increased BMI in offspring was strongly associated with parental CAD.	Q5. There are race & sex differences in the prevalence of C-V RFs associated with parental CAD. Offspring of parents with CAD were overweight beginning in early childhood and significantly different from a mean age of 10 y, with other RFs becoming more apparent with increasing age. Q. 6 There is an increased prevalence of clustered RFs in offspring with (+) hx of parental CAD. There is an accelerated progression of C-V RFs in offspring of parents with early CAD.
9506630	Rosner B	Percentiles for body mass index in U.S. children 5 to 17 years of age	1998	CrS	Retrospective	9 different studies, including NHANES II and III	None	Q5 (RF2. RF3, RF5, RF8) Q6 (RF2, RF8)	U.S.A	Clinical	Describe the distribution of BMI in children and adolescents in the U.S	66,772	Pediatric/ Young adults	5-17 yr	Patient characteristics from NHANES II and III, as well as 7 other studies	Groups were studied by age, gender, and ethnic groups	NR	NR	Mean BMI [kg/m² (SD)]	Distributions of BMI by age and ethnic group are provided for this, the largest set of national values available; adequate numbers are included for each major ethnic group so the tables provide a good approximation to randomly sampled national data. The mean BMI increases with age and is slightly higher for girls than boys. Mean BMI for black and Hispanic girls is noticeably higher than for white girls, especially after 9 yrs of age. Hispanic boys had consistently higher BMI than other ethnic groups. The percentiles of BMI are consistently higher than those based on the NHANES I measures, particularly for the 85th & 95th percentiles, up to 9% higher in boys and 10% higher in girls. The proportion of obese children compared with NHANES I standards is higher and is highest for Hispanic boys and black and Hispanic girls.	Q5: Mean BMI for black and Hispanic girls was noticeably higher than for white girls. The proportion of obese children compared with NHANES I standards is higher and is highest for Hispanic boys and black and Hispanic girls. Q6: The mean BMI increases with age and is slightly higher for girls than boys. The percentiles of BMI are consistently higher than those based on the NHANES I measures, particularly for the 85th and 95th percentiles, up to 9% higher in boys and 10% higher in girls.

PMID	First Author	Title	Year	Study Type	Prospect./ Restrospect.	Study	CVD	RF by CQ	Country	Setting	Main Study Objective	N at Baseline (N at Follow-up)	Target Population	Eligibility Criteria	Patient Characteristics	Study Groups	n at Baseline (n at Follow-up) for Study Groups	Total Follow-up Duration	Outcomes Measured	Results	Main Reported Findings by Critical Question
9544768	Andersen RE	Relationship of physical activity and television watching with body weight and level of fatness among children: results from the Third National Health and Nutrition Examination Survey	1998	CrS	Retrospective	NHANES III	None	Q5 (RF11) Q6 (RF2, RF8, RF11)	U.S.A	Clinical	Assess participation in vigorous activity and television watching habits and their relationship to body weight and fatness in U.S. children.	4,063	Pediatric/ Young adults	8-16 yr	Patient characteristics from NHANES III	Non-Hispanic white / Non-Hispanic black / Mexican-American	1,063 (NR) / 1,424 (NR) / 1,386 (NR)	NR	Weekly play or exercise that results in sweating or hard breathing; Mean BMI [kg/m2]; Mean sum of the subscapular or suprailiac skinfolds; Television watched [hr/d]	Eighty percent of US children reported performing 3 or more bouts of vigorous activity each week. This rate was lower in non-Hispanic black and Mexican American girls (69% and 73%, respectively). Twenty percent of US children participated in 2 or fewer bouts of vigorous activity perweek, and the rate was higher in girls (26%) than in boys (17%). Overall, 26% of US children watched 4 or more hours of television per day and 67% watched at least 2 hours per day. Non-Hispanic black children had the highest rates of watching 4 or more hours of television per day (42%). Boys and girls who watch 4 or more hours of television each day had greater body fat (P<.001) and had a greater body mass index (P<.001) than those who watched less than 2 hours per day.	Q5: Eighty percent of US children reported performing 3 or more bouts of vigorous activity each week. This rate was lower in non-Hispanic black and Mexican American girls (69% and 73%, respectively). Non-Hispanic black children had the highest rates of watching 4 or more hours of television per day (42%). Q6: Twenty percent of US children participated in 2 or fewer bouts of vigorous activity perweek, and the rate was higher in girls (26%) than in boys (17%). Boys and girls who watch 4 or more hours of television each day had greater body fat (P<.001) and had a greater body mass index (P<.001) than those who watched less than 2 hours per day.
9614255	Berenson GS	Association between multiple cardiovascular risk factors and atherosclerosis in children and young adults. The Bogalusa Heart Study	1998	CrS	Retrospective	Bogalusa	Atherosclerosis	Q1(RF 4,5,8,10) Q2(RF 4,5,8,10) Q3(RF 4,5,8,10) Q4(RF 4,5,8,10)	USA	Community (other)	Compare pre-mortem measurement of C-V RFs with postmortem evidence of atherosclerosis in children and young adults.	93	Pediatric/ Young adult	Of 204 deaths in individuals eligible to have participated in the Bogalusa study, 93 had participated in at least one C-V RF evaluation. Correlation of post-mortem data with premortem C-V RFs in these subjects is the basis of this study.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% female(F),48% male(M); 44% B. For this report, there were 41 WMs, 19 WFs, 23 BMs & 10 BFs.	N/A	N/A	N/A	Age; Race; Gender; Ht; Wt; BMI; SBP; DBP; TC; TG; HDL; LDL; TC/HDL; Smoking status	All autopsied individuals in this series had fatty streaks in the aorta. Prevalence of fatty streaks in the coronary arteries increased with age, from ~ 50% at 2-15 y of age to ~ 85% at 21-39 y of age (p=S**). Aortic surface involved with fatty streaks increased from 13.8 +/- 5.5 % at 2-15 y of age to 28.8+/-15.3% at 26-39 yrs (p=S**); aortic surface involved with fibrous plaques increased from 0.2+/-0.5% at 2-15 y of age to 4.0+/-7.4%% at 26-39 y of age (p=S**). Involvement in the coronary arteries was much less extensive for both fatty streaks and fibrous plaques but still increased significantly with aging. Fatty streaks strongly correlated with fibrous plaques in the coronary arteries(r=.60),less in the aorta (r=.23). With simple regression, the extent of atherosclerotic lesions correlated significantly with BMI, SBP, DBP,TC, LDL & TGs. BMI, BP, TC, TGs, LDL-C and HDL-C as a group were strongly asst'd with the combined extent of lesions in the coronary arteries and aorta; r=0.70;p=S**); Cigarette smoking increased the % of intimal surface with fibrous plaques in the aorta (1.22% vs.0.12%;p=S) and fatty streaks in the coronary arteries(8.27% vs 2.89%;p=S) Subjects with 0,1,2, & 3 or 4 RFs had 19.1%, 30.3%, 37.9% & 35% of the intimal surface of the aorta covered with fatty streaks (p for trend =S*). For the coronary arteries, this was 1.3%, 2.5%, 7.9% & 11% for fatty streaks & 0.6%, 0.7%, 2.4% and 7.2% for fibrous plaques.	Q1. Atherosclerosis begins in childhood. Q2. Presence of RFs in childhood affects the development of atherosclerosis in childhood. Q3. Presence of RFs in childhood affects the development of atherosclerosis in adult life. Q4. Cigarette smoking powerfully increases the extent of atherosclerotic lesions. Q9. The percentage of involved surface increased exponentially as the # of RFs increased, especially for fibrous plaques in the coronary arteries.
10052443	Strong JP	Prevalence and extent of atherosclerosis in adolescents and young adults: implications for prevention from the Pathobiological Determinants of Atherosclerosis in Youth Study	1999	CrS	Retrospective	PDAY	Atherosclerosis	Q1(RF2,3) Q5(RF2,3)	USA	Clinical	Describe the pathologic extent & severity of atherosclerosis in adolescents & young adults.	2,876	Pediatric/ young adult	Autopsy results of 2,876 cases evaluated for extent & severity of atherosclerotic lesions	3,201 15-34 y olds who died accidentally in 15 different cities in the U.S. between 6/1/87 & 8/31/94. In this study, results of 2,876 cases are evaluated.	N/A	N/A	N/A	Extent of intimal surface of RCA & abd Ao with fatty streaks and raised lesions evaluated by pathologists and by computerized image analysis.	Mean % of surface area involved increased with age (p=S**) and was greater in Bs than Ws in all arterial segments. (p=S**). Involvement was greater in Ms than Fs for the CAs(p=S**) and thoracic Ao(p=S*) but less in the abd Ao(S**). Ms have a greater extent of advanced lesions in the RCA. Intimal lesions appeared in all the aortas & more than half the RCAs of the youngest grp, 15-19 y old, and increased in prevalence & extent through the oldest age grp (30-34 y). Fatty streaks were more common in Bs than Ws but raised lesions did not differ btween these groups. Raised lesions were similar in the aortas of men & women but raised lesions in the RCA in Fs were less than those of men. Prevalence of total lesions was lower in the RCA in the aorta, but the proportion of raised/ total was higher in the RCA.	There are distinct regional differences to atherosclerotic extent in the aorta and CAs. Q1. Atherosclerosis begins in childhood. Q5. There are race and gender differences in the development of atherosclerosis.
10086972	Sinaiko AR	Relation of weight and rate of increase in weight during childhood and adolescence to body size, blood pressure, fasting insulin, and lipids in young adults. The Minneapolis Children's Blood Pressure Study	1999	Cohort	Prospective	Minn	None	Q6 (RF4,5,8,14) Q7 (RF4,5,8,14) Q8 (RF4,5,8,14) Q11 (RF4,5,8,14)	USA	Community (other)	Assess the impact of rate of weight gain on the development of insulin resistance from childhood to young adult life.	1207/ 817/ 679	Pediatric/ young adult	From a longitudinal cohort of 1207 children examined first in 1st-3rd grade and followed through high school with serial exams, 879 returned for a post high school evaluation and 679 at a mean of 23.6 y for young adult F/U.	Subjects followed from 7.7+/- 0.1 yrs to 23.6+/- 0.2 yrs with repeated measures of ht, wt & SBP. At study end, insulin & lipids were measured. 52% male(M); 48% female(F) 66% white(W); 25% black(B); 4% Native American(N-A).	N/A	1207 /817/ 679	16 yrs	Age; Race/ Ethnicity; Gender; Ht; Wt; BMI (>25kg/m squared = overweight); Waist circumference (WC); Hip circumference (HC); Waist to hip ratio (WC/HC); Triceps SFs (TSF); % body fat (calculated from SFs); SBP; TC; TG; HDL; LDL; TC/HDL; Fasting glucose (FG); Fasting insulin (INS)	At baseline, 7.4% of the cohort were obese vs 24.3% at late F/U. At young adult evaluation, wt, BMI, WC/HC and TSFs were (+)ly correlated with INS, TC, TGs, & LDL and (-)ly correlated with HDL (all, p=S**); ht was (+)ly correlated with TGs and (-)ly with HDL (both, p=S**); INS was (+)ly correlated with TC, TGs & LDL and (-) correlated with HDL(all, p=S**). Initial childhood wt, BMI, & ht were significantly correlated with young adult wt, ht and BMI (all, p=S**). Young adult INS, TGs, HDL & SBP were significantly related to initial childhood wt, BMI and ht(all,p=S**) but relationships of TC and LDL to childhood body measurements were not significant. Rates of increase in wt & BMI but not ht during childhood were significantly related to young adult levels of insulin, all lipids & SBP. Rates of increase in wt & BMI but not ht during adolescence were significantly related to INS,HDL & SBP. With MRA, young adult INS was significantly related to both childhood and adolescent rates of wt gain (p=S**)	Ht, wt and BMI measured early in childhood are significantly associated with body size in adult life. Childhood wt and BMI are significantly related to INS, TG, HDL and SBP in adult life. Wt gain in excess of constitutional gain is a major constituent of young adult C-V risk. Excess rate of increase in wt or BMI in childhood and/ or adolescence is associated with adverse INS, SBP, TG & HDL in young adult life. Conversely, below average increase in wt or BMI in childhood and adolescence is associated with advantageous C-V risk profile in young adult life. The degree of excess wt gain and the duration are both directly related to adult C V risk factors.
10086972	Sinaiko AR	Relation of weight and rate of increase in weight during childhood and adolescence to body size, blood pressure, fasting insulin, and lipids in young adults. The Minneapolis Children's Blood Pressure Study	1999																	In 2 X 2 analysis with subjects divided according to their position above or below the median for childhood & adolescent rates of wt gain, subjects with above median wt gain in both time periods (190.1+/-7.2 pmol/L) had significantly greater INS than those below the median in both periods(116.2 +/- 7.2 pmol/L); below median during childhood and above in adolescence (134.9 +/- 5.7 pmol/L); or above the median in childhood and below in adolescence (135.6 +/-5.7 pmol/L),(all,p=S**). Results were similar for lipid & SBP and when analysis was performed for BMI.	

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10553393	Morrison JA	Sex and race differences in cardiovascular disease risk factor changes in schoolchildren, 1975-1990: the Princeton School Study	1999	CrS	Retrospective	Princeton	None	Q5(RF4,5,8) Q6(RF4,5,8)	USA	Community (schools)	Compare obesity & C-V RFs in B & W children assessed in 1973-1975 and in 1989-990 in a biracial community.	300 + 1456	Pediatric/ young adult	From a pool of 3rd -5th grade students in Princeton, Ohio participating in the LRL study in 1973-1975, 15% were randomly selected for testing. Their results are compared to those of a group recruited from the same grades in 1989-1990.	For this CrS study, 300 3rd - 5th grade students from the LRC study in 1973-75 + 1456 3rd - 5th grade students in the same grades & school district in 1989-1990 were compared.	1973-75: 300 1989-90-: 1456	N/A	N/A	Age Race Gender Ht Wt BMI (> 85th%ile=overweight) TC (>200 mg/dL = elevated) HDL TG LDL SBP (> 95th%ile for sex-age-ht = elevated) DBP (> 95th%ile for sex-age-ht = elevated) 3 d diet record	Overall, students in the 1989-90 study had significantly higher BMI, TC, TGs, SBP and DBP than those in the earlier study. Prevalence of obesity increased from 12.5 to 25.3% and of hypercholesterolemia from 8.0 to 14.8%. Increases in wt & BMI were greatest in the top deciles. BFs had the greatest increase in BMI & the highest prevalence of elevated TC in '89-'90 study. By subgroup, there was an increased prevalence of hypercholesterolemia in W & BFs but not in W or BMs; BMs had a significant increase in SBP not seen in other groups. Calories consumed were unchanged but '89-'90 students reported consuming fewer calories from fat & sat fat.	There is a secular trend towards increased obesity in elementary school-aged children over a 15 y period. Increases in BMI cluster with increases in TC and BP. There are race and sex differences in the change in C-V RFs over this time period.
10656168	Kadar A	World Health Organization (WHO) and the World Heart Federation (WHF) pathobiological determinants of atherosclerosis in youth study (WHO/WHF PDAY Study) 1986-1996. Histomorphometry and histochemistry of atherosclerotic lesions in coronary arteries and the aorta in a young population	1999	CrS	Retrospective	PDAY	Atheroscl erosis	Q2 (RF2,3,4,10) Q3 (RF2,3,4,10) Q9 (RF2,3,4,10)	Hungary, Cuba, Germany, Mexico, SriLanka	Clinical	Study the development of atherosclerotic lesions in a young population with known pre-mortem RFs.	214	Pediatric/ young adult	All subjects aged 15-34 y who died suddenly in 5 international collaborating centers. Pre-mortem RF data obtained when possible. Path analysis identical to US PDAY study.	Subjects aged 15-34 yrs who died traumatically in Germany/ Hungary/ Cuba/ Mexico City/ Sri Lanka.	15-24 y n= 81 25-34 y n=133	N/A	N/A	Sections of proximal LAD and thoracic & desc. Ao evaluated for intima/media (I/M) ratio and grades 1-6 intimal lesions. BP Smoking status	Intima/ media ratio and extent of grade 3-4 lesions increased in all arteries with age. Geographic region had little impact on findings. I/M ratio in the LAD was significantly greater in Ms than Fs (p=S) Atherosclerotic lesions were more prevalent in men, especially in the LAD. HTN was asst'd with higher prevalence of gr 3 & 4 lesions in all arteries but significantly only in the thoracic aorta (p=S). Smoking was asst'd with higher prevalence of gr 3 & 4 lesions in all arteries but this was only significant in the ascending aorta (p=S).	Q2,3,9. Atherosclerosis begins in childhood and the presence and extent of RFs affects atherosclerotic extent in children.
10712411	McGill HC, Jr.	Effects of coronary heart disease risk factors on atherosclerosis of selected regions of the aorta and right coronary artery. PDAY Research Group. Pathobiological Determinants of Atherosclerosis in Youth	2000	CrS	Retrospective	PDAY	Atheroscl erosis	Q1(RF2,3,4,6,8, 10,14) Q2(RF2,3,4,6,8, 10,14) Q4(RF2,3,4,6,8, 10,14) Q5(RF2,3,4,6,8, 10,14) Q9(RF2,3,4,6,8, 10,14) Non14a(RF2,3,4,6, 8,10,14)	USA	Clinical	Evaluate the topographic distribution of atherosclerosis in relation to RFs for adult C-VD.	2,000	Pediatric/ young adult	All subjects aged 15-34 y who died suddenly in 15 US collaborating centers. Topography of atherosclerotic lesions evaluated in light of RF status.	3,201 15-34 y olds who died accidentally in 15 different cities in the U.S.; information on age/ gender/ lipids/ smoking / HTN / obesity / hyperglycemia was available. In this study, information on > 2000 autopsies was used.	N/A	N/A	N/A	Extent of intimal surface of RCA & abd Ao with fatty streaks and raised lesions evaluated by pathologists and by computerized image analysis. C-V RFs: Age Race Gender HDL < 35 mgm/dl Non-HDL-C = TC - HDL (LDL cutpoints + 30mgm/dL = non- HDL cutpoints) = > 160 mg/dl Thiocyanate level ≥ 90mmol/L Intimal thickness of small renal arteries = Mean BP estimate >110 mmHg BMI > 30 kg/ m squared HbA1C ≥ 8%	There are distinct regional differences to atherosclerotic extent in the aorta and CAs. With increasing age, fatty streaks decrease or remain stable and raised lesions increase in all regions with raised lesions in the RCA beginning in the 20-24 y old age group. RF effects on arterial regions that are vulnerable to lesions are 25% greater than RF effects assessed over entire arterial segments. In subjects with multiple RFs, extent of fatty streaks and raised lesions is greater in all regions of the aorta at all ages compared with low risk group, with increasing divergence between the 2 groups over time. In the RCA, differences between the low & high risk groups become apparent after age 25 with the difference between groups increasing in 30-34 y olds. Smoking selectively affects atherosclerosis in the abd Ao at a younger age than the CAs.	There are distinct regional differences to atherosclerotic extent in the aorta and CAs. Q1. Atherosclerosis begins in childhood. Q2. The presence of RFs correlates with the extent of atherosclerotic lesions at autopsy. Q9. An increase in the number of RFs is associated with increased prevalence and severity of atherosclerotic lesions at autopsy. Q14a. A low risk state is associated with decreased prevalence of atherosclerotic lesions at all ages.
10938023	McGill HC, Jr.	Associations of coronary heart disease risk factors with the intermediate lesion of atherosclerosis in youth. The Pathobiological Determinants of Atherosclerosis in Youth (PDAY) Research Group	2000	CrS	Retrospective	PDAY	Atheroscl erosis	Q1(RF2,3,4,6,8,10, 14) Q2(RF2,3,4,6,8,10, 14) Q4(RF2,3,4,6,8,10, 14) Q5(RF2,3,4,6,8,10, 14) Q9(RF2,3,4,6,8,10, 14) Q14a(RF2,3,4, 6,8,10,14)	USA	Clinical	Assess the presence of raised fatty streaks, the intermediate lesion of atherosclerosis, in a population of adolescents and young adults.	2,876	Pediatric/ young adult	2,876 cases collected in the PDAY study between 1987&1994 with corresponding RF information.	3,201 15-34 y olds who died accidentally in 15 different cities in the U.S.; information on age/ gender/ lipids/ smoking / HTN / obesity / hyperglycemia was available. In this study, results of 2,876 cases were included. 25% F; 54% B.	N/A	N/A	N/A	Extent of intimal surface of RCA & abd Ao with fatty streaks and raised lesions evaluated and AHA grading (grades 1-6) of stained sections of CAs and abd Ao performed. Raised fatty streak = Intermediate lesion between simple fatty streak and raised lesions. Defined as a type III lesion in AHA classification. C-V RFs: Age Race Gender HDL < 35 mgm/dl Non-HDL-C = TC - HDL (LDL cutpoints + 30mgm/dL = non- HDL cutpoints) = > 160 mg/dl Thiocyanate level ≥ 90mmol/L Intimal thickness of small renal arteries = Mean BP estimate >110 mmHg BMI > 30 kg/ m squared HbA1C ≥ 8%	In the abdominal aorta, raised fatty streaks were more prevalent in Ms than Fs and in Bs vs Ws, present in 20% of 15-19 y old's and 40% of 30-34 y olds. In the RCA, raised fatty streaks were more prevalent in Ms than in Fs and in Bs vs Ws, found in 10% of 15-19 y olds & 30% of 30-34 y olds. Associations of RFs with fatty streaks began in the late teens while association with raised fatty streaks became evident in subjects > 25 y. The % of intimal surface involved with fatty streaks increased with age in both arteries & was asst'd with high non-HDL-C and low HDL in the abd aorta & RCA, with HTN in the abdominal aorta, with obesity in the RCA of Ms, & with impaired GT in the RCA. When subjects with multiple RFs (HTN+smoking+non-HDL>160 mg/dl+HDL < 35 mg/dl + BMI > 30) were compared with low risk subjects with none of these RFs, high-risk level was associated with more extensive flat fatty streaks, raised fatty streaks & raised lesions in the abdAo & RCA in all age groups (p=S). The impact of combined RFs increased with increasing age in both abd Ao and RCA.	The raised fatty streak represents a transitional lesion between the flat fatty streak and advanced raised lesions (fibrous plaques) Q1. Atherosclerosis begins in childhood. Q2. The presence of RFs correlates with the extent and severity of atherosclerotic lesions at autopsy. Q9. An increase in the number of RFs is associated with increased prevalence and severity of atherosclerotic lesions at autopsy. Q14a. A low risk state is associated with decreased prevalence of atherosclerotic lesions at all ages.
11257083	McGill HC, Jr.	Effects of nonlipid risk factors on atherosclerosis in youth with a favorable lipoprotein profile	2001	CrS	Retrospective	PDAY	Atheroscl erosis	Q1(RF2,3,4,6,8,10, 14) Q2(RF2,3,4,6,8,10, 14) Q4(RF2,3,4,6,8,10, 14) Q5(RF2,3,4,6,8,10, 14) Q9(RF2,3,4,6,8,10, 14) Q14a(RF2,3,4, 6,8,10,14)	USA	Clinical	Evaluate the extent of atherosclerosis at autopsy in adolescents and young adults with a favorable lipid profile	856	Pediatric/ young adult	In this study, among 2,876 autopsies performed between 1987-91, 629 males/ 227 females with non-HDL-C < 160 mg/dl & HDL ≥ 35 mg/dl; age range = 15-34 were evaluated.	3,201 15-34 y olds who died accidentally in 15 different cities in the U.S.; information on age/ gender/ lipids/ smoking / HTN / obesity / hyperglycemia was available. In this study, among 2,876 autopsies performed between 1987-91, 629 males/ 227 females with non-HDL-C < 160 mg/dl & HDL ≥ 35 mg/dl; age range = 15-34 were evaluated.	N/A	N/A	N/A	Extent of intimal surface of RCA & abd Ao with fatty streaks and raised lesions was evaluated and AHA grading (grades 1-6) of stained sections of CAs and abd Ao was performed. C-V RFs: Gender Race Age Thiocyanate level ≥ 90mmol/L Intimal thickness of small renal arteries = Mean BP estimate >110 mmHg BMI > 30 kg/ m squared HbA1C ≥ 6.9%	Prevalence of smoking was high at 44% for the whole cohort & for those with favorable lipid profile. Of those with favorable lipid profile, 38.8% had no RFs, 47.3% had 1 non-lipid RF, 13.1% had 2 non-lipid RFs, 0.7% had 3 non-lipid RFs and 0.1% had all 4 non-lipid RFs. Those with favorable lipid profile and no other RFs had much less RCA involvement with raised lesions from the youngest age and extent of atherosclerosis progressed much less rapidly with increasing age vs those who smoked, had HTN, were obese and had hyperglycemia - for example, in 15-19 y Ms, low risk group had 0.5% raised lesions vs 1.3% in high non-lipid RF group; by 30-34 y, low risk group had 1% involvement with raised lesions vs 4% for high non-lipid RF group. This difference persisted in all race/sex groups. In the abd. aorta, smokers had more extensive fatty streaks & raised lesions than non-smokers and Bs with HTN had more raised lesions than normotensive Bs. In the RCA, Bs with HTN had more raised lesions than normotensive Bs, obese M had more extensive fatty streaks than non-obese men, and individuals with elevated HbA1c had more extensive fatty streaks. In the LADCA, obese men had more severe lesions.	Q9. Non-lipid RFs significantly accelerate atherosclerosis beginning in childhood. Progression of atherosclerosis is accelerated in Ms compared with Fs. Q5. There are race and gender differences in RF impact on the development of atherosclerosis. Q9. An increase in the number of RFs is associated with increased prevalence and severity of atherosclerotic lesions at autopsy even in the absence of dyslipidemia. Q14a. A low risk state is associated with decreased development & progression of atherosclerosis.

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11395036	Homma S	Histopathological modifications of early atherosclerotic lesions by risk factors-- findings in PDAY subjects	2001	CrS	Retrospective	PDAY	Atherosclerosis	Q4(RF3,4,5,10) Q9(RF3,4,5,10)	USA	Clinical	Evaluate histopathological modifications of atherosclerotic lesions in light of pre-mortem RFs.	140	Pediatric/ young adult	From the 151 male PDAY cases collected from 1987-1989, 140 cases without significant branch artifacts or intimal damage were evaluated. Males from the PDAY study examined in 1987-89 for whom pre-mortem RF results were available were included in this study.	3,201 15-34 y olds who died accidentally in 15 different cities in the U.S.; information on age/ gender/ lipids/ smoking / HTN / obesity / hyperglycemia was available. Age TC HDL Non-HDL-C = TC - HDL (LDL cutpoints + 30mgm/dL = non-HDL cutpoints) Thiocyanate level ≥ 90mmol/L Intimal thickness of small renal arteries = Mean BP estimate >107 mmHg BMI > 30 kg/ m squared HbA1C ≥ 8%	N/A	N/A	N/A	Extent of intimal surface of RCA & abd Ao with fatty streaks and raised lesions was evaluated and AHA grading (grades 1-6) of stained sections of CAs and abd Ao was performed. AHA grading of gross specimens + intimal thickness + status of foam cells + density of fibrosis reviewed.	A pair-matched control was selected for each RF. Extent of gross atherosclerotic lesions did not progress differently by individual RFs. In both aorta and LCA, intimal thickness of subjects with HTN was greater than for normotensives who had no proliferation of foam cells. In the aorta, hypercholesterolemia was ass'd with an increase in foam cells but not with an increase in intimal thickness. HDL-C correlated inversely with # of foam cells in the aorta & LCA and the degree of thickness in the LADCA where early appearance of advanced lesions such as preatheroma or atheroma was also indicated in the low HDL-C grp. Smokers had fewer foam cells in both aorta and CAs and more intensive fibrosis in the LADCA than non-smokers.	Q4. Histopathologic changes of atherosclerosis vary with individual RF extent and severity.
11571603	Strauss RS	Smoking and weight loss attempts in overweight and normal-weight adolescents	2001	CrS	Retrospective	NHANES III	None	Q6 (RF9, RF10)	U.S.A	Clinical	Explore the relationship between smoking and dieting in a cross-sectional nationally representative sample of young adolescents.	1,331	Pediatric/ Young adults	12-18 yr	Patient characteristics from NHANES III	Normal weight / Overweight	NR / NR	NR	Frequency of smoking Cigarettes/d Mean energy intake [kcal (SE)] Mean percentage of calories from fat [% (SE)]	There was a two-fold increase in smoking among normal-weight adolescent girls who reported trying to lose weight (23.7% vs 12.6%, P<0.01). In contrast, prevalence of smoking was similar among overweight adolescent girls who tried to lose weight compared to those who did not (15.8% vs 14.1%, P=0.76). In males, overweight boys who were trying to lose weight were less likely to smoke than overweight boys who were not trying to lose weight (9.8% vs 24.5%, P<0.05). There were no differences in body weight, BMI, caloric intake or fat intake among smokers and non-smokers. However, smokers reported eating less fruit and vegetables compared to non-smokers, and were over five times more likely to drink alcohol compared to non-smokers (odds ratio: >/ =1x/month, 5.28 (3.82-7.28), ≥4x/month, 5.29 (3.58-7.82).	Q6: There was a two-fold increase in smoking among normal-weight adolescent girls who reported trying to lose weight (23.7% vs 12.6%, P<0.01). In contrast, prevalence of smoking was similar among overweight adolescent girls who tried to lose weight compared to those who did not (15.8% vs 14.1%, P=0.76). In males, overweight boys who were trying to lose weight were less likely to smoke than overweight boys who were not trying to lose weight (9.8% vs 24.5%, P<0.05). There were no differences in body weight, BMI, caloric intake or fat intake among smokers and non-smokers.
11709270	Chen W	The magnitude of familial associations of cardiovascular risk factor variables between parents and offspring are influenced by age: the Bogalusa Heart Study	2001	Cohort	Prospective	Bogalusa	None	Q8 (RF2,3,4,5,8)	USA	Community (other)	Evaluate familial role in development of C-V RFs by comparing RF profile in children to that of their parents both as children and as adults.	727children	Pediatric/ Young adult	From Bogalusa population, parent child pairs were identified with RF information on offspring and on parents both as children and as adults. 504 unrelated offspring-mother pairs & 326 unrelated offspring-father pairs identified.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% female(F),48% male(M); 44% B. For this study, 727 children evaluated at mean age of 11.2 yrs. Parents evaluated in childhood at mean age of 11.3 yrs and as adults at 25.5 yrs.Parents were 51.7% W/48.3% B.	Offspring Parents as children Parents as adults	N/A	14.2 yrs	Age Gender Ht Wt BMI SBP DBP TC TG HDL LDL TC/HDL	For the groups, there was evidence of secular trends with offspring BMI, LDL & HDL differing significantly from mean levels of parents at the same age. There were significant correlations between offspring RFs & parent RFs, both as children and as adults. By simple regression, parental RFs correlated significantly with RFs measured as children (BMI: 0.68 for Ms, 0.60 for Fs; SBP: 0.45 for Ms & 0.44 for Fs; DBP: 0.40 for Ms & 0.29 for Fs; LDL: 0.52 for Ms & 0.53 for Fs; HDL: 0.35 for Ms & Fs; TG: 0.25 for Ms & 0.37 for Fs; all p=S**) With simple regression, mothers childhood RFs correlated better with children's RFs than did mother's adult RFs: BMI: r=.45 vs .32; SBP: r =.22 vs .10; DBP: r = .22 vs .13; LDL-C: r = .20 vs .11). HDL-C & TGs did not show age-specific correlation. Father-offspring correlations were similar but differences were less. With MVA, parents' childhood BMI, BP and LDL-C were better predictors of children's RFs than adult RF measures.	There is significant familial clustering for major C-V RFs between parents & offspring. Parents childhood RF levels were better predictors of children's RFs than were their adult results. Q8. Parental RF levels were strongly correlated with their childhood results.
11733400	Davis PH	Carotid intimal-medial thickness is related to cardiovascular risk factors measured from childhood through middle age: The Muscatine Study	2001	CrS	Retrospective	Muscatine	IMT	Q3 (RF2,3,4,5,8) Q9(RF2,3,4,5,8)	USA	Community (other)	Correlate CIMT in young adult life with C-V RFs measured in childhood, currently and as a "load" from childhood to adulthood.	725	Pediatric/ young adult	Subjects from the Muscatine study who had participated in at least 1 childhood survey, 1 young adult survey and in the CAC study were eligible - 725 subjects, 33-42 y, 52% F participated.	Longitudinal cohort study based in Muscatine, IA of children aged 8-18 y at enrollment between 1971 & 1981, followed with biennial school surveys into adult life. A total of 14,066 children have undergone 32,636 evaluations. For this study, 346 men/ 379 women; aged 33 - 42 yrs; from the cohort followed from childhood were evaluated.	N/A	769/725	N/A	Ht Wt BMI (>25kg/m squared = overweight) Waist circumference (WC) Hip circumference (HC) Waist to hip ration (WC/HC) Triceps SFs SBP DBP TC TG HDL LDL TC/HDL Lp(a) Fasting glucose (FG) Fasting insulin (INS) Mean CIMT from carotid U/S average of 12 measurements from near & far wall of each CCA, carotid bifurcation and internal carotid artery.	Mean maximum CIMT was 0.79 +/- 0.12 in men & 0.72 +/- 0.10 in women (p=S**) In Ms, the only childhood RF to correlate with CIMT was TC (r=0.17, p=S*); in Fs, childhood BMI (r=0.18), TSFs (r=0.09), TC (r=0.14), SBP (r=0.15), DBP(r=0.10) & TGs (r=0.12) all correlated with CIMT in univariate analysis (all, p=S-S**). With MVA, significant current predictors of CIMT were age & LDL-C in both sexes and DBP in women. With MVA, significant childhood predictors were TC in both sexes & childhood BMI only in women. In a risk factor load model, LDL-C, HDL-C & DBP predicted CIMT; in women, LDL-C, BMI & TGs were predictive. In a MVA with CIMT in upper quartile vs lower 3 quartiles, childhood TC was a significant RF in Ms (OR=1.47,CI=1.02,2.13) and in Fs (OR=1.71, CI=1.16,2.50). Smoking & DM did not correlate with CIMT but the # of subjects with DM was very small and pack-yrs of smoking low compared with other studies.	Q 3. RFs present in childhood and in adult life correlate with atherosclerosis measured by CIMT in young adult life.
11976155	Freedman DS	Differences in the relation of obesity to serum triacylglycerol and VLDL subclass concentrations between black and white children: the Bogalusa Heart Study	2002	CrS	Retrospective	Bogalusa	None	Q5 (RF5,8) Q6 (RF5,8)	USA	Community (other)	Evaluate the relationship of obesity to VLDL subclasses in children.	916	Pediatric/ Young adult	All 10-17 y olds examined in the Bogalusa study in 1992-4 in whom lipoprotein sub-classes were obtained.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% female(F),48% male(M); 44% B. For this study: Age: 10-17y; 40% AA/ 60% white	N/A	N/A	N/A	Age Gender Race Ht Wt BMI Rohrer Index (RI) Waist circumference (WC) Subscapular & triceps skinfolds TC TG HDL LDL VLDL VLDL/ TG sub-classes	In a large background sample, BMs were shown to be thinner than WMs and BFs were shown to be heavier than WFs,with consistently higher HDL & lower TGs in Bs vs Ws. Mean TGs were 25 mg/dl higher in white than black children due to a 140% difference in large VLDL. Small VLDL was 29% higher in whites. For the entire sample, VLDL + TGs correlated with all measures of obesity, most strongly with WC (r=0.36, p= S**). This association was curvilinear and was 2 to 6 X stronger in whites than blacks. As WC increased, the proportion of large VLDL increased; WC was not related to small VLDL.	Q.5. There are racial differences in TG/VLDL/HDL levels between W and B children with higher large VLDL sub-class largely responsible for the difference. Q 6. For the entire sample, VLDL/TGs correlated with all measures of obesity,most strongly with WC. The association with WC was 6X stronger in W children. Measurement of VLDL sub-classes may provide information on the role of race and obesity in the process of atherosclerosis.

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12629565	Norman JE	The impact of weight change on cardiovascular disease risk factors in young black and white adults.	2003	Cohort	Prospective	CARDIA	None	Q6 (RF4,5,8,14) Q7(RF4,5,8,14) Q8(RF4,5,8,14) Q10 (RF4,5,8,14) Q13 (RF4,5,8,14)	USA	Community (other)	Quantify change in weight with change in BP, lipids & insulin levels by race & by baseline level of obesity in a longitudinal cohort of young B & W men & women.	5115/3325	Pediatric/ young adult	All subjects from the original cohort of 5,115 subjects available for evaluation at 10 y F/U with exclusion of those with incomplete data and pregnant women.	Population-based, prospective observational study with participants recruited from 4 metropolitan areas (Birmingham, Ala; Chicago, Ill, Minneapolis, Minn; & Oakland, Calif) in 1985 1986 at 18-30 yrs of age (44.9% black, 53.9% women) & followed up for 10 yrs.	N/A	N/A	10 yrs.	Age Race Gender Ht Wt BMI (>25kg/m squared = overweight) SBP DBP TC TG HDL LDL TC/HDL Fasting glucose (FG) Fasting insulin (INS) Smoking status	At baseline, 34.4% of WMs, 22.5% of WFs, 37% of BMs & 44.5% of BFs were overweight. Over 10 y F/U, % of subjects with abnormal RF values increased proportionately for all RFs and all groups; obesity increased from 11 to 27%. Mean(SD) of weight gained was 10.5 kgs (10.0) for B men, 11.7kg (11.0) for B women, 7.7 kgs(8.0) for W men & 7.2 kgs (10.0) for W women. Increase in wt was ass'd with adverse changes in all RFs for all race-sex groups. Change in TGs was greater for W than B participants (p=S); no other racial differences were found. Changes in TGs (p=S**) & fasting insulin (p=S*) were greater in men than women. Only for LDL-C was there a significantly greater change for baseline non-overweight vs. baseline overweight subjects (p=S**). A small group either lost weight or did not gain (12% of BM, 10% of BFs, 13% of WMs & 20% of WFs); mean levels of HDL, LDL & SBP improved in all those who did not gain or lost weight over the 10 yr period. Prevalence of cigarette smoking was significantly higher for this group vs those who gained wt (35 vs 26%,p=S**)	RFs cluster with excess wt gain and track from adolescence into adult life. There are strong correlations between wt gain over a 10 yr period from late adolescence/ early adult life with adverse changes in mean values of lipids, BP & insulin.
12957690	Kieltyka L	Framingham risk score is related to carotid artery intima-media thickness in both white and black young adults: the Bogalusa Heart Study	2003	CrS	Retrospective	Bogalusa	IMT	Q5 (RF1,2,3,4,5,6, 8,10,11,14) Q9 (RF1,2,3,4,5,6, 8,10,11,14)	USA	Community (other)	Correlate FRS with CIMT in young adults	517	Pediatric/ Young adult	From a group of 1420 young adults evaluated in 1995-6 as part of the Bogalusa Post HS Survey, 517 subjects who were previously examined in childhood were selected for cIMT and LVM by ultrasound.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% male(M); 44% B. Age at CIMT = 20-37 y; 71% white; 39% M.	N/A	N/A	N/A	Age Gender Ht Wt BMI Waist circumference (WC) SBP DBP TC TG HDL LDL TC/HDL ApoA1 ApoB Fasting glucose (FG) Fasting insulin (INS) HOMA Metabolic syndrome (NCEP definition) Smoking status Alcohol use CRP Physical activity Diet Family hx of CHD/ stroke/ HTN/ DM Carotid IMT (cIMT) - mean of 3 maximum right and left carotid measurements from the common carotid, bulb & internal carotid segments. Carotid diameter LVM indexed to ht in meters squared from M mode echo	CIMT is greater in Bs than Ws at the common carotid (p=S***) & carotid bulb (Fs only)(p=S**) Ms had higher CIMT than Fs in common carotid (p=S), internal carotid (p=S) & carotid bulb (Ws only) (p=S**) With respect to components of FRS, age, cigarette use & T2DM were similar in all race-sex groups. However, race and gender differences were significant for : SBP - Bs>Ws,p=S**; Ms>Fs, p=S** TC/HDL - Ws > Bs,p=S**; Ms> Fs,p=S** LVH - Bs > Ws, p=S**; Ms > Fs,p=S** Significant (+) linear relationship between race-and gender-specific tertiles tertiles of FRS and IMT of common, bulb and int carotid segments (p=S* for all). With MVA, FRS independently ass'd with CIMT in all 3 carotid segments after stratification by race. FRS as a main predictor variable explained more of the variance in IMT of the carotid bulb (9%) than in the common (5%) or internal (3%) carotid segments. There was no association between IMT and family hx of CHD.	Q9. The multivariate Framingham risk score correlated (+)ly and significantly with CIMT, irrespective of race in asymptomatic young adults. There are race- & gender-specific differences in CIMT.
14600185	Li S	Childhood cardiovascular risk factors and carotid vascular changes in adulthood: the Bogalusa Heart Study	2003	Cohort	Retrospective	Bogalusa	IMT	Q3 (RF2,3,4,5,8) Q4 (RF2,3,4,5,8) Q5 (RF2,3,4,5,8) Q9 (RF2,3,4,5,8)	USA	Community (other)	Correlate CIMT in young adulthood with CV RFs measured in childhood	486	Pediatric/ Young adult	From a group of 1,420 young adults who had U/S evaluation of cIMT,486 who had been examined ≥ 3 X since childhood were included.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% male(F),48% male(M); 44% B. For this study, age at CIMT = 25-37 y; 71% white; 39% M. ≥3 measures of CV RFs in childhood.	N/A	N/A	23 y	Age Gender Wt BMI SBP DBP TC TG HDL LDL TC/HDL ApoA1 ApoB Carotid IMT (cIMT) - mean of 3 maximum right and left carotid measurements from the common carotid, bulb & internal carotid segments. * RFs measured at the first childhood & last adulthood exam were used to represent childhood & adult values and were standardized to z scores specific for age, sex & race.	CIMT measurement: M vs F(0.757 vs 0.723 mm,p=S**) and B vs W (0.760 vs 0.723,p=S**). Bs had higher SBP & HDL and lower TGs & LDL than Ws; Ms had higher SBP, LDL & TGs and lower HDL than Fs; WMs & BFs had higher BMI than WFs; BFs had higher BMI than BMs. In univariate analysis, childhood LDL,BMI & SBP all correlated significantly with CIMT in young adult life with highest correlation for LDL. In adulthood, SBP, LDL,BMI, HDL(inversely) & TGs all correlated with CIMT, with highest correlation for LDL & SBP. In MVA for CIMT in the top quartile vs. lower 3 quartiles, childhood LDL [OR=1.42,CI=1.14-1.78] & BMI [OR=1.25;CI=1.01-1.54]; adult LDL [OR=1.46,CI=1.16-1.82], HDL [OR=0.67,CI=0.51-0.88] & SBP [OR=1.36,1.08-1.72] were all significant RFs for elevated cIMT. Long term burden of LDL [OR=1.58, CI=1.24-2.01] & HDL [OR=0.75,0.58-0.97] measured serially from childhood to adulthood also correlated significantly with top quartile vs lower 3 quartiles CIMT. Increasing trend in CIMT across quartiles of LDL in childhood was observed. Mean value of CIMT for those who were in the top quartile for LDL in childhood was 0.761mm(CI=0.743-0.780) vs 0.724 mm (CI=0.715-0.734) for those in the lower 3 quartiles (p=S**).	Q 3. C-V RFs identified in childhood (BMI,LDL) are associated with evidence of atherosclerosis-related target organ damage in adult life. Q4.In this study, the strongest predictor of increased cIMT was LDL measured in childhood. Q 5. There are race- & gender-specific differences in cIMT.

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14600186	Raitakari OT	Cardiovascular risk factors in childhood and carotid artery intima-media thickness in adulthood: the Cardiovascular Risk in Young Finns Study	2003	Cohort	Prospective	Young Finns	IMT	Q3 (RF4,5,8,10) Q4 (RF4,5,8,10) Q9 (RF4,5,8,10)	Finland	Community (other)	Correlate carotid IMT in 24-39 yr old adults with CV RFs measured at 3-18 yr of age	3596/ 2229	Pediatric/ Young adult	All participants in the C-V Risk in Young Finns Study who had carotid U/S prformed in 2001 and who also had been evaluated at least once in childhood.	Finnish cohort enrolled at 3-18 yr of age in 1980 and followed with serial RF evaluation over time. Carotid IMT assessed at 24-39 yr of age.	N/A	N/A	21 yr	Ht Wt BMI Sum of skin folds (SSFs) BP Smoking status TC TG HDL LDL Carotid intima media thickness (CIMT)	In MVA, adjusted for age and sex, CIMT in adulthood was significantly associated with childhood LDL-C (S**), SBP (S**), BMI (S*) & smoking (S*) In MVA , CIMT in adulthood was significantly associated with adult SBP (S**), BMI (S**), male sex (p=S**), age (S**) and smoking (S*). Age-adjusted CIMT was 0.013mm greater in smoking vs non-smoking Ms (p=S) The greater the number of abnormal RFs at 12-18 yr of age, the higher the CIMT at 33-39 yr (S**, after adjustment for adult RFs). In Ms, childhood LDL, TC, LDL/HDL,TGs, SBP, DBP & BMI measured at 12-18 y correlated significantly with cimt; in Fs, SBP & BMI measured at 12-18 y correlated with adult cimt. The number of abnormal RFs at 3-9 yr of age correlated weakly (S) with carotid IMT at 24-30 yr of age in men but not in women. When current RFs were entered into MVA, childhood SBP(p=S*) and LDL(p=S*) remained independently associated with CIMT.	Q 3 C-V RFs in childhood(LDL-C,SBP, BMI,smoking) are associated with atherosclerosis evidenced by increased CIMT in young adult life. Q.4 Strongest pediatric predictors were LDL and SBP followed by BMI and smoking. Q.9 The greater the number of abnormal RFs at 12-18 yr of age, the higher the CIMT at 33-39 yr in both Ms & Fs, even after adjustment for current RF levels.
14709364	Cohen HW	Glucose interaction magnifies atherosclerotic risk from cholesterol. Findings from the PDAY Study	2004	CrS	Retrospective	PDAY	Atheroscl erosis	Q1(RF2,3,4,5,6,8,1 0,14) Q2(RF2,3,4,5,6,8,1 0,14) Q4(RF2,3,4,5,6,8,1 0,14) Q6(RF2,3,4,5,6,8,1 0,14) Q9(RF2,3,4,5,6,8,1 0,14)	USA	Clinical	Evaluate impact of hyperglycemia on pathologic findings of atherosclerosis	1,530	Pediatric/ young adult	Autopsy specimens from 1,530 deaths in 15-34 y olds who died of external causes and who had valid values of HbA1c, TC & HDL-C - correlation of RFs with lesions in the coronary arteries and abdominal aorta.	3,201 15-34 y olds who died accidentally in 15 different cities in the U.S.; information on age/ gender/ lipids/ smoking / HTN / obesity / hyperglycemia was available. 25% F; 54% B.	N/A	N/A	N/A	Extent of intimal surface of RCA & abd Ao with fatty streaks and raised lesions was evaluated and AHA grading (grades 1-6) of stained sections of CAs and abd Ao was performed. AHA grading (grades 1-6) of CAs and abd Ao C-V RFs: Gender Age TC HDL Non-HDL-C = TC - HDL (LDL cutpoints + 30mgm/dL = non-HDL cutpoints) Thiocyanate level ≥ 90mmol/L Intimal thickness of small renal arteries = Mean BP estimate >110 mmHg BMI > 30 kg/ m squared HbA1C ≥ 6.9%	Subjects were grouped into quintiles by TC/HDL and dichotomized for HbA1C with top quartile vs. lower 3 quartiles. An interaction product term of TC/HDL X HbA1C was statistically significantly asst'd with raised lesions even after correction for sex/race/age/BMI/smoking/HBP. Higher TC/HDL was associated with B race, older age, higher HbA1c, higher TC and lower HDL but not with sex, HTN or smoking status. Elevated glucose as estimated by HbA1 significantly increased the probability of raised atherosclerotic lesions at autopsy beyond that associated with dyslipidemia alone. Findings were most striking in the 25-34 y old age group vs those < 24.	Q1. Atherosclerosis begins in childhood. Q.2. The presence of RFs correlates with the extent of atherosclerotic lesions at autopsy. Q4. Addition of hyperglycemia to dyslipidemia substantially increases the extent of atherosclerosis at autopsy. Q9. An increase in the number of RFs is associated with increased prevalence and severity of atherosclerotic lesions at autopsy.
15066605	Mzayek F	Differential association of birth weight with cardiovascular risk variables in African-Americans and Whites: the Bogalusa heart study	2004	Cohort	Prospective	Bogalusa	None	Q5 (RF4,5,8,14)	USA	Community (other)	Evaluate the relationship between birth weight and subsequent C-V RF profile in Bs and Ws.	1155	Pediatric/ Young adult	189 of 228 newborns from 1973 Bogalusa community cohort + 966 schoolchildren from a possible 1242 in the 1987-1988 cohort for whom birth weights were known.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% female(F),48% male(M); 44% B. For this study, 730 Ws/ 425 Bs were evaluated at 7-21 yrs of age	N/A	N/A	N/A	Age Gender Ht Wt BMI SBP DBP TC TG HDL LDL TC/HDL ApoA1 ApoB Fasting glucose (FG) Fasting insulin (INS) HOMA-IR	Prevalence of low BW (< 2500 gms) was 4.5% among Ws and 10.6% among Bs. In MRA, low BW was (+) ly related to BMI and inversely related to SBP (p=S*), log HOMA-IR (p=S), LDL (p=S*) and TGs (p=S). Association of birth wt with LDL, TGs and HOMA-IR was stronger in Bs while the asst'n with SBP was stronger in Ws. Subjects with BW < 2500 g were at increased risk for upper quartile HOMA-IR (OR=2.4, CI 1.4,4.3)and LDL (OR=1.7, CI 1.02, 2.8) compared with those with birth wt > 2500 gms.	Low birth wt is associated with adverse C-V profile in later childhood & adolescence . Low birth wt is significantly more prevalent in Bs than in Ws.
15126439	Muntner P	Trends in blood pressure among children and adolescents	2004	CrS	Retrospective	NHANES III and NHANES 1999-2000	None	Q5 (RF2, RF4)	U.S.A	Clinical	To examine trends in systolic and diastolic blood pressure among children and adolescents between 1988 and 2000.	NHANES III: 3,496 NHANES 1999-2000: 2,086	Pediatric/ Young adults	8-17 yr NHANES III and NHANES 1999-2004 eligibility criteria	Patient characteristics from NHANES III and NHANES 1999-2000	Whites Blacks Mexican Americans	NR	NR	SBP DBP	In 1999-2000, the mean (SE) SBP was 106.0 (0.3) mm Hg and DBP was 61.7 (0.5) mm Hg. After adjustment for age, mean SBP was 1.6 mm Hg higher among non-Hispanic black girls (P =.11) and 2.9 mm Hg higher among non-Hispanic black boys (P<.001) compared with non-Hispanic whites. Among Mexican Americans, girls' SBP was 1.0 mm Hg higher (P =.21) and boys' was 2.7 mm Hg higher (P<.001) compared with non-Hispanic whites (P<.001). With further adjustment for BMI, these differences were attenuated. After age, race/ethnicity, and sex standardization, SBP was 1.4 (95% CI, 0.6-2.2) mm Hg higher (P<.001) and DBP was 3.3 (95% CI, 2.1-4.5) mm Hg higher in 1999-2000 (P<.001) compared with 1988-1994. With further adjustment for differences in the BMI distribution in 1988-1994 and 1999-2000, the increase in systolic blood pressure was reduced by 29% and diastolic blood pressure was reduced by 12%.	Q5: Blood pressure has increased over the past decade among children and adolescents. After age, race/ethnicity, and sex standardization, SBP was 1.4 (95% CI, 0.6-2.2) mm Hg higher (P<.001) and DBP was 3.3 (95% CI, 2.1-4.5) mm Hg higher in 1999-2000 (P<.001) compared with 1988-1994. With further adjustment for differences in the BMI distribution in 1988-1994 and 1999-2000, the increase in systolic blood pressure was reduced by 29% and diastolic blood pressure was reduced by 12%. Q5. There are racial/ethnic and sex differences in BP.
15589670	Karlamangla AS	Impact of socioeconomic status on longitudinal accumulation of cardiovascular risk in young adults: the CARDIA Study (USA)	2005	Cohort	Prospective	CARDIA	None	Q5 (RF 2,4,5,8,10,11,14) Q6 (RF 2,4,5,8,10,11,14) Q7 (RF 2,4,5,8,10,11,14) Q8 (RF 2,4,5,8,10,11,14)	USA	Community (other)	To describe the trajectories of RFs over time in young adults and to evaluate the impact of SES on CV RF status.	5155/4149	Pediatric/ Young adults	All 4149 CARDIA participants with SES and all biologic measurements at baseline PLUS measurement of all 7 biologic values at least once in follow-up.	Population-based , prospective observational study with participants recruited from 4 metropolitan areas (Birmingham, Ala; Chicago, Ill, Minneapolis, Minn; & Oakland, Calif) in 1985 1986 at 18-30 yrs of age (44.9% black(B),55.1% white(W), 53.9% female(F),46.1% male(M)) & followed up over a 7 yr period. For this study, participants were 54%F; 51% W.	N/A	N/A	10 y	Age Race Gender Ht Wt BMI (>25kg/m squared = overweight) Waist-hip circumference SBP DBP TC TG HDL LDL TC/HDL Fasting glucose (FG) Fasting insulin (INS) Smoking status Educational level of parents and subjects Activity level Alcohol intake	Risk scores were created from baseline data and longitudinal change over 10 y showed tracking of all 7 RFs: in each case, the cluster with the highest baseline value maintained its position as the highest risk cluster over the next 10 y. After adjustment for age, lifestyle & healthcare access, SES was inversely associated with baseline RFscore in B & WFs, with risk change score in all race/gender groups, and with accumulated RFscore in B & WFs and WMs.	Q5. Race & SES significantly affect CV risk status in late childhood and young adult life. Q6,7,8. CV RFs cluster together consistently in late childhood and young adult life and this pattern tracks into adult life.

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15851639	McMahan CA	Risk scores predict atherosclerotic lesions in young people	2005	CrS	Retrospective	PDAY	Atherosclerosis	Q1(RF2,3,4,5,6,8,10,14) Q2(RF2,3,4,5,6,8,10,14) Q4(RF2,3,4,5,6,8,10,14) Q9(RF2,3,4,5,6,8,10,14)	USA	Clinical	Develop a risk score derived from CHD RF measurements in young people to predict the probability of advanced atherosclerotic lesions in the coronary arteries or abdominal aorta.	1117 & 1458	Pediatric/ young adult	Autopsy specimens from 1,127 deaths in 15-34 y olds who died of external causes - 1117 cases had correlation of RFs with lesions in the coronary arteries and 1458 cases with lesions in the abdominal aorta.	3,201 15-34 y olds who died accidentally in 15 different cities in the U.S.; information on age/ gender/lipids/smoking/HTN/ obesity/ hyperglycemia was available. Autopsy findings in the RCA, LADCA and abdominal aorta were available with grade 4 or 5 lesions defined as target lesions for this study. 25% F; 54% B.	N/A	N/A	N/A	Extent of intimal surface of RCA & abd Ao with fatty streaks and raised lesions was evaluated and AHA grading (grades 1-6) of stained sections of CAs and abd Ao was performed. AHA grading (grades 1-6) of CAs and abd Ao C-V RFs: Gender Age TC HDL Non-HDL-C = TC - HDL (LDL cutpoints + 30mgm/dL = non-HDL cutpoints) Thiocyanate level ≥ 90mmol/L Intimal thickness of small renal arteries = Mean BP estimate >110 mmHg BMI > 30 kg/ m squared HbA1C > 8%	Prevalence of target lesions increased with increasing age in all arteries(p<.001) and was higher in men than in women for the coronary arteries (p<.05). Relationship between modifiable RFs and atherosclerosis differed for CAs and Ao with highest prevalence of target lesions in CAs associated with obesity in Ms, hyperglycemia in Ms & Fs and HTN vs smoking, HTN, Fsex & hyperglycemia for the abd Ao. From logistic regression models, points were assigned to each RF. ORs for a 1 unit increase in the risk score were 1.18 (95%CI, 1.14-1.22) for the CAs and 1.29(CI, 1.23-1.35) for the abd Ao. Risk scores were used to estimate CA & abd Ao lesions and these were then correlated with observed extent of CA and abd Ao target lesions with high corrleation indicating that the system could be used to identify youth at high probability of advanced atherosclerotic lesions. Risk scores were normalized so that a 1-unit increase was equivalent to a 1y increase in age. The presence of abdominal aortic target lesions significantl;y increased the probability of an advanced CA lesion by 48%.	Q1. Atherosclerosis begins in childhood. Q2. The presence of RFs correlates with the extent of atherosclerotic lesions at autopsy. Q9. An increase in the number of RFs is associated with increased prevalence and severity of atherosclerotic lesions at autopsy. The RF scoring system based on measured RFs can be used to estimate the probability of advanced atherosclerotic lesions in young subjects. The presence of abdominal aortic target lesions significantly increased the probability of an advanced CA lesion by 48%.
15925733	Urbina EM	Impact of multiple cardiovascular risk factors on brachial artery distensibility in young adults: the Bogalusa Heart Study	2005	CrS	Retrospective	Bogalusa	Distensibility	Q4 (RF4,5,8,10,14) Q5 (RF4,5,8,10,14) Q9 (RF4,5,8,10,14)	USA	Community (other)	Evaluate impact of multiple RFs on brachial distensibility (BrachD)	803	Pediatric/ Young adult	803 young adults who underwent BrachD measurement as part of the Bogalusa post high school F/U study.	Community-based cohort of black(B) & white(W) children and young adults - originally examined at 5-17 yrs; 52% female(F),48% male(M); 44% B. For this study: Age: 19-37 y; 42% male; 72% white; Race, age, BP, lipids, anthropometrics, glucose status, smoking status	N/A	N/A	N/A	Age Gender Ht Wt BMI Waist circumference (WC) SBP DBP TC TG HDL LDL TC/HDL ApoA1 ApoB Fasting glucose (FG) Fasting insulin (INS) HOMA Metabolic syndrome (NCEP definition) Smoking status Alcohol use Brachial distensibility (BrachD)	BrachD was significantly higher in Ws than Bs (6.% vs 6.3%,p=S*)and was slightly higher in Fs than Ms. By trend analysis, BrachD consistently decreased as the number of RFs increased (p=S**).	Q5. There are racial differences in brachial distensibility in young adults. Q9. As the number of CV RFs present increased, brachial distensibility progressively & significantly decreased.
16061737	Weitzman M	Tobacco smoke exposure is associated with the metabolic syndrome in adolescents	2005	CrS	Retrospective	NHANES III	None	Q6 (RF6, RF8, RF10, RF14)	U.S.A	Clinical	Evaluate the association of environmental tobacco smoke (ETS) exposure and active smoking with the prevalence of the metabolic syndrome in US adolescents.	3,211 (2773)	Pediatric/ Young adults	12-19 yr	Patient characteristics from NHANES III	Overweight status Metabolic syndrome status Smoking status	NR	NR	BMI Metabolic syndrome: 3 ot these 4 characteristics: WC ≥ 90th %ile, SBP+/-DBP ≥ 90th %ile for age/ht; TG≥110 mgdL; FG≥100 mg/dL Active smoking Exposure to smoke (ETS): serum cotinine; presence of household smokers	Among adolescents, 5.6% met the criteria for metabolic syndrome overall. Prevalence increased with tobacco exposure: 1.2% for nonexposed, 5.4% for those exposed to ETS, and 8.7% for active smokers (P<0.001). In adolescents at risk for overweight and overweight adolescents (BMI > 85th percentile), a similar relationship was observed but with increased prevalence: 5.6% for nonexposed, 19.6% for those exposed to ETS, and 23.6% for active smokers (P=0.01). In MVA, among all adolescents, ETS exposure was independently associated with the metabolic syndrome (ETS exposure: OR: 4.7, 95% CI: 1.7 to 12.9; active smoking: OR: 6.1; 95% CI: 2.8 to 13.4).	Q6: Among adolescents, 5.6% met the criteria for metabolic syndrome. Prevalence increased significantly with tobacco exposure and in overweight/obese individuals to a maximum of 23.6% among overweight/obese adolescents who smoke. In MVA among all adolescents, tobacco exposure(active or passive) was independently associated with the metabolic syndrome.
16129802	Juonala M	Risk factors identified in childhood and decreased carotid artery elasticity in adulthood: the Cardiovascular Risk in Young Finns Study	2005	Cohort	Prospective	Young Finns	Distensibility	Q3 (RF4,5,8,10)	Finland	Community (other)	Correlate carotid artery elasticity measured by ulyrasound in young adulthood with CV RFs measured in childhood	3956/ 2255	Pediatric/ Young adult	Finnish cohort enrolled at 3-18 yr of age in 1980 and followed with serial RF evaluation over time. At 24-39 yr of age, group underwent evaluation of carotid artery elasticity using compliance (COM), Young's elastic modulus (YEM) and stiffness index (SI). All participants in the childhood CrS studies from 1980 who returned for F/U study were eligible - 2255 participated.	n=2255; M=1012/ F=1243.	N/A	N/A	21 yr	Ht Wt BMI Sum of skin folds (SSFs) BP Smoking status TC TG HDL- C LDL-C CRP Fasting glucose (FG) Fasting insulin (INS) Carotid intima media thickness (CIMT) Carotid artery compliance (CAC) Young's elastic modulus (YEM) Stiffness index (SI) No major difference between subjects & drop-outs except slightly younger age of drop-outs.	With increasing age, CAC decreased and YEM & SI increased in both Ms & Fs. **With univariate analysis:** Childhood SBP, BMI, INS in Ms & Fs & SSFs only in Fs(all,p=S**) correlated inversely with CAC in Ms & Fs. Childhood TGs, BP, SSFs, INS & BMI all correlated directly and significantly (all,p=S**) with YEM. Childhood TGs, BP, SSFs, INS & BMI all correlated directly & significantly(all,p=S**) with SI. Adult LDL,TGs, BP, BMI & INS + CRP in men all correlated inversely with CAC. Adult LDL,TGs, BP, BMI, INS & FG all correlated directly with YEM in both Ms & Fs. Adult LDL,TGs,BMI & INS corrleated directly with SI in Ms & Fs. **With MVA:** Age, male sex, childhood SSFs & SBP all correlated inversely with CAC(all, p=S**). Age, male sex & childhood SBP all correlated with YEM (all, p=S**);childhood SSFs correlated less strongly (p=S*). Age (p=S**), male sex(p=S**) & childhood SSFs(p=S*) were directly related to SI.	Q3. The presence of RFs in childhood correlates with subclinical measures of atherosclerosis in adult life. In MVA, childhood BP & adiposity correlated significantly with ultrasound measures of decreasing arterial elasticity. Increasing number of RFs including LDL, BP, HDL and smoking at adverse levels in childhood related significantly with ultrasound measures of decreasing arterial elasticity. These associations persisted after adjustment for adult RFs.
16129802	Juonala M	Risk factors identified in childhood and decreased carotid artery elasticity in adulthood: the Cardiovascular Risk in Young Finns Study	2005																	Adult LDL, SBP & INS were inversely related to CAC & directly related to YEM & SI. BMI corrleated directly with YEM. With increasing # of childhood RFs, there was a significant decreasing trend in CAC (P=S**) and an increasing trend in YEM (p=S**). After adjustment for current RFs, effect of childhood RFs was attenuated ~ 50%. Childhood risk score remained highly significant (p=S*). When current BP was introduced, effect of childhood BP was borderline significant. & SSFs(S**only in females) correlated inversely with CAC .	

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16263998	Williams DE	Prevalence of impaired fasting glucose and its relationship with cardiovascular disease risk factors in US adolescents, 1999-2000	2005	CrS	Retrospective	NHANES 1999-2000	None	Q5 (RF6) Q6 (RF2, RF4, RF5, RF6)	U.S.A	Clinical	Examine the prevalence of IFG and its relationship with overweight and CVD risk factors in a nationally representative sample of U.S. adolescents who were aged 12 to 19 yr.	915	Pediatric/ Young adults	12-19 yr	Patient characteristics from NHANES 1999-2000	Normal weight / At risk for overweight / Overweight / Non-Hispanic white / Non-Hispanic black / Mexican-Americans	N/A	N/A	Percent overweight / BMI / Fasting glucose (FG) / Fasting insulin (INS) / Hemoglobin A1C(HbA1C) / Fasting lipids: TC TG HDL-C LDL-C	In 1999-2000, the prevalence of IFG in US adolescents was 7.0% and was higher in boys than in girls (10.0% vs 4.0%). Prevalence of IFG was higher in overweight adolescents (17.8%) but was similar in those with normal weight and those who were at risk for overweight (5.4% vs 2.8%). The prevalence of IFG was significantly different across racial/ethnic groups (13.0%, 4.2%, and 7% in Mexican Americans, non-Hispanic black individuals, and non-Hispanic white individuals, respectively). Adolescents with IFG had significantly higher mean hemoglobin A1c, fasting insulin, total and low-density lipoprotein cholesterol, triglycerides, and systolic blood pressure and lower high-density lipoprotein cholesterol than those with normal fasting glucose concentrations.	Q5: The prevalence of IFG was high at 7% overall, and was significantly different across racial/ethnic groups (13.0%, 4.2%, and 7% in Mexican Americans, non-Hispanic black individuals, and non-Hispanic white individuals, respectively). Q6: Prevalence of IFG was higher in overweight adolescents (17.8%) but was similar in those with normal weight and those who were at risk for overweight (5.4% vs 2.8%). Adolescents with IFG had adverse CV risk profiles with significantly higher mean hemoglobin A1c, fasting insulin, total and low-density lipoprotein cholesterol, triglycerides and systolic blood pressure and lower high-density lipoprotein cholesterol than those with normal fasting glucose concentrations.
16530772	McMahan CA	PDAY risk score predicts advanced coronary artery atherosclerosis in middle-aged persons as well as youth	2007	CrS	Retrospective	PDAY	Atherosclerosis	Q2 (RF4, RF5, RF8, RF10) Q3 (RF4, RF5, RF8, RF10)	USA	Don't know/NR	Estimate the probability of advanced atherosclerosis using coronary heart disease risk factors by applying the PDAY risk score to autopsied individuals from the Community Pathology Study	NR (NR)	Pediatric/ Young Adult	PDAY is a post mortem study of 15-34 yr olds who died accidentally in 15 different cities in the U.S.; information on age/ gender/ lipids/ smoking/ HBP/obesity/ hyperglycemia available; this data was used to develop the PDAY risk score for coronary artery atherosclerosis. In this study, the PDAY risk score was applied to 212 autopsied young and middle-aged subjects in PDAY and in the Community Pathology Study (CPS).	24% F	Individuals who died from CHD / Individuals who died from external causes (Basal) / Individuals who died from related diseases such as systemic hypertension, stroke, chronic renal disease, diabetes, or dissecting aneurysm, or who had CHD although it was not the cause of death (Related)	N/A	N/A	PDAY risk score / Extent of raised lesions in coronary arteries	In CPS cases 15-34 y of age, the PDAY risk score was significantly associated with extent of raised lesions in the LAD (p=S) and LCF(p=S*), less in the RCA(p=.0762) In CPS subjects 35-54 yr of age, the PDAY risk score computed from only the modifiable risk factors was significantly associated with extent of raised lesions in the LCF (p=S) but not significantly in the RCA and LAD. In both PDAY and CPS cases combined, RCA surface area with raised lesions varied with age with a significant risk score-age interaction (p=S**).	Q2: The PDAY risk score was associated with extent of raised lesions in the coronary arteries of cases 15-34 yr of age Q3: The PDAY risk score computed from only the modifiable risk factors was associated with extent of raised lesions in the coronary arteries of subjects 35-54 yr of age. This association in middle-aged subjects validates the PDAY risk score. The associations in both younger (15-34 yr) and older (35-54 yr) subjects suggest a seamless progression of the effects of the modifiable risk factors on atherosclerosis from 15 to 54 yr of age
16595758	Ogden CL	Prevalence of overweight and obesity in the United States, 1999-2004	2006	CrS	Retrospective	NHANES	None	Q5 (RF2, RF3, RF8) Q6 (RF2, RF8)	U.S.A	Clinical	Provide current estimates of the prevalence and trends of overweight in children and adolescents and obesity in adults.	3,958	Pediatric/ Young adults	2-19 yr	Patient characteristics from NHANES 2003-2004	At risk of overweight or overweight / Overweight / Non-Hispanic white / Non-Hispanic black / Mexican-American	NR	NR	BMI	In 2003-2004, 17.1% of US children and adolescents were overweight based on BMI ≥ 95th %ile for age/sex. Tests for trend were significant for male and female children and adolescents, indicating an increase in the prevalence of overweight in female children and adolescents from 13.8% in 1999-2000 to 16.0% in 2003-2004(p=S) and an increase in the prevalence of overweight in male children and adolescents from 14.0% to 18.2%(p=S). Adolescents were significantly more likely to be overweight than children. In males: The prevalence of overweight was significantly greater in Mexican-American children & adolescents than in their white counterparts. The prevalence of overweight did not differ between non-Hispanic white and black male children and adolescents. In females: Mexican-American and non-Hispanic black children & adolescents were significantly more likely to be overweight compared with non-Hispanic white female children & adolescents. In 2003-2004 alone, among children & adolescents 2-19 yrs of age, no significant difference in prevalence of overweight was found between the sexes.	Q5: There were significant differences in obesity prevalence by race/ethnicity and by age. Q6: In 2003-2004, 17.1% of US children and adolescents were overweight. The prevalence of overweight increased from 13.8% to 16.0% in females and from 14% to 18.2% in males from 1999-2000 to 2003-2004.
16939740	Gunczler P	Coronary artery calcification, serum lipids, lipoproteins, and peripheral inflammatory markers in adolescents and young adults with type 1 diabetes	2006	Case control	Prospective	Other	Coronary Ca	Q1(RF4,5,6,7,8) Q2(RF4,5,6,7,8) Q9(RF4,5,6,7,8)	USA	Community (other)	To compare CAC, serum lipids and CRP + MMP-9 in young diabetics with same factors in age-matched controls.	32	Pediatric/ young adult	Consecutive recruits from diabetes & peidatric endocrine clinics	This study compared CAC in 32 Hispanic subjects with type 1 DM, mean age of 16.1+/-4.4 yrs vs. 15 healthy controls, mean age = 15.2+/-2.2 yrs.	T1DM: n = 32 / Control:n =15	N/A	N/A	Age / Sex / BP / BMI / TC / HDL / TGs / LDL / Apolipoprotein A / Apolipoprotein B / CRP / MMP-9 / HbA1C	No CAC in T1DM subjects or controls at this age.. Mean RF levels did not differ between groups but 34.4% & 25% of T1DM subjects had elevated total & LDL-C vs 20% & 13.3% of CON; 15.6% of T1DM had elevated TGs vs 6.7% of CON; 28.1% of T1DM subjects had elevated apo B vs 13.3% of CON. 28.1% of T1DM had elevated CRP vs 6.7% of CON subjects. In diabetic group, TC, LDL, HDL, TGs, apoB and CRP correlated significantly with duration of disease (p=S** for TC, LDL, apoA, apoB, HDL; p=S* for CRP) and with HbA1C (p=S** for TC, S for LDL & TGs, S* for HDL & apoB, S** for apoA).	Q1, Q2, Q9 - No CAC was detected in adolescents with type 1DM. Association between disease duration and HbA1C with lipid and other RFs suggests that glycemic control may be an important modifier of C-V risk in this population.
17015535	McMahan CA	Pathobiological determinants of atherosclerosis in youth risk scores are associated with early and advanced atherosclerosis	2006	CrS	Retrospective	PDAY	Atherosclerosis	Q1(RF2,3,4,5,6,8,10,14) Q2(RF2,3,4,5,6,8,10,14) Q4(RF2,3,4,5,6,8,10,14) Q9(RF2,3,4,5,6,8,10,14)	USA	Clinical	Evaluate use of a risk score derived from CHD RF measurements in young people to predict the presence of advanced atherosclerotic lesions in the coronary arteries or abdominal aorta	1,127	Pediatric/ young adult	Autopsy specifimens from 1,127 deaths in 15-34 y olds who died of external causes.	3,201 15-34 y olds who died accidentally in 15 different cities in the U.S.; information on age/ gender/lipids/smoking/HTN/ obesity/ hyperglycemia was available. Autopsy findings in the RCA, LADCA and abdominal aorta were graded using the AHA system plus an estimation of the extent of fatty streaks and raised lesions in the RCA and abdominal aorta was made independently by 3 pathologists. 25% F; 54% B.	N/A	N/A	N/A	Extent of intimal surface of RCA & abd Ao with fatty streaks and raised lesions was evaluated and AHA grading (grades 1-6) of stained sections of CAs and abd Ao was performed. AHA grading of LCA (grades 1-6) and independent blinded grading of RCA & abd Ao. C-V RFs: Gender Age Non-HDL-C = TC - HDL (LDL cutpoints + 30mgm/dL = non-HDL cutpoints) Thiocyanate level ≥ 90mmol/L Intimal thickness of small renal arteries =Mean BP estimate >110 mmHg BMI > 30 kg/ m squared HbA1C > 8%	Only ~ 20% of PDAY subjects had a risk score of 0 - 1, compatible with low prevalence of atherosclerosis. The extent of atherosclerotic lesions increased with age and with risk score. The prevalence of high-risk scores was unusual in Fs and and the severity of atherosclerosis was lower for the same RF score. PDAY risk scores correlated with the entire range of atherosclerotic lesions predicting the prevalence of the earliest microscopically demonstrable lesions of atherosclerosis in the LADCA & with the extent of fatty streaks in the RCA and abdominal aorta. Risk scores were also correlated with prevalence of higher grade lesions in the LADCA & with extent of lesions of higher severity in the RCA & abd. aorta.	Q1. Atherosclerosis begins in childhood. Q2. The presence of RFs correlates with the extent of atherosclerotic lesions at autopsy. Q9. An increase in the number of RFs is associated with increased prevalence and severity of atherosclerotic lesions at autopsy.

NHLBI Evidence Table: MultiRF-OB

PMID	First Author	Title	Year	Study Type	Prospect./ Restrospect.	Study	CVD	RF by CQ	Country	Setting	Main Study Objective	N at Baseline (N at Follow-up)	Target Population	Eligibility Criteria	Patient Characteristics	Study Groups	n at Baseline (n at Follow-up) for Study Groups	Total Follow-up Duration	Outcomes Measured	Results	Main Reported Findings by Critical Question
17188605	Freedman DS	Cardiovascular risk factors and excess adiposity among overweight children and adolescents: the Bogalusa Heart Study	2007	Cohort	Prospective	Bogalusa	None	Q6 (RF4, RF5, RF8, RF14) Q8 (RF8)	USA	Community (other)	Explore the accuracy of various BMI cutpoints in identifying children who have excess adiposity (based on skinfold thicknesses), adverse levels of lipids, insulin, and blood pressures, and a high risk for severe adult obesity	10,999 (NR)	Pediatric/ Young Adult	Community-based cohort of B & W children and young adults - original group examined at 5-17 yr; 52% F, 35% B. in 1982; serial cross-sectional studies performed from 1970 to present. For this study, participants were 5-17 yr, fasting and had recorded values for weight, height, and levels of six cardiovascular disease risk factors: TG, LDL-C, HDL-C fastinginsulin, SBP and DBP Exclusions: Pregnant girls	Mean age: 11.4 yr	Childhood BMI percentile 1-49 Childhood BMI percentile 50-84 Childhood BMI percentile 85-89 Childhood BMI percentile 90-94 Childhood BMI percentile 95-98 Childhood BMI percentile ≥ 99	1,161 832 130 121 122 26	NR	Sum of skinfolds BMI Lipid levels Insulin levels Blood pressures * Adverse RF levels were based on the distribution of RFs in Bogalusa and were defined as: SSF> 90th%ile TG, INS, LDL ≥ 90th%ile; HDL < 10th %ile; SBP &/or DBP ≥ 90th %ile	12% of children had a BMI > 95th%ile and 2% equalled or exceeded the 99th%ile. Of children with a BMI ≥ 95th percentile, 39% had at least 2 risk factors, and 65% had an adult BMI of ≥ 35 kg/m2. Of those with a BMI ≥ 99th percentile, 59% had at least 2 risk factors, 94% had excess adiposity, and 88% had an adult BMI of ≥ 35 kg/m2. Childhood BMI / # of CV RFs: ≥1 ≥2 ≥3 ≥4; 85th-94th%ile 51% 19% 5% 1%; > 95th%ile 70% 39% 18% 5%; > 99th %ile 84% 59% 33% 11%. Only 5% of children with a BMI < 50th%ile were obese as adults; 84% of children with a BMI between the 95th & 98th %iles and all of those with a BMI>99th%ile were obese as adults (mean age=27 yrs).	Q6,7,8. Of children with a BMI ≥ 95th percentile, 39% had at least 2 risk factors and 65% had excess adiposity. Only 5% of children with a BMI < 50th%ile were obese as adults; 84% of children with a BMI between the 95th & 98th %iles and all of those with a BMI>99th%ile were obese as adults (mean age=27 yrs). Q6,7,8. Of those with a BMI ≥ 99th percentile, 59% had at least 2 risk factors, 94% had excess adiposity, and 88% had an adult BMI of ≥ 35 kg/m2. The 99th percentile of BMI-for-age may be appropriate for identifying children who are at very high risk for metabolic abnormalities and severe adult obesity
17237318	Ritchie LD	Dietary Patterns in Adolescence Are Related to Adiposity in Young Adulthood in Black and White Females	2007	Cohort	Prospective	NGHS	None	Q12a (RF8)	USA	Community (schools)	Identify dietary patterns using cluster analysis and to determine the relation of dietary patterns with nutrient intakes and measures of adiposity using data from the NHLBI Growth and Health Study	2379 (2371)	Pediatric/ Young adults	Participants in the NHLBI Growth and Health Study. Female Self reported as black or white 9-10 years of age Living with parents/guardians with racial concordance. Must have dietary information collected during the three stages of adolescence (9-11 years, 12-14 years, 15-19 years)	100% female. 1213 black 1166 white.	Black girls. White girls.	Black 1213(1211) White 1166(1160)	10 yr	Dietary pattern: In blacks: Customary: General intake of many food groupings including low intake of diet drinks, coffee/tea, yogurt, cheese, plain grains, crackers, fish/poultry, red meat, soups & most vegetables. Snack-type: High intake of diet drinks, coffee/tea, yogurt, crackers, pretzels, soups, green salad; low intakes of flavored milks, other grain groupings & processed meats/sandwiches. Meal-type: Relatively high intake of plain breads & grains, other breakfast grains,most types of sandwiches & protein sources including legumes. High intake of other vegetable & potatoes (fried & not fried). Sweets & cheese: Relatively large amounts of sweets, flavored milk & cheese & relatively small amounts of eggs, fried fish/poultry,fried potatoes. In whites: Healthy: high intake of fruits & vegetables(F&V), dairy, grains without added fats; low intake of sweets including sweetened drinks(SSB), fried foods, burgers & pizza.	Black dietary pattern (n): 53% Customary, 23% Snack-type, 22% Meal type, <2% Sweets and cheese; White dietary pattern (n): 45% Convenience, 33% Sweets and snacks, 10% Fast food, 12% Healthy. Black BMI (kg/m2): 27.2 +/- 0.2 (customary), 26.8 +/- 0.3 (snack-type), 26.8 +/-0.31 (meal-type), 28.3 +/-1.03 (sweets and cheese). White BMI (kg/m2): 24.1 +/- 0.18 (convenience), 24.0+/- 0.2 (sweets and snack-type) 24.2 +/- 0.32 (fast-food), 23.5 +/- 0.41 (healthy); Black percent body fat: 33.8 +/- 0.4 (customary), 32.7 +/- 0.6 (snack-type), 33.1 +/- 0.62 (meal-type), 36.3 +/- 2.07 (sweets and cheese). White percent body fat: 28.2 +/- 0.37 (convenience), 28.8 +/- 0.41 (sweets and snacks) 29.7 +/- 0.67 (fast-food), 27.7 +/- 0.86 (healthy); Black waist circumference (cm): 79.7 +/- 0.37 (customary), 78.9 +/- 0.56 (snack-type), 78.5 +/-0.57 (meal-type), 78.7 +/-1.92 (sweets and cheese). White waist circumference (cm): 74.5 +/- 0.37 (convenience), 75.1 +/- 0.4 (sweets and snacks) 74.7 +/- 0.66 (fast-food), 73.2 +/- 0.85 (healthy)	Q14b: A Healthy diet pattern, followed by 12% of white girls and no black girls was related to more favorable nutrient intakes and a smaller increase in waist circumference over 10 yr F/U. This diet was characterized by a high intake of fruits, vegetables, dairy, grains without added fats, mixed dishes and soups, and a low intake of sweetened drinks, other sweets, fried foods, burgers, and pizza. A cumulative pattern of food intake consistent with recommendations for general health appears to help prevent overweight, but this pattern was followed by only a minority of adolescent girls.
17237318	Ritchie LD	Dietary Patterns in Adolescence Are Related to Adiposity in Young Adulthood in Black and White Females	2007																Convenience: Relatively high intakes of pizza, fried fish/poultry&ramen and relatively low intakes of juice, plain milk, grains,eggs, not fish/ poultry, cheese/spread sandwiches, F&V. Sweets & snacks: Relatively high intakes of SSBs & diet drinks, juice, cheese, desserts,candy, crackers, nuts/popcorn,peanut butter(PB) & cheese spread sandwiches;relatively low intakes of flavored milk,processed meats/sandwiches & mixed dishes. Fast food: relatively high in flavored milk, burgers,fried potatoes,eggs, red meat, processed meats/ sandwiches, chips,legumes & baked desserts. Relatively low in diet drinks,yogurt, cheese, candy,crackers,pretzels, PB sandwiches. BMI Waist circumference % body fat	Overall, among black girls, mean BMI, % body fat & WC did not differ by dietary pattern. Among white girls, healthy pattern eaters had significantly lower WC(p=S) and lower values for body fat(p=0.063)	
17329668	Parker ED	Physical activity in young adults and incident hypertension over 15 years of follow-up: the CARDIA study	2007	Cohort	Prospective	CARDIA	None	Q6 (RF4, RF11)	USA	Don't know/NR	Examine the relation between physical activity and incident hypertension in young adults over 15 yr of follow-up	NR (3,993)	Pediatric/ Young Adult	Population-based , prospective observational study with participants recruited from 4 metropolitan areas (Birmingham, Ala; Chicago, Ill, Minneapolis, Minn; & Oakland, Calif) in 1985 1986 at 18-30 yrs of age (44.9% black, 53.9% women) & followed up 2,5,7,10 & 15 yrs later. Exclusions: Hypertension at baseline Missing BP data at more than 2 follow-up exames Missing data for any other co-variates Self-reported pregnancy	Black: 50% Mean years of education: 14.6 yr Prevalence of smoking: 28.8%	Black men Black women White men White women	815 1,101 967 1,110	15 yr	Cases of incident hypertension (BP> 140/90) Physical activity level by questionnaire	Baseline physical activity was greatest in BMs, then WMs, then WFs with much less in BFs. Over time, physical activity levels decreased in all groups except BFs where there was no change. There were 634 cases of incident HTN, most in BMs and BFs, least in WFs. With multivariable proportional hazards regression, those who were more versus less physically active experienced a reduced risk (hazard rate ratio = 0.83; 95% CI = 0.73, 0.93) for incident hypertension, after adjustment for race, sex, age, education, and family history of high blood pressure.	Q13: Consistent high levels of physical activity are associated with reduced risk of incident hypertension in young adults.
17512357	Loria CM	Early adult risk factor levels and subsequent coronary artery calcification: the CARDIA Study	2007	Cohort	Prospective	CARDIA	Coronary Ca	Q3 (RF2, RF4, RF5, RF10)	USA	Community (other)	Determine whether early adult levels of cardiovascular risk factors predict subsequent coronary artery calcium better than concurrent or average 15-yr levels and independent of a 15-yr change in levels	NR (3,043)	Pediatric/ Young Adult	Participants with a CT scan who completed the year 15 examination 18-30 yr African American or white Exclusions: Participants missing data on CAC or risk factors at year 0 or year 15 Participants who were pregnant or if weight was above CT scanner limits	Population-based , prospective observational study with participants recruited from 4 metropolitan areas (Birmingham, Ala; Chicago, Ill, Minneapolis, Minn; & Oakland, Calif) in 1985 1986 at 18-30 yrs of age (44.9% black, 53.9% women) & followed up ≥ 15 yrs later in 2000-2001 @ 33-45 yrs of age. For this study: 33-39 yr: 1,464 40-45 yr: 1,579 Men: 1,383 African-American women: 800 African-American men: 576 White women: 860 White men: 807	Detectable levels of CAC Non-detectable levels of CAC	N/A	N/A	Race/ gender Age Cigarette smoking status BMI TC TG HDL-C LDL-C SBP DBP Fasting glucose (FG) Coronary Ca (CAC)(Agatson score)	9.6% of adults had any CAC, with a greater prevalence among men than women (15.0% vs. 5.1%), white than African American men (17.6% vs. 11.3%), and ages 40 to 45 years than 33 to 39 years (13.3% vs. 5.5%). Baseline levels predicted CAC presence (C = 0.79) equally as well as average 15-year levels (C = 0.79; p = 0.8262) and better than concurrent levels (C = 0.77; p = 0.019), despite a 15-year change in risk factor levels. Highest ORs for baseline RFs predicting CAC at year 15 were for LDL-C(1.42-1.43) and cigarettes/day(1.41) but were also significant for BMI, SBP and FG. Multivariate-adjusted OR of having CAC by ages 33-45 years were 1.5 (95% CI 1.3 to 1.7) per 10 cigarettes, 1.5 (95% CI 1.3 to 1.8) per 30 mg/dl LDL-C, 1.3 (95% CI 1.1 to 1.5) per 10 mmHg SBP, and 1.2 (95% CI 1.1 to 1.4) per 15 mg/dl glucose at baseline	Q2.3: RF in early adult life predicted CAC presence as well as did average 15-year levels and better than concurrent levels , despite a 15-year change in risk factor levels. Highest ORs for baseline RFs predicting CAC at year 15 were for LDL-C(1.42-1.43) and cigarettes/day (1.41) but were also significant for BMI, SBP and FG.

PMID	First Author	Title	Year	Study Type	Prospect./Restrospect.	Study	CVD	RF by CQ	Country	Setting	Main Study Objective	N at Baseline (N at Follow-up)	Target Population	Eligibility Criteria	Patient Characteristics	Study Groups	n at Baseline (n at Follow-up) for Study Groups	Total Follow-up Duration	Outcomes Measured	Results	Main Reported Findings by Critical Question
17671060	Morrison JA	Metabolic Syndrome in Childhood Predicts Adult Cardiovascular Disease 25 Years Later: The Princeton Lipid Research Clinics Follow-up Study	2007	Cohort	Prospective	Princeton	CVD unspecified	Q8 (RF14) Q3 (RF 14) Q8 (RF14)	USA	Community (other)	Assess the association of metabolic syndrome in childhood with adult CVD 25 years later	771 (771)	Pediatric/ Young adults	Participants in the National Heart, Lung, and Blood Institute LRC Prevalence Study: Students in the Princeton School District of Greater Cincinnati in grades 1 through 12		NA	NA	25 yr	BMI, Waist Circumference(WC). Fasting Glucose (FG) HDL-C TG SBP & DBP Metabolic Syndrome(MS) = > 3 of: In adults: HDL< 50mg/dl in Fs, 40 mg/dl in Ms; TG >150mg/dl; SBP>130 +DBP> 85; FG >110mg/dl.; BMI>25. In children: TG >110mg/dl; BMI > 90th%ile for age/sex; SBP/DBP>age sex-specific 90th%ile; HDL<50mg/dl in Fs, 40 mg/dl in Ms; FG >110mg/dl CVD: MI, CABG,angioplasty, stroke.	All MS components increased: High BMI:13.7% (LRC) to 25.4% (PFS); Large WC: NA (LRC) to 49.1% (PFS); High FG: 0.7% (LRC) to 6% (PFS); Low HDL: 13.0% (LRC) to 52.9% (PFS); High TG: 12.3% (LRC) to 28.3% (PFS); High BP: 11.9% (LRC) to 33.8% (PFS); CVD occurred in 2.2% of the adult subjects. MS: 4%(LRC) to 27.2% (PFS) MS was strongly asst'd with increased BMI - 95% of adults with MS were overweight or obese. 68% of pediatric MS had MS at follow-up;32% did not. In MVA with age, gender, and race, only ped MS predicted adult MS(OR=6.1,p=S**). When change in BMI was added, it was significant (OR=1.024,p=S**). For each 10%ile change in BMI, the MS prevalence increased 24%. 0% (LRC) to 2.2% (PFS). Among the ped MS subjects, the incidence of CVD was 19.4% vs 1.5% for those without ped MS. In MVA, ped MS (OR=14.7;p=S**) and age (OR=1.2;p=S) were significant predictors of adult CVD. Gender, race & fam hx of CVD were not.	Q8: Children with the cluster of risk factors defined as pediatric metabolic syndrome were significantly more likely to have CVD 25 years later as adults, compared with their peers. Metabolic syndrome was strongly associated with obesity. 68% of pediatric MS had MS at follow-up; 32% did not.
17884375	McMahan CA	Association of Pathobiologic Determinants of Atherosclerosis in Youth Risk Score and 15-Year Change in Risk Score With Carotid Artery Intima–Media Thickness in Young Adults (from the Cardiovascular Risk in Young Finns Study)	2007	CrS	Retrospective	PDAY/ Young Finns	IMT	Q3 (RF2,3,4,5,6, 8,10)	Finland	Clinical	Calculate the PDAY risk score for the participants in the Cardiovascular Risk in Young Finns study population based on CV RF assessment in childhood adult life and correlate results with CIMT measured in adult life.	1279	Pediatric/ Young adults	Participants in the Young Finns Study who were over 12 years old in 1986 for whom risk factors were measured in 1986 and 2001 and IMT was measured in 2001. Exclusions: Subjects who were pregnant at either measurement.	NR	NA	NA	15 yr	Age Sex Smoking status Hyperglycemia/Diabetes mellitus (DM) BP BMI Non-HDL & HDL cholesterol CIMT by ultrasound imaging PDAY risk score from adolescence & adult CV RFs: Low risk = -1 or 0 Intermediate risk = > 1- 4 High risk = > 5 Risk score change: Improved ≤ -2 No change = -1 to 1 Worsened ≥2	CIMT and plaque presence increased with increasing age(p=S**) & were higher in Ms (p=S**). Child/adolescent RF score significantly predicted young adult CIMT with OR for a 1 point increase in score (= 1y of aging) of 1.106 (CI:1.056,1.158). The child/adolescent score predicted CIMT better but not significantly better than the young adult score (OR 1.007;CI: 1.004,1.010). The change in RF score - increase or decrease - significantly predicted CIMT.	Q3. CV RFs measured in adolescence predicted the presence of increased CIMT 15 years later using the PDAY RF score. The PDAY coronary artery risk score based on CV RFs determined at autopsy predicted CIMT in living young adults.
18206689	Morrison JA	Metabolic Syndrome in Childhood Predicts Adult Metabolic Syndrome and Type 2 Diabetes Mellitus 25 to 30 Years Later	2008	Cohort	Prospective	Princeton	None	Q8 (RF14) Q6 (RF 4,5,8,14)	USA	Mult settings	Assess the association of metabolic syndrome in childhood with adult metabolic syndrome and type 2 diabetes mellitus (T2DM) 25 to 30 years later	NR (814)	Pediatric/ Young adults	Participants in the National Heart, Lung, and Blood Institute LRC Prevalence Study: Students in the Princeton School District of Greater Cincinnati in grades 1 through 12	At the LRC the participants ranged in age from 5-19 yr; at follow-up, subjects ranged from 30 - 59 yr. Male: 45% White: 72% Black: 28%	NA	NA	25-30 yr	BMI Waist circumference (WC) Blood Pressure (BP) Lipid profile: TC,TG,HDL,LDL Fasting Glucose T2DM = FG > 126 mg/dl. Metabolic Syndrome(MS) = > 3 of: In adults: HDL< 50mg/dl in Fs, 40 mg/dl in Ms; TG >150mg/dl; SBP>130 +DBP> 85; FG >110mg/dl.; BMI>25. In children: TG >110mg/dl; BMI > 90th%ile for age/sex; SBP/DBP>age sex-specific 90th%ile; HDL<50mg/dl in Fs, 40 mg/dl in Ms; FG >110mg/dl	3.9% of baseline LRC participants met the definition for pediatric MS; of these 75% had BMI > 90th%ile. At follow-up, 25.4% of the cohort had BMI> 90th%ile for age; 28.1% had high TG; 52.5% had low HDL; 33.4% had abnormal BP;6% had abnormal FG. Prevalence of high WC was 48.9%. At follow-up, prevalence of MS was 26.6%. Adult MS was strongly assoc'd with BMI at F/U: 95% of those with MS had BMI > 25 kg/m squared. In multivariate analysis, adult MS correlated with pediatric MS (OR=9.4,CI:1.6,3.5); parental history of DM (OR=2.4, CI:1.6,3.5); age at F/U: (OR=1.06,CI:1.01,1.11);and change in weight (OR=1.025,CI:1.018,1.033). Among adults with T2DM, 15.6% had pediatric MS vs 5% in those without MS in childhood (p=S**). In multivariate analysis,adult T2DM correlated with pediatric MS (OR= 11.5, p=S*); parental hx of DM(OR=1.12,p=S*);and black race (OR=2.2,p=S).	Q6. RFs cluster together in children as they do in adults. Children with the MS cluster are much more likely to have T2DM 25 - 30 years later as adults. Pediatric MS and a (+) parental hx of T2DM were major independent predictors of adult T2DM. Q5. There are racial differences in T2DM prevalence: Black Ms and Fs had 2X the risk of developing T2DM as did whites and for each 1 y increase in age, risk of DM increased 12.2%. Prevalence of MS increased from 4% in childhood to 27.2% at a mean age of 38 yrs asst'd primarily with changes in weight. For each 10%ile change in BMI, the MS prevalence increased 25%. (+) parental hx of T2DM correlated with high BMI as children and as adults.
18505949	Ogden CL	High Body Mass Index for Age Among US Children and Adolescents, 2003-2006	2008	CrS	Retrospective	NHANES	None	Q5 (RF8) Q6 (RF8)	US	Clinical	Estimate the prevalence of high BMI for age among children and adolescents.	8,165	Pediatric/ Young adults	2-19 yr participants in the NHANES surveys, 1988-1994 and 1999-2004.	Nationally representative sample of US children and aolescents Group 1: 2-5 yr: 22% 6-11 yr: 34% 12-19yr: 43% Male: 51% Non-Hispanic white(W): 73% Non-Hispanic black(B): 17% Mexican American(M-A): 10% Group 2: 2-5 yr: 21% 6-11 yr: 34% 12-19yr: 46% Male: 51% Non-Hispanic white(W): 70% Non-Hispanic black(B): 17% Mexican American(M-A): 14%	Group 1: NHANES respondents 2003-2004 Group 2: NHANES respondents 2005-2006	Group 1: 4,207 Group 2: 3,958	N/A	Prevalence of BMI at or above the 85th, 95th and 97th %iles for age/sex and racial/ethnic group.	In 2003 - 06, 11.3% (CI:9.7%-12.9%) of children and adolescents aged 2 - 19 y were ≥ the 97th%ile of the 2000 BMI age-for-growth charts; 16.3% (CI:14.5% - 18.1%) were ≥ above the 95th%ile; and 31.9% (CI:29.4% - 34.4%) were ≥ the 85th%ile. There were no significant time trends over the 4 time periods (1999 2000,2001-2002,2003-2004,2004-2005) for Ms or Fs or by race/ethnicity. BMI > 97th%ile was more prevalent in 12-19 y olds than in 2-5 y olds (OR=0.59 for Ms, 0.65 for Fs). Non-Hispanic B(28%;CI:23.8-31.6%) and Mexican American (20%;CI:17.0 - 22.8%) girls were significantly more likely to have a BMI for age > 95th%ile than non-Hispanic W girls (14.5%;CI:10.4-18.6%). Among Ms, Mexican American boys were significantly more likely to have a high BMI for age than were non-Hispanic W boys; among non-Hispanic B boys, this was only true for BMI > 97th%ile.	Obesity prevalence in children and aolescents is high but stable over the time period from 1999 to 2005. Q5. There are significant difference by race and gender with higher prevalence of obesity in Fs, especially in non-Hispanic B and mexican American girls. Obesity prevalence has increased with age in Ms and Fs.

PMID	First Author	Title	Year	Study Type	Prospect./ Restrospect.	Study	CVD	RF by CQ	Country	Setting	Main Study Objective	N at Baseline (N at Follow-up)	Target Population	Eligibility Criteria	Patient Characteristics	Study Groups	n at Baseline (n at Follow-up) for Study Groups	Total Follow-up Duration	Outcomes Measured	Results	Main Reported Findings by Critical Question
18534237	Messiah SE	Relationship between body mass index and metabolic syndrome risk factors among US 8- to 14-year-olds, 1999 to 2002	2008	CrS	Retrospective	NHANES	None	Q5 (RF8) Q6 (RF2, RF3, RF4, RF6, RF8)	US	Clinical	Determine the prevalence of metabolic syndrome risk factors (MSRF) and examine the relationship between body mass index and the prevalence of 3 or more MSRF in children and adolescents.	1,698	Pediatric/ Young adults	Combined results from the nationally represented sample in the 1999-2002 NHANES survey for 8 - 11 yr olds and 12 - 14 yr olds. Exclusions: Race = "other" Diabetes mellitus Use of medications that alter blood pressure, lipid metabolism, or blood glucose	8-11 yr: 62.8% 12-14 yr: 37.2% Male: 49.8% Non-Hispanic white: 27.6% Non-Hispanic black: 34.4% Mexican American: 38%	Group 1: Younger (8-11 yr) Group 2: Older (12-14 yr)	Group 1: 1067 (N/A) Group 2: 631 (N/A)	N/A	Weight BMI Waist circumference SBP DBP HDL-C Fasting glucose (FG) TG Met S (MS) defined as ≥ 3 of the following: WC ≥ 90th%ile for age/sex (≥ 75th%ile for age/sex/ethnicity); FG ≥ 100 mg/dl; SBP +/- DBP ≥ 90th %ile for age/sex/ht.; TG ≥ 110 mg/dl(≥ 90th%ile for age & ethnicity); HDL ≤ 40 mg/dl (≤ 10th %ile for age/ethnicity).	Based on BMI, 17.5% of Ms and 17% of Fs were ≥ 95th%ile for age/sex. Overall, 25% of non-Hispanic Bs, 22% of M-As and almost 15% of non-Hispanic Ws were overweight/ obese. For the older age group, 22% of non-Hispanic B, 27% of M-As and almost 15% of non-Hispanic Ws were overweight/ obese. As BMI increased, the % of those with abnormal CV RFs increased. For 8 - 11 yr olds, 35% of those who were overweight had ≥ 2 MS RFs present vs 2% of those with normal weight. For 12 - 14 yr olds, 29% of those who were overweight had ≥ 2 MS RFs present vs 8% of those with normal weight. ≥ 3 adjusted MS RFs were seen in 26.28%(CI:16.71 - 38.78) of 12 - 14 yr olds and 9.51% (CI:5.59 - 15.71) of 8 - 11 yr olds.	Q6. Among overweight/ obese children and young adolescents, the prevalence of a MS profile (≥ 3 MS RFs) is high, and greater with older age. The MS cluster occurred in almost 10% of 8 - 11 yr olds and 26% of 12-14 yr olds in the 1999-2002 NHANES survey.