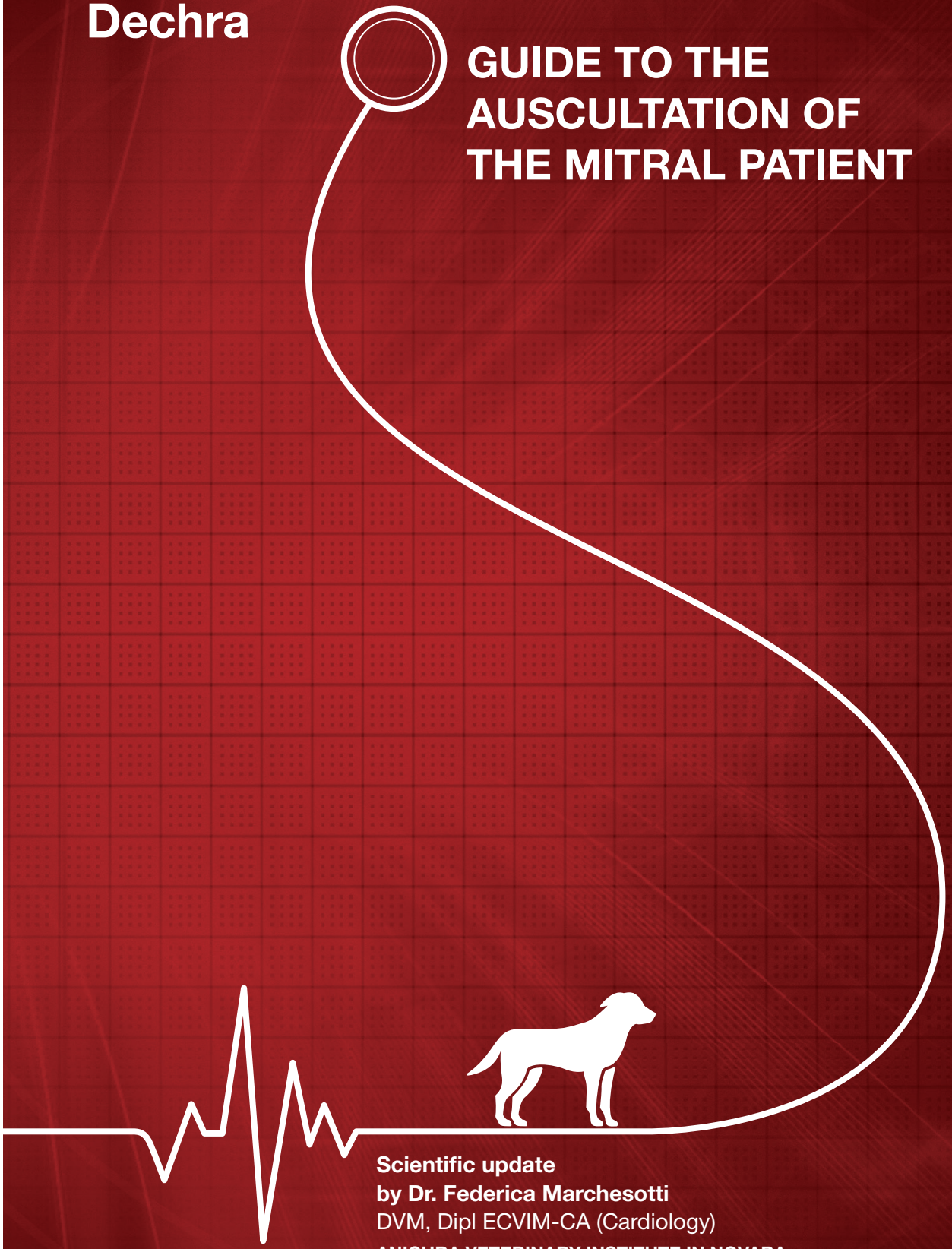
INFORMATIONAL MATERIALS FOR VETERINARY PROFESSIONALS ONLY

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GUIDE TO THE AUSCULTATION OF THE MITRAL PATIENT



Scientific update
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Cardiac auscultation in the patient with mitral insufficiency

Cardiac auscultation plays a crucial role in the correct diagnosis of a patient with heart disease, as it can provide very important information on **heart function**, the **aetiology** of the disease and, very often, its **severity**.

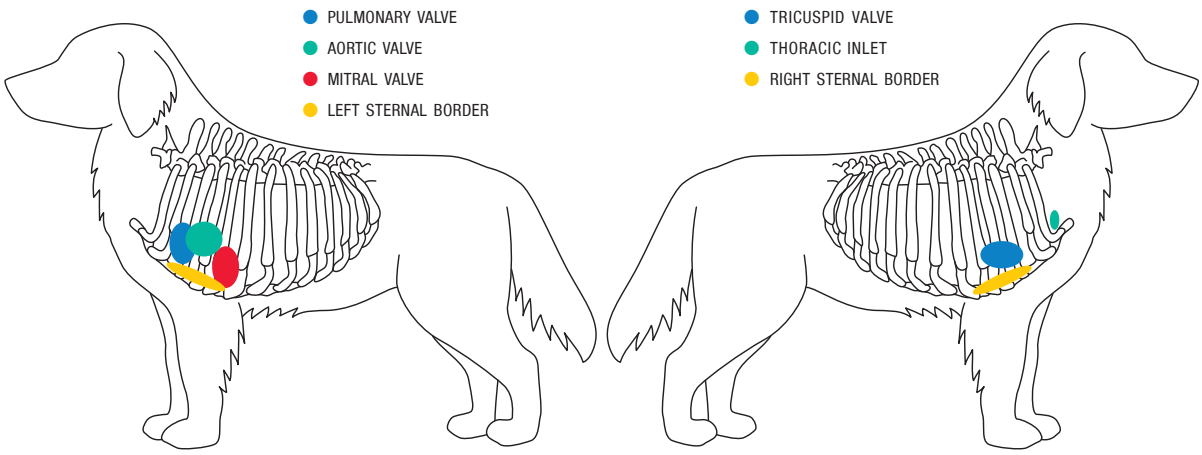
Auscultation includes the assessment of heart rate (HR), heart rhythm and the presence of any murmurs. All this data can help in staging the mitral patient and assessing heart failure.

It is an inexpensive diagnostic investigation and can be easily performed by all Veterinary Professionals. For optimal auscultation, the use of a good stethoscope and a quiet, peaceful environment is necessary.





Cardiac auscultation in dogs



1

Place the patient in an upright position on all four legs in a quiet room. Auscultation of the patient who is laying down predisposes to the formation of noises that can be confused with a heart murmur.

2

Before starting the auscultation, palpate the left side of the chest in search of the cardiac apex. It is the point in the thoracic wall where the heartbeat is most strongly perceived. Its location, intensity (in patients with cardiac dilatation it is usually increased) and the possible presence of thrilling can be assessed. The latter can be felt as a vibration, and is usually associated with cardiac remodelling.

3

Assess normal heart rate (normal HR in dogs: 60-180 beats per minute (bpm); tachycardia: HR > 180 bpm; bradycardia: HR < 60 bpm) and heart rhythm. Also analyse any changes in heart rate and rhythm based on the respiratory cycle.

4

Place the stethoscope over the left apex, which corresponds to the apex of the heart and the mitral valve area; after assessing this region, move cranio-dorsally (approx. 2 intercostal spaces) to analyse the cardiac base, which coincides with the aortic and pulmonary valve region. This area is further divided into two regions: the aortic and the pulmonary regions. However, in clinical practice the identification of these 2 distinct regions is very difficult, especially in small to medium-sized dogs.

5

Auscultate the heart from left then repeat the procedure on the right. It is also very important, especially in puppies, to assess the left axillary region, as this is the site of the typical continuous murmur produced by the pervious arterial duct (ductus arteriosus).

6

Recognise normal heart sounds and assess the presence of any abnormalities (e.g. heart murmurs). If any abnormalities are detected, assess their location, intensity and duration. The signalling combination with the type, intensity and location of the murmur, can allow us to identify the most likely cardiac pathology and its severity.

HEART SOUNDS IN HEALTHY DOGS

In a healthy dog, without cardiac disease, two heart sounds can be distinguished:

- the **“LUB”** which represents the first heart sound (S1) and corresponds to the closing of the atrioventricular valves and, therefore, the beginning of systole

- the **“DUB”** which represents the second heart sound (S2) and indicates the closing of the semilunar valves and therefore the end of systole. All murmurs that are identified between S1 and S2 are termed "systolic", those murmurs identified between S2 and S1 are termed "diastolic". A continuous murmur is present in both systole and diastole.

Evaluation and diagnosis in the mitral patient

Assessment of heart rate, heart rhythm and murmur intensity can help in staging the mitral patient and assessing heart failure.

RATE

Normal heart rate in dogs is 60-180 bpm.
A patient experiencing heart failure will tend to have a heart rate equal to or greater than 140 bpm, due to activation of the sympathetic nervous system.



Arrhythmia

Sinus arrhythmia

Although the term “arrhythmia” suggests a pathological meaning, actually, this type of cardiac arrhythmia is an absolutely normal finding in healthy dogs. This is a cyclical variation in heart rate that, when synchronous with breathing (an increase in heart rate during inspiration and a decrease in heart rate during expiration), is called **respiratory sinus arrhythmia**. This arrhythmia is linked to the influence of the parasympathetic nervous system. Its presence, therefore, indicates the absence of sympathetic nervous system activation and consequently a **low probability of heart failure**.

Scan the QR code to listen to a sinus arrhythmia

Atrial and ventricular premature beats

They are usually present when the disease has already resulted in **atrio-ventricular dilatation**. Upon auscultation they are perceived as a premature beat, usually followed by a pause. However, auscultation alone is not enough to differentiate them, so an electrocardiogram is necessary for diagnosis.

Scan the QR code to hear atrial and ventricular premature beats

Atrial fibrillation

In the mitral patient, this is usually associated with **severe atrial dilatation** and very often with **heart failure**, so its presence should lead one to suspect an advanced stage of the pathology. Upon auscultation, a high heart rate (usually > 170–180 bpm) is detected, which is completely irregular and in which S1 and S2 vary in beat-to-beat intensity. Basically, it's like hearing the sound that shoes make in a washing machine while it is running.

Scan the QR code to listen to atrial fibrillation

MURMUR

In the patient with mitral insufficiency, the heart murmur is systolic, i.e. it occurs between S1 and S2. The point of maximum intensity is the mitral projection region, which corresponds to the 5th intercostal space on the left side of the chest. Basically, it is the point where, on palpation of the chest, you feel the left cardiac apex. **According to its intensity, the murmur can be classified into 6 grades.**

Intensity	Grade	Description
Mild	**I**	The murmur is very soft, audible in a quiet environment, only after careful auscultation and is only localised over a precise cardiac region
	II	The murmur is soft but immediately audible as soon as the stethoscope is placed over the point of maximum intensity
Moderate	**III**	The murmur is of moderate intensity
Loud	**IV**	The murmur is loud and can be auscultated over several regions of the chest, however, thrilling is not perceived
Thrilling	**V**	The murmur is loud with a palpable precordial thrill
	VI	The murmur is loud with a precordial thrill, and also audible when the stethoscope is placed next to the thorax but with no direct contact



Recently, a simpler and more intuitive classification has been proposed, which divides the murmur into:

Mild

Moderate

Loud

Thrilling

A loud murmur with the addition of a palpable pre-cordial thrill.

This type of classification, in small patients with mitral disease, helps to predict/establish the severity of the disease. In fact, heart failure is unlikely in a dog with a mild murmur. But that is not all: such a dog will most likely have a mild disease without cardiac remodelling; a dog that has a heart murmur with thrilling will most likely have severe mitral valve disease. The presence of a moderate or loud murmur is not always synonymous with a severe disease.

Finally, according to duration, we can distinguish the following types of murmurs:

Mesosystolic:
these are murmurs of mild intensity, rarely moderate. They are perceived between S1 and S2, which are clearly identifiable on auscultation

Holosystolic:
begin at the end of S1 and end at the beginning of S2. The first heart sound is therefore usually perceptible, while the second is muffled by the murmur. The intensity of such murmurs is usually “moderate” to “thrilling.”

Pansystolic:
begin at the beginning of S1 and extend to the end of S2. With this type of murmur the heart sounds are usually not audible, and only the heart murmur will be heard

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In Summary ...



The presence of **respiratory sinus arrhythmia**, even in a patient with severe mitral valve disease, indicates that the likelihood of that dog suffering heart failure is very low.

The presence of **atrial fibrillation** with rapid ventricular response in patients with mitral insufficiency indicates advanced disease and is very often associated with heart failure.

The presence of a **mild murmur** in a small breed with suspected mitral valve disease may reasonably indicate that the disease is mild and that the dog is not experiencing heart failure, although it may show signs of dyspnoea/ tachypnoea.

The **likelihood** of a dog experiencing cardiac remodelling or heart failure increases as the intensity of the murmur increases. This probability becomes very high in dogs with thrilling murmur.

Echocardiographic examination is always necessary in order to perform accurate staging of the cardiac patient and identify targeted treatment.

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