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Terminating Ventricular Fibrillation Using Pulsed Far-Field Stimulation in Whole Rabbit Hearts[1] AMGAD SQUIRES, Cornell University, DANIEL HORNUNG, PHILIP BITTIHN, DONG XIA WU, VALENTIN KRINSKY, Max Planck Institute for Dynamics and Self-Organization, MARKUS ZABEL, University Hospital Göttingen, EBERHARD BODENSCHATZ, STEFAN LUTHER, Max Planck Institute for Dynamics and Self-Organization — During life-threatening cardiac fibrillation, chaotic spatio-temporal dynamics is mediated by vortex-like rotating waves. Current defibrillation strategies rely on global control through high-energy shocks, which may have severe side-effects including traumatic pain and tissue damage. Far-field antifibrillation pacing terminates fibrillation using a train of low-energy electric pulses [1,2]. Using optical mapping in isolated rabbit heart preparations, we evaluate the efficiency and robustness of this approach. We found that a series of pulses at low energies (< 2.0 J) is sufficient to extinguish ventricular fibrillation with a success rate of 95%. We will discuss the physical mechanisms involved.

[1] F.H. Fenton et al, Circulation 120 467-476 (2009).
[2] A. Pumir et al., Phys. Rev. Lett. 99, 208101 (2007).

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