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ORIGINAL ARTICLE

Repeat measurements of glycated haemoglobin A_{1c} and N-terminal pro-B-type natriuretic peptide: divergent behaviour in diabetes mellitus

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risk marker for future events in patients with diabetes.

Beside HbA_{1c}, several other biomarkers such as proteinuria or natriuretic peptides have been evaluated for their predictive properties. Among them, plasma B-type natriuretic peptide (BNP) and the inactive N-terminal precursor NT-proBNP, both reflecting myocardial wall tension, are established biomarkers for diagnosis, risk stratification, and prognostication across populations with or at risk of cardiovascular disease [2,3]. Studies consistently show that elevated NT-proBNP levels are associated with an elevated cardiovascular risk in the general population and also in patients with diabetes [4–6]. Low NT-proBNP values have an excellent negative predictive value to rule out short-term cardiovascular events in patients with diabetes mellitus [7]. This seems to be quite different from the nonmonotonic behaviour of HbA_{1c}, which is associated with poor outcome at high, and maybe also at very low levels [8,9].

The ACCORD substudies have sparked a discussion on whether the modification of risk markers is related to outcome [10,11]. It is worth considering that great efforts are made both by patients and by physicians to influence surrogate markers of risk, but to date there are no data on whether serial measurements of these biomarkers improve prognostication. The aim of this study was to investigate the prognostic role of serial measurements of NT-proBNP and the benchmark-marker HbA_{1c} in a cohort of patients with longstanding diabetes mellitus.

with routine tests by a central laboratory. NT-proBNP was measured with a commercially available kit (Roche Diagnostics, Vienna, Austria). Kidney function was estimated using the four-variable MDRD equation. During follow-up, patients were treated according to current diabetes guidelines at tertiary-care diabetes clinics. NT-proBNP and HbA_{1c} analyses were repeated after 1 year, and patients were then followed for a median period of 40 months. Data were analysed in 2010.

Endpoints

Endpoints of this study were all-cause mortality, hospitalization for cardiac events (heart failure, heart rhythm disturbances, valvular disease and ischaemic events), cardiovascular hospitalization (cardiac events, stroke and peripheral artery disease) and all-cause hospitalizations. All patients were traced through the national registry until the end of March 2010. Hospital reports about hospitalizations for cardiovascular events were obtained through the regional hospital data network. A cardiologist (MH) analysed information about hospitalizations for cardiovascular events.

The study was approved by the ethics committee of the Medical University of Vienna and the city of Vienna and conducted in accordance with the Helsinki declaration. Written informed consent was obtained from every patient participating in this study. Reporting of the study conforms to STROBE statement along with references to STROBE and the broader EQUATOR guidelines [12].