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Modeling atrial fibrillation formation by multilayer cellular automata

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Atrial fibrillation is one of the most common sustained abnormal heart rhytm (1). Continous models have been shown to reproduce the macroscopic behaviour (2), however they fail to capture the microscopic effects of fibrosis (2). Discrete, cellular automata based models have been succesufully used to reproduce the phenomena of spiral waves formation in atrial fibrillation (3),(4),(5),(6).

In the following a multilayer cellular automata model, inspired by (5), is presented. Fibrosis is simulated by the introduction of collagen fibers, and by regulation of a number of lateral crossconnections. Effects on spiral waves formation and wave propagation speed are examined. Single and multilayer models are compared.

The results were obtained by performing numerical simulations.

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