Non-Invasive Skin Cholesterol Measurement Correlates with the Presence and Extent of Coronary Calcium

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Aim: Identification of individuals with subclinical atherosclerosis may allow for focused strategies to reduce the risk of coronary heart disease. Keratinocytes maintain cholesterol homoeostasis using LDL and HDL-scavenger receptor pathways implicated in atherosclerosis. Skin cholesterol has been shown to correlate with the Framingham risk score. We tested whether skin cholesterol measured using a novel non-invasive colorimetric assay is associated with the presence and extent of subclinical atherosclerosis assessed by coronary artery calcification (CAC).

Methods: Subjects (N = 177, 67 [45-84] yrs, 45% female, 55% African-American) were recruited from the Johns Hopkins site of the Multi-Ethnic Study of Atherosclerosis (MESA) cohort. Baseline MESA examination included fasting blood collection and CAC determination (Agatston score) by helical CT among other tests. Skin cholesterol was measured using the Cholesterol 1,2,3 kit (IMI Inc, Canada).

Results: Skin cholesterol was not significantly associated with serum lipid and lipoprotein concentrations (serum lipids: total cholesterol, LDL, HDL, triglycerides), but was significantly correlated with coronary calcium (Spearman rho =0.19, p=0.01). Using multiple logistic regression adjusting for age and sex, a 1 standard deviation (1SD) increase in skin cholesterol was associated with a 48% increase in the odds of the presence of CAC (95% CI of odds ratio: 1.00-2.18, p=0.047) independently of serum lipids. Since CAC levels were not normally distributed, non-zero values of CAC were divided into tertiles, dividing the sample into four levels of CAC (zero, and three non-zero levels). Multiple ordered logistic regression analysis revealed that a 1SD increase in skin cholesterol was associated with a 44% increase in the odds of belonging to a higher CAC level (95% CI of standardized odds ratio [OR]: 1.07-1.94, p=0.02) independently of serum lipids.

Conclusion: Skin cholesterol was associated with presence of CAC and correlated with severity of CAC independently of serum lipids and lipoproteins. Skin cholesterol may provide a useful index of subclinical atherosclerosis.