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EDITORIAL

Belgian contributions to contemporary cardiovascular research: linking science, practice, and outcomes

Belgian publications in *Acta Cardiologica* showcase how scientific progress translates into improved patient care [1]. Studies on cardiac troponins confirmed their central diagnostic role while cautioning against false-positive results from analytical interferences [2]. Research in congenital heart disease and pulmonary hypertension emphasised the need for precise risk evaluation and standardised echocardiographic practice [3,4]. Long-term registry data documented a major decline in heart attack with persistent survival gains linked to modern revascularization [5]. Therapeutic innovation was reflected in the benefits of new glucose-lowering drugs for patients with heart attack and preserved heart failure [6]. Investigations in diabetes highlighted the strong interplay between small- and large-vessel disease and their cardiovascular consequences [7]. Work on the ankle–brachial index in kidney disease refined prognostic assessment in vulnerable patients [8]. Finally, studies on coronary angiography and malpractice risk offered important insights into the Belgian healthcare system [9].

Cardiac troponins are the most sensitive and specific biomarkers for detecting myocardial injury and are considered the gold standard for diagnosing acute coronary syndromes [10–12].

However, elevated troponin levels are not invariably indicative of myocardial necrosis [2].

They may also rise in various indirect conditions, including pulmonary embolism, stroke, renal dysfunction, or systemic illness. Analytical interferences represent an additional and clinically relevant source of falsely elevated values. Heterophile antibodies can cross-react with assay reagents and generate spurious troponin signals. Macrotroponin complexes, resulting from immunoglobulin–troponin binding, are increasingly recognised as a frequent cause of assay interference. Such false-positive elevations may bias diagnostic reasoning and lead to unnecessary, costly, or invasive procedures. Awareness of these interferences and close collaboration between clinicians and laboratory specialists are essential to ensure diagnostic accuracy and patient safety.

Advances in the management of congenital heart disease (CHD) have enabled many women to reach reproductive age, although pregnancy remains associated with substantial cardiovascular risk [13]. To better anticipate maternal and neonatal complications, a catheterization-based volume challenge has been implemented at University Hospitals Leuven as part of the pre-pregnancy evaluation. In a cohort of 25 women with nine distinct forms of CHD, the protocol demonstrated significant hemodynamic modifications, including increases in systemic venous pressure, pulmonary artery pressures, and pulmonary capillary wedge pressure following the challenge [3]. Elevated pre-test systemic venous pressure was negatively correlated with gestational age at delivery, while a higher post-test cardiac index was inversely associated with both gestational age and neonatal birthweight. These findings underline the potential pathophysiological relevance of specific hemodynamic parameters but also indicate that systematic volume challenge does not provide robust predictive value. Careful integration of invasive hemodynamics with clinical risk stratification remains essential to optimise counselling and management of women with CHD considering pregnancy.

Pulmonary hypertension (PH) is a life-threatening disease where echocardiography plays a central role in detection, assessment, and prognosis [14–16]. A national survey of 57 physicians revealed broad use of standard parameters such as tricuspid regurgitation velocity, right/left ventricular (RV/LV) diameter ratio, and pulmonary artery diameter (Figure 1) [4]. By contrast, key markers including TAPSE/sPAP (systolic pulmonary arterial pressure) ratio, RVOT (outflow tract) acceleration time, and pulmonary regurgitation velocity were underutilised. Right atrial and inferior vena cava indices were frequently assessed, but end-systolic right atrial (RA) area and collapsibility were inconsistently measured. Evaluation of left-sided chambers was performed by only one-third of respondents, despite its diagnostic importance in PH. These findings highlight significant variability across institutions and underline the need for standardised echocardiographic protocols and reinforced training.

Acute myocardial infarction (AMI) remains a leading cause of morbidity, yet its incidence has changed substantially over time [17–23]. Based on 30 years of WHO MONICA-BELLUX data, 6786 suspected AMIs were reclassified using modern definitions of ST-elevation MI (STEMI), non–ST-elevation MI (NSTEMI), and type III infarction (Figure 2) [5]. The overall incidence declined from 314 to 116 per 100,000 inhabitants, corresponding to an annual decrease of 5.3 cases per 100,000. This reduction was primarily driven by a 3.8-fold fall in STEMI, while NSTEMI incidence initially decreased but stabilised after 2004 with a converging STEMI-to-NSTEMI ratio by 2009. Women showed a nearly fourfold lower incidence than men, but temporal patterns were consistent across sexes and age groups. Survival improved progressively, largely owing to increased use of coronary angiography and revascularization. These findings highlight a sharp decline in STEMI, a stabilisation of NSTEMI, and improved outcomes reflecting advances in diagnostic and therapeutic strategies.

The no-reflow phenomenon, defined as inadequate myocardial perfusion despite angiographically successful reperfusion, remains a serious complication in AMI

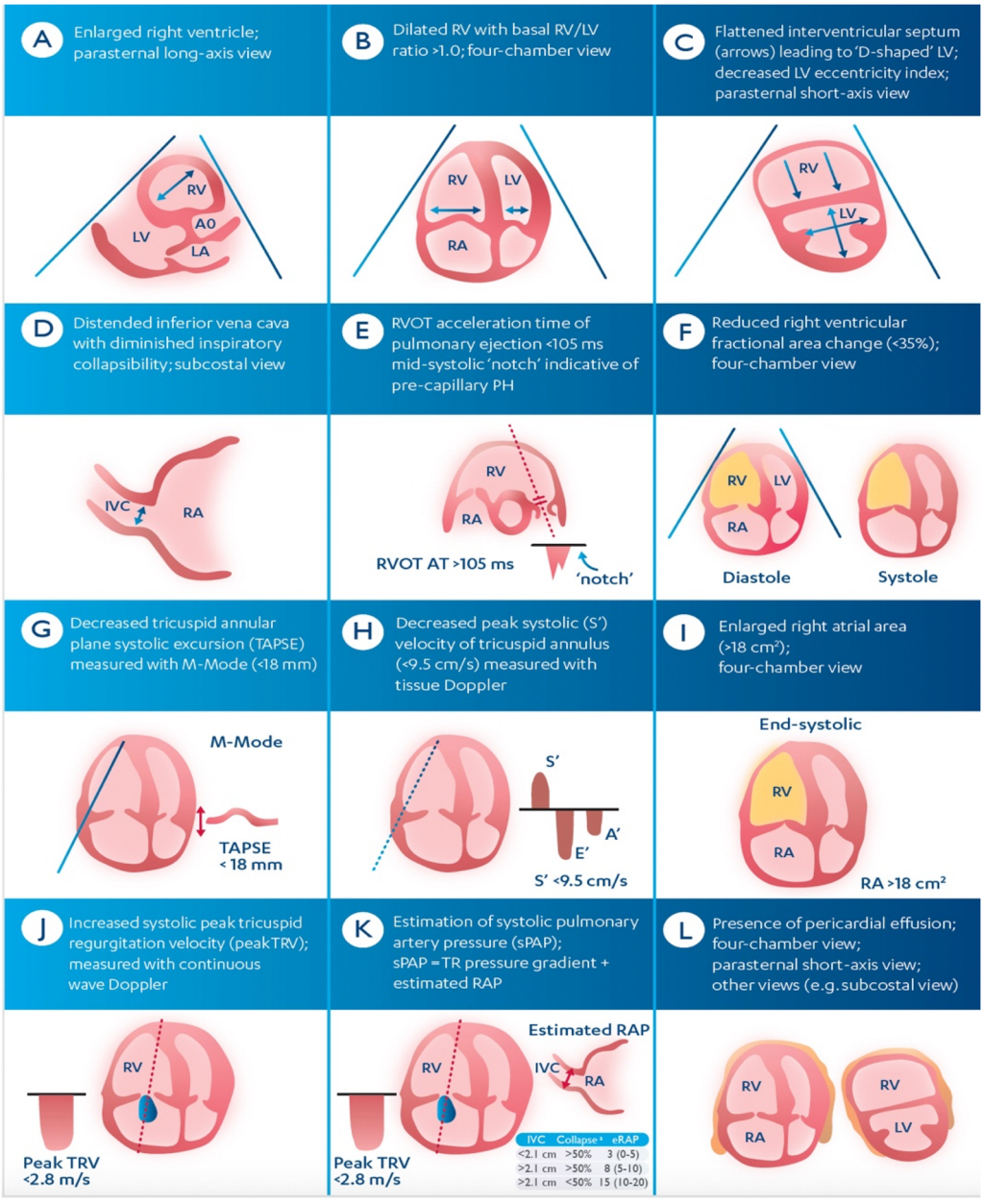

Figure 1. Echocardiography pictogram of parameters for pulmonary hypertension (from reference [4]).

[24–29]. A total of 829 patients with type II diabetes mellitus (T2DM) presenting with AMI and treated by percutaneous coronary intervention (PCI) within 24 h were evaluated [6]. Among them, 434 had STEMI and 395 had NSTEMI. Multivariable analysis showed that estimated glomerular filtration rate, SYNTAX score, and dapagliflozin use were independent predictors of no-reflow in STEMI. In NSTEMI, dapagliflozin was the only independent predictor. Across both AMI subtypes, dapagliflozin therapy was associated with significantly reduced rates of no-reflow. These results suggest a potential protective effect of dapagliflozin in diabetic patients undergoing PCI, which merits confirmation in prospective trials.

Macro- and microangiopathy represent major target organ damages (TOD) in type 2 diabetes mellitus (T2DM), yet their coexistence and shared determinants are insufficiently documented [30,31]. A total of 876 T2DM patients were evaluated for the prevalence of microvascular and macrovascular complications and their clinical correlates (Figure 3) [7]. Overall, microangiopathy was present in 41% and macroangiopathy in 33%, with 45.5% free of comorbidities, 21% presenting microangiopathy only, 13.5% macroangiopathy only, and 20% both. Albuminuria was more frequent in all TOD groups compared to unaffected patients. The coexistence of micro- and macroangiopathy was associated with higher rates of atrial fibrillation, peripheral artery disease, diabetic foot, and heart failure. Lipid-related variables (non-HDL cholesterol, remnant cholesterol), sleep apnoea, and non-O blood group were independently linked to vascular damage. These findings underscore the strong interconnection between small- and large-vessel disease and their overlap

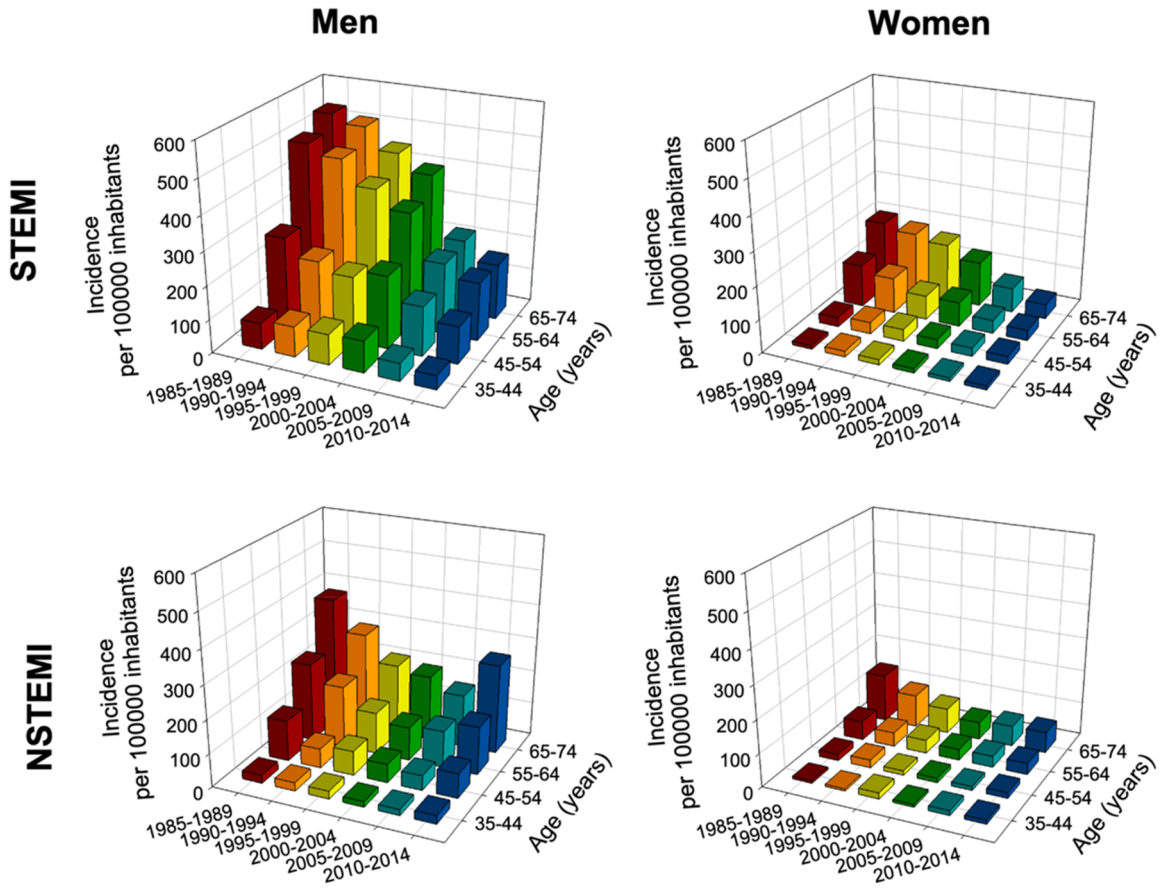

Figure 2. Presents the incidence of STEMI and NSTEMI, stratified by age group and gender, over time, with data averaged over five-year periods. As expected, the incidence of both STEMI and NSTEMI was higher with increasing age. The trends in decrease of STEMI incidence over the 30-year observation period were consistent across all age groups. The increase of NSTEMI from 2001 was present only in men, as NSTEMI incidence in women remained stable, and was most pronounced in the age groups > 55 years (from reference [5]).

with atherosclerotic, cardiometabolic, and cardiorenal comorbidities.

Heart failure with preserved ejection fraction (HFpEF) is common in elderly patients with multiple comorbidities, but evidence on real-world use of empagliflozin remains scarce [32].

Between April 2023 and April 2024, 577 consecutive HFpEF patients (median age 82 years, 58% female) initiated on empagliflozin were evaluated. Hypertension (78%) and atrial fibrillation (67%) were the most prevalent comorbidities [33]. Treatment was associated with marked improvement in NYHA functional class and a significant reduction in peripheral oedema. Additional benefits included modest reductions in blood pressure, heart rate, body weight, and BMI, alongside an increase in haemoglobin. Renal function declined slightly but without clinical consequence, and treatment discontinuation was infrequent (2.8%). During 16 months of follow-up, all-cause mortality was 6.9%, supporting the tolerability and clinical benefit of empagliflozin in routine care.

The ankle-brachial index (ABI) is a marker of peripheral arterial disease, yet its prognostic value may differ in patients with chronic kidney disease (CKD) [34,35]. Data from 6318 participants of the NHANES cohort were analysed, including 1311 (20.8%) with CKD, with a median follow-up of 203 months [8]. ABI was categorised as low (≤0.9), normal (0.9–1.4), or high (>1.4). In individuals with CKD, high ABI was associated with significantly increased cardiovascular and all-cause mortality, whereas no such association was observed in those without CKD. Low ABI was linked to higher cardiovascular and all-cause mortality regardless of CKD status. These associations remained robust after multivariable adjustments. Findings highlight that CKD modifies the prognostic significance of high ABI, underscoring the need for tailored risk assessment in this population.

Medical malpractice litigation is an increasing concern for physicians, yet data regarding cardiologists in Belgium have not been available until now. Analysis of the annual reports of the Fund for Medical Accidents (FMA) from 2012 to 2023 identified 6884 applications for malpractice claims, with 3185 cases reaching a final decision [9]. During this 10-year period, 73 claims were filed against cardiologists, placing the specialty among the top fifteen at risk. With 1237 cardiologists currently practicing in Belgium, the cumulative risk of malpractice litigation through the FMA corresponds to 6% over 10 years. This rate is lower than expected from international literature, where missed myocardial infarction and

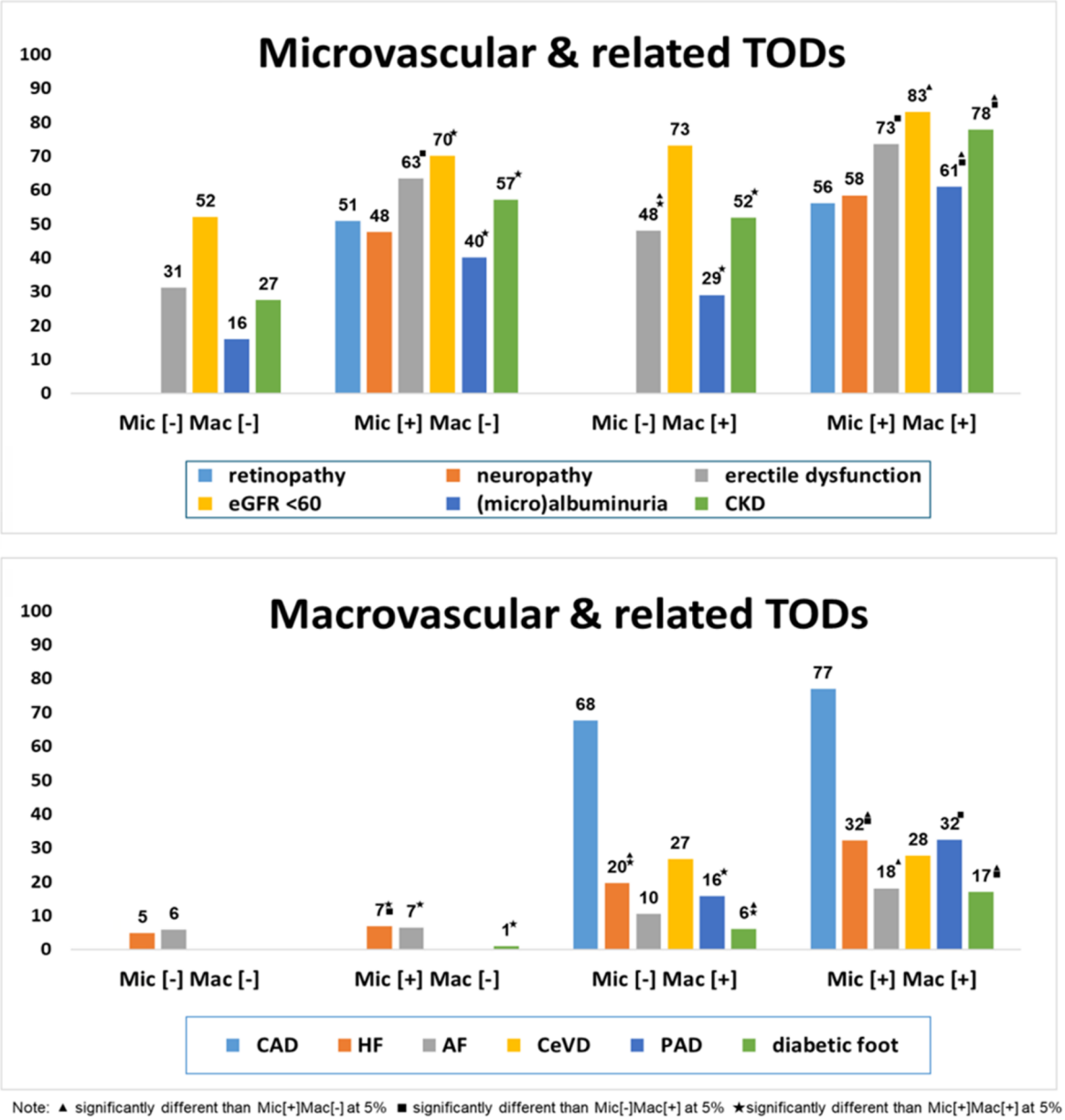

Figure 3. Target organ damage (TOD) according to cross-prevalence of overall micro- and macroangiopathy (from reference [7]).

complications of interventional cardiology procedures are the predominant causes of claims. When compared to gastroenterology, another interventional subspecialty of internal medicine, cardiologists appear less exposed, with gastroenterologists showing a cumulative litigation risk of 12% ($p < .001$). These findings suggest that although Belgian cardiologists face a measurable risk of malpractice litigation, their relative exposure remains moderate.

In this issue of *Acta Cardiologica*, some focus images highlighting interesting cases have also been reported [36–38].

Disclosure statement

No potential conflict of interest was reported by the author(s).

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