

Level 5: Too many P waves

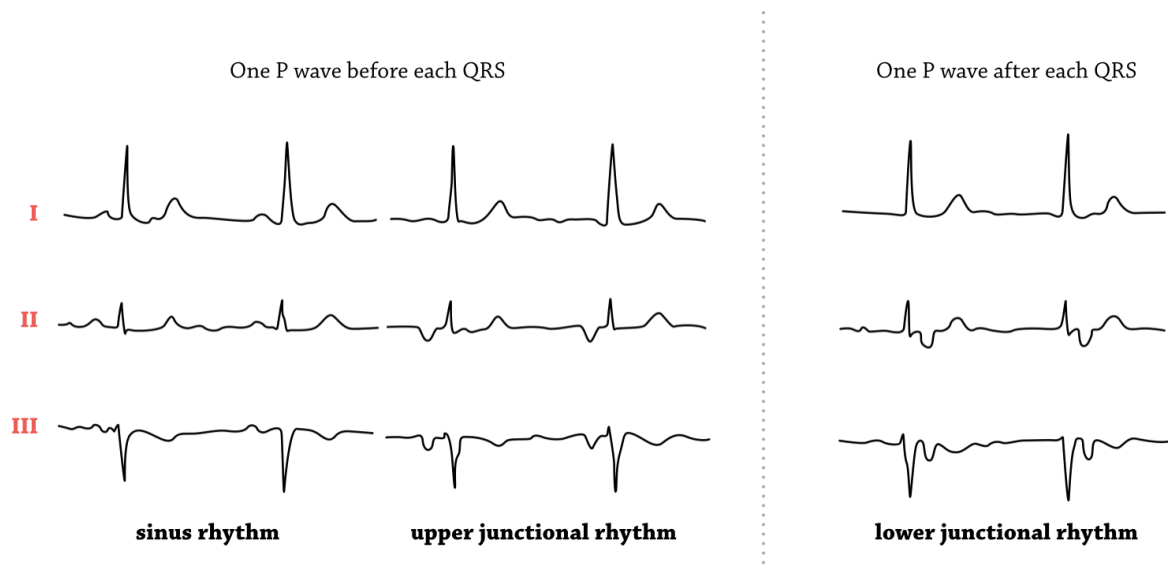
If you still haven't reached a diagnosis, it's time to move on to step 6 of the Rhythm Cheat Sheet and **count the number of P waves and QRS complexes**.

initial question			answer		additional question	rhythm diagnosis
6	Are there too many P waves?	N	Y		PR constant?	2nd deg. AVB Mobitz type II
					PR varying QRS regular	3rd deg. AV block
					PR varying QRS irregular	2nd deg. AVB Mobitz type I

Step 6 of the cheat sheet: too many P waves

Before we give you some practical tips on how to count the P waves, let's review what we have learned before.

In the previous chapters, there used to be a constant relationship between P waves and QRS complexes. Most of the time there was one P wave for each QRS complex, even if the rhythm was not sinus rhythm. Let's check out three examples:



In the two cases to the left of the dotted line, there's one P wave preceding each QRS complex. In the example on the right, there is one P wave following each QRS complex. Most of these P waves look abnormal but their numbers match those of the QRS complexes.

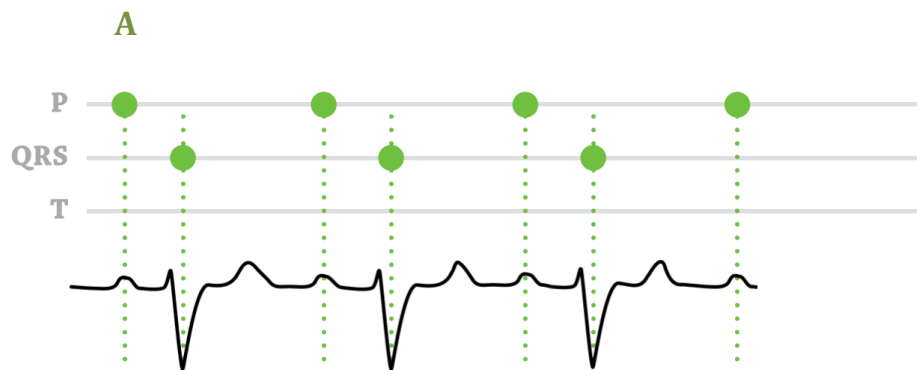
In this and the upcoming chapter, we are going to focus on situations where these numbers don't match.



When the number of P waves exceeds the number of QRS complexes, this means that conduction from the atria to the ventricles is not working properly. This is a situation that we call "high degree AV block." Let's start with two practical tips on counting the P waves.

Tip #1: Make sure that the rhythm strip is long enough

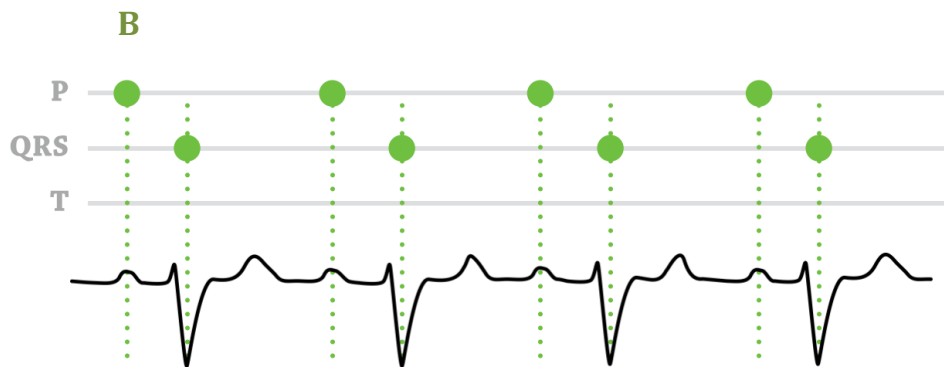
Take a look at ECG A below. There are four P waves but only three QRS complexes. Does this mean that the number of P waves exceeds the number of QRS complexes?



ECG strip that's too short

No it doesn't. The simple answer is that the QRS complex following P wave #4 was cut off. So the rhythm strip is too short in order to count the P waves and QRS complexes properly.

Here's the ECG with all the QRS complexes:

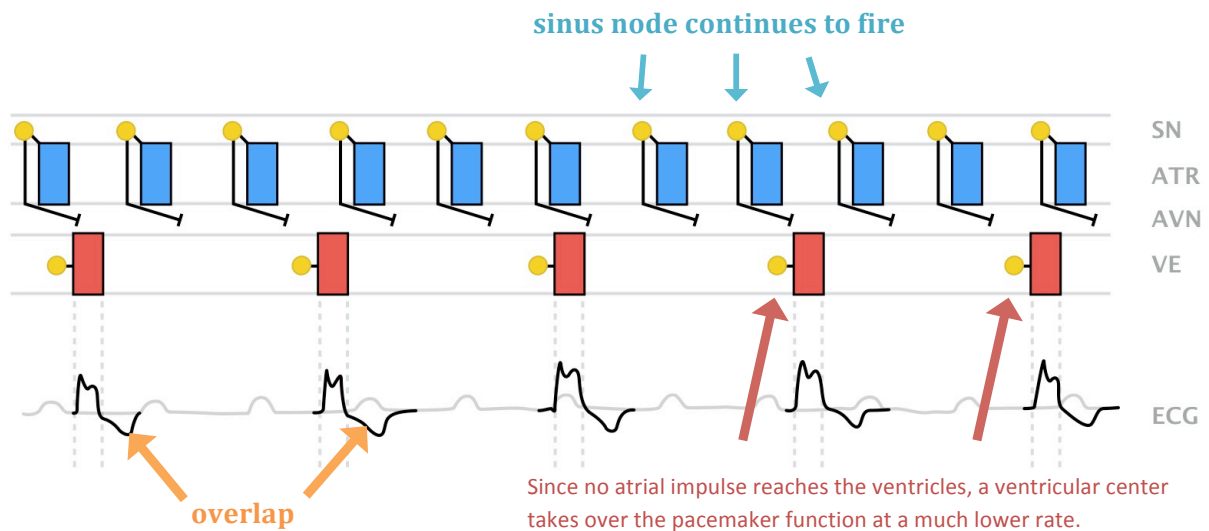


correct ECG strip

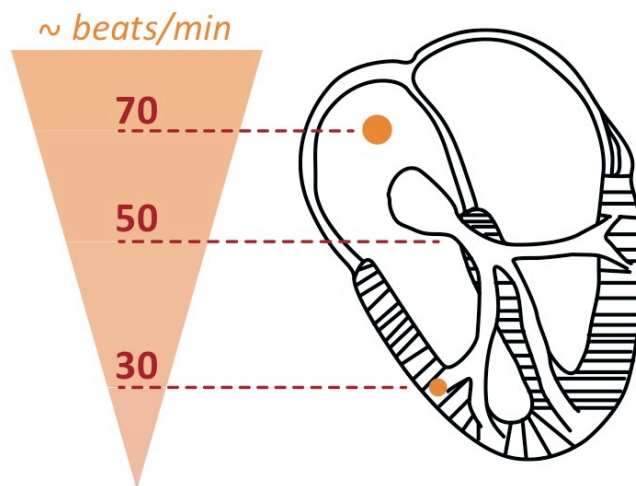
Tip #2: Use the "paper and pen method" to identify P waves

When AV conduction is completely blocked (third degree AV block), no atrial impulse can travel down into the ventricles. In this case, three things will happen:

1. The atrial pacemaker (usually the sinus node) continues to fire at a regular rate.
2. A ventricular pacemaker center takes over in order to keep the circulation going. Like every myocardial pacemaker, this one will fire at regular intervals, but we must keep in mind that the stimulation rate gradually decreases as we descend from the sinus node (approximately 70 beats per minute) to the AV node (approximately 50 bpm) and into the ventricles (approximately 25 to 40 bpm).
3. The atrial and ventricular pacemaker centers are completely independent of one another; therefore, P waves and QRS complexes can occur at the same time.



Both atrial and ventricular pacemakers discharge at their own individual and regular intervals. But since they are completely independent of one another, P waves, QRS complexes, and T waves sometimes overlap, which makes counting the P waves much harder than normal.



Here's a trick for finding all the P waves, even the hidden ones. Just remember:

- P waves can sometimes be hidden within the QRS complexes.
- P waves occur at constant intervals (i.e., their rate is regular).
- Using one P wave and the P-to-P interval, you'll be able to find all other P waves on the ECG strip—even the hidden ones.

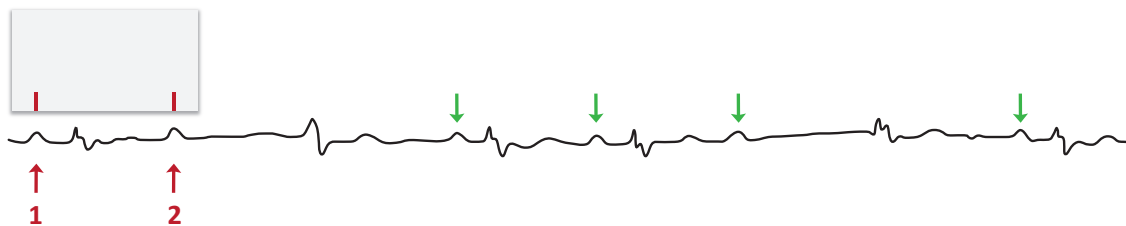
All you have to do is to take a piece of **paper and a pen** and mark the shortest P-to-P interval on the ECG strip. Then use this interval to find all the other P waves. Also mark those areas on the ECG where no clear P waves can be seen. Remember, they might just be hidden.

Here's an example:

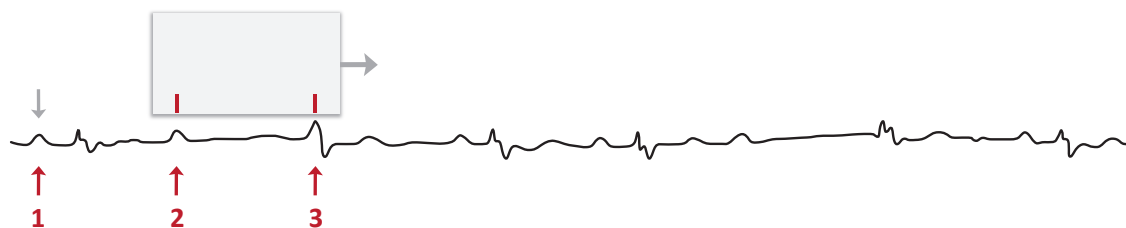
At first you'll count six P waves:



Take a piece of paper, and mark the shortest P-to-P interval:



Moving the paper further along the ECG will help you find all the other P waves:



You see, you have managed to identify all eight P waves!

