Homa-IR: A Marker of Vascular Dysfunction in Nondiabetic Hemodialysis Patients?

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We found the paper of Zhou et al. [1], recently published in your journal, of special interest. We would like to report that we observed similar findings in a group of 63 (27 female and 36 male) nondiabetic chronic hemodialysis patients.

Our patients, aged 60.5 ± 12.1 years, were on chronic hemodialysis for at least 6 months (median 38 months). Causes of renal disease were chronic glomerulonephritis (34.3%), primary hypertension (27.1%), polycystic kidney disease (7.1%), chronic interstitial nephritis (7.2%) and unknown (24.3%). None of the patients was diagnosed to suffer from diabetes mellitus (based on medical history, or abnormal blood glucose). All patients were dialyzed on a 4-hour, thrice weekly schedule with a bicarbonate-buffered dialysate. All patients had a functioning vascular access (arteriovenous fistula or graft) and were clinically stable (no acute inflammatory event or cardiovascular event for the last 3 months, no malignant or severe hepatic disease). Twenty patients had a history of smoking, but none was a current smoker. Seventeen patients had a medical history remarkable for cardiovascular disease. All participants gave their informed consent

to the study and the institute's ethics committee approved the study protocol.

Predialysis blood samples were taken on a midweek session to assess biochemical parameters, including glucose, insulin, CRP, total and HDL cholesterol, triglycerides, and apolipoproteins A and B. We estimated HOMA-IR (Homeostasis Model Assessment for Insulin Resistance) according to the formula: fasting glucose (mmol/l) $\times$ fasting insulin (IU/ml)/22.5 [2]. All patients underwent B-mode ultrasonography of common carotid arteries (bilaterally) to obtain measures of arterial stiffness (including distensibility, compliance and carotid incremental elastic modulus; Einc index), and central (aortic) blood pressure was estimated using SphygmoCor, as we have previously described [3, 4]. Einc is an index of the elastic properties of vessels, which is inversely correlated to distensibility. Einc is calculated by the following mathematic formula: $Einc = 3(1 + LCSA/WCSA)/distensibility$. LCSA (lumen cross-sectional area) is estimated by the internal common carotid artery diameter (CCI) as: $LCSA = \pi(CCI/2)^2$, where $\pi = 3.14$ and WCSA (wall cross-sectional area) is estimated by the external com-

mon carotid artery diameter (CCE) as: $\pi(CCE/2)^2 - \pi(CCI/2)^2$. Our patients had a median HOMA-IR value of 1.45 (range 0.39–5.26). In univariate regression analysis (using HOMA-IR in log scale as the dependent variable), we found HOMA-IR to be positively correlated with apolipoprotein B ($b = 0.68$, $p = 0.008$), LDL cholesterol ($b = 0.006$, $p = 0.001$), non-HDL cholesterol (defined as total minus HDL cholesterol; $b = 0.006$, $p < 0.001$), total cholesterol ($b = 0.005$, $p = 0.001$), CRP (in log scale; $b = 0.11$, $p = 0.05$) and negatively with the apolipoprotein A/apolipoprotein B ratio ($b = -0.21$, $p = 0.016$). In stepwise multivariate regression analysis, only CRP ($b = 0.13$, $p = 0.012$) and non-HDL cholesterol ($b = 0.005$, $p < 0.001$) were independently associated with HOMA-IR. There was no statistically significant association between HOMA-IR and intima-media thickness or plaque score ($p > 0.05$). Furthermore, in accordance to Zhou et al. [1], there was no significant association between HOMA-IR and cardiovascular disease ($p < 0.05$). In ordinal regression analysis using tertiles of HOMA-IR as the dependent variable, only Einc was associated with statistically significant odds for in-

creased HOMA-IR (odds ratio: 3.74, $p = 0.017$).

Although our findings regarding associations of HOMA-IR with dyslipidemia and arterial stiffness are in accordance to Zhou et al. [1], we noted that HOMA-IR

was not correlated to cardiovascular disease itself or robust markers of advanced atherosclerosis (i.e. intima-media thickness, plaque score). It seems possible that HOMA-IR is a marker of early functional alterations rather than advanced structur-

al abnormalities noted in vascular disease. However, to confirm any causal relationship, randomized longitudinal studies should be carried out.

References

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