The North American Society of Pacing and Electrophysiology (NASPE) and British Pacing and Electrophysiology Group (BPEG) published as a joint effort the pacemaker code. This joint project is known as the NBG pacemaker code. The NBG was initially published in 1983 and was last revised in 2002. It describes the five letter code for operation of implantable pacemakers and defibrillators.

**NASPE/BPEG Revised in 2002 NBG Pacemaker Code**

<table>
<thead>
<tr>
<th>Position I</th>
<th>Position II</th>
<th>Position III</th>
<th>Position IV</th>
<th>Position V</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Chamber Paced)</td>
<td>(Chamber Sensed)</td>
<td>(Response to Sensed Event)</td>
<td>(Programmability, Rate Modulation)</td>
<td>(Multisite Pacing)</td>
</tr>
<tr>
<td>O = none</td>
<td>O = none</td>
<td>O = none</td>
<td>Rate Modulation</td>
<td>O = none</td>
</tr>
<tr>
<td>A = atrium</td>
<td>A = atrium</td>
<td>I = inhibited</td>
<td></td>
<td>A = atrium</td>
</tr>
<tr>
<td>V = ventricle</td>
<td>V = ventricle</td>
<td>T = triggered</td>
<td>O = none</td>
<td>V = ventricle</td>
</tr>
<tr>
<td>D = dual (A + V)</td>
<td>D = dual (A + V)</td>
<td>D = dual (T + I)</td>
<td>R = rate modulation</td>
<td>D = dual (A + V)</td>
</tr>
</tbody>
</table>


The first two positions of this code (Chamber Paced and Sensed) are relatively straightforward. The third position is the most confusing. The most frequently used programs are the DDD (dual chamber pacing and sensing, both triggered and inhibited mode), VVI (for single chamber, ventricular pacing in the inhibited mode), VDD (ventricular pacing with atrial tracking), and DDI (dual chamber pacing and sensing, but inhibited mode only).

The third position is described as follows:

**D** - (dual): In DDD pacemakers, atrial pacing is in the inhibited mode (the pacing device will emit an atrial pulse if the atrium does not contract). In DDD and VDD pacemakers, once an atrial event has occurred (whether paced or native) the device will ensure that an atrial event follows.

**I** - (inhibited): The device will pulse to the appropriate chamber unless it detects intrinsic electrical activity. In the DDI program, AV synchrony is provided only when the atrial chamber is paced. If on the other hand if intrinsic atrial activity is present, then no AV synchrony is provided by the pacemaker.

**T** - (triggered): Triggered mode is only used when the device is being tested. The pacing device will emit a pulse only in response to a sensed event.

The VDD pacemaker is used for AV nodal dysfunction but intact and appropriate sinus node behavior. DDI is rarely used as the primary mode of pacing. The DDI pacemaker is used for a patient with a dual-chamber pacemaker that has episodes of paroxysmal atrial fibrillation. DDI prevents high ventricular rates. Some DDD pacemakers are programmed to enter the DDI mode when high atrial rates occur.

The fourth position, rate modulation, increases the patient’s heart rate in response to “patient exercise”. A number of mechanisms (vibration, respiration, and pressure) are used to detect “patient exercise”. As the exercise wanes, the sensor indicated rate returns to the programmed mode.
The fifth position describes multisite pacing functionality. Atrial multisite pacing is being investigated as way to prevent atrial fibrillation. Ventricular multisite pacing is a treatment for pacing a patient with dilated cardiomyopathy.

There are four types of pacemakers: asynchronous, single-chamber synchronous, double-chamber AV sequential, and programmable.

- Asynchronous or fixed-rate (AOO, VOO, DOO) – discharge at a preset rate that is independent of the inherent heart rate.
- Single-chamber synchronous or demand (AAI, VVI) – discharge at a preset rate only when the spontaneous heart rate drops below the preset rate.
- Dual-chamber AV sequential pacing (VDD, DVI, DDD) – usually uses two electrodes, one in the atrial appendage and one in the right ventricular apex. The atrium is stimulated to contract first, then after an adjustable PR interval, the ventricle is stimulated.
- Programmable pacemakers – pacing rate, pulse duration, voltage output, and R-wave sensitivity are the most common programmable functions.

References:
