How to Determine Heart Rate

Description

Determine the heart rate is one of the first steps in the sequence for the correct interpretation of the electrocardiogram.

Determining whether the patient is in tachycardia or bradycardia allows the correct suspicion of associated pathologies or the assessment of the severity of the patient's condition.

Although many ECGs already display the heart rate value automatically, some even print it on paper. It is important that as a health professional you know the different methods that exist to **calculate the heart rate on ecg**.

How to Calculate the heart rate on ECG with regular rhythm

Before calculating the heart rate from an electrocardiogram, it is necessary to know whether the heart rhythm is regular or irregular. The RR interval is used for this. If the rhythm is regular, the distance between each R wave should be similar.

Normally the heart rhythm can be determined just by looking at the ECG. However, if you still have doubts, in this other article we explain in detail how to determine the heart rhythm.

Calculate heart rate with the number 300

This is one of the simplest methods to calculate the heart rate on an ECG. However, this method can only be applied if the heart rhythm is regular.

To calculate the heart rate with the number 300 the RR interval is used. What you need to do is look for an R wave that matches a thick line on the ECG paper. Next, the large squares that are up to the next R wave are counted. 300 is then divided by the number of squares.

It is important to remember that every five of these large squares represents one second on the EKG.

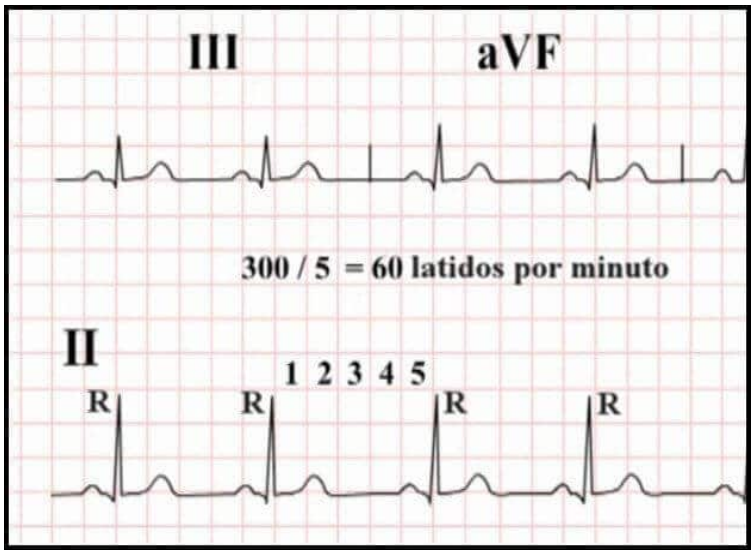

Figure 1 – Heart rate of 60 bpm

The example in Figure 1 shows an Electrocardiogram (ECG) with a regular rhythm in which, in the DII lead, there are 5 large squares between two R waves.

So the process to calculate the heart rate in this EKG would be to divide 300 by 5. Resulting in a Rate of 60 beats per minute (bpm).

If in the previous example the number of large squares had been 4 then the rate would have been 75 bpm. (300/4 = 75).

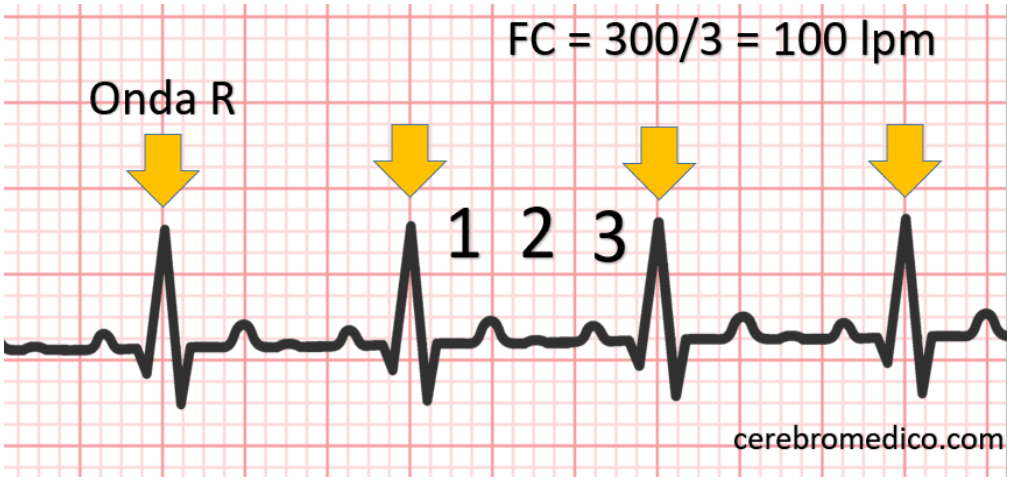

Figure 1B – 300 method to calculate HR on an ECG.

Another example of the 300 method for calculating Heart Rate on an ECG is shown in Figure 1B. In this example there are 3 large squares between both R Waves so the Rate is 100 bpm (300/3 = 100).

The problem with this method is that in most cases the second R wave does not coincide with one of the thick lines and sometimes none of the R waves coincide with these lines.

If the second R wave does not match.

It is important to remember that each large square on the EKG paper equals 0.20 seconds and is made up of 5 small squares that equals 0.04 seconds. You can read more about this in ECG Paper Characteristics.

To calculate the heart rate in the event that the second R wave does not coincide with a thick line on the EKG paper, the small squares must be counted up to the R wave and multiplied by 0.2. The result is then added to the number of large squares and 300 is divided by that number.

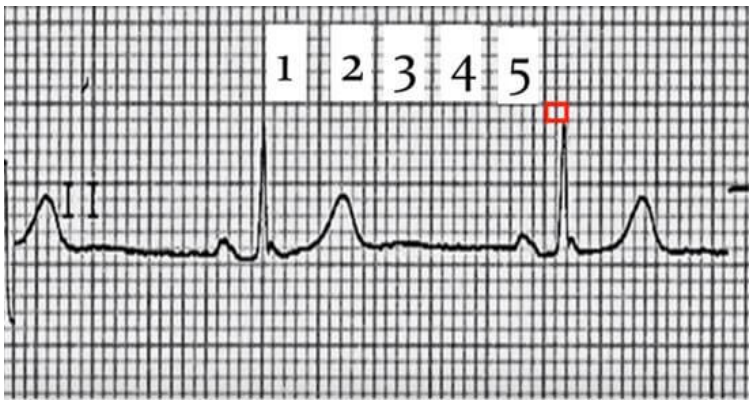

Figure 2 – 55 bpm rate

In figure 2 you can see an electrocardiogram in which the second R wave does not coincide with the thick line.

In this example there is a distance of 5 large squares between both R waves. But there are also 2 small squares until the next R wave (Marked with a red square).

As explained before, the small squares must be multiplied by 0.2, and the result must be added to the number of large squares. In this case 2 x 0.2 = 0.4, this value is added to the 5 large squares that lie between both R waves, resulting in 5.4. This value is then divided by the 300. Giving a rate of 55 bpm.

1500 method of calculating heart rate

The 1500 method is very similar to the 300 method for calculating heart rate on ECG. However, this is exceptionally useful when none of the R waves coincide with a vertical line on the ECG. **This is the most accurate method to calculate heart rate.**

Unlike the previous method, this one counts the number of small squares that are in the RR interval. Then this amount is divided by the number 1500 to get the heart rate. It is important to mention that this method, like the previous one, only works if the rhythm is regular.

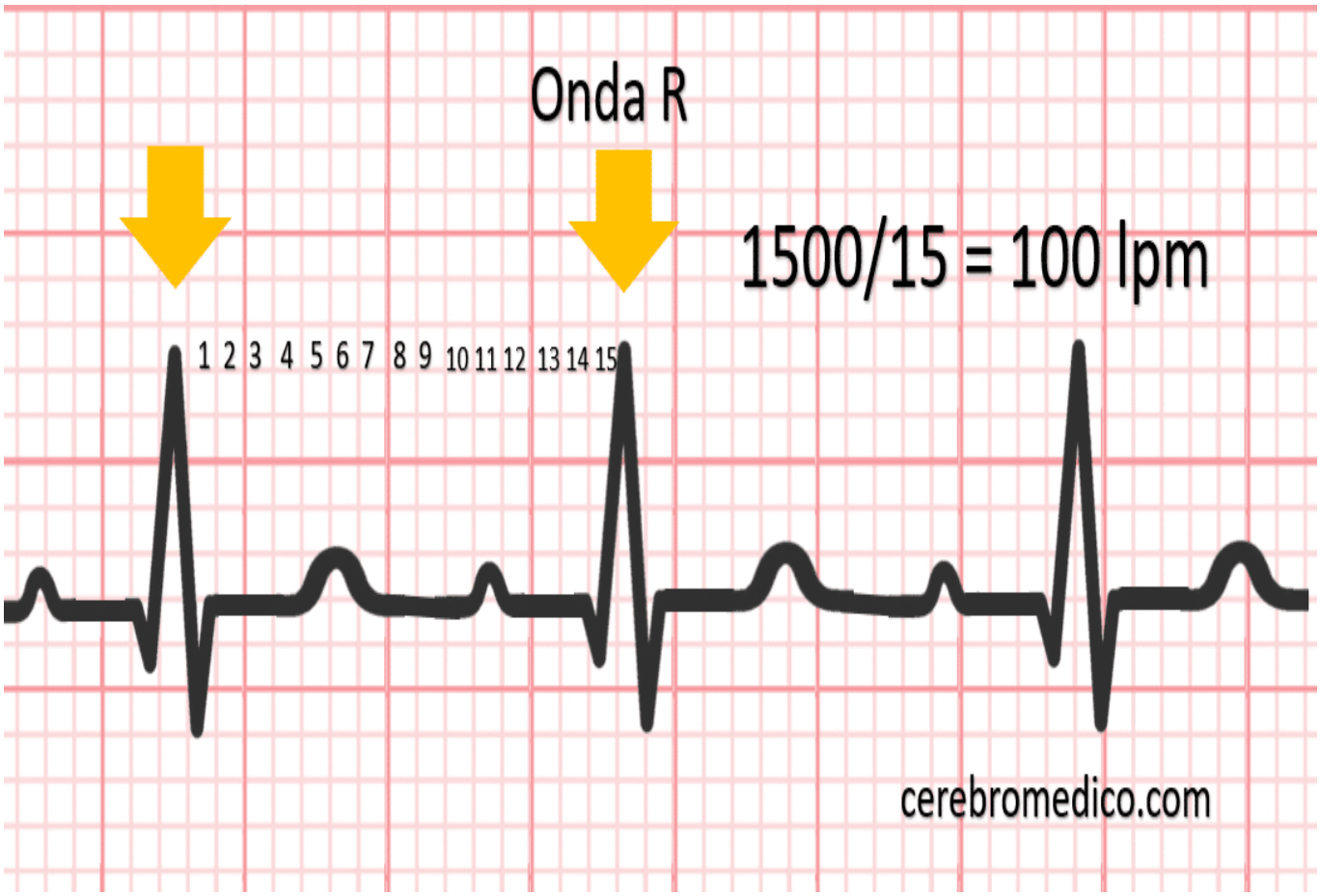

Figure 3 – 1500 method to calculate HR on an ECG. 100 bpm electrocardiogram.

In figure 3 you can see an ECG in which none of the R waves coincide with a vertical line.

If you look closely, you can count 2 small squares after the first R wave. Next there are a total of 2 large squares, remember that each large frame has a total of 5 small squares.

Before the next R wave there are 3 more small squares giving a total of 15 small squares (2 + 10 + 3) between both R waves.

To calculate the heart rate then 1500 is divided between the 15 small squares. In this example the heart rate is 100 beats per minute.

How to Calculate Heart Rate on an Irregular Rhythm ECG

The above methods for calculating heart rate only work if the rhythm is regular. However, with certain cardiac pathologies such as Atrial Fibrillation or Cardiac Arrhythmias, the rhythm is irregular.

6-second method to calculate heart rate

This is one of the safest and easiest methods to calculate heart rate in rhythms both regular and irregular rhythms. One of the aspects to take into account in order to apply this method are the

properties of the electrocardiogram paper.

Remember that in the electrocardiogram the paper runs at a speed of 25 mm per second. This is represented on paper by 25 small squares or 5 large squares. Therefore, every 5 large squares represents 1 second in the electrocardiogram.

To apply the 6-second method, it is necessary to count the number of QRS complexes found in 6 seconds. These 6 seconds are represented by 30 large squares on the **Electrocardiogram Strip**. **The number of QRS complexes is multiplied by 10 to determine the heart rate.**

Figure 4 – 6-second electrocardiogram

In Figure 4 you can see a 6 second long ECG. To know the heart rate using the 6-second method, only the QRS complexes should be counted. In this example there are a total of 9 QRS complexes. This value is then multiplied by 10, which works as a constant. Resulting in a heart rate of 90 beats per minute (9 x 10 = 90).

It is important to mention that there are other methods to determine the heart rate, however, those exposed here are the most exact and practical methods to apply.

Video of How to Calculate Heart Rate in Electrocardiogram

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Normal Heart Rate Values

The normal range of the heart rate is between 60 to 100 beats per minute.

Any value above 100 beats per minute is considered Tachycardia. And any value that is below 60 beats per minute is Bradycardia.

It is important to mention that Bradycardia and Tachycardia may not be a sign of a disease. Certain drugs like beta blockers can lower your heart rate. In addition, certain substances such as caffeine can cause tachycardia.

References consulted

[su_spoiler title="See references" icon="plus-circle"]

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Category

1. Electrocardiogram

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