

Atrial fibrillation cardioversion in the emergency department



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Atrial fibrillation is the most common arrhythmia, with a prevalence of 10–20% in individuals aged 80 years and older.^{1,2} This condition is associated with substantial morbidity, mainly related to tachycardia and thrombus formation (with risk of stroke and peripheral embolism).³ The increase in heart rate could be bothersome to patients and cause left ventricular dysfunction, leading to heart failure.⁴ Hence, atrial fibrillation is a frequent reason for admission to the emergency department.⁵

Several aspects of the management of patients with atrial fibrillation in the emergency department are still matters of debate and research.⁶ First, it is unknown whether a strategy based on rate control (ie, using drugs that slow the heart rate without suppressing the arrhythmia) is better or worse than a strategy based on rhythm control (ie, attempts to restore and maintain sinus rhythm).⁷ Second, it is questionable whether immediate restoration of sinus rhythm is necessary in patients with new-onset atrial fibrillation because a trial in 2019 showed spontaneous cardioversion within 48 h in 69% of patients.⁸ Third, no conclusive evidence on the best strategy for cardioversion of atrial fibrillation (electrical defibrillation vs pharmacological cardioversion) exists, and guidelines do not provide recommendations.^{6,7,9,10}

In *The Lancet*, Ian Stiell and colleagues¹¹ report the results of RAFF2, a multicentre, single-blind, randomised, placebo-controlled trial including patients with acute (ie, first detected, recurrent paroxysmal, or recurrent persistent, with onset \leq 48 h) atrial fibrillation. The authors randomly assigned 396 patients (mean age 60 years; 260 [66%] men) to either attempted pharmacological cardioversion with intravenous procainamide followed by electrical cardioversion if necessary (drug-shock) or placebo infusion followed by electrical cardioversion (shock only). The primary outcome was conversion to and maintenance of sinus rhythm for at least 30 min after cardioversion attempts. A second protocol aimed at assessing the most effective pad position among patients having electrical cardioversion. The authors report a high proportion of patients converting to sinus rhythm in both study

groups, with no significant differences among groups (96% in the drug-shock group vs 92% in the shock-only group, absolute difference 4%; 95% CI 0–9; $p=0.07$). The comparison of the anteroposterior and anterolateral pad positions showed similar conversions to sinus rhythm in both groups.

This trial addresses one gap in the management of atrial fibrillation: which cardioversion strategy should be preferred in the emergency department. The most important finding of this study is that both the drug-shock and shock-only strategies are equally highly effective. The question of how to decide which strategy to use in each individual patient therefore remains. The authors of the RAFF2 study favour the drug-shock approach because they state that antiarrhythmic drugs have fewer side-effects than electrical cardioversion and allow physicians to attend to other tasks during the procainamide infusion. However, only one patient in the shock-only group had a serious adverse outcome (due to an absence of synchronisation during the electrical cardioversion), whereas several patients in the drug-shock group had mild adverse events. Therefore, it is not known whether the drug-shock approach requires less monitoring of patients than the shock-only approach.

The assessment of the primary outcome at 30 min is useful from the perspective of the emergency



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department clinician. However, from the perspective of the patient, a sustained persistence of sinus rhythm is a desirable outcome. 95% of patients were in sinus rhythm, with no difference between groups at 14 days, although fewer than 80% of patients returned for follow-up evaluation. Moreover, because patients in the shock-only group had a placebo infusion, the study cannot assess the differences in length of stay in the emergency department. Furthermore, the authors used procainamide as the antiarrhythmic drug because it is the Canadian standard of care. This drug is much less popular outside of North America, where class IC antiarrhythmic drugs are available in intravenous formulations. The potential advantage of using flecainide or propafenone for pharmacological cardioversion is that the clinician could assess the efficacy of these drugs and prescribe them for long-term maintenance of sinus rhythm. However, class IA and IC antiarrhythmic drugs are similarly effective for cardioversion, so the study findings could potentially be extended to class IC drugs.¹²

In conclusion, this study adds important evidence to the management of haemodynamically stable patients with acute atrial fibrillation. However, because no cardioversion strategy was shown to be superior, the answer might be that patients and clinicians should share this decision, considering the preference of the patient, the experience of the clinicians, and the pros and cons of each strategy.

We declare no competing interests.

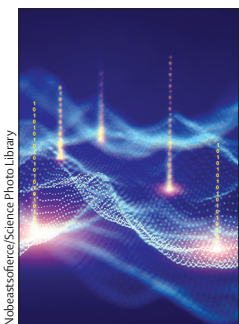
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Defining colon cancer biomarkers by using deep learning



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Refined approaches are needed to better risk-stratify patients with colorectal cancer for prognosis. No predictive biomarkers of treatment efficacy have yet been identified in patients with non-metastatic disease. Ole-Johan Skrede and colleagues¹ in *The Lancet* report on a computer-generated biomarker, the DoMore-v1-colorectal cancer (DoMore-v1-CRC) classifier, which was derived from conventionally stained histopathological images by using deep learning methods. This study adds value to the application of deep learning methods in cancer research as it stimulates a discussion on the potential

use of automated methods to generate new information from existing pathological data.

The study used training, test, and validation cohorts to develop and retrospectively apply a deep learning-based algorithm for estimation of colorectal cancer-specific survival. 828 patients with stage I–III colorectal cancer in the training set (49% women; median age 69 years [IQR 61–75]) were categorised as having a good or poor disease outcome. Data from these patients were used to train a total of ten convolutional neural networks (built for classifying heterogeneous images), which were then integrated into a prognostic

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