IN BRIEF

ACUTE CORONARY SYNDROMES

Sonothrombolysis improves PCI after STEMI

The use of sonothrombolysis — the delivery of high mechanical index impulses from a diagnostic ultrasound transducer during an intravenous microbubble infusion — improves outcomes after primary percutaneous coronary intervention (PCI) for ST-segment elevation myocardial infarction (STEMI), according to data from the MRUSMI trial presented at ACC.19. Patients with a first STEMI were randomly assigned to receive sonothrombolysis before and after PCI or to undergo PCI only ($n = 50$ in each group). Compared with PCI only, the addition of sonothrombolysis was associated with increased rates of ST-segment resolution and improved angiographic recanalization before PCI. Moreover, infarct size at hospital discharge was decreased, left ventricular ejection fraction after PCI was increased and the need for defibrillator implantation was reduced with sonothrombolysis compared with PCI only.

ORIGINAL ARTICLE Mathias, W. Jr et al. Sonothrombolysis in ST-segment elevation myocardial infarction treated with primary percutaneous coronary intervention. *J. Am. Coll. Cardiol.* https://doi.org/10.1016/j.jacc.2019.03.006 (2019)

DEVICE THERAPY

Magnetically levitated LVAD gains MOMENTUM

In patients with advanced heart failure, the use of a fully magnetically levitated, centrifugal-flow left ventricular assist device (LVAD; HeartMate 3, Abbott) is associated with a reduced rate of disabling stroke and reoperation to replace or remove a malfunctioning device compared with the use of an axial-flow device (HeartMate 2, Abbott). This finding comes from the MOMENTUM 3 trial presented at ACC.19. In two previous interim analyses, the HeartMate 3 device was associated with a reduced rate of pump thrombosis or nondisabling stroke. The final analysis included a total of 1,028 patients who were randomly assigned to receive the HeartMate 3 or the HeartMate 2 device. The rate of survival free from disabling stroke and reoperation to replace or remove a malfunctioning device (the primary end point) was 76.9% and 64.8% in each group, respectively (relative risk (RR) 0.84, 95% CI 0.78–0.91, $P < 0.001$ for superiority). Pump replacement (the principal secondary end point) was also less common with the HeartMate 3 than with the HeartMate 2 device (RR 0.21, 95% CI 0.11–0.38, $P < 0.001$).

ORIGINAL ARTICLE Mehra, M. R. et al. A fully magnetically levitated left ventricular assist device — final report. *N. Engl. J. Med.* https://doi.org/10.1056/NEJMoa1900486 (2019)

RISK FACTORS

Eating eggs is linked to increased risk of CVD

Higher consumption of dietary cholesterol or eggs is associated with an increased risk of incident cardiovascular disease (CVD) and all-cause death in a dose–response relationship, according to an analysis of individual participant data pooled from six prospective cohorts from the USA. The analysis included 29,615 participants (44.9% men, 31.1% black, mean age 51.6 years at baseline), and the median duration of follow-up was 17.5 years. Each additional 300 mg of dietary cholesterol consumed per day was associated with an increased risk of CVD (adjusted HR 1.17) and all-cause death (adjusted HR 1.18). Similarly, each additional half egg consumed per day was associated with an increased risk of CVD (adjusted HR 1.06) and all-cause death (adjusted HR 1.08). "These results should be considered in the development of dietary guidelines," conclude the researchers.

ORIGINAL ARTICLE Zhong, V. W. et al. Associations of dietary cholesterol or egg consumption with incident cardiovascular disease and mortality. *JAMA* **321**, 1081–1095 (2019)

INFECTION

Pushing the envelope to prevent CIED infection

The use of an absorbable, antibacterial envelope is a safe and effective strategy for reducing major infections related to cardiac implantable electronic devices (CIEDs), according to the results of the WRAP-IT study presented at ACC.19.

"More than 1.5 million patients receive a CIED worldwide every year, but one of the most dreaded complications is infection," says Khaldoun Tarakji, the corresponding author. "Despite proper management with antibiotic therapy and device extraction and reimplantation, mortality remains high; therefore, prevention has been the cornerstone to address the issue of CIED infection." To date, the only intervention proven to decrease the risk of infection is one dose of preoperative antibiotic therapy.

Tarakji and colleagues performed a randomized, controlled trial to assess the safety and efficacy of an antibacterial envelope plus standard infection prevention strategies for reducing the risk of infection after CIED implantation compared with standard infection prevention strategies alone. The envelope is constructed from a fully absorbable mesh coated with an absorbable polymer mixed with two antibiotics, minocycline and rifampin. The antibiotics are eluted into the local tissue over the course of 7 days, and the envelope is fully absorbed in 9 weeks.

A total of 6,983 patients were included in the study — 3,495 in the envelope group and 3,488 in the control group. Patients were undergoing a CIED pocket revision, generator replacement or system upgrade, or an initial implantation of a cardiac resynchronization therapy defibrillator. The primary end point — major CIED infection within 12 months — occurred in 42 patients in the control group and

ANTIPLATELET THERAPY

Novel antibody-based reversal agent for ticagrelor

To date, no reversal agents for $P2Y_{12}$ receptor antagonists exist, despite the increased risk of major bleeding associated with its use. In a study presented at the ACC.19 and published in the *NEJM*, Deepak L. Bhatt and colleagues now report that a novel antibody-based agent that can bind to and reverse the antiplatelet effects of ticagrelor is safe and effective in healthy individuals.

$P2Y_{12}$ inhibitors such as ticagrelor are an essential part of the treatment regimen for many patients with acute coronary syndromes, but at present, no reversal agents for these inhibitors are clinically available. "[Given that] the antiplatelet effects of ticagrelor cannot be reversed with platelet transfusions," remarks Bhatt, "a rapid-acting reversal agent would be useful". PB2452 is a monoclonal antibody fragment that binds to ticagrelor with high affinity. The investigators hypothesized that intravenous administration of PB2452 would result in the rapid reversal of ticagrelor's antiplatelet effects, thereby diminishing the risk of bleeding.

In this placebo-controlled, double-blind, phase I trial, 64 healthy volunteers, most of whom were pretreated with ticagrelor, were assigned to receive various doses of intravenous PB2452 ($n = 48$) or placebo ($n = 16$). No dose-limiting toxic effects or infusion-related reactions were observed with PB2452 treatment.

Platelet aggregation was suppressed by approximately 80% after 48 h of ticagrelor pretreatment. Compared with placebo, PB2452 given as a 10-min bolus, followed by a 16-h infusion, was associated with significantly greater increase in platelet function, as measured by multiple platelet function assays.