

What Cannot Be Missed: Important Publications on Electrophysiology in 2021

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The editors are pleased to present the following important papers and brief summaries from 2021 for your attention.

Clinical Arrhythmias Atrial Fibrillation

Lurie A, Wang J, Hinnegan KJ, et al. Prevalence of left atrial thrombus in anticoagulated patients with atrial fibrillation. *J Am Coll Cardiol* 2021;77:2875–86. <https://doi.org/10.1016/j.jacc.2021.04.036>; PMID: 34112315.

- Left atrial thrombus prevalence is high in subgroups of anticoagulated patients with AF/atrial flutter, who may benefit from routine pre-procedural transoesophageal echocardiography before cardioversion or catheter ablation.

Gencer B, Djousse L, Al-Ramady OT, et al. Effect of long-term marine ω -3 fatty acids supplementation on the risk of atrial fibrillation in randomized controlled trials of cardiovascular outcomes: a systematic review and meta-analysis. *Circulation* 2021;144:1981–90. <https://doi.org/10.1161/CIRCULATIONAHA.121.055654>; PMID: 34612056.

- In randomised controlled trials examining cardiovascular outcomes, marine ω -3 supplementation was associated with an increased risk of AF.

Schmidt AS, Lauridsen KG, Møller DS, et al. Anterior-lateral versus anterior-posterior electrode position for cardioverting atrial fibrillation. *Circulation* 2021;144:1995–2003. <https://doi.org/10.1161/circulationaha.121.056301>; PMID: 34814700.

- Anterior-lateral electrode positioning was more effective than anterior-posterior electrode positioning for biphasic cardioversion of AF.

Squara F, Elbaum C, Garret G, et al. Active compression versus standard anterior-posterior defibrillation for external cardioversion of atrial fibrillation: a prospective randomized study. *Heart Rhythm* 2021;18:360–5. <https://doi.org/10.1016/j.hrthm.2020.11.005>; PMID: 33181323.

- Active compression applied to the anterior defibrillation electrode is more effective for persistent AF cardioversion than standard

anterior-posterior cardioversion, with lower defibrillation threshold and higher success rate.

Lip GYH, Tran G, Genaidy A, et al. Improving dynamic stroke risk prediction in non-anticoagulated patients with and without atrial fibrillation: comparing common clinical risk scores and machine learning algorithms. *Eur Heart J Qual Care Clin Outcomes* 2021. <https://doi.org/10.1093/ehjqcco/qcab037>; PMID: 33999139; online ahead of press.

- Large improvements in stroke risk prediction can be shown with a multimorbid index and a machine learning approach incorporating changes in risk related to ageing and incident comorbidities.

Chao TF, Joung B, Takahashi Y, et al. 2021 Focused update consensus guidelines of the Asia Pacific Heart Rhythm Society on stroke prevention in atrial fibrillation: executive summary. *Thromb Haemost* 2022;122:20–47. <https://doi.org/10.1055/s-0041-1739411>; PMID: 34773920.

- Guidelines on stroke prevention in AF from the Asia Pacific Heart Rhythm Society.

Ventricular Arrhythmias

Muser D, Nucifora G, Pieroni M, et al. Prognostic value of non-ischemic ring-like left ventricular scar in patients with apparently idiopathic non-sustained ventricular arrhythmias. *Circulation* 2021;143:1359–73. <https://doi.org/10.1161/CIRCULATIONAHA.120.047640>; PMID: 33401956.

- In patients with apparently idiopathic non-sustained ventricular arrhythmias, non-ischaemic left ventricular scar with a ringlike pattern is associated with malignant arrhythmic events.

Cadrin-Tourigny J, Bosman LP, Wang W, et al. Sudden cardiac death prediction in arrhythmogenic right ventricular cardiomyopathy: a multinational collaboration. *Circ Arrhythm Electrophysiol* 2021;14:e008509. <https://doi.org/10.1161/circep.120.008509>; PMID: 33296238.

- Life-threatening ventricular arrhythmic events in patients with arrhythmogenic right ventricular cardiomyopathy can be predicted by a novel simple prediction model using only four clinical predictors.

Syncope

Sheldon R, Faris P, Tang A, et al. Midodrine for the prevention of vasovagal syncope: a randomized clinical trial. *Ann Intern Med* 2021;174:1349–56. <https://doi.org/10.7326/M20-5415>; PMID: 34339231.

- Midodrine can reduce the recurrence of syncope in healthy, younger patients with a high syncope burden.

Electrophysiology and Ablation

DeLurgio DB, Crossen KJ, Gill J, et al. Hybrid Convergent procedure for the treatment of persistent and long-standing persistent atrial fibrillation: results of CONVERGE clinical trial. *Circ Arrhythm Electrophysiol* 2020;13:e009288. <https://doi.org/10.1161/circep.120.009288>; PMID: 33185144.

- The Hybrid Convergent procedure has superior effectiveness compared to catheter ablation for the treatment of persistent and long-standing persistent AF.

Andrade JG, Wells GA, Deyell MW, et al. Cryoablation or drug therapy for initial treatment of atrial fibrillation. *N Engl J Med* 2021;384:305–15. <https://doi.org/10.1056/nejmoa2029980>; PMID: 33197159.

- Among patients receiving initial treatment for symptomatic, paroxysmal AF, there was a significantly lower rate of AF recurrence with catheter cryoballoon ablation than with antiarrhythmic drug therapy, as assessed by continuous cardiac rhythm monitoring.

Wazni OM, Dandamudi G, Sood N, et al. Cryoballoon ablation as initial therapy for atrial fibrillation. *N Engl J Med* 2021;384:316–24. <https://doi.org/10.1056/nejmoa2029554>; PMID: 33197158.

- Cryoballoon ablation as initial therapy was superior to drug therapy for the prevention of atrial arrhythmia recurrence in patients with paroxysmal AF.

Kuniss M, Pavlovic N, Velagic V, et al. Cryoballoon ablation vs. antiarrhythmic drugs: first-line therapy for patients with paroxysmal atrial fibrillation. *Europace* 2021;23:1033–41. <https://doi.org/10.1093/europace/euab029>; PMID: 33728429.

- Cryoballoon catheter ablation was superior to anti-arrhythmic drug therapy, significantly reducing atrial arrhythmia recurrences in treatment naive patients with paroxysmal AF.

Heeger CH, Sohns C, Pott A, et al. Phrenic nerve injury during cryoballoon-based pulmonary vein isolation: results of the worldwide YETI registry. *Circ Arrhythm Electrophysiol* 2022;15:e010516. <https://doi.org/10.1161/CIRCEP.121.010516>; PMID: 34962134.

- The incidence of phrenic nerve injury (PNI) during cryoballoon-based pulmonary vein isolation was 4.2%. Overall 97% of PNI cases recovered within 12 months.

Calkins H, Gache L, Frame D, et al. Predictive value of atrial fibrillation during the postradiofrequency ablation blanking period. *Heart Rhythm* 2021;18:366–73. <https://doi.org/10.1016/j.hrthm.2020.11.020>; PMID: 33242668.

- Freedom from AF recurrence during the blanking period is highly predictive of longer-term success in catheter ablation.

Katrtsis DG, Marine JE, Katrtsis G, et al. Spatial characterization of the tachycardia circuit of atrioventricular nodal re-entrant tachycardia. *Europace* 2021;23:1596–602. <https://doi.org/10.1093/europace/euab130>; PMID: 34240123.

- Successful ablation affects the tachycardia circuit without necessarily

abolishing slow conduction, probably by interrupting the circuit at the septal isthmus.

Reddy VY, Dukkipati SR, Neuzil P, et al. Pulsed field ablation of paroxysmal atrial fibrillation: 1-year outcomes of IMPULSE, PEFCAT, and PEFCAT II. *JACC Clin Electrophysiol* 2021;7:614–27. <https://doi.org/10.1016/j.jacep.2021.02.014>; PMID: 33933412.

- Pulmonary vein isolation (PVI) with a ‘single-shot’ pulse-field-ablation catheter results in excellent PVI durability and acceptable safety, with a low 1-year rate of atrial arrhythmia recurrence

Brignole M, Pentimalli F, Palmisano P, et al. AV junction ablation and cardiac resynchronization for patients with permanent atrial fibrillation and narrow QRS: the APAF-CRT mortality trial. *Eur Heart J* 2021;42:4731–9. <https://doi.org/10.1093/eurheartj/ehab569>; PMID: 34453840.

- Ablation plus cardiac resynchronisation was superior to pharmacological therapy in reducing mortality in patients with permanent AF and narrow QRS on ECG who had been hospitalised for heart failure, irrespective of their baseline left ventricular ejection fraction.

Katrtsis G, Luther V, Jamil-Copley S, et al. Postinfarct ventricular tachycardia substrate: characterization and ablation of conduction channels using ripple mapping. *Heart Rhythm* 2021;18:1682–90. <https://doi.org/10.1016/j.hrthm.2021.05.016>; PMID: 34004345.

- Conduction channels can be located using ripple mapping to analyse scar potentials. Ablation at channel entrances can eliminate scar-related potentials and is associated with good medium-term results.

Cardiac Implanted Electronic Devices

Gold MR, Lambiase PD, El-Chami MF, et al. Primary results from the understanding outcomes with the S-ICD in primary prevention patients with low ejection fraction (UNTOUCHED) trial. *Circulation* 2021;143:7–17. <https://doi.org/10.1161/CIRCULATIONAHA.120.048728>; PMID: 33073614.

- This study demonstrates high efficacy and safety with contemporary subcutaneous-ICD devices and programming despite the relatively high incidence of comorbidities in comparison with earlier subcutaneous-ICD trials.

Schaller RD, Brunker T, Riley MP, et al. Magnetic resonance imaging in patients with cardiac implantable electronic devices with abandoned leads. *JAMA Cardiol* 2021;6:549–56. <https://doi.org/10.1001/jamacardio.2020.7572>; PMID: 33595595.

- The risk of MRI in patients with abandoned cardiac implanted electronic device leads was low in this large observational study, including patients who underwent examination of the thorax.

Vijayaraman P, Ponnusamy OC, Sharma PS, et al. Left bundle branch area pacing for cardiac resynchronization therapy: results from the International LBBASP Collaborative Study Group. *JACC Clin Electrophysiol* 2021;7:135–47. <https://doi.org/10.1016/j.jacep.2020.08.015>; PMID: 33602393.

- Left bundle area pacing is feasible and safe and provides an alternative option for cardiac resynchronisation therapy.

Vinther M, Risum N, Svendsen JH, et al. A randomized trial of His pacing versus biventricular pacing in symptomatic heart failure patients with left bundle branch block (His-Alternative). *JACC Clin Electrophysiol* 2021;7:1422–32. <https://doi.org/10.1016/j.jacep.2021.04.003>; PMID: 34167929.

- In heart failure patients with left bundle branch block, His-based cardiac resynchronisation therapy provided similar clinical and physical improvement compared with biventricular cardiac resynchronisation therapy at the expense of higher pacing thresholds.

Basic Science and Future Directions

Ng FS, Toman O, Petru J, et al. Novel low-voltage multipulse therapy to terminate atrial fibrillation. *JACC Clin Electrophysiol* 2021;7:988–99. <https://doi.org/10.1016/j.jacep.2020.12.014>; PMID: 33812836.

- Low-voltage MultiPulse Therapy effectively terminated AF at voltages and energies known to be well tolerated or painless in some patients.

Choi YS, Yin RT, Pfenniger A, et al. Fully implantable and bioresorbable cardiac pacemakers without leads or batteries. *Nat Biotechnol* 2021;39:1228–38. <https://doi.org/10.1038/s41587-021-00948-x>; PMID: 34183859.

- A report of leadless, battery-free, fully implantable cardiac

pacemaker for postoperative control of cardiac rate and rhythm that undergoes complete dissolution and clearance by natural biological processes after a defined operating timeframe.

Rogers AJ, Selvalingam A, Alhusseini MI, et al. Machine learned cellular phenotypes in cardiomyopathy predict sudden death. *Circ Res* 2021;128:172–84. <https://doi.org/10.1161/circresaha.120.317345> PMID: 33167779.

- Machine learning of action potential recordings in patients revealed novel phenotypes for long-term outcomes in ischaemic cardiomyopathy.

Giudicessi JR, Schram M, Bos JM, et al. Artificial intelligence-enabled assessment of the heart rate corrected QT Interval using a mobile electrocardiogram device. *Circulation* 2021;143:1274–86. <https://doi.org/10.1161/circulationaha.120.050231>; PMID: 33517677.

- Using smartphone-enabled electrodes, an artificial-intelligence deep neural network can predict accurately the QTc of a standard 12-lead ECG. 