ESC 2025

A major highlight of the ESC Congress 2025 was the unveiling of five new clinical guidelines

Congress Review

Review of the European Society of Cardiology (ESC) Congress 2025

Location:	Madrid, Spain
Date:	29th August–1st September 2025
Citation:	EMJ Cardiol. 2025;13[1]:10-23. https://doi.org/10.33590/emjcardiol/HTBS1731

THE EUROPEAN Society of Cardiology (ESC) celebrated a landmark moment this year, marking its 75th anniversary at the ESC Congress 2025, held in Madrid, Spain. In collaboration with the World Congress of Cardiology (WCC), the event brought together cardiologists, researchers, policymakers, and allied professionals. Uniting the global community to push the boundaries of cardiovascular disease within the evolving global health landscape, this year's Congress explored 'Cardiology Beyond Borders' with a spotlight on 'Global Health'.

With three-quarters of a century dedicated to advancing cardiovascular science and improving patient care, the ESC President, Thomas F. Lüscher, took the opportunity at the inaugural session to reflect on the history of the ESC. He explained that in 1950, the ESC was founded to bring together the diverse national cardiac societies of Europe under a single umbrella organisation. Now, the ESC has grown into a global community that encompasses 58 national cardiac societies, 49 affiliated societies, seven sub-specialty associations, 15 working groups, and seven councils.

This year's Congress provided an in-depth look at the latest and greatest in cardiovascular medicine, cutting-edge science, bold ideas, practical breakthroughs, and stimulating debates. With a clear emphasis on making change at the policy level, a major highlight of the ESC Congress 2025 was the unveiling of five new clinical guidelines, designed to translate cutting-edge science into practice. Tomasz Guzik, The University of Edinburgh, UK, highlighted the importance of these guidelines, which cover valvular heart disease, myocarditis and pericarditis, dyslipidaemias, and cardiovascular disease and pregnancy. He also noted that for the first time, there would be evidence-based recommendations on the crucial link between mental health and cardiovascular disease, which will "change your clinics on Tuesday morning when you go back to your hospitals." Guzik further emphasised the importance of the spotlight on global health, as cardiovascular disease is universal, yet its global burden is unequal. He explained that this is why the ESC has partnered with the World Heart Federation (WHF) to advance cardiovascular health worldwide, whilst addressing regional needs.

Another key aspect of the Congress that Guzik highlighted was the Hot Line sessions, which presented 40 major clinical trials, representing new therapies and evaluating standards of care. These sessions were complemented by 29 trial discussions and 28 late-breaking science

sessions, offering insights into therapies, standards of care, and innovations from around the world. Furthermore, this year's Congress welcomed 1,900 speakers from 85 countries and nearly 5,000 abstracts presented by researchers representing 108 nations. The Research Gateway featured 145 oral abstract sessions, 442 moderated e-posters, and 116 clinical case presentations, ensuring that even early-career scientists had a platform to share their work.

The Programme Committee curated multiple scientific tracks to meet the needs of the diverse global audience, with 'New Horizons' to showcase breakthroughs in new therapies, sessions on AI to highlight real-world algorithms ready for clinical application, clinical evidence sessions to translate trial data into day-to-day practice, and sessions on cardiometabolic medicine exploring the links between cardiology and obesity, diabetes, hypertension, sleep disorders, and anaemia. New initiatives, such as ePoster Rounds and Fireside Chats, further enriched the Congress, allowing attendees to engage in small, interactive discussions with leaders of cardiology: a reminder, as Guzik noted, that "science is about people as much as it is about data."

The inaugural session also celebrated excellence and leadership in the field with the prestigious ESC Gold Medals. Lars Køber, University of Copenhagen, Denmark, was honoured for his pioneering work in the diagnosis and treatment of heart failure. Roxana Mehran, Icahn School of Medicine at Mount Sinai, New York, USA, was recognised for advancing interventional cardiology and championing gender equality in medicine. Ulrich Sigwart, University of Geneva, Switzerland, a trailblazer in interventional cardiology, received the award for his role in designing and implanting one of the first self-expanding intracoronary stents. The ESC President's Awards were also presented to Panos Vardas, University of Crete, Greece, and Béla Merkely, Semmelweis University Heart and Vascular Center, Budapest, Hungary, in recognition of their transformative contributions to both cardiology and society at large.

Concluding the inaugural session with his Presidential Lecture, Lüscher outlined a vision for the future of ESC as it enters a new era. He reflected on the Society's legacy while confronting today's most pressing challenges: environmental hazards, the obesity pandemic, and an ageing society. He called for stronger political advocacy, noting the ESC's growing influence at the EU level, urging that medicine must be combined with politics in order to make sustained change. Looking ahead, he identified five major opportunities that will define the next chapter of ESC: AI and digital tools; expanding new sub-specialties like cardio-oncology and cardiometabolic care; building registries and real-world evidence to guide policy and practice; investing in career development, mentoring, and training for young professionals; and strengthening global collaboration. Together, these pillars will guide the community toward 'better science, stronger careers, and healthier patients'.

Read on for key insights into this year's Congress, and don't miss our coverage of ESC Congress 2026, which will be held in Munich, Germany, from 28th–31st August 2026.

Baxdrostat Lowers Blood Pressure in Uncontrolled and Resistant Hypertension

BAXDROSTAT 1 mg or 2 mg once daily significantly reduced systolic blood pressure in patients with uncontrolled or resistant hypertension, according to results of the Phase III BaxHTN trial presented during a Hot Line session at the ESC Congress 2025.[1]

Despite the widespread use of multiple antihypertensive drugs, many patients fail to achieve adequate blood pressure control, leaving them at increased cardiovascular risk. Uncontrolled hypertension refers to blood pressure that remains above target despite at least two medications, whereas resistant hypertension persists despite three or more agents, including a diuretic. Aldosterone is recognised as a key driver of hypertension, and the selective aldosterone synthase inhibitor baxdrostat has been developed to target this pathway with improved precision.

The BaxHTN trial was conducted across 214 international sites and included 796 patients randomised to receive baxdrostat 1 mg, baxdrostat 2 mg, or placebo once daily for 12 weeks. In total, 27% had uncontrolled hypertension and 73% had resistant hypertension, and at baseline, mean seated systolic and diastolic blood pressure were 149 and 85 mmHg, respectively, with a median number of three antihypertensive drugs.

At 12 weeks, the placebo-adjusted reductions in seated systolic pressure were 8.7 mmHg with 1 mg and 9.8 mmHg with 2 mg (both p<0.0001). Ambulatory 24-hour systolic pressure fell by 16.9 mmHg, and night-time values by 11.7 mmHg, with the 2 mg dose. Control rates <130 mmHg systolic were achieved in 39.4% with baxdrostat 1 mg, 40% with 2 mg, and 18.7% with placebo.

At the end of the 8-week randomised withdrawal phase, discontinuation of baxdrostat led to a systolic rise of 1.4 mmHg, compared with a further reduction of 3.7 mmHg in those maintained on therapy for 32 weeks (p=0.0016). Adverse events were uncommon, with serious events in <4% of patients, and hyperkalaemia leading to discontinuation in <2% of patients.

At the end of the 8-week randomised withdrawal phase, discontinuation of baxdrostat led to a systolic rise of 1.4 mmHg

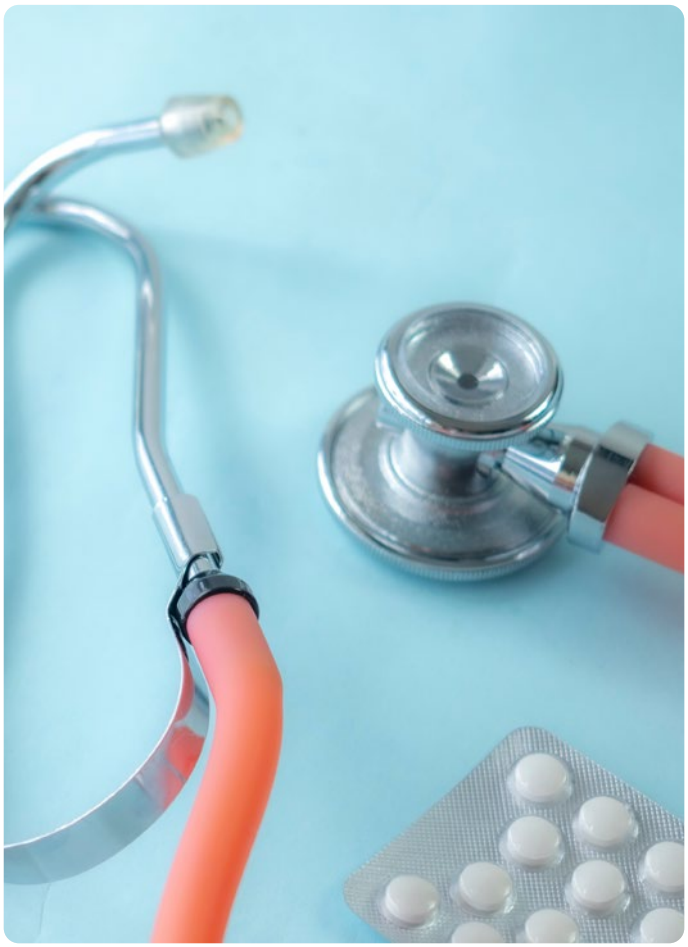
These findings support the role of aldosterone synthase inhibition in the management of hard-to-control hypertension. Baxdrostat was well-tolerated and delivered clinically meaningful reductions in systolic blood pressure beyond standard therapy. Future research will focus on long-term safety, cardiovascular outcomes, and integration into treatment pathways.

> **These findings support the role of aldosterone synthase inhibition in the management of hard-to-control hypertension**

Are β-Blockers Recommended After Myocardial Infarction?

LATE-BREAKING findings from the REBOOT trial, presented at the ESC Congress 2025, suggest that β-blockers may no longer be necessary for many patients recovering from myocardial infarction (MI) with preserved left ventricular ejection fraction (LVEF).[2] However, results from the BETAMI and DANBLOCK trials support the use of β-blockers after MI, showing that long-term use significantly reduced all-cause mortality and major adverse cardiovascular events in patients with MI and preserved or mildly reduced LVEF. These contrasting findings add to the complexities of this area of ongoing debate.[3]

Current guidelines recommending β-blockers after MI without left ventricular systolic dysfunction are based on older trials conducted before routine reperfusion, invasive care, complete revascularisation, and modern pharmacologic therapy became standard. To re-evaluate their relevance, investigators in Spain and Italy conducted the REBOOT trial. This was an open-label, randomised trial comparing β-blocker therapy with no β-blocker therapy in patients hospitalised with acute MI (with or without ST-segment elevation) and LVEF >40%. The primary endpoint was a composite of death from any cause, reinfarction, or hospitalisation for heart failure.



> **Based on these results, the REBOOT trial suggests that routine β-blocker therapy may offer little benefit for patients with preserved LVEF in the contemporary treatment era**

Of 8,438 patients analysed, 4,243 received β-blockers and 4,262 received no β-blocker therapy. Over a median follow-up of 3.7 years, the primary outcome occurred in 316 patients in the β-blocker group (22.5 events per 1,000 patient-years) versus 307 patients in the no-β-blocker group (21.7 events per 1,000 patient-years; hazard ratio [HR]: 1.04; 95% CI: 0.89–1.22; p=0.63). Individual components of the outcome were also similar: death from any cause occurred in 161 versus 153 patients (11.2 versus 10.5 events per 1,000 patient-years; HR: 1.06; 95% CI: 0.85–1.33), reinfarction in 143 versus 143 patients (10.2 versus 10.1 events per 1,000 patient-years; HR: 1.01; 95% CI: 0.80–1.27), and hospitalisation for heart failure in 39 versus 44 patients (2.7 versus 3.0 events per 1,000 patient-years; HR: 0.89;

95% CI: 0.58–1.38). No significant differences in safety outcomes were observed.

Based on these results, the REBOOT trial suggests that routine β-blocker therapy may offer little benefit for patients with preserved LVEF in the contemporary treatment era. These findings could prompt a re-evaluation of guideline recommendations and influence post-MI management strategies.

However, opposing results from the BETAMI trial in Norway and the DANBLOCK trial in Denmark were also presented at the congress. Whilst β-blockers are strongly recommended in the management of MI with reduced LVEF, their benefit in patients with preserved or mildly reduced function (40% or higher) is unclear. These two trials were conducted to address this gap and to evaluate the efficacy of β-blocker therapy in contemporary clinical practice. The combined programme randomised 5,574 patients with recent MI, LVEF of at least 40%, and no clinical heart failure to receive long-term β-blocker therapy or no β-blocker therapy. The primary endpoint was a composite of all-cause mortality, new MI, unplanned coronary revascularisation, ischaemic stroke, heart failure, or malignant ventricular arrhythmias.

After a median follow-up of 3.5 years, the primary endpoint occurred in 14.2% of patients assigned to β-blockers and 16.3% of those without therapy (HR: 0.85; 95% CI: 0.75–0.98; p=0.027). The incidence of new MI was lower with β-blockers (5.0% versus 6.7%; HR: 0.73; 95% CI: 0.59–0.92). All-cause mortality was similar between groups (4.2% versus 4.4%), as were the risks of stroke, heart failure, and arrhythmia, although event numbers for individual endpoints were relatively low. Safety outcomes were favourable, with serious adverse events infrequent and comparable between groups.

Of **8,438** patients analysed, **4,243** received β-blockers and **4,262** received no β-blocker therapy.

These findings support the continued clinical relevance of β-blocker therapy for secondary prevention following MI in patients with preserved or mildly reduced left ventricular function. In particular, the reduction in recurrent infarction highlights an important therapeutic benefit despite contemporary advances in acute and long-term care. Further pooled analyses, including meta-analyses of patients with mildly reduced ejection fraction, will help to refine patient selection.

Routine Breath Test for *Helicobacter Pylori* Not Recommended Post-heart Attack

A MAJOR Swedish clinical trial, presented at the ESC Congress 2025, has investigated whether routinely screening patients for *Helicobacter pylori* infection after an MI could help reduce the risk of upper gastrointestinal bleeding, a frequent complication following heart attacks.[4]

16.8 events per 1,000 person-years

Among patients in the screening group, the incidence rate was 16.8 events per 1,000 person-years

The study, which involved 18,466 patients admitted across 35 hospitals, tested the impact of adding a urea breath test for *H. pylori* to standard post-infarction care. Participants were randomly assigned by hospital clusters to either a year of routine screening or a year of usual care, with a short washout period before switching approaches. Patients were followed for a median of 1.9 years, and the primary outcome measured was the rate of upper gastrointestinal bleeding.

> **Patients were followed for a median of 1.9 years, and the primary outcome measured was the rate of upper gastrointestinal bleeding**

The findings showed that routine screening did not significantly lower bleeding events overall. Among patients in the screening group, the incidence rate was 16.8 events per 1,000 person-years, compared with 19.2 events per 1,000 person-years in the usual care group. This translated to a rate ratio of 0.90, a difference that did not reach statistical significance. Of those screened, 70% underwent testing, and nearly a quarter tested positive for *H. pylori*.

Interestingly, subgroup analyses suggested that some patients at higher risk, particularly those with anaemia, may benefit from screening. For individuals with moderate-to-severe anaemia, the risk of bleeding was notably reduced. However, these analyses were not adjusted for multiple comparisons, meaning the results should be interpreted with caution.

Overall, the trial concluded that routine *H. pylori* screening in all patients with MI cannot be recommended. While the potential benefit for high-risk subgroups warrants further investigation, the broad use of such testing does not appear to meaningfully reduce bleeding risk in this population.

Olezarsen Significantly Lowers Triglycerides in Patients at High Cardiovascular Risk

OLEZARSEN, an investigational RNA-based therapy, presented at the ESC Congress 2025, has been shown to markedly lower triglyceride levels in patients with elevated cardiovascular risk, addressing an unmet clinical need for more effective treatments.[5]

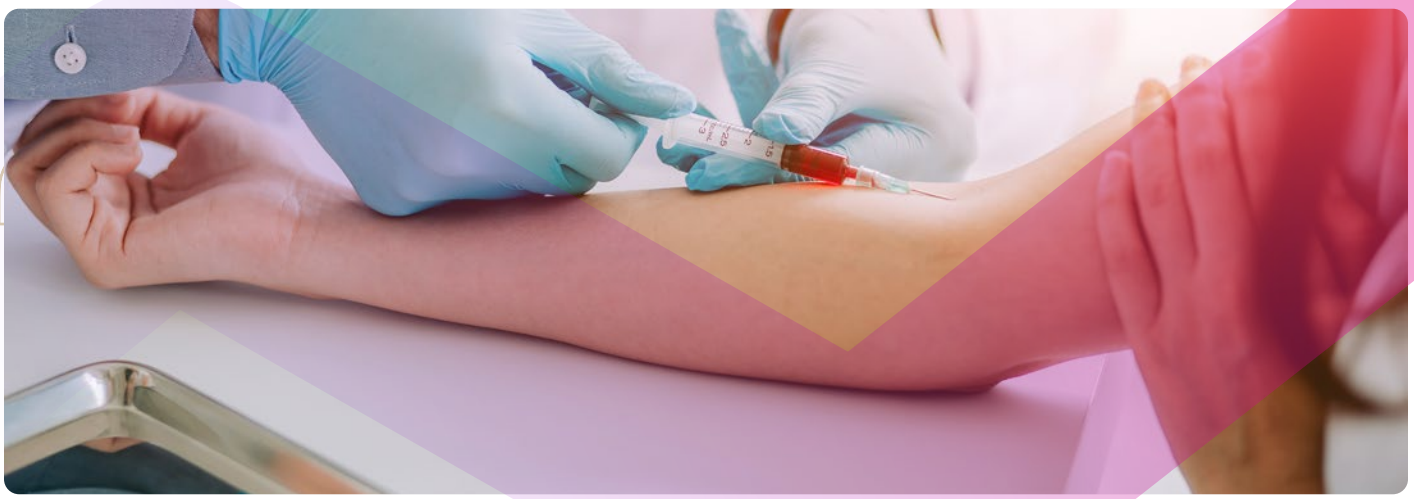
Led by Brian Bergmark from the TIMI Study Group, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts, USA, the ESSENCE-TIMI 73b trial was a placebo-controlled, double-blind Phase III trial conducted at 160 sites in North America and Europe. Despite advances in lipid-lowering therapies, many patients continue to face residual cardiovascular risk driven by elevated triglycerides. The trial tested olezarsen, a novel medicine targeting the mRNA of apolipoprotein C-III (apo-CIII), which inhibits triglyceride clearance.

At 160 sites across North America and Europe, 1,349 patients with moderate hypertriglyceridaemia (triglycerides: 150–499 mg/dL) were enrolled, all with an established diagnosis of atherosclerotic cardiovascular or increased risk due to diabetes and older age (≥55 years). Participants were randomised to olezarsen 50 mg (n=254), olezarsen 80 mg (n=766), or placebo (n=329) given every 4 weeks via subcutaneous injection for 12 months. The primary endpoint was the percentage change from baseline to triglyceride levels at 6 months compared with placebo.

The findings were striking. At 6 months, olezarsen reduced triglyceride levels: the placebo-adjusted least-squares mean difference in percentage change from baseline was –58.4 percentage points for olezarsen 50 mg and –60.6 percentage points for olezarsen 80 mg (both $p<0.001$ versus placebo). Conversely, in the placebo group, 12.5% of patients had triglyceride levels <150 mg/dL at 6 months, compared with 85.0% of patients receiving olezarsen 50 mg, and 88.7% receiving olezarsen 80 mg ($p<0.001$ for both).

These results were similar at the 12-month mark, showing reductions to be greater in the groups receiving olezarsen compared to placebo groups (20.6%, 82.8%, and 85.0% for placebo, olezarsen 50 mg, and olezarsen 80 mg, respectively; $p<0.001$ for both versus placebo).

Reductions were also seen in other atherogenic lipoproteins, including remnant cholesterol and apolipoprotein B (apoB), but without impact on low-density lipoprotein cholesterol. Importantly, treatment was generally safe and well-tolerated, with adverse events consistent across groups.



POTCAST Trial: Targeting High-Normal Potassium Levels Reduces Ventricular Arrhythmia Burden

RESULTS from the POTCAST trial, presented at the ESC Congress 2025, found that actively increasing plasma potassium concentrations to the mid-to-high normal range significantly reduced arrhythmic events, hospitalisations, and mortality risk compared with standard care.[6]

The benefit was largely driven by reductions in appropriate ICD therapies (15.3% versus 20.3%; HR: 0.75; 95% CI: 0.57–0.80) and unplanned arrhythmia-related hospitalisations (6.7% versus 10.7%; HR: 0.63; 95% CI: 0.28–0.64)

These findings support the hypothesis that higher-normal potassium levels confer anti-arrhythmic protection in patients at elevated risk of ventricular arrhythmias with implantable cardioverter defibrillators (ICD).

The open-label RCT enrolled 1,200 patients across three Danish centres. Participants had an ICD or cardiac resynchronisation therapy defibrillator, and a baseline potassium concentration ≤4.3 mmol/L. Key exclusion criteria were advanced renal impairment (estimated glomerular filtration rate: <30 mL/min/1.73 m^2) and pregnancy.

Patients were randomised 1:1 to a strategy aiming to raise potassium to 4.5–5.0 mmol/L via dietary counselling, potassium supplements, and/or mineralocorticoid receptor antagonists, or to standard care. The primary endpoint was a composite of sustained ventricular tachycardia (>125 beats per minute for >30 seconds), appropriate ICD therapy, unplanned hospitalisation (>24 hours) for arrhythmia or heart failure, and all-cause mortality. Median follow-up was 39.6 months.

Results showed a baseline mean potassium level of 4.01 mmol/L. At 6 months, levels increased to 4.36 mmol/L in the intervention group versus 4.05 mmol/L in controls. The primary endpoint occurred in 22.7% of patients in the treatment arm compared to 29.2% of controls (HR: 0.76; 95% CI: 0.61–0.95; p=0.015).

The benefit was largely driven by reductions in appropriate ICD therapies (15.3% versus 20.3%; HR: 0.75; 95% CI: 0.57–0.80) and unplanned arrhythmia-related hospitalisations (6.7% versus 10.7%; HR: 0.63; 95% CI: 0.28–0.64). Hospitalisation for heart failure (3.5% versus 5.5%) and all-cause mortality (5.7% versus 6.8%) were numerically lower in the intervention group, though not statistically significant.

Safety outcomes were reassuring, with comparable rates of hyperkalaemia- or hypokalaemia-related hospitalisations (1% in both groups). Overall, 29.5% of patients in the treatment group and 33.2% of controls experienced the combined outcome of unplanned hospitalisation and death (HR: 0.88; 95% CI: 0.72–1.08).

The investigators concluded that raising plasma potassium into the mid-to-high normal range represents an inexpensive and widely accessible adjunctive strategy for patients with ICDs and a high risk of ventricular arrhythmias.

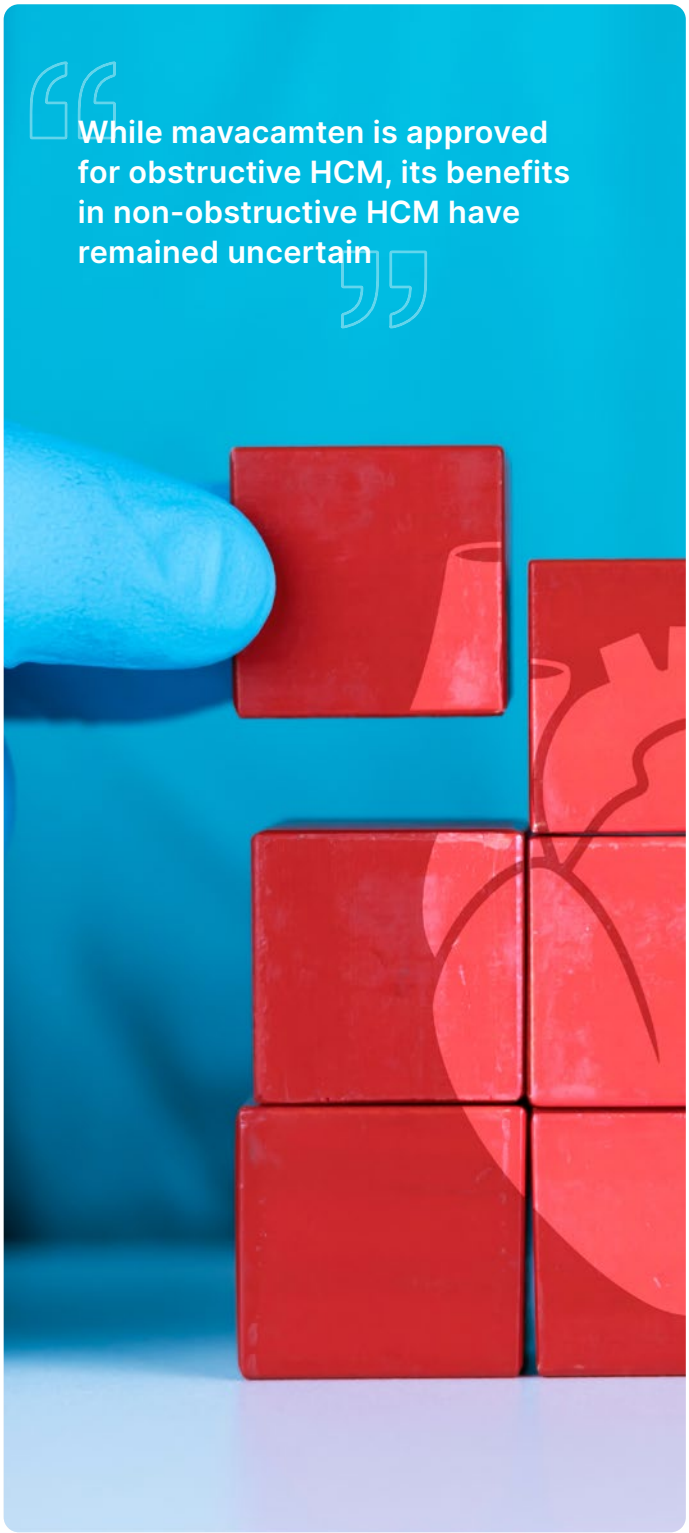
Mavacamten Falls Short in Non-obstructive Hypertrophic Cardiomyopathy Trial

NEW DATA from the ODYSSEY-HCM trial, presented at the ESC Congress 2025, challenge the potential role of mavacamten in patients with non-obstructive hypertrophic cardiomyopathy (HCM), showing limited impact on exercise capacity or symptoms.[7]

While mavacamten is approved for obstructive HCM, where it improves outflow tract obstruction, exercise tolerance, and quality of life, its benefits in non-obstructive HCM have remained uncertain. To evaluate this, investigators conducted a Phase III, international, double-blind, placebo-controlled trial in adults with symptomatic non-obstructive HCM. Participants were randomised 1:1 to mavacamten (starting at 5 mg/day, titrated up to 15 mg/day based on LVEF) or placebo with sham dose adjustments for 48 weeks. The co-primary endpoints were the change from baseline to Week 48 in peak O_2 uptake and the Kansas City Cardiomyopathy Questionnaire Clinical Summary Score (KCCQ-CSS).

A total of 580 patients were enrolled (289 mavacamten, 291 placebo; mean age: 56 years; 46% women). Over 48 weeks, peak O_2 uptake increased by 0.52 mL/kg/min (95% CI: 0.09–0.95) in the mavacamten arm versus 0.05 mL/kg/min (95% CI: −0.38–0.47) with placebo, for a between-group difference of 0.47 mL/kg/min (95% CI: −0.03–0.98; p=0.07). KCCQ-CSS improved by 13.1 points (95% CI: 10.7–15.5) with mavacamten versus 10.4 points (95% CI: 8.0–12.8) for placebo, yielding a between-group difference of 2.7 points (95% CI: −0.1–5.6; p=0.06). Adverse effects, including reductions in ejection fraction and treatment interruptions, were more common in the mavacamten group.

The findings suggest that mavacamten does not meaningfully improve functional capacity or patient-reported symptoms in non-obstructive HCM. Clinicians should interpret these results cautiously, and the study emphasises the ongoing need for effective therapies in this challenging patient population.



Initiation of Sodium-Glucose Co-transporter-2 Inhibitors in Patients Hospitalised for Heart Failure

STARTING sodium-glucose co-transporter-2 inhibitors (SGLT2i) during hospitalisation for heart failure (HF) appears beneficial, according to late-breaking data from the DAPA ACT HF-TIMI 68 trial and a supporting meta-analysis presented at the ESC Congress 2025.[8]

All-cause mortality was numerically lower with dapagliflozin (3.0% versus 4.5%; HR: 0.66; 95% CI: 0.43–1.00)

DAPA ACT HF-TIMI 68 was a double-blind, placebo-controlled trial conducted at 210 sites in the USA, Canada, Poland, Hungary, and Czechia. A total of 2,401 patients (median age: 69 years; 33.9% women) hospitalised with HF and signs of fluid overload were randomised to dapagliflozin 10 mg daily or placebo, initiated between 24 hours and 14 days after admission.

The primary endpoint, which was a composite of cardiovascular death or worsening HF within 2 months, occurred in 10.9% of patients in the dapagliflozin group and 12.7% in the placebo group (HR: 0.86; 95% CI: 0.68–1.08; p=0.20). Rates of cardiovascular death (2.5% versus 3.1%) and worsening HF events (9.4% versus 10.3%) were not significantly different.

All-cause mortality was numerically lower with dapagliflozin (3.0% versus 4.5%; HR: 0.66; 95% CI: 0.43–1.00). Safety outcomes were consistent with the known profile of SGLT2is, with slightly higher rates of hypotension (3.6% versus 2.2%) and renal events (5.9% versus 4.7%) in the dapagliflozin arm.

A pre-specified meta-analysis pooling DAPA ACT HF-TIMI 68 with two other in-hospital initiation trials (empagliflozin and sotagliflozin; n=3,527) demonstrated significant benefits. SGLT2i initiation reduced cardiovascular death or worsening HF (HR: 0.71; 95% CI: 0.54–0.93; p=0.012) and all-cause mortality (HR: 0.57; 95% CI: 0.41–0.80; p=0.001).

Dual Antiplatelet Therapy Offers No Benefit Over Aspirin Alone After Coronary Artery Bypass Grafting

DUAL antiplatelet therapy (DAPT) with ticagrelor and aspirin does not provide additional protection against major cardiovascular events after coronary artery bypass grafting (CABG) compared with aspirin alone, and it significantly increases bleeding risk, according to results of the TACSI trial, presented at the ESC Congress 2025.[9]

Led by Anders Jeppsson from Sahlgrenska University Hospital, Gothenburg, Sweden, the TACSI trial was an investigator-initiated pragmatic, open-label, registry-based trial. Current ESC Guidelines recommend DAPT for patients with acute coronary syndrome undergoing CABG, but this is largely based on data extrapolated from non-CABG trials.

To address the evidence gap, TACSI enrolled 2,201 patients across 22 cardiothoracic surgery centres in Sweden, Denmark, Norway, Finland, and Iceland. Patients undergoing their first isolated CABG were randomised to either DAPT (ticagrelor 90 mg twice daily plus aspirin 75 mg once daily) or aspirin only (75–160 mg daily according to local protocols) for 12 months.

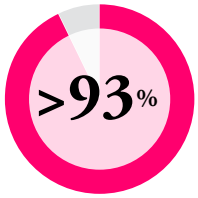
At 12 months, the primary endpoint of major adverse cardiovascular events, including all-cause death, MI, stroke, or repeat revascularisation, occurred in 4.8% of patients receiving DAPT and 4.6% of patients on aspirin alone (HR: 1.09; 95% CI: 0.74–1.60; log rank p=0.77).

This demonstrated no significant benefit of DAPT for event prevention. However, the incidence of major bleeding was more than doubled with DAPT compared to the aspirin group (9.1% versus 6.4%; HR: 1.45; 95% CI: 1.07–1.97).

> **Patients undergoing their first isolated CABG were randomised to either DAPT or aspirin only for 12 months**

Prospective Validation of an AI Stethoscope for Early Cardiovascular Disease Detection

AN AI-enabled stethoscope can accurately detect heart failure with reduced ejection fraction (HFrEF), atrial fibrillation, and valvular heart disease, according to a prospective multicentre study presented at the ESC Congress 2025.[10]



The AI stethoscope demonstrated high specificity (>93%) for detecting at least moderate valvular heart disease at the pulmonic position

Heart failure, atrial fibrillation, and valvular heart disease are all frequently diagnosed at advanced stages, often following emergency hospital admission, despite being conditions where earlier intervention is associated with improved outcomes. Therefore, researchers sought to determine if the use of digital stethoscopes augmented with AI has the potential to improve early detection of these conditions during routine clinical examinations.

In this observational, multicentre study, 1,378 adult patients undergoing transthoracic echocardiography at three UK centres were prospectively recruited. Each patient received a 15-second examination with the AI-enabled stethoscope, which simultaneously captured single-lead ECG and phonocardiogram waveforms from four auscultation positions (aortic, pulmonary, tricuspid, and mitral). These were analysed using AI algorithms developed for the detection of HFrEF, atrial fibrillation, and structural murmurs.

For HFrEF, defined as reduced LVEF ≤40%, the AI stethoscope achieved an area under the curve of 0.87 (95% CI: 0.84–0.90), with sensitivity of 83% and specificity of 76%. For moderate or severe aortic stenosis, performance was also robust, with an area under the curve of 0.81 (95% CI: 0.76–0.86), sensitivity of 61%, and specificity of 85%. The AI stethoscope demonstrated high specificity (>93%) for detecting at least moderate valvular heart disease at the pulmonic position, and detection of atrial fibrillation demonstrated a sensitivity of 84% and specificity of 93%.

These results indicate that an AI-enabled stethoscope can provide accurate detection of HFrEF, atrial fibrillation, and clinically significant aortic stenosis in routine settings. Integration into primary care could support earlier diagnosis, streamlined workflows, and timely initiation of treatment, with potential to reduce late presentations and associated complications.

References

1. Williams B et al. BaxHTN - efficacy and safety of the aldosterone synthase inhibitor baxdrostat in patients with uncontrolled or resistant hypertension. ESC Congress, 29 August-1 September, 2025.
2. Ibanez B. REBOOT-CNIC: beta-blockers after infarction with LVEF greater than 40%. ESC Congress, 29 August-1 September, 2025.
3. Atar D et al. BETAMI-DANBLOCK trial: randomised discontinuation of beta-blockers after myocardial infarction. ESC Congress, 29 August-1 September, 2025.
4. Hofmann R et al. Helicobacter pylori screening after acute myocardial infarction: the cluster randomized crossover HELP-MI SWEDEHEART trial. ESC Congress, 29 August-1 September, 2025.
5. Bergmark B et al. Olezarsen in patients with hypertriglyceridemia at high cardiovascular risk: the ESSENCE-TIMI 73b trial. ESC Congress, 29 August-1 September, 2025.
6. Jons C, Bndgaard H. Increasing potassium levels improve outcomes in patients at high risk of ventricular arrhythmia. ESC Congress, 29 August-1 September, 2025.
7. Desai M. ODYSSEY-HCM: mavacamten in nHCM. ESC Congress, 29 August-1 September, 2025.
8. Berg D et al. Evidence appears supportive for the initiation of SGLT2 inhibitors in patients hospitalised for heart failure. ESC Congress, 29 August-1 September, 2025.
9. Anders Jeppsson et al. TACSI: dual or single antiplatelet therapy after CABG in patients with acute coronary syndrome. ESC Congress, 29 August-1 September, 2025.
10. Bachtiger P et al. Quick and easy multi-pathology cardiovascular disease detection with an artificial intelligence-enabled stethoscope: multi-centre prospective validation study in secondary care. ESC Congress, 29 August-1 September, 2025.