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Ventricular fibrillation (VF) is a chaotic arrhythmia, with asynchronous depolarisation and repolarisation in different areas of the heart. However, frequency analysis of electrically-induced VF in the dog showed a narrow bandwidth (4.6± 0.6 Hz at - 10 db), and a strongly dominant frequency of 11.5± 0.6 Hz (mean ± S.E.M., 10 dogs). What is the significance of this periodic component in VF? Is it possible to synchronise the defibrillating countershock to a peak or a trough of the waveform? If less energy was required for defibrillation with shocks synchronised to a particular phase of VF, this would be important in minimising the risk of myocardial damage, and for endocardial defibrillation. Arterial blood pressure, pH and the ECG were monitored in 12 anaesthetised dogs, artificially respired. VF was induced electrically. A synchronisation circuit sensed the peaks of the VF waveform, and discharged the defibrillator at the following trough or peak of the VF waveform. The ventricular defibrillation threshold was determined as the smallest transthoracic shock to defibrillate the heart under the 3 conditions, in random order. There was no significant difference in the threshold delivered energy for shocks synchronised to the peaks of VF (19.9± 1.2 J), to the troughs (18.9± 1.4 J), or for unsynchronised shocks (21.1± 2.1 J). There was also no significant difference in the threshold delivered current for shocks synchronised to the peaks of VF, to the troughs or for unsynchronised shocks. There is some periodicity in the VF waveform. It is possible to synchronise the defibrillating countershock to a particular phase of VF. However this is unlikely to be of clinical value.