How to program ST. JUDE MEDICAL PACEMAKER

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When dealing with heart rate systems, it is necessary to consider the following factors:

- Sensing threshold
- Capture threshold
- Pacing configuration
- Delay intervals
Sensing

- Sensing refers to the pacemaker’s ability to “see” intrinsic cardiac activity and, if appropriate, to respond to it
- Most pacemaker patients have some intrinsic cardiac activity
Sensitivity

- Sensitivity is the parameter that governs sensing in a pacemaker
- Sensitivity is programmable in mV (millivolts)
Considerations in Sensitivity Programming

- To make the device more sensitive (to pick up signals it might be missing), lower the mV setting.
- To make the device less sensitive (to avoid detecting non-cardiac signals), increase the mV setting.
- Sensitivity should:
  - Pick up low-amplitude cardiac signals.
  - Avoid very low-amplitude non-cardiac signals.
The optimal amplitude of intrinsic R_WAVE > 5 mv

The optimal amplitude of intrinsic P_WAVE > 2 mv
Capture

- **Capture** is the depolarization and resulting contraction of the heart (atria or ventricles) in response to a pacemaker output pulse.

- 1:1 capture means every pacemaker output pulse causes a cardiac contraction.

- What does capture look like?
  - Spike followed immediately by a beat.
  - Beat often has a distinctly “paced”-looking morphology:
    - Wider, notched QRS
    - Inverted P-waves
An VVI-Paced ECG
Capture Threshold

- Capture threshold is the minimum amount of electrical energy required to consistently depolarize (or “capture”) the heart
- Capture threshold is stated in two output parameters:
  - Pulse amplitude, stated in volts
  - Pulse width or duration, stated in milliseconds
- Capture threshold may also be called
  - Pacing threshold
  - Stimulation threshold
Got Capture?
- The optimal threshold in the ventricle is \( <1 \text{ v} \)
- The optimal threshold of the Atrium is \( <1.5 \text{ v} \)
What to do next ????????
The sequence to program a pace maker

- Programming the pulse amplitude
- Best lead configuration
- Heart rate
- Delay intervals
Pulse amplitude programming
- The safety margin to be put in consideration is 2:1

For example:
If the capture threshold is 1 v
The safety margin must not be less than 2 v
Lead configuration

It is the polarity of the lead which got the best capture and sensing threshold.

The two configurations available in the pacemaker parameter is **UNIPOLAR/BIPOLAR**.
Heart rate interval and hysteresis options
Delay interval
Delays

- Paced AV Delay: 170 ms
- Sensed AV Delay: 150 ms
- Rate Responsive AV Delay: Off
- Shortest AV Delay: 100 ms

Ventricular Intrinsic Preference (VIP)™: 100 ms
Search Interval: 1 Minute
Search Cycles: 1

Encourage intrinsic conduction
or
Encourage ventricular pacing

Negative AV Hysteresis / Search: Off

2:1 Block Rate: 142 min⁻¹
Summary

- Getting the reading of the intrinsic P & R waves
- Got the capture threshold
- Begin programming:
  - Pulse amplitude
  - Lead configuration
  - Heart rate interval and hysteresis
  - Delay interval options
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