Truncated Biphasic Pulses for Transthoracic Defibrillation.


**Purpose**
To determine the transthoracic defibrillation waveform efficacy of two low-energy (115 and 130 Joules; J) SMART Biphasic truncated exponential waveforms (Philips Medical), as compared to a conventional 200 J monophasic damped sine waveform. This study was undertaken as part of the early stage development of the SMART Biphasic waveform, to determine if this biphasic waveform was equivalent to a standard monophasic waveform design.

**Methods**
- Prospective, randomized study done in an electrophysiology laboratory setting. Transthoracic rescue shocks were delivered following failed transvenous shocks during implantable cardioverter-defibrillator (ICD) testing. A sample size of 30 patients was selected from a total of 33 cardiac arrest survivors.
- Each of the three transthoracic defibrillation waveforms was selected in random order. Success was defined as termination of VF within 3 seconds of shock delivery without intervention. Following induction of each VF episode, the transvenous shock was delivered after 10 seconds of VF; if unsuccessful, the transthoracic shock was administered within 4 seconds. If the first transthoracic shock failed, a second shock was delivered using a 200 J monophasic damped sine waveform.
- Primary endpoint: First shock defibrillation efficacy.

**Findings**
First shock defibrillation efficacy rate was 97%, regardless of the waveform used.

**Conclusions**
Both the 115 and 130 Joule biphasic truncated exponential waveform are as effective as the traditional 200 Joule monophasic damped sine waveform for transthoracic defibrillation following failed ICD shocks of short duration, induced ventricular fibrillation.