

3 • Rhythms of sinus origin

The formation of the normal ECG complex has been explained in the preceding chapter; this normal complex is termed a **sinus complex**. A sequence of beats originating from the SA node will form a sinus rhythm. Four common sinus rhythms are described below.

Sinus rhythm

The stimulus originates regularly at a constant rate from the SA node (dominant pacemaker) depolarising the atria and ventricles normally producing a coordinated atrioventricular contraction. This is a normal rhythm.

ECG characteristics

There is a normal P wave followed by normal QRS–T waves. The rhythm is regular (constant) and the rate is within normal for age and breed (Fig. 3.1).

The size of the ECG complexes are typically small in cats (Fig. 3.2). Obtaining an artifact-free tracing is therefore important (in cats) in order to identify clearly the ECG complexes.

Clinical findings

There are regular heart sounds on auscultation (i.e. lubb dub) with a pulse for each heart beat and at a rate that is normal for age, breed and species.

Sinus arrhythmia

The stimulus originates from the SA node, but the rate varies (increases and decreases) regularly. This is a normal and common rhythm in dogs. It is associated with an increase in parasympathetic activity (i.e. vagal tone) on the SA node. There is commonly a regular variation in rate often associated with respiration (i.e. it speeds up and slows down) and it is therefore often called **respiratory sinus arrhythmia**. Since sinus arrhythmia is an indicator of increased parasympathetic tone, conversely, it is also an indicator of reduced sympathetic tone. In dogs with heart failure one of the compensatory responses is an increase in sympathetic tone and therefore normal sinus arrhythmia is often lost and a sinus tachycardia develops. Sinus arrhythmia is uncommon in the cat and it might be seen in association with dyspnoea.

ECG characteristics

There is a normal P wave followed by normal QRS–T waves. The rhythm varies in rate; this is often associated with respiration (Fig. 3.3). The rhythm can sometimes be described as being regularly irregular, i.e. the variation in rate is fairly regular. The rate is within normal for age and breed.

Clinical findings

The heart rhythm varies with some regularity – increasing and decreasing in rate, and there is a pulse for every heart beat.



Figure 3.1 ECG from a dog showing a normal sinus rhythm at a rate of 140/min (25 mm/sec and 10 mm/mV).

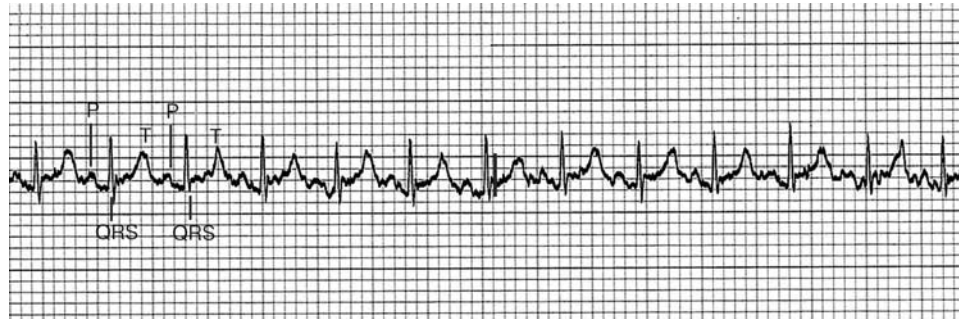


Figure 3.2 ECG from a cat showing a normal sinus rhythm at a rate of 220/min (25 mm/sec and 10 mm/mV).

Sinus tachycardia

The SA node generates an impulse and depolarisation at a rate that is faster than normal.

ECG characteristics

There is a normal sinus rhythm but at a faster rate than normal (Fig. 3.4).

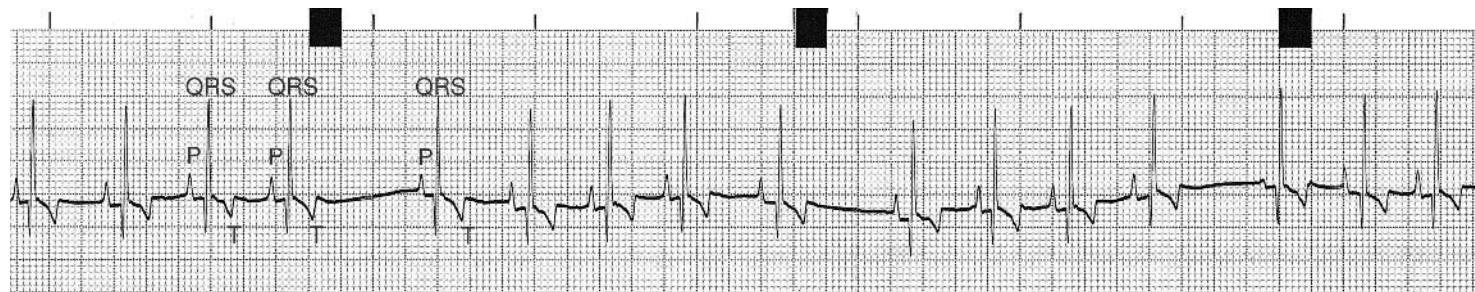


Figure 3.3 ECG from a dog showing a normal respiratory sinus arrhythmia at a rate of 110/min (25 mm/sec and 10 mm/mV).

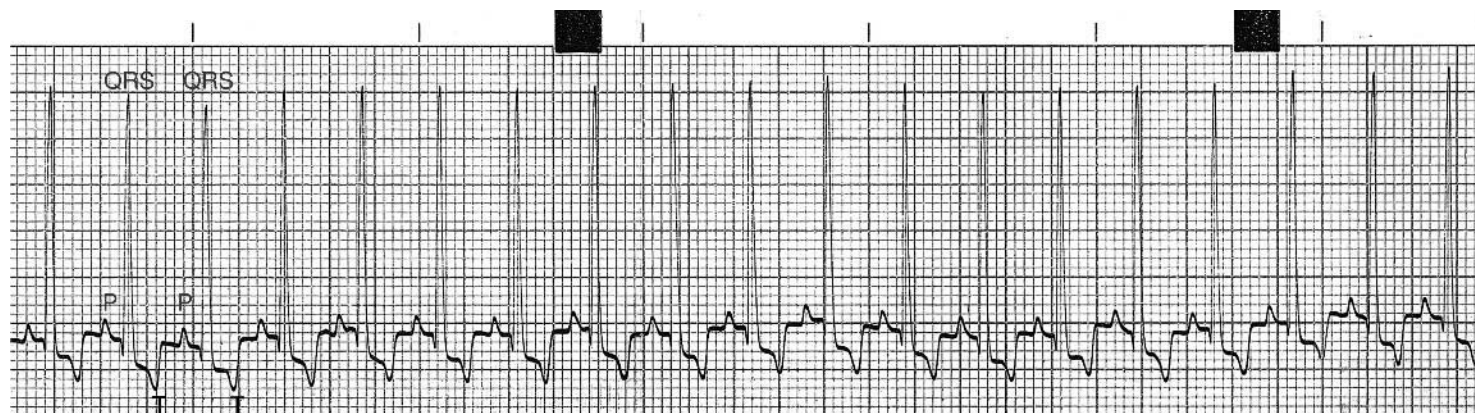


Figure 3.4 ECG from 13-year-old Cavalier King Charles spaniel dog in heart failure due to mitral valve disease. There is a sinus tachycardia at 180/min (25 mm/sec and 10 mm/mV).

Clinical findings

The heart rate is faster than normal for age and breed with a pulse for every heart beat (although with very fast rates the pulse may become weaker).

Sinus bradycardia

The SA node generates an impulse and depolarisation slower than normal. This can be a normal feature in some giant-breed dogs and in athletically fit dogs.

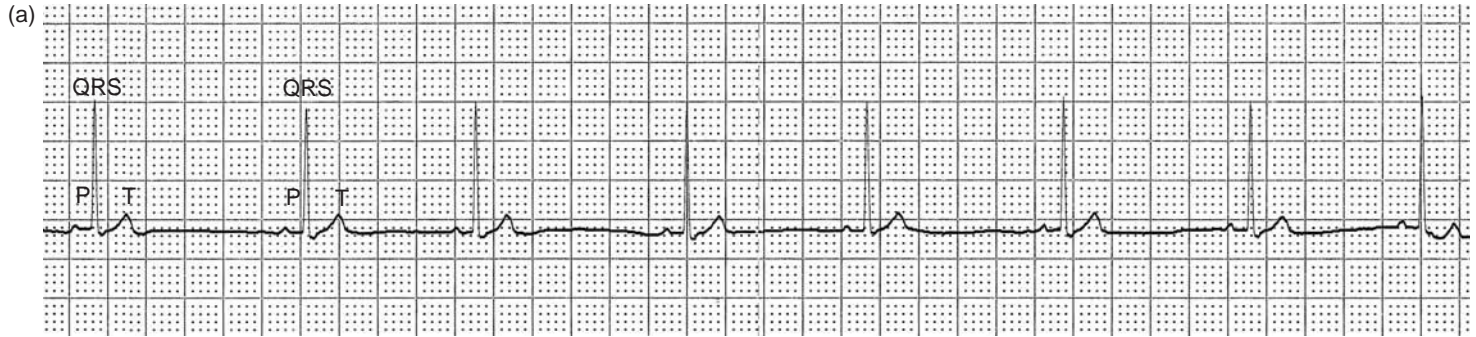


Figure 3.5 (a) ECG from a dog showing a sinus bradycardia at 65/min (25 mm/sec and 10 mm/mV).

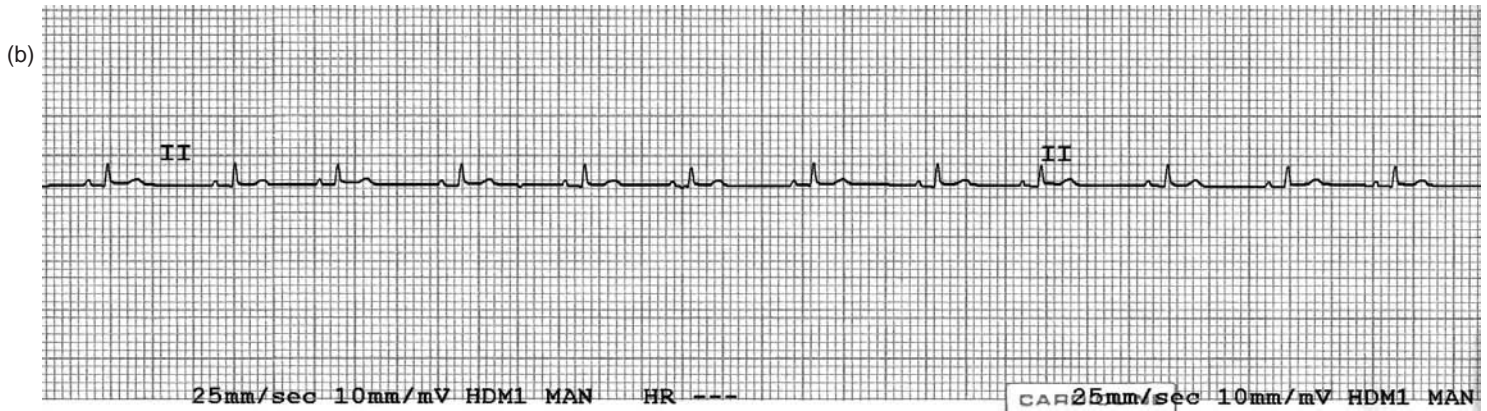


Figure 3.5 (b) ECG from a cat following sedation, showing a sinus bradycardia at 110/min (25 mm/sec and 10 mm/mV).

ECG characteristics

There is a normal sinus rhythm but at a slower rate than normal (Fig. 3.5).

Clinical findings

The heart rate is slower than normal for age and breed, with a pulse for every heart beat.