

8. Hurlen M, Abdelnoor M, Smith P, Erikssen J, Arnesen H. Warfarin, aspirin, or both after myocardial infarction. *N Engl J Med* 2002;**347**:969–974.
9. Alexander JH, Lopes RD, James S, Kilaru R, He Y, Mohan P, Bhatt DP, Goodman S, Verheugt FW, Flather M, Huber K, Liaw D, Husted S, Lopez-Sendon J, De Caterina R, Jansky P, Darius H, Vinereanu D, Cornel JH, Cools F, Atar D, Leiva-Pons JL, Keltai M, Ogawa H, Pais P, Parkhomenko A, Ruzyllo W, Diaz R, White HD, Ruda M, Gerdas M, Lawrence J, Harrington R, Wallentin L. Apixaban with antiplatelet therapy after acute coronary syndrome. *N Engl J Med* 2011;**365**:699–708.
10. Mega JL, Braunwald E, Wiviott SD, Bassand JP, Bhatt D, Bode C, Burton P, Cohen M, Goto S, Fox KAA, Murphy S, Plotnikov AN, Schneider D, Sun X, Verheugt FWA, Gibson CM. Rivaroxaban in patients with a recent coronary syndrome. *N Engl J Med* 2012;**366**:9–19.
11. Oldgren J, Wallentin L, Alexander JH, James S, Jönelid B, Steg PG, Sundström J. New oral anticoagulants in addition to single or dual antiplatelet therapy after an acute coronary syndrome: a systematic review and meta-analysis. *Eur Heart J* 2013;**34**:1670–1680.
12. Granger GB, Alexander JH, McMurray JJV, Lopes RD, Hylek EM, Hanna M, Al-Khalidi HR, Ansell J, Atar D, Avezum A, Bahit MC, Diaz R, Easton JD, Ezekowitz JA, Flaker G, Garcia D, Gerdas M, Gersh BJ, Golitsyn G, Goto S, Hermosillo AG, Hohnloser SH, Horowitz J, Mohan P, Jansky P, Lewis BS, Lopes-Sendon J, Pais P, Parkhomenko A, Verheugt FWA, Zhu J, Wallentin L. Apixaban versus warfarin in patients with atrial fibrillation. *N Engl J Med* 2011;**365**:981–992.
13. Patel MR, Mahaffey KW, Garg J, Pan G, Singer DE, Werner H, Breithardt G, Halperin JL, Hankey GJ, Piccini JP, Becker RC, Nessel CC, Paolini JF, Berkowitz CD, Fox KAA, Califf RM. Rivaroxaban versus warfarin in nonvalvular atrial fibrillation. *N Engl J Med* 2011;**365**:883–891.
14. Tricoci P, Huang Z, Held C, Moliterno DJ, Armstrong PW, Van de WF, White HD, Aylward PE, Wallentin L, Chen E, Lokhnygina Y, Pei J, Leonardi S, Rorick TL, Kilian AM, Jennings LH, Ambrosio G, Bode C, Cequier A, Cornel JH, Diaz R, Erkan A, Huber K, Hudson MP, Jiang L, Jukema JW, Lewis BS, Lincoff AM, Montalescot G, Nicolau JC, Ogawa H, Pfisterer M, Prieto JC, Ruzyllo W, Sinnaeve PR, Storey RF, Valgimigli M, Whellan DJ, Widimsky P, Strony J, Harrington RA, Mahaffey KW. Thrombin-receptor antagonist vorapaxar in acute coronary syndromes. *N Engl J Med* 2012;**366**:20–33.
15. Dewilde WJM, Oirbans T, Verheugt FWA, De Smet BJGL, Herrman JP, Adriaenssens T, Vrolix M, Heestermans ACM, Vis MM, Tijssen JGP, Van 't Hof AW, Ten Berg JM. Use of clopidogrel with or without aspirin in patients talking oral anticoagulant therapy and undergoing percutaneous coronary intervention: an open-label, randomised controlled trial. *Lancet*; doi: 10.1016/S0140-6736(12)62177-1. Published online ahead of print 12 February 2013.

## CARDIOVASCULAR FLASHLIGHT

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### Percutaneous biventricular cardiac assist device in cardiogenic shock

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Patients with cardiogenic shock who require mechanical circulation support may profit from more effective, less invasive devices. *Panel A* shows the first-in-man use of biventricular percutaneous support with impeller devices (Abiomed Impella, Danvers, MA, USA). The 54-year-old patient presented with acute myocardial infarction and shock due to biventricular pump failure. When angioplasty of the RCA, intravascular volume optimization, and high-dose inotropes failed to stabilize the patient, a percutaneous left ventricular-assist device was implanted. Pulmonary oedema resolved, but severe right heart failure with multi-organ failure (liver, kidney) persisted despite nitric oxide therapy. Additional percutaneous device implantation in the right heart led to circulatory stabilization and progressive organ function recovery, with successful device weaning on Day 8. Echocardiography on Day 44 showed a normal right ventricular function. *Panel B* shows the pump head and *Panel C* the topology of the devices.

