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Subclinical atherosclerosis: independent predictor of cardiovascular events in patients with type 2 diabetes mellitus

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Purpose: Osteogenic differentiation in vascular smooth muscle cells by oxidative stress and inflammation is an important role on development of Coronary Artery Calcification. Homocysteine is known to be an independent risk factor for atherosclerosis via endothelial dysfunction and smooth muscle cell proliferation.

Methods: Coronary Artery Calcium Score (CACS) and plasma homocysteine levels were investigated in a total of 21,235 men (42±6.5 years) who participated in the Health Study between 2010 and 2011. Individuals were divided into 4 groups according to homocysteine quartiles, and classified into two groups according to the presence/absence of Coronary Artery Calcium (CAC). CAC (+) group with CACS>0 and CAC (-) group with CACS=0. Results: The prevalence of presence of CAC among total individuals was 13.5%. Among those with diabetes (n=1,345), hypertension (n=3,196), or metabolic syndrome (n=4,581), the prevalence of the presence of CAC was 31.3%, 23.2%, and 19.7%, respectively. According to homocysteine quartiles, the prevalence of CAC (+) group was 12.1%, 12.6%, 13.9%, and 15.3% in the lowest, 2nd, 3rd, and highest homocysteine quartiles, respectively. The CAC (+) group had unfavorable cardiovascular and lipid profiles. In a multivariate regression analysis after adjusting for variables with a univariate relationship (p<0.02), the highest quartile group of homocysteine had higher odds ratios (ORs) for the presence of CAC compared with that of the lowest quartile group (OR=95% confidence interval (CI); 1.286[1.079, 1.534]), and increasing quartiles of homocysteine was also associated with the presence of CAC (p for trend=0.002). Moreover, plasma homocysteine level had a significant relationship with the presence of CAC and increasing CACS, respectively (OR=95% CI) 1.391[1.131, 1.710] standardized (i.e.0.041, p=0.004, respectively).

Conclusions: This study indicates an independent relationship between plasma homocysteine level and Coronary Artery Calcification, suggesting that homocysteine could be a useful marker for coronary artery calcification.

Conflict of interest: No potential conflicts of interest relevant to this study were reported.

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High sensitivity cardiac troponin T and N-terminal pro-BNP predict cardiovascular events and death in patients with type 2 diabetes mellitus

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Purpose: Current methods of risk-stratification in patients with type 2 diabetes mellitus (T2DM) are suboptimal. The current study assesses the ability of N-terminal pro-B-type natriuretic peptide (NT-proBNP) and high sensitivity cardiac troponin T (hs-cTnT) to improve the prediction of cardiovascular events and death in patients with T2DM.

Methods: A nested case-cohort study was performed in patients with T2DM who participated in the Action in Diabetes and Vascular Disease: Preterax and Diamicron Modified Release Controlled Evaluation (ADVANCE) trial.

Results: In 3,862 patients with available samples, 709 (18%) experienced a major cardiovascular event (composite of cardiovascular death, non-fatal myocardial infarction or non-fatal stroke) and 706 (18%) died during a median of 5 years follow-up. In Cox regression models, adjusting for all established risk predictors, the hazard ratio [HR] for cardiovascular events for NT-proBNP was 1.94 per 1 standard deviation (SD) increase [95% confidence interval (CI) 1.72-2.19] and the HR for hs-cTnT was 1.52 per 1 SD increase [95% confidence interval (CI) 1.38-1.67]. The HRs for death were 1.97 [95% CI 1.74-2.23] and 1.54 [95% CI 1.39-1.70], respectively. The addition of either marker improved 5-year risk classification for cardiovascular events (net reclassification improvement in continuous model, 39% for NT-proBNP and 45% for hs-cTnT). Likewise, both markers greatly improved the accuracy with which the 5-year risk of death was predicted (table). The combination of both markers provided the best risk discrimination.

Conclusion: NT-proBNP and hs-cTnT appear to remarkably improve the accuracy with which the risk of cardiovascular events or death can be estimated in patients with T2DM.

P1547 | SPOTLIGHT 2013
Slight increase of urinary albumin excretion predicts incident hypertension in the Japanese general population

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Background: Previous studies suggested that urine albumin excretion in the high normal range predicts hypertension. However, this still remains unclear in the Japanese general population.
Aim: To clarify the relationship between the levels of urinary albumin-creatinine ratio (UACR) and incident hypertension among subjects without diabetes and renal insufficiency.

Methods: We conducted a cohort study of 459 normotensives without diabetes and renal insufficiency (eGFR ≥ 60 ml/min/1.73m²) in a community-based study in Japan and followed for 7 years (median 6.7 years). We examined the incidence of hypertension depending on the UACR levels at baseline. The incident hypertension was defined as new onset of systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg or taking any anti-hypertensive drugs.

Results: During follow-up, 256 subjects (55.8%) developed hypertension. The incidence of hypertension was increased along with the increase in UACR at baseline (41.5% in UACR < 5 mg/g, 59.1% in 5-14 mg/g and 66.0% in 15-29 mg/g, P < 0.05). Multivariate logistic regression analysis after adjustment with age, sex, obesity, smoking status, alcohol consumption, and estimated 24-hour urinary excretion of sodium showed that UACR 5-14 mg/g and 15-29 mg/g were independent risk for incident hypertension, compared with UACR < 5 mg/g (odds ratio [OR] 1.99, 95% confidence interval [CI] 1.20-3.30 and OR 2.12, 95% CI 1.01-4.45, respectively). Subgroup analysis showed that UACR 5-29 mg/g was a significant risk for incident hypertension compared with UACR <5 mg/g, especially in the subjects conventionally regarded as low risk, such as women, young (<60 years), non-obese, non-smoker, no habitual drinker, and subjects on low sodium diet (NaCl <10 g/day).

Conclusions: This study showed that a slight increase of urinary albumin excretion might predict incident hypertension in the Japanese general population, especially in the subjects conventionally regarded as low risk group.