

myocytes into pacemaker cells like those in the sinoatrial node. Focal gene therapy with just one gene (a transcription factor named Tbx18) suffices to perform this little feat of biological alchemy'.

Although the biological pacemaker is not yet in use in humans, if all goes well, Dr Marbán and his colleagues hope to start clinical testing within four years. 'The first target indications will be restricted to patients who desperately need a pacemaker, but cannot tolerate implantable hardware. If we are successful, it is conceivable that, eventually, biological pacemakers might supplant electronic devices for more common indications', he said.

Away from medicine, he enjoys sailing in the Pacific Ocean and spending time with his wife Linda and their children, watching baseball or football. When asked what advice he would give to young researchers, he said: 'If we have learned anything from the past couple of decades of cardiac research, it is that there is still so much to learn'.

'The heart still has many mysteries; 20 years ago, we didn't know that the adult heart could regenerate itself, even to a small degree; 10 years ago, we had no idea that exosomes might mediate the benefits of cell therapy. Both of these concepts have upended conventional wisdom about our prospects to improve the heart's response to injury. So, my advice to young researchers is to look for those mysteries. Ask big questions. If you don't, at best you will come up with small answers'.



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'Ten Commandments' of the 2017 ESC DAPT focused update Guidelines

- (1) The implementation of a DAPT regimen well before the decision to proceed to PCI is taken is both patient and P2Y12 inhibitor dependent.
- (2) DAPT duration should be individualized and be guided by both bleeding and ischaemic risks.
- (3) The decision for DAPT duration should be dynamic and reassessed during the course of the initially selected DAPT regimen.
- (4) The type of stent implanted should not *per se* affect the decision-making on DAPT duration.
- (5) The decision to implant a bare metal or a drug-eluting stent does not justify a 30-day or longer course of DAPT, respectively.
- (6) Clopidogrel is the only recommended P2Y12 inhibitor when a DAPT regimen needs to be associated with oral anticoagulation.
- (7) A proton-pump inhibitor should be liberally prescribed in association with a DAPT regimen and not only restricted to those patients at high risk for gastrointestinal bleeding
- (8) Elective surgery requiring discontinuation of DAPT should be planned from beyond 1 month after DAPT implementation time in patients who experienced an ACS and/or underwent coronary stent implantation.
- (9) Prolongation of a DAPT regimen beyond 1 year remains a patient-by-patient decision
- (10) Female gender should not *per se* drive a different type of duration of DAPT.



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