

Order of amplitude and pulse duration for: ventricular capture; atrial capture

1. Output

- a) The pulse generator's output is measured in volts, units of electrical potential difference. The difference in electrical potential pushes current through the pacing lead and heart. The current flow, measured in amps, is the electron flow rate. Resistance, measured in ohms, is the opposition to current flow. The amount of current flow is determined by the voltage & resistance
- b) Pulse generators provide either constant current or constant voltage.
 - i) Constant voltage means that generator produces the same voltage to the lead regardless of lead resistance. As the resistance increases, the current decreases, maintaining a constant voltage output.
 - ii) Constant current means that the generator varies the output voltage in proportion to the lead resistance. As the resistance increases, the voltage increases to maintain a constant current level.
- c) Current used to depolarise the heart
 - i) up to 20mA
 - ii) Usually < 5 mA for ventricles
- d) Pulse width & pulse amplitude
 - i) Pulse width
 - a) Amount of time during which the voltage is applied to the heart, causing current to flow, is the pulse width - measured in ms.
 - b) Amount of time current is applied to the heart
 - c) Determined by the length of time it takes for the capacitor to discharge
 - d) Under 1 ms
 - e) The longer the pulse width, the greater discharge of energy per pulse & the shorter the battery life
 - ii) Pulse amplitude
 - a) Potential required to capture heart ?
 - (1) A typical pacemaker delivers about 5 volts to the myocardium resulting in a surface recorded pacemaker of about 200 mV
 - b) Peak to peak voltage of the signal, mV above or below the isoelectric line on the ECG
 - (1) Typical R-waves amplitudes range 5—15 mv, so we are assured that the R-waves are being sensed and the generator is being inhibited
 - (2) P-waves are seldom large enough to be sensed
 - (3) T-waves are not sensed by using a refractory period in the sensing circuit (after the R-wave)

2. Pulse interval

- a) The time between pacing pulses
- b) Determined by the length of time the capacitor takes to recharge
- c) Determines the paced heart Rate !!

