IN BRIEF

IMAGING

Estimating ejection fraction by video-based AI

EchoNet-Dynamic is a new deep learning algorithm developed using 10,030 echocardiogram videos to estimate left ventricular ejection fraction (LVEF) and classify patients with heart failure with similar accuracy to that of experienced cardiologists. Human interpretation of echocardiograms relies on segmenting the left ventricle over a small number of cardiac cycles, which can have high interobserver variability. The artificial intelligence (AI)-based algorithm incorporated information across multiple cardiac cycles and accurately segmented the left ventricle (Dice similarity coefficient 0.92), predicted LVEF (mean absolute error 4.1%) and classified heart failure with reduced ejection fraction (area under the curve 0.97). This performance was validated using an independent dataset and was more reproducible than that of clinicians.

ORIGINAL ARTICLE Ouyang, D. et al. Video-based AI for beat-to-beat assessment of cardiac function. *Nature* https://doi.org/10.1038/s41586-020-2145-8 (2020)

ANTIPLATELET THERAPY

Aspirin withdrawal in complex PCI and diabetes

In the TWILIGHT trial, switching from dual antiplatelet therapy (DAPT) with ticagrelor and aspirin to ticagrelor monotherapy at 3 months after percutaneous coronary intervention (PCI) was found to reduce the risk of bleeding without increasing the risk of ischaemic events. In two new analyses, similar benefits have been found in the subgroups of patients who underwent complex PCI or who had diabetes mellitus. In 2,342 patients who underwent complex PCI, the rate of BARC type 2, 3 or 5 bleeding was lower with ticagrelor monotherapy than with DAPT (4.2% versus 7.7%; HR 0.54, 95% CI 0.38–0.76), whereas the rate of ischaemic events (myocardial infarction, stroke or death) was not significantly different between the two groups (3.8% versus 4.9%). Similarly, in 2,620 patients with diabetes, the incidence of BARC type 2, 3 or 5 bleeding was lower with ticagrelor monotherapy than with DAPT (4.5% versus 6.7%; HR 0.65, 95% CI 0.47–0.91), but the rate of ischaemic events was not significantly different (4.6% versus 5.9%).

ORIGINAL ARTICLES Dangas, G. et al. Ticagrelor with aspirin or alone after complex PCI: the TWILIGHT-COMPLEX analysis. *J. Am. Coll. Cardiol.* https://doi.org/10.1016/j.jacc.2020.03.011 (2020) | Angiolillo, D. J. et al. Ticagrelor with or without aspirin in high-risk patients with diabetes mellitus undergoing percutaneous coronary intervention. *J. Am. Coll. Cardiol.* https://doi.org/10.1016/j.jacc.2020.03.008 (2020)

ANTICOAGULATION THERAPY

Rivaroxaban prevents VTE in orthopaedic surgery

Rivaroxaban, a non-vitamin K antagonist oral anticoagulant, is superior to enoxaparin for the prevention of venous thromboembolism (VTE) during the period of immobilization after patients undergo lower-limb non-major orthopaedic surgery. In Europe, thromboprophylaxis with a low-molecular-weight heparin, such as enoxaparin, is recommended after this form of surgery in patients who are at risk of thrombosis, whereas thromboprophylaxis is not currently recommended in the USA. In the PRONOMOS trial, 3,604 patients undergoing lower-limb non-major orthopaedic surgery were randomly assigned to receive rivaroxaban therapy or enoxaparin therapy. The primary end point of major VTE occurred in 0.2% and 1.1% of patients in each group, respectively (risk ratio 0.25, 95% CI 0.09–0.75, $P < 0.001$ for non-inferiority, $P = 0.01$ for superiority). The incidence of major or non-major bleeding was not significantly different between the two groups.

ORIGINAL ARTICLE Samama, C. M. et al. Rivaroxaban or enoxaparin in nonmajor orthopedic surgery. *N. Engl. J. Med.* https://doi.org/10.1056/NEJMoa1913808 (2020)

HEART FAILURE

Novel sGC stimulator improves outcomes in patients with HFrEF

Vericiguat, a novel oral soluble guanylate cyclase (sGC) stimulator, significantly reduces the incidence of cardiovascular death and hospitalization for heart failure (HF) in patients with worsening HF with reduced ejection fraction (HFrEF) compared with placebo. These findings were presented at the virtual ACC Scientific Sessions 2020.

Vericiguat can interact directly with sGC, the intracellular receptor for endogenous nitric oxide, to promote the production of cGMP. Vericiguat has previously been shown to reduce N-terminal pro-B-type natriuretic peptide levels in patients with worsening HFrEF. Investigators in the randomized, double-blind, placebo-controlled VICTORIA trial sought to evaluate the safety and efficacy of vericiguat in patients with worsening HFrEF.

A total of 2,526 patients were randomly assigned to receive vericiguat, and 2,524 were assigned to receive placebo. Over the follow-up period (median 10.8 months), the primary outcome (death from cardiovascular causes or first hospitalization for HF) occurred in 897 patients (35.5%) treated with vericiguat and 972 patients (38.5%) treated with placebo (HR 0.90, 95% CI 0.82–0.98, $P = 0.02$). The relative difference between treatment groups translated into an absolute event rate reduction of 4.2 events per 100 patient-years. The frequency of serious adverse events was not significantly different between the vericiguat and placebo groups (32.8% versus 34.8%).

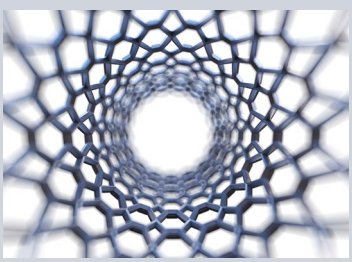
In a separate study, Butler and colleagues compared the findings from the VICTORIA trial with those from PARADIGM-HF and DAPA-HF. These trials each assessed a different drug (vericiguat, sacubitril–valsartan

CORONARY ARTERY DISEASE

No benefit of initial invasive strategy for managing CAD in advanced CKD

An initial invasive strategy in addition to guideline-based medical therapy does not reduce the risk of death or nonfatal myocardial infarction or relieve angina symptoms compared with an initial conservative strategy with medical therapy alone in patients with stable coronary artery disease (CAD) with moderate or severe ischaemia and advanced chronic kidney disease (CKD). These findings from the ISCHEMIA-CKD trial have been published in *The New England Journal of Medicine*.

Patients with CAD, also known as chronic coronary syndrome, who have CKD have often been excluded from trials on invasive treatment strategies for CAD. Therefore, the management of CAD in these patients is based on extrapolating results from cohorts without CKD. To address this knowledge gap, the ISCHEMIA-CKD trial investigators enrolled 777 patients with CAD, advanced CKD and moderate or severe ischaemia upon stress testing. The patients were randomly assigned to an initial invasive strategy with coronary angiography and revascularization (if appropriate) plus medical therapy or an initial strategy of medical therapy alone followed by angiography if medical therapy was unsuccessful. Of note, in the invasive-strategy group, 85% of the patients underwent angiography (versus 32% in the conservative-strategy group) and only 50% underwent revascularization.



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