

Holter Monitoring in Dogs and Cats

Darcy Adin, DVM DACVIM

Holter monitoring (ambulatory electrocardiography) is a valuable clinical tool for monitoring cardiac rhythm over a prolonged period during normal daily activities. The benefits of this noninvasive diagnostic test include the detection of serious arrhythmias missed during routine electrocardiography, determining if an arrhythmia is the cause of syncope in a collapsing patient, increased detection of familial arrhythmias in predisposed breeds, and improved monitoring and adjustment of anti-arrhythmic therapy.

The ECG is the test of choice for arrhythmia characterization. Holter monitoring can be viewed as an extension of this test. It is important to recognize that the routine ECG only detects approximately 0.1% of the heartbeats in a day; thus, it is not surprising that intermittent arrhythmias may be missed with a routine ECG tracing. Holter monitoring is typically performed for 24 hrs or sometimes 48 hrs and so it provides the clinician with volumes of information about the patient's rhythm. The Holter below is a prime example of the diagnostic benefit gained by Holter monitoring. This Holter tracing was obtained from a Boxer dog that had collapsed but had a completely normal long ECG tracing. The dog had shown no ventricular arrhythmias during a 15 minute routine ECG; however, the Holter monitor revealed dangerous ventricular tachycardia. In one retrospective study of the usefulness of Holter monitors in syncopal patients, Holter recordings were helpful in establishing a diagnosis in almost half the patients. Cardiac event recorders (worn for up to one month) can provide additional diagnostic benefit in some syncopal patients.

Holter monitoring has a unique role in the diagnosis and treatment of Arrhythmogenic Right Ventricular Cardiomyopathy in Boxers and Dilated Cardiomyopathy in Dobermans. Holter monitoring is critical in the identification of affected dogs prebreeding, in determining the severity of an individual dog's disease and whether medication is indicated, determining the response to medication, and monitoring of disease progression. The role of Holters as a prebreeding screen in Boxers has recently been supplemented by the release of a genetic test for the identification of Arrhythmogenic Right Ventricular Cardiomyopathy in this breed. The identification of ventricular arrhythmias by Holter monitoring in Doberman pinschers has been shown to be predictive of the overt development of Dilated Cardiomyopathy, making Holter monitoring a useful resource to Doberman breeders and owners seeking to monitor their dogs. Holter monitor results from Boxers and Dobermans has also led to the important discovery that not all arrhythmogenic syncope in these breeds is from ventricular tachycardia. Rather, some have clinically important bradyarrhythmias which would warrant completely different therapy.

In addition to detection of occult arrhythmias, Holter monitoring provides us with other information including average, minimum and maximum hourly and daily heart rates, severity of and number of arrhythmias, response to antiarrhythmic medications, and rhythm analysis during specific daily events. Because the majority of Holter recording is in the home environment, this modality allows us to reduce the effects of hospitalization stress on the rhythm and heart rate. This can be particularly useful when assessing the heart rate in atrial fibrillation or the control of ventricular tachyarrhythmias with medical therapy. Medical therapy for atrial fibrillation is aimed at controlling the ventricular rate response; yet, in the stressful clinical environment, rate control is difficult to assess. Likewise, an in-clinic ECG may not reflect heart rates reached during exercise and other at home activities. Medical therapy for





ventricular arrhythmias is aimed at controlling clinical signs of collapse or near collapse (staggering, stumbling) and minimizing the electrical risk of sudden death. Due to the extreme day-to-day variability in ventricular arrhythmias, it is easy to misinterpret response or lack of response to antiarrhythmic drugs when only evaluating an ECG recording for a few seconds or minutes in the clinic environment.

Holter monitoring is accomplished by placing adhesive electrodes on both sides of the chest. The electrodes attach to a lead system that feeds into a recorder. The rhythm is digitally recorded onto a memory card that can be inserted into a computer with software for analysis. This system is held together on the animal with tape, vetwrap and vests specially designed for animals and this has successfully produced high quality readings despite the challenges faced with movement. Dogs are surprisingly tolerant of wearing the monitor and can accomplish anything except swimming while wearing the monitor. It is preferable to return the dog or cat to its home environment with as normal an activity schedule as possible, so that the recordings obtained are representative of the animals' daily routine. We request that owners provide us with a diary so we can correlate activity and rhythm.

Analysis of the large volumes of information contained in a 24 hr Holter recording requires either large amounts of time by the interpreting clinician or sophisticated analysis software. Until recently, veterinary cardiologists were forced to work with software systems designed for humans and to try to mold these systems to read the canine and feline ECG. Some specific problems encountered include the presence of sinus arrhythmia in dogs and the relatively high normal heart rates in dogs and cats, neither of which are typically encountered in people. For example, systems designed for humans commonly report supraventricular tachycardia as an erroneous interpretation of sinus tachycardia in an excited dog. Such an error could result in incorrect medical treatment or extra time evaluating and correcting each of the computer misreads. Recently, advanced software designed specifically for animals has been released (Trillium Vet™ Holter System) and its algorithms have been tailored to the unique nature of animal ECGs providing rapid, accurate analysis for veterinarians. The Cardiology group at MedVet is excited to announce the acquisition of this state-of-the art Trillium Vet™ Holter System. This system will allow us to provide the best available analysis of heart rate and rhythm in a timely manner for our clients and their pets' primary clinicians.



New Service Makes Precision Monitoring More Accessible

With the addition of this new Holter system, we are also pleased to announce a new service designed to make Holter monitoring more accessible to our referring veterinarians and your clients. Our new Holter send-out service will allow you to request a Holter monitor from us for placement on your patient. We will include detailed instructions for monitor placement and removal as well as return service. You may also request to rent a vest so less tape is needed for its application. Some of you may be worried about applying a Holter monitor in your office - but we promise - it is not difficult, and we will gladly help walk you through it.

Once we receive the returned monitor, we will analyze the Holter recording and deliver a report to you within 1 week. There are many potential applications for the use of Holter monitoring as discussed above. We would be happy to talk with you about whether this approach may be indicated for your patients. This send-out Holter service may be particularly helpful for your clients that find the drive to MedVet difficult, for cardiology follow-up on mutual patients, and for clients that cannot be referred for evaluation.

Please feel free to call (614-431-4405) to speak with us about this new service.