

# 27. Permanent Pacers

## Basically Two Types of Clinically Pacemakers

1. **"VVI" SINGLE LEAD**
  - a. Ventricular pacing and sensing; inhibited when ventricle fires on its own
  - b. Useful for patients with chronic atrial fibrillation
  
2. **"DDD" TWO LEADS**
  - a. Excellent for providing atrial kick; can adjust PR interval to allow filling
  - b. Generally should be used in most patients without atrial fibrillation

## **Pacemaker types are designated by 3 or 4 letters**

- a. First letter - Pacing (which or both ventricles), eg. A, V, or D (dual)
- b. Second letter - Sensing (which or both ventricles)
- c. Third letter - Mode (whether pacer is inhibited or activated after sensing)
- d. Fourth letter -Rate responsive (R) or other option
  1. Pacing---Ventricle (V), Atrium (A), or both (D for dual)  
Lithium-Iodide battery generates electrical impulse
  2. Sensing - V, A or D
  3. Mode - Triggered (T) or Inhibited (I) when sensing occurs or Both (D).
  4. Rate Responsive (R) - usually to motion, oxygen levels, etc.
  5. Mode switching: DDD pacer switches to VVI when atrial fibrillation is noted
  6. Hysteresis - waiting period: pacer begins at heart rate < Z, but paces at rate > Z

**Holding magnet over pacemaker**, pacer becomes VOO or DOO-pacing only

**Pacemaker Implantation Guidelines**: (Gregoratos, et al, JACC 2002; 40:1703-19)

1. Sinus Node Dysfunction
  - Class I Symptomatic bradycardia, sinus pauses even if due to essential drug therapy
  - Class IIb In minimally symptomatic patients, rates <30 bpm while awake  
Tachy-Brady Syndrome
  - Class III In asymptomatic, or symptomatic bradycardia due to nonessential drug
2. Acquired Atrioventricular Block
  - Class I --Asystole 3.0 sec or any escape rate <40 bpm in awake symptom-free, or  
After catheter ablation, Postoperative AV block not expected to resolve
  - Class IIa Asymptomatic 3<sup>o</sup> AV block average awake ventricular rates > 40 bpm
  - Class III AV block expected to resolve (drug toxicity, Lyme disease)
3. Chronic Bifascicular and Trifascicular Block
  - Class I - Intermittent third-degree AV block & Type II 2<sup>o</sup> AV block.  
--2<sup>o</sup> AV block regardless of type with associated symptomatic  
--Alternating Bundle Branch Blocks (may progress to 3<sup>o</sup> AVB)
  - Class IIa -Syncope probably due to AV block
  - Class III Fascicular block without AV block or symptoms..
4. After the Acute Myocardial Infarction
  - Class I-- Mostly as above  
Persistent 1<sup>o</sup> AV Block with associated BBB (not present before MI)
  - Class III- Transient AV block in the absence of intraventricular conduction defects.
5. Newer Indications
  - a. Hypertrophic obstructive cardiomyopathy-DDD pacing, short AV interval
  - b. Biventricular Pacing pacing both ventricles via RV apex and LV from the coronary sinus venous system Indication NYHA Class III, QRS Duration > 150 msec
  - c. Paroxysmal Atrial Fibrillation - may be with nodal ablation and dual pacing