Conventional cardiovascular risk factors and metabolic syndrome in predicting carotid intima-media thickness progression in young adults

The Cardiovascular Risk in Young Finns Study

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SUPPLEMENTAL METHODS

MetS definitions

Three different classifications of MetS were used in this study: MetS/EGIR was defined as the presence of hyperinsulinemia (defined as non-diabetic subjects having fasting insulin level in the highest quartile, the cutoff point in our study was 9 mU/l), and at least two of the following abnormalities: fasting blood glucose ≥6.1 mmol/l, blood pressure ≥140/≥90 mmHg or current use of antihypertensive medication, serum triglycerides ≥2.0 mmol/l or HDL-cholesterol level ≤1.0 mmol/l, and waist circumference at least 94 cm in men and 80 cm in women.¹ MetS/revNCEP is a modification of the original National Cholesterol Education Program definition by a joint expert group of the National Heart, Lung and Blood Institute and the American Heart Association. MetS/revNCEP was identified when three or more of the following five criteria were present: waist circumference ≥102 cm in men or ≥88 cm in women, triglycerides ≥1,695 mmol/l, HDL-cholesterol <1.036 mmol/l in men or <1.295 mmol/l in women, blood pressure ≥130/≥85 mmHg or on antihypertensive medication, fasting glucose ≥5.6 mmol/l.² MetS/IDF was diagnosed as: waist circumference ≥94 cm for men and ≥80 cm for women plus any two of the following four factors: raised triglycerides: ≥1.695 mmol/l, or specific treatment for this lipid abnormality, reduced HDL-cholesterol: ≤1.036 mmol/l in males and ≤1.295 mmol/l in females, or specific treatment for this lipid abnormality, raised blood pressure: blood pressure ≥130/85 mm Hg, or treatment of previously
diagnosed hypertension, raised fasting plasma glucose $\geq 5.6$ mmol/L, or previously diagnosed type 2 diabetes$^3$. 
SUPPLEMENTAL RESULTS

MetS definitions and 6-year progression of IMT

The rate of IMT progression was increased in subjects with MetS compared to subjects without MetS (Figure IA). Figure IB shows the mean values for the 6-year IMT progression after adjusting for age, sex, and baseline IMT. The differences in IMT progression remained significant for all three MetS groups (Figure IC) when further adjusting for risk factors not included in the MetS definition (smoking, CRP, LDL-cholesterol and family history of coronary disease).

Changes in MetS prevalence, waist circumference, and insulin levels by age.

Figure II shows the prevalence of MetS stratified according to the age groups of 24 to 45-year-olds in study years 2001 and 2007 according to the MetS/EGIR classification. In men, the prevalence of MetS increased linearly by age both in 2001 (P<0.0001) and 2007 (P=0.01). Whereas in women, no such age trend was observed (in 2001, P=0.88; in 2007 P=0.66).

Figure III shows trends of waist circumference and insulin levels among study subjects during 2001 and 2007. Waist circumference increased significantly by age in both study years and in both sexes (P always <0.0001). The age trend in serum insulin level was non-significant in analysis when sexes were pooled.

Associations between baseline and the 6-year change in study variables

As shown in Figure IV, there was an inverse association between baseline IMT (in 2001) and 6-year change in IMT (2001-2007). For continuous IMT variables, the correlation coefficient between baseline IMT and ΔIMT was r=-0.39 (P<0.0001). Similarly, we observed a significant inverse associations between baseline and 6-year Δ-values for CRP (r=-0.71, P<0.0001), LDL-cholesterol (r=-0.48, P<0.0001), HDL-cholesterol (r=-0.32, P<0.0001), systolic blood pressure (r=-0.29,
P<0.0001), glucose (r=-0.31, P<0.0001), BMI (r=-0.10, P<0.0001), and height (r=-0.08, P=0.0005).

These associations are consistent with the regression to the mean phenomenon\(^4\).
SUPPLEMENTAL FIGURE LEGENDS

Figure I
A) Mean±SEM values of IMT progression in subjects with and without MetS.
B) Comparison of IMT progression in subjects with and without MetS after adjusting for age, sex, and baseline IMT.
C) IMT progression values between subjects with and without MetS after further adjustment for smoking, LDL-cholesterol, CRP and family history of coronary disease.

Figure II
Details (percentages) about MetS/EGIR prevalence in men and women in 2001-2007

Figure III
Waist circumference and insulin levels (Mean±SEM) in 2001 and 2007 according to age.

Figure IV
The mean values of IMT progression according to baseline IMT quintiles.
SUPPLEMENTAL FIGURES

Figure I

A

B
C

![Bar chart showing change in IMT (μm) for MetS/EGIR, MetS/revNCEP, and MetS/IDF with no or yes status. The y-axis represents change in IMT (μm) ranging from 0 to 100, and the x-axis represents different categories of MetS. The chart includes error bars indicating the variability in the data. The p-values for different categories are P<0.0001, P=0.0005, and P<0.0001 respectively.](image-url)
Figure II

A

B
Figure III

A

Waist circumference (cm) vs Age (years)

P-value 0.0002

B

Insulin (U/l) vs Age (years)

P-value 0.77
Figure IV

P<0.0001 for trend
SUPPLEMENTAL REFERENCES


