**Morphological substrates for atrial arrhythmogenesis in a heart with atrioventricular septal defect**

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**Supplementary material**

**Video legends**

**Supplementary video 1.** Inter-nodal conduction through the atrial muscle bundles. Showing excitation of the distal aspect of the region normally associated with the ‘slow’ pathway precedes that of the ‘fast’ pathway. The septal aspect of the elongated ‘fast pathway’ is indicated by the red arrow. The simulation is viewed superiorly. Pink indicates activated myocardium, light blue indicates dormant myocardium. Simulation time period equals 180 milliseconds. See methods for modelling parameters. White\*- location of compact atrioventricular node, CS- coronary sinus, VA- valve annulus.

**Supplementary video 2.** Preferential inter-nodal conduction via the ‘slow’ pathway in the whole atria of a heart with AVSD. Showing excitation of the distal aspect of the region normally associated with the ‘slow’ pathway precedes that of the ‘fast’ pathway. The septal aspect of the elongated ‘fast pathway’ is indicated by the red arrow. The simulation is viewed inferiorly. Pink indicates activated myocardium, light blue indicates dormant myocardium. Simulation time period equals 112 milliseconds. See methods for modelling parameters. White\*- location of compact atrioventricular node, LAA- left atrial appendage, RAA- right atrial appendage, SN- sinus node.

**Supplementary video 3.** Fast pacing elicits retrograde conduction via the ‘slow’ pathway in the atria of a heart with AVSD. Showing preferential inter-nodal conduction via the region normally associated with the ‘fast’ pathway, and subsequent retrograde conduction up the ‘slow’ pathway, during an atrial pacing protocol (s1-s2 interval 300 ms). The septal region of the elongated ‘fast’ pathway is indicated by the red arrow. The simulation is viewed inferiorly. Pink indicates activated myocardium, light blue indicates dormant myocardium. Simulation time period equals 1000 milliseconds. See methods for modelling parameters. White\*- location of compact atrioventricular node, LAA- left atrial appendage, RAA- right atrial appendage, SN- sinus node.