



## Guided Mark-Up in Metron: VHS Analysis



Click F11 on your keyboard for full screen display!

Dependent on your screen size, the menu buttons on the Database Browser screen may appear in one or two rows.



## Guided Mark-Up in Metron: VHS Analysis

This online training session will provide you with the details of how to use  
"Guided Mark-Up in Metron: VHS Analysis for Canine and Feline".



Click F11 on your keyboard for full screen display!

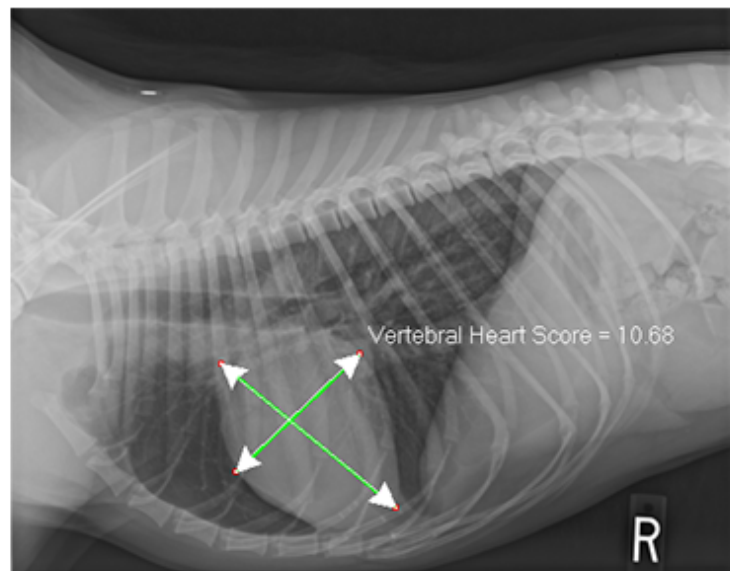
Dependent on your screen size, the menu buttons on the Database Browser screen may appear in one or two rows.

# 1

## Guided Mark-Up: VHS Analysis

### What is Guided Mark-Up?

Metron supports a process called "Guided Mark-Up" in which the user is prompted to pick key points in certain images of the canine or feline chest. Metron then uses those picked points to compute many important parameters of the heart.



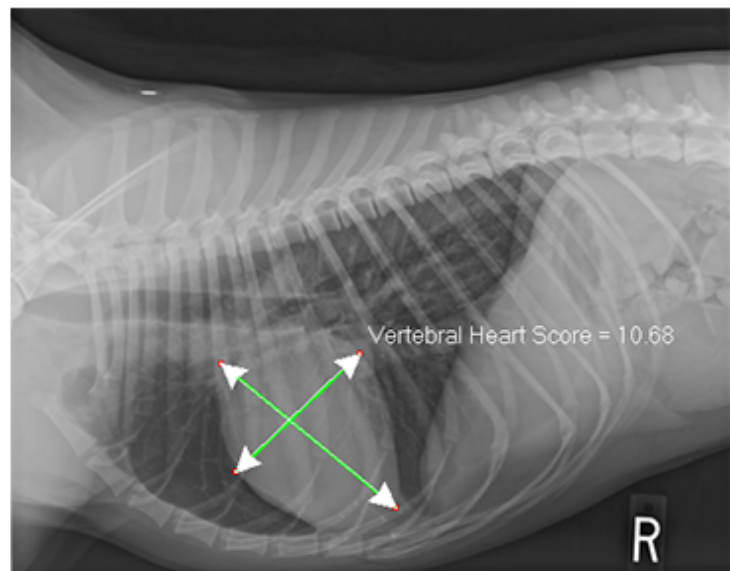
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## 2

# Guided Mark-Up: VHS Analysis

### **What is Vertebral Heart Score Analysis (VHS)?**

A series of three measurements that are used with the Metron algorithms to present you with an analysis of the heart.



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# 3

## Guided Mark-Up: VHS Analysis



The screenshot displays the Metron software interface. On the left, a grid of eight medical image thumbnails is shown, each with a label and a small green icon. The labels are: RH Pelvis DAR, LF LowerLimb Lateral, R Abdomen Lateral, LH Stifle Lateral, RH Stifle Lateral-TPLO, LH Pelvis VD, R Abdomen Lateral, R Thorax Lateral, and RH Stifle Lateral-TPLO. On the right, the 'DATABASE BROWSER' panel is visible, featuring a search bar, a 'Browse & Acquire' section with filters for Owner (Bob Miller), Animal (Cooper), and Date (9-Apr-2014), and a 'Select Items' section with buttons for All, Next Region, and None. Below these are various icons for file operations like Image File(s), USB Video, Receive Images, Add, Worklist, and DICOM Q/R. A red text prompt at the bottom of the panel says 'Double-click a thumbnail to view'. A yellow callout box with a black border points to the thumbnails and contains the following text:

***With Metron, you will always start in the 'Database Browser' screen where thumbnails of all the images in the currently selected study are displayed on the screen.***

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## Guided Mark-Up: VHS Analysis



The screenshot displays the Metron software interface. On the left, a grid of eight X-ray thumbnails is shown, each with a label and a green 'A' icon. The labels are: RH Pelvis DAR, LF LowerLimb Lateral, R Abdomen Lateral, LH Stifle Lateral, RH Stifle Lateral-TPLO, LH Pelvis VD, R Abdomen Lateral, R Thorax Lateral, and RH Stifle Lateral-TPLO. On the right, the 'DATABASE BROWSER' panel is visible, featuring a search bar, filters for 'Studies with new images' (Day, Week, Month, All), and fields for 'Owner' (Bob Miller), 'Animal' (Cooper), and 'Date' (9-Apr-2014). Below these are buttons for 'New', 'Edit', and 'Search'. Further down are buttons for 'Reset Collection', 'Add to Collection', and 'All Dates Collection'. A section for 'Add New Image, Video Clip, Form, or Report' includes buttons for 'Image File(s)...', 'USB Video...', 'Receive Images...', 'Add...', 'Worklist...', and 'DICOM Q/R...'. At the bottom of the panel are 'Select Items' buttons (All, Next Region, None) and a grid of icons for various actions like delete, download, print, and share. A red text prompt at the bottom of the panel says 'Double-click a thumbnail to view'. An 'Exit' button is located at the bottom right of the panel.

**A study is the group of images for a particular owner, animal and date combination. Metron always starts at the study you were viewing when you last used Metron.**

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# 5

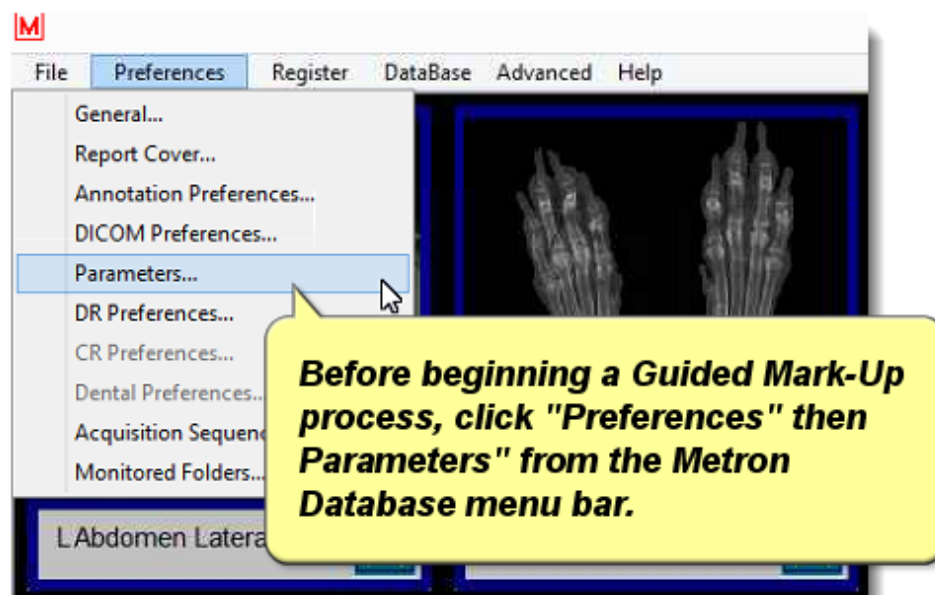
## Guided Mark-Up: VHS Analysis



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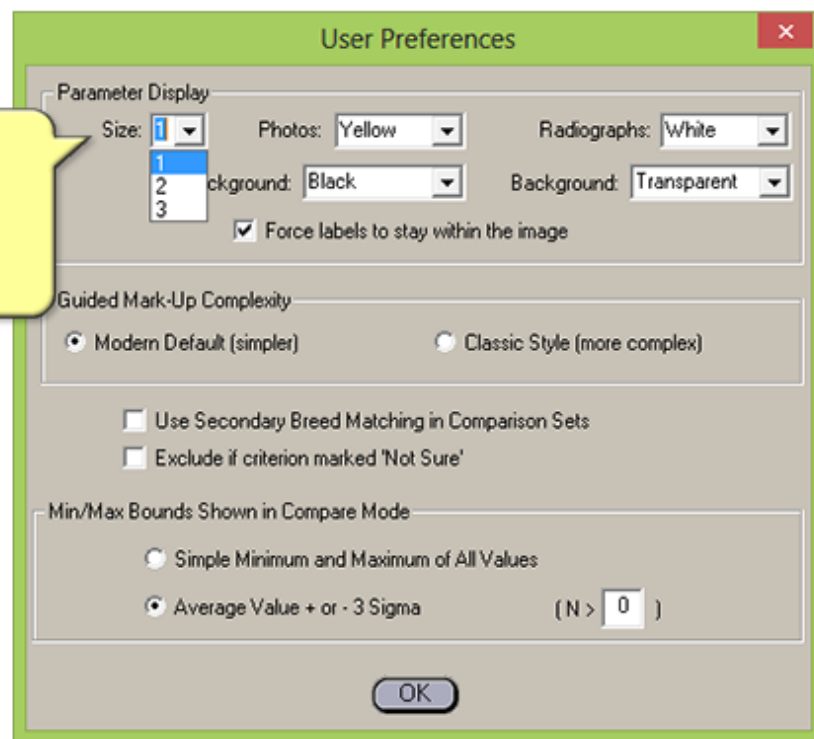
## Guided Mark-Up: VHS Analysis



## 7

## Guided Mark-Up: VHS Analysis

***User Preferences can  
be selected here for  
Mark-Up line width...***



The 'User Preferences' dialog box is shown with a green title bar and a red close button. It contains several sections: 'Parameter Display' with dropdowns for 'Size' (1, 2, 3), 'Photos' (Yellow), 'Radiographs' (White), 'Background' (Black), and 'Background' (Transparent), along with a checked checkbox 'Force labels to stay within the image'; 'Guided Mark-Up Complexity' with radio buttons for 'Modern Default (simpler)' and 'Classic Style (more complex)'; checkboxes for 'Use Secondary Breed Matching in Comparison Sets' and 'Exclude if criterion marked 'Not Sure''; and 'Min/Max Bounds Shown in Compare Mode' with radio buttons for 'Simple Minimum and Maximum of All Values' and 'Average Value + or - 3 Sigma' (with a field for N > 0). An 'OK' button is at the bottom.

User Preferences

Parameter Display

Size: 1 Photos: Yellow Radiographs: White

Background: Black Background: Transparent

☒ Force labels to stay within the image

Guided Mark-Up Complexity

☒ Modern Default (simpler) ☐ Classic Style (more complex)

☐ Use Secondary Breed Matching in Comparison Sets

☐ Exclude if criterion marked 'Not Sure'

Min/Max Bounds Shown in Compare Mode

☐ Simple Minimum and Maximum of All Values

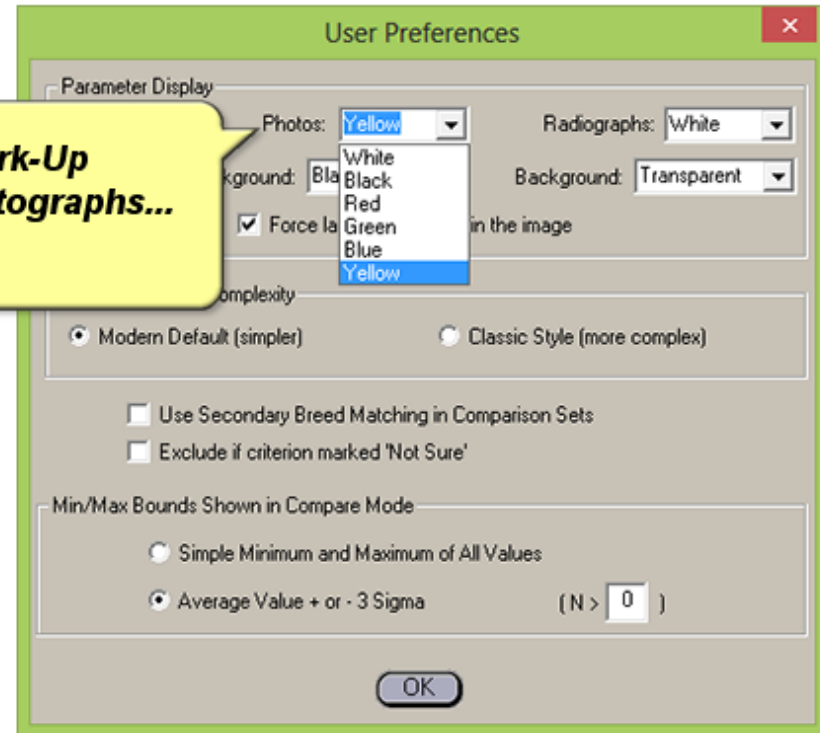
☒ Average Value + or - 3 Sigma (N > 0)

OK

## 8

## Guided Mark-Up: VHS Analysis

***...font color for Mark-Up  
description in photographs...***



The image shows a 'User Preferences' dialog box with a green title bar and a red close button. The 'Parameter Display' section is active, showing a dropdown menu for 'Photos' with 'Yellow' selected. Other options in the dropdown include White, Black, Red, Green, Blue, and Yellow. To the right, 'Radiographs' is set to 'White' and 'Background' is set to 'Transparent'. Below these, there is a checkbox for 'Force label in the image' which is checked. Further down, there are radio buttons for 'Modern Default (simpler)' and 'Classic Style (more complex)'. Below that are two unchecked checkboxes: 'Use Secondary Breed Matching in Comparison Sets' and 'Exclude if criterion marked 'Not Sure''. At the bottom, there is a section for 'Min/Max Bounds Shown in Compare Mode' with two radio buttons: 'Simple Minimum and Maximum of All Values' and 'Average Value + or - 3 Sigma'. The 'Average Value + or - 3 Sigma' option is selected, and next to it is a text box containing '0' with a label '(N > )'. An 'OK' button is at the bottom right of the dialog.

User Preferences

Parameter Display

Photos: Yellow

Radiographs: White

Background: Transparent

☒ Force label in the image

Modern Default (simpler) Classic Style (more complex)

☐ Use Secondary Breed Matching in Comparison Sets

☐ Exclude if criterion marked 'Not Sure'

Min/Max Bounds Shown in Compare Mode

☐ Simple Minimum and Maximum of All Values

☒ Average Value + or - 3 Sigma (N > 0 )

OK

## 9

## Guided Mark-Up: VHS Analysis

**and font color for Mark-Up  
description in radiographs.**

The screenshot shows a software dialog box titled "Guided Mark-Up Complexity" with a yellow callout bubble pointing to the "Radiographs" dropdown menu. The callout bubble contains the text: "and font color for Mark-Up description in radiographs." The dialog box has a title bar with a close button (X) in the top right corner. It contains several sections:

- Parameter Display**:
  - Size: 1 (dropdown)
  - Photos: Yellow (dropdown)
  - Radiographs: White (dropdown, with a list of options: White, Black, Red, Green, Blue, Yellow)
  - Background: Black (dropdown)
  - Background: Tra (dropdown)
  - ☒ Force labels to stay within the image
- Guided Mark-Up Complexity**:
  - ☒ Modern Default (simpler)
  - ☐ Classic Style (more complex)
- ☐ Use Secondary Breed Matching in Comparison Sets
- ☐ Exclude if criterion marked 'Not Sure'
- Min/Max Bounds Shown in Compare Mode**:
  - ☐ Simple Minimum and Maximum of All Values
  - ☒ Average Value + or - 3 Sigma (N > 0)

At the bottom of the dialog box is an "OK" button.

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## Guided Mark-Up: VHS Analysis

***All other areas checked are set as Metron default settings and seldom need to be changed.***

User Preferences

Parameter Display

Size: 1    Photos: Yellow    Radiographs: White

Background: Black    Background: Transparent

☒ Force labels to stay within the image

Guided Mark-Up Complexity

☒ Modern Default (simpler)    ☐ Classic Style (more complex)

☐ Use Secondary Breed Matching in Comparison Sets

☐ Exclude if criterion marked 'Not Sure'

Min/Max Bounds Shown in Compare Mode

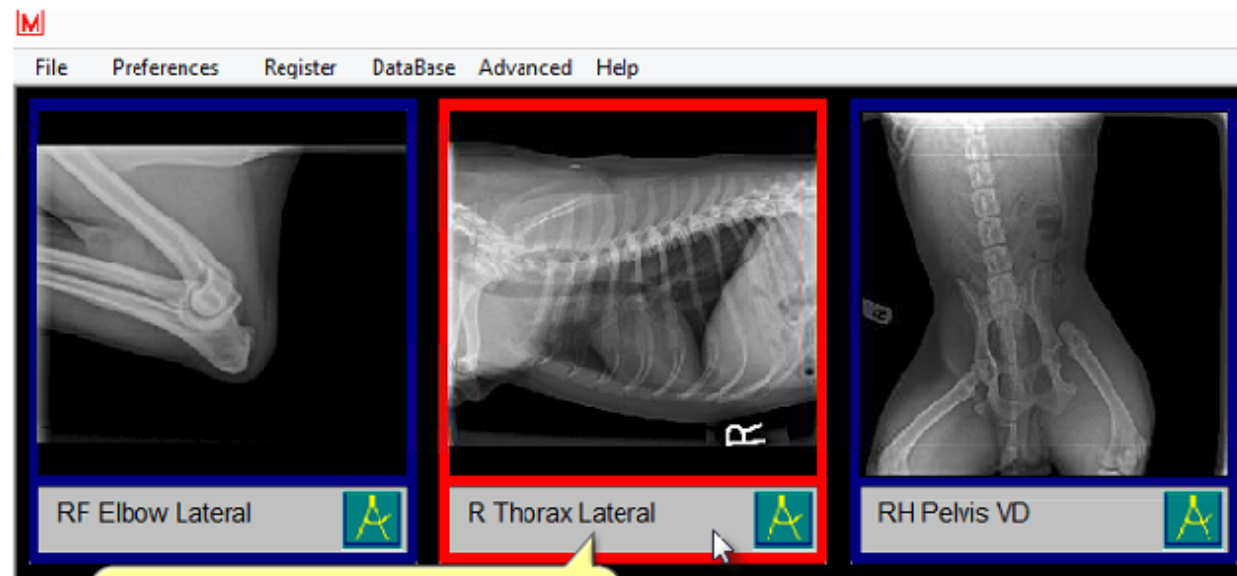
☐ Simple Minimum and Maximum of All Values

☒ Average Value + or - 3 Sigma    (N > 0)

OK

# 11

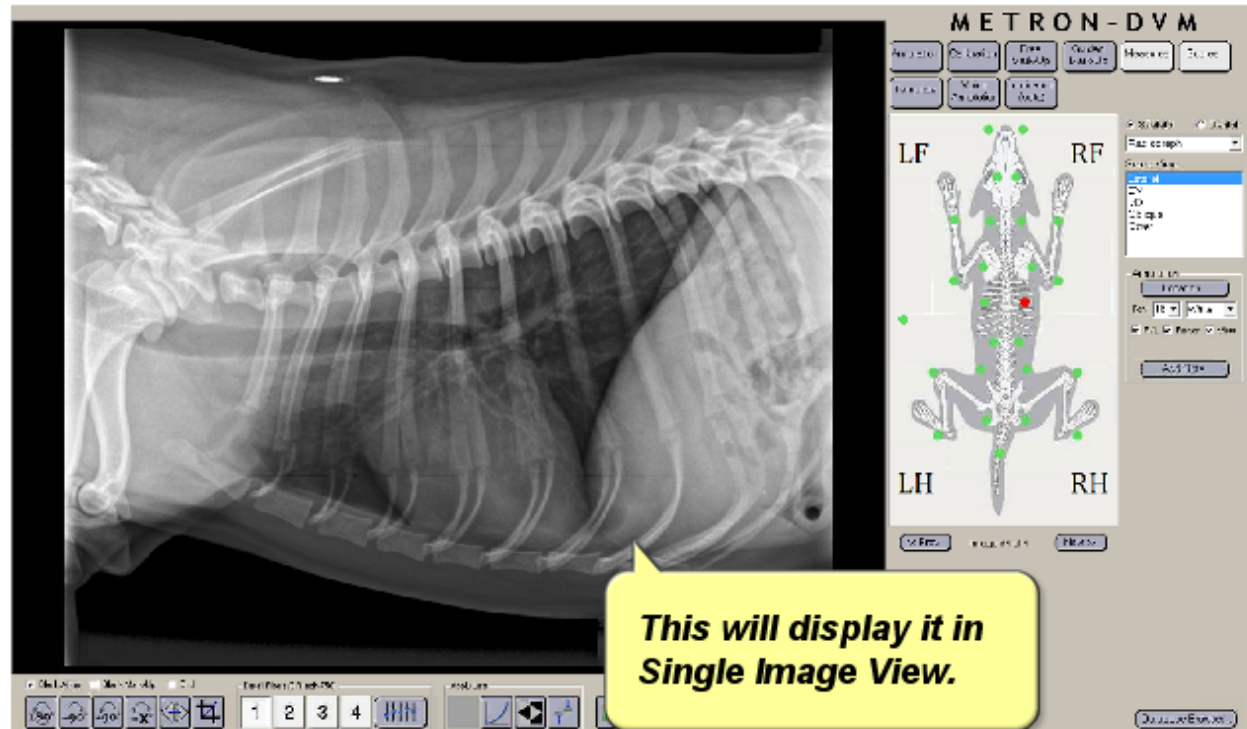
## Guided Mark-Up: VHS Analysis



**Select an image by double clicking on the image.**

# 12

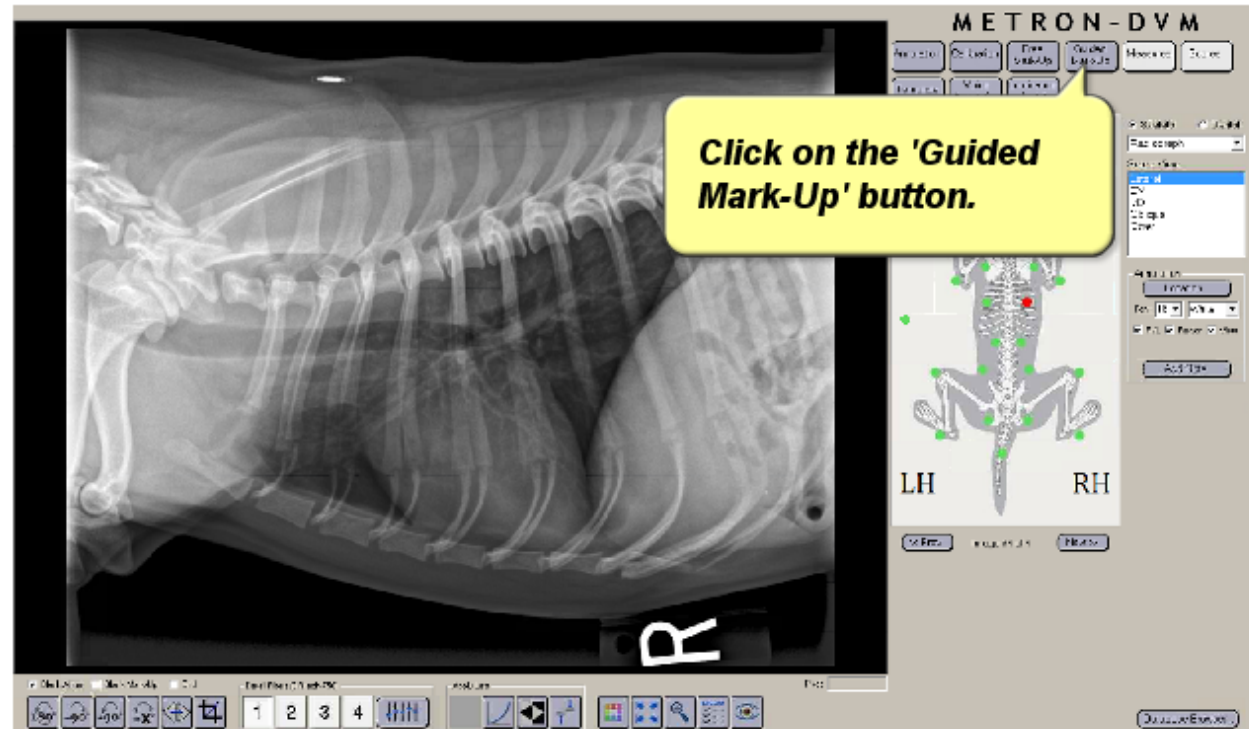
## Guided Mark-Up: VHS Analysis



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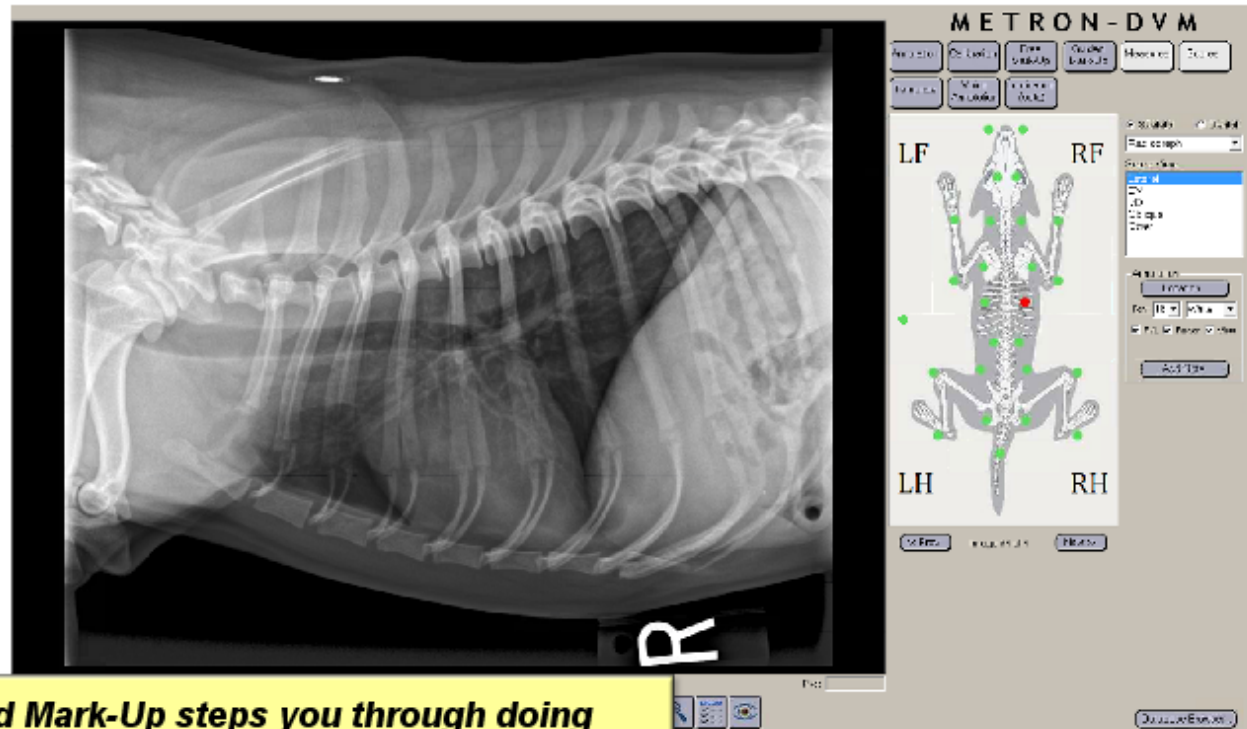
## Guided Mark-Up: VHS Analysis



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## Guided Mark-Up: VHS Analysis



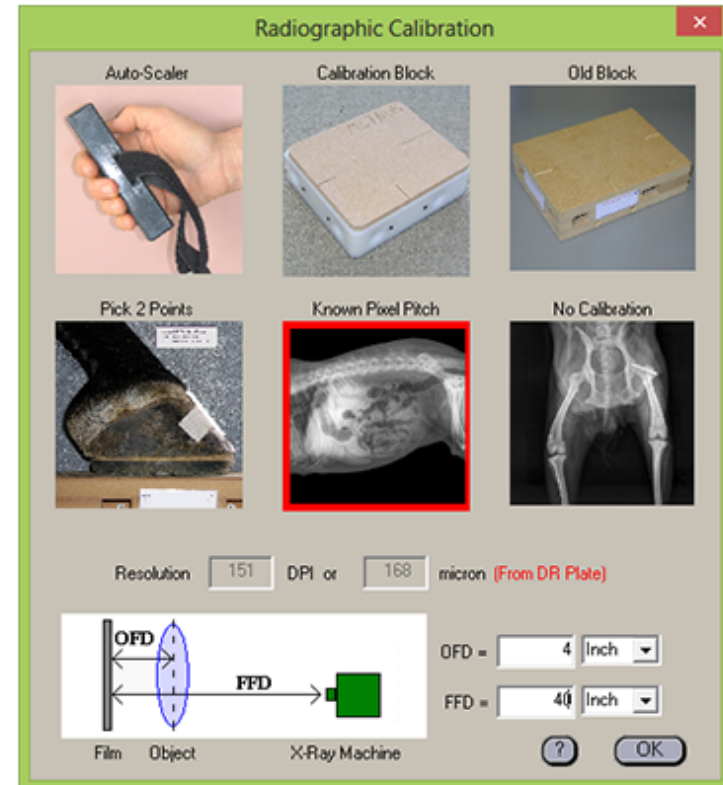
***Guided Mark-Up steps you through doing mark-ups on your image. When you click the 'Guided Mark-Up' button and you have not previously calibrated this image, you will first be brought to the Calibration panel.***

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## Guided Mark-Up: VHS Analysis

If the calibration panel pops up, and the image was taken with a CR or DR system controlled by Metron, the entries as shown to the right can be used to calibrate.

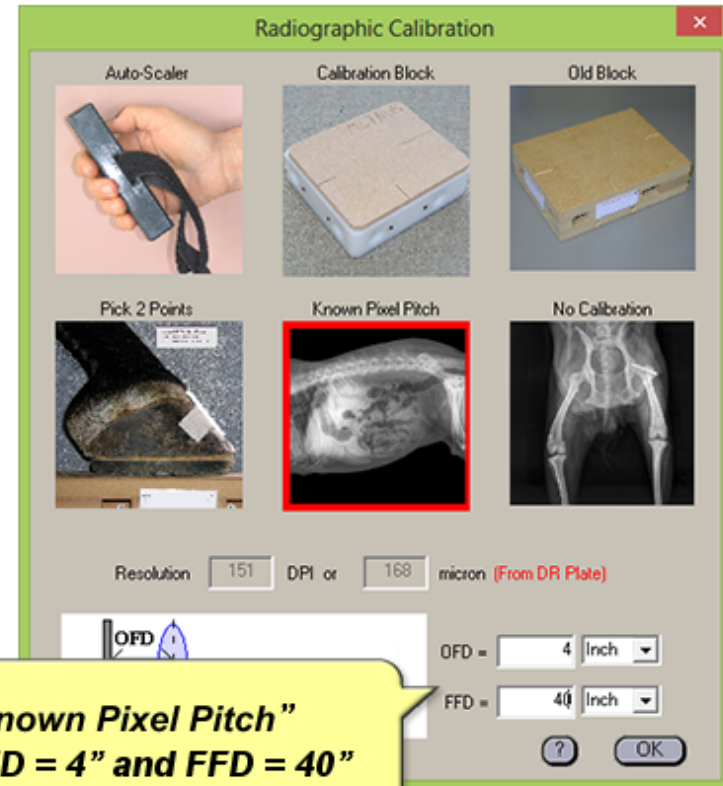


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## Guided Mark-Up: VHS Analysis

If the calibration panel pops up, and the image was taken with a CR or DR system controlled by Metron, the entries as shown to the right can be used to calibrate.

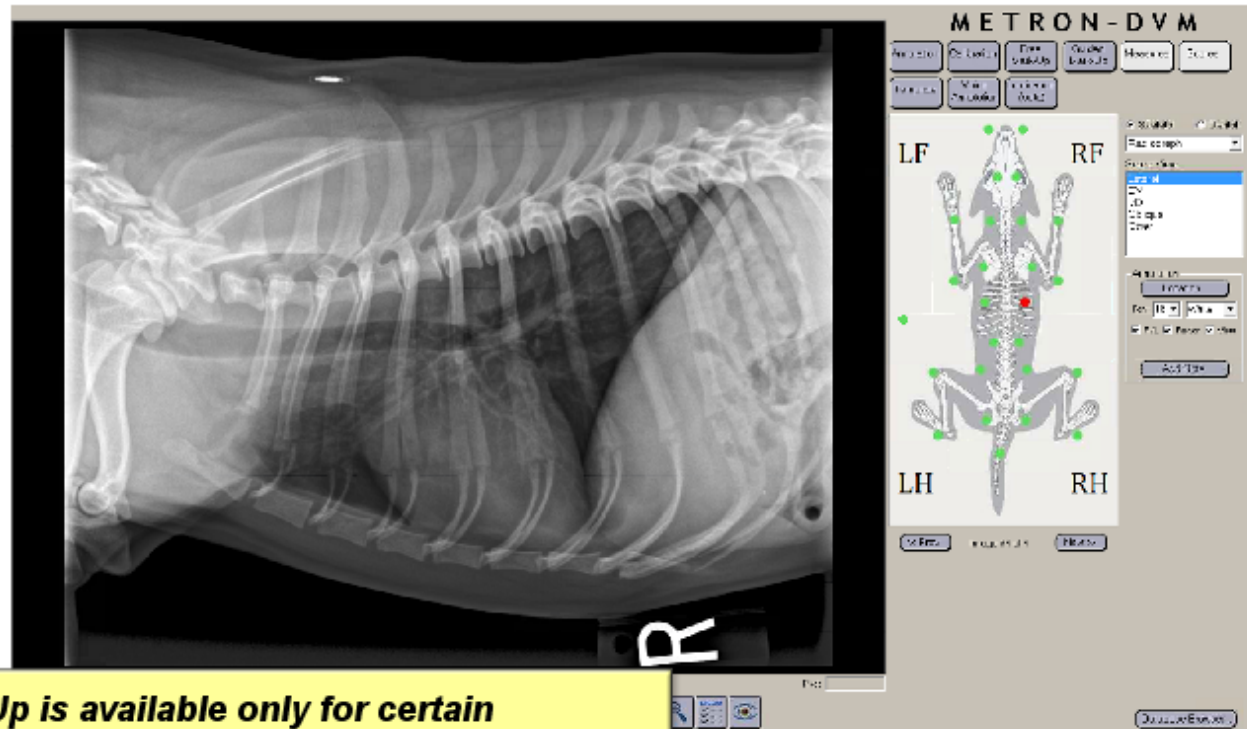


**Use "Known Pixel Pitch"  
and OFD = 4" and FFD = 40"  
for small animal table.**

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## Guided Mark-Up: VHS Analysis



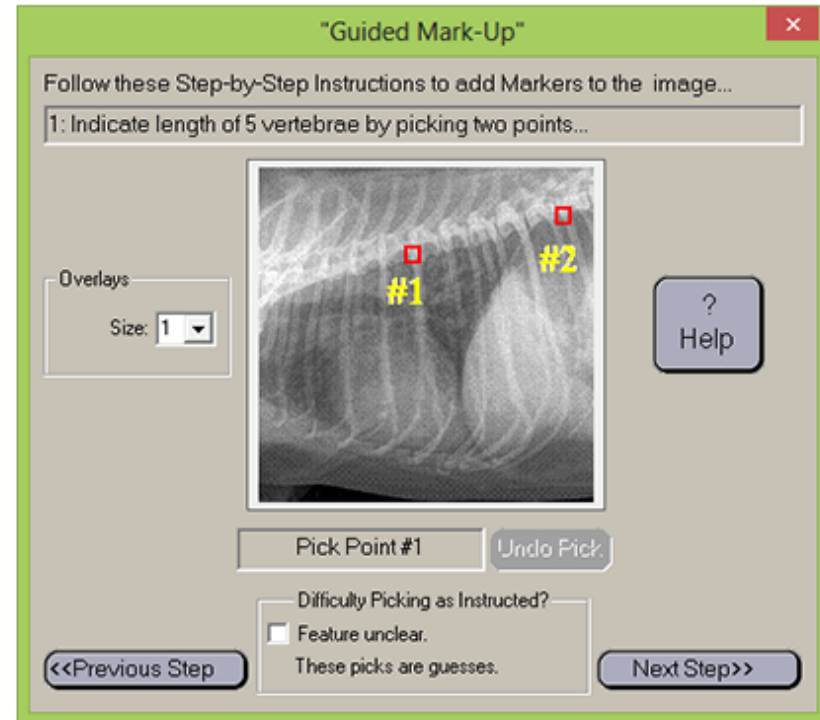
**Guided Mark-Up is available only for certain "anatomical regions" for the feline and canine. The "Guided Mark-Up" button only becomes available when you indicate that the image is of the chest. For canine, there is also a Guided Mark-Up for TPLO.**

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## Guided Mark-Up: VHS Analysis

The following are the three steps as indicated on the instruction window.

### Step 1: "Length"

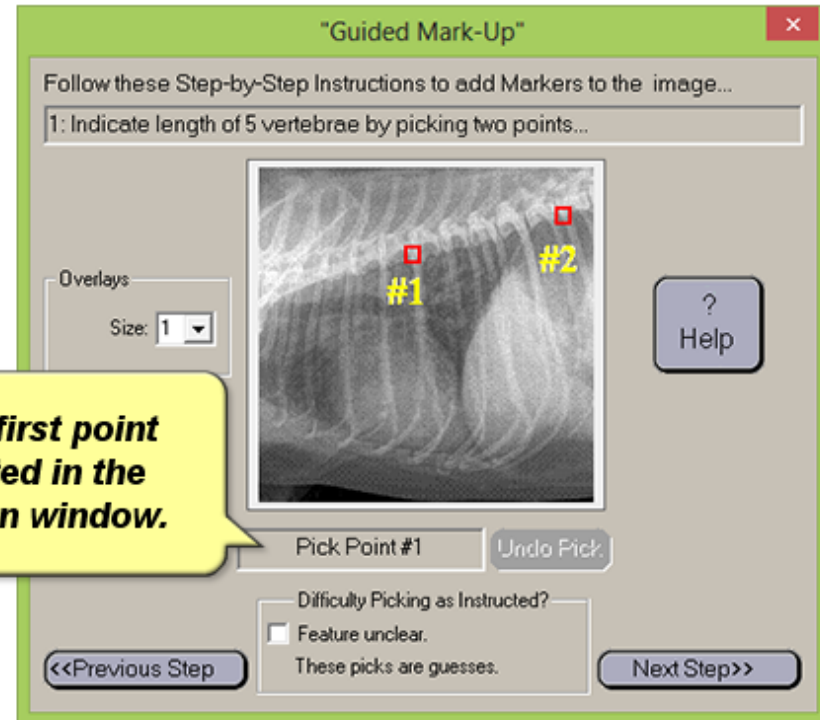


## Guided Mark-Up: VHS Analysis

The following are the three steps as indicated on the instruction window.

### Step 1: "Length"

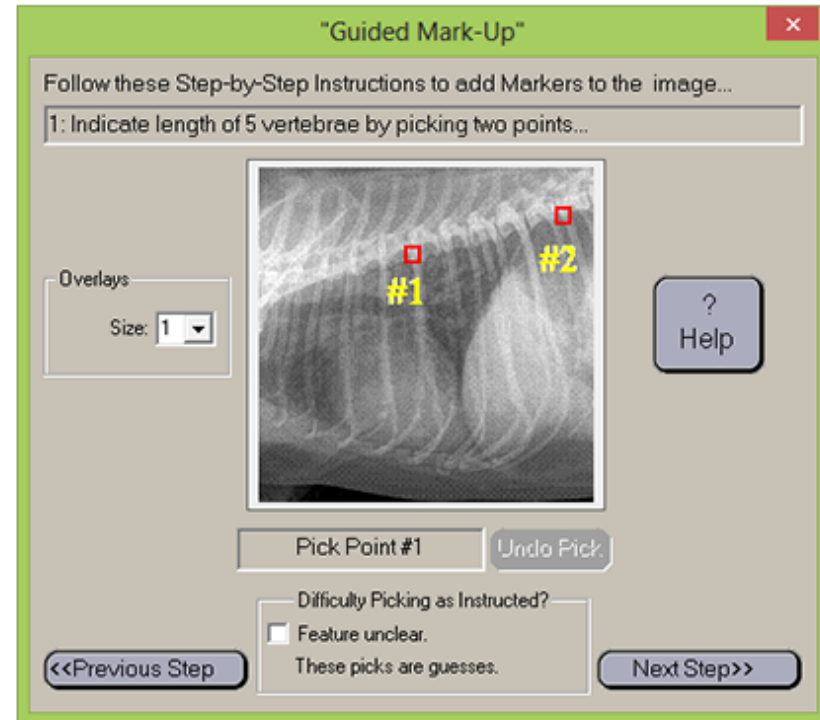
***Click the first point  
as indicated in the  
instruction window.***



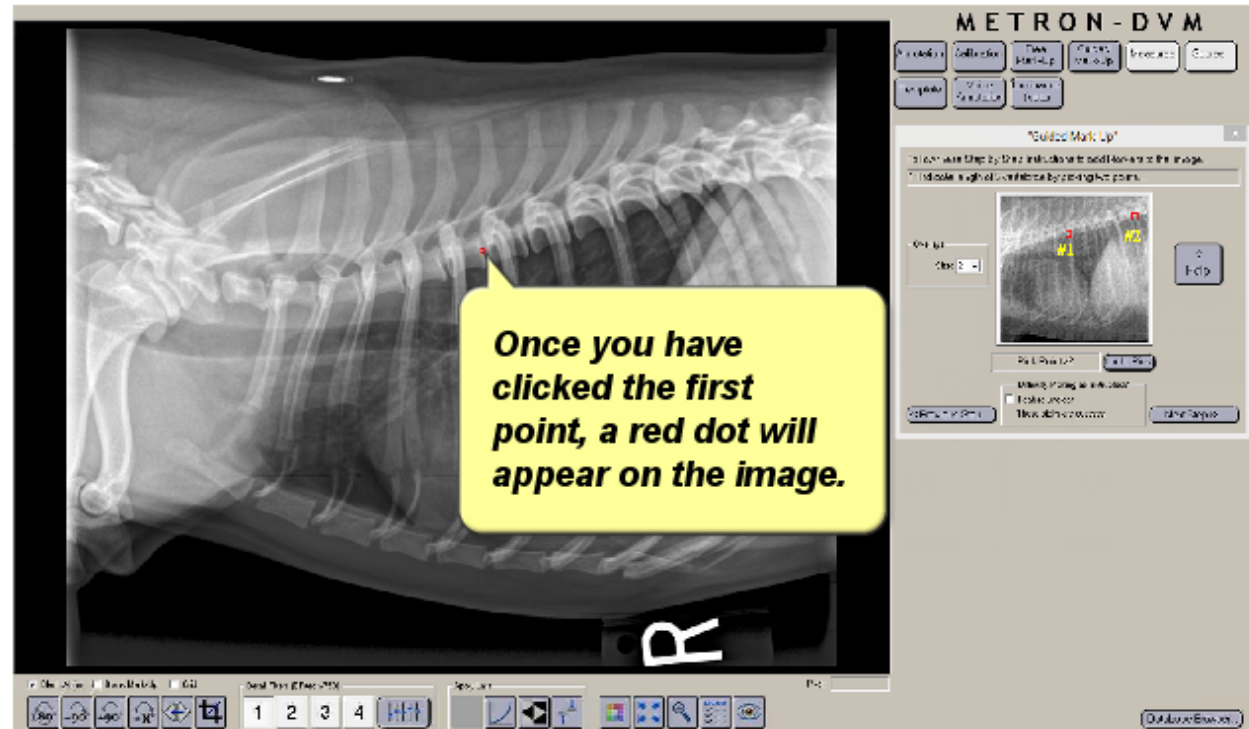
## Guided Mark-Up: VHS Analysis

Pick a point in an inter-vertebral space, then count five vertebrae and pick a second point. Hence the two points you pick are spaced apart exactly 5 vertebral widths.

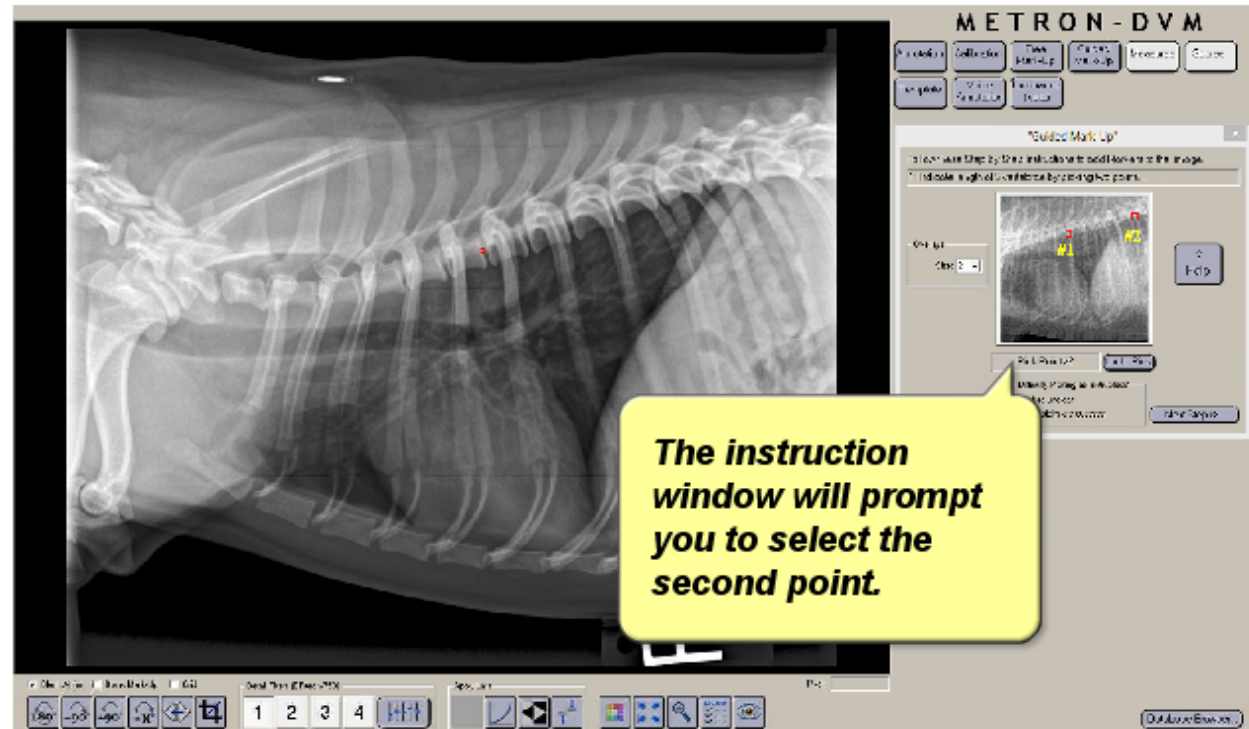
Ideally the first pick is on the cranial edge of T4 and then count five vertebrae caudally and pick at the cranial edge of T9. However, any set of 5 mid-thoracic vertebrae may be used.



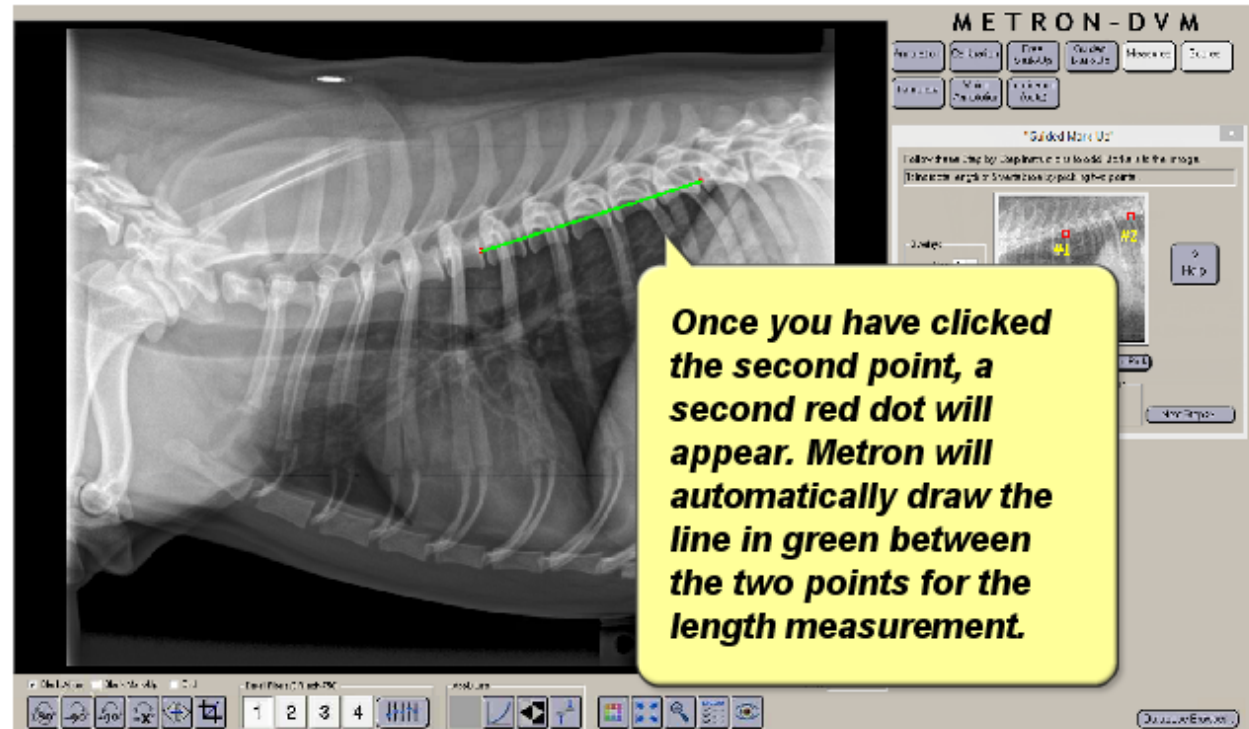
## Guided Mark-Up: VHS Analysis



## Guided Mark-Up: VHS Analysis

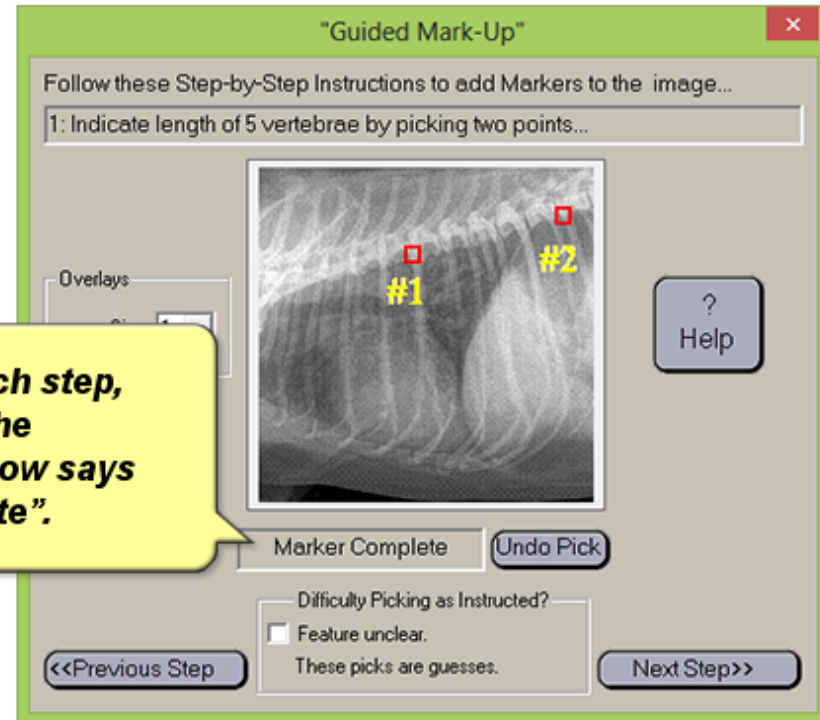


## Guided Mark-Up: VHS Analysis

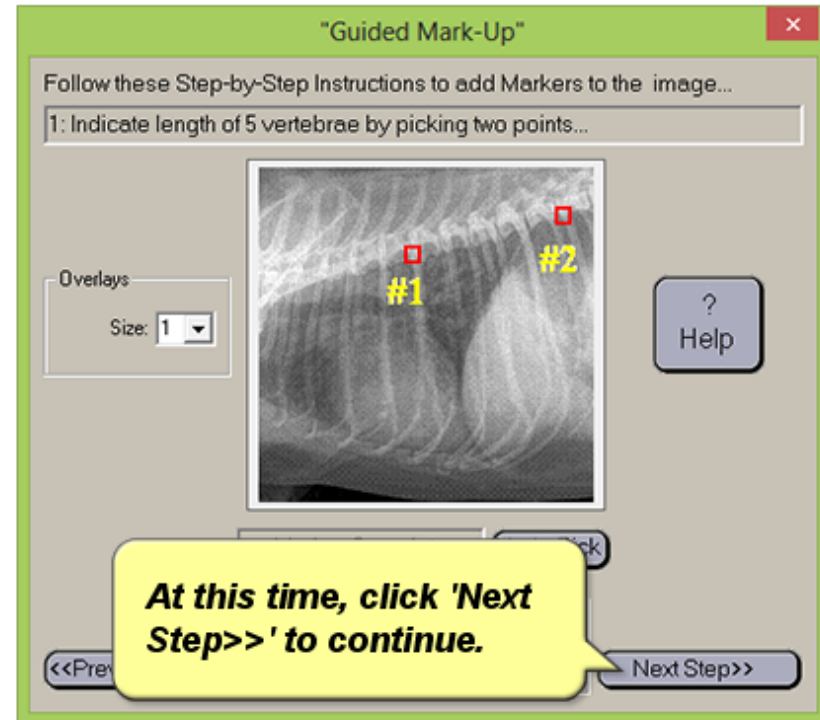


## Guided Mark-Up: VHS Analysis

***At the end of each step,  
you will notice the  
instruction window says  
"Marker Complete".***

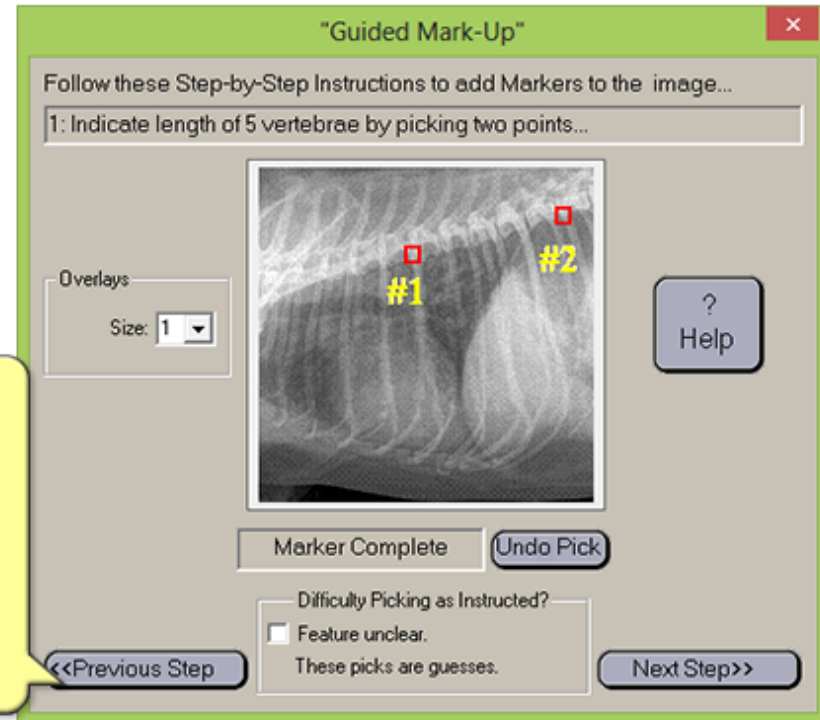


## Guided Mark-Up: VHS Analysis

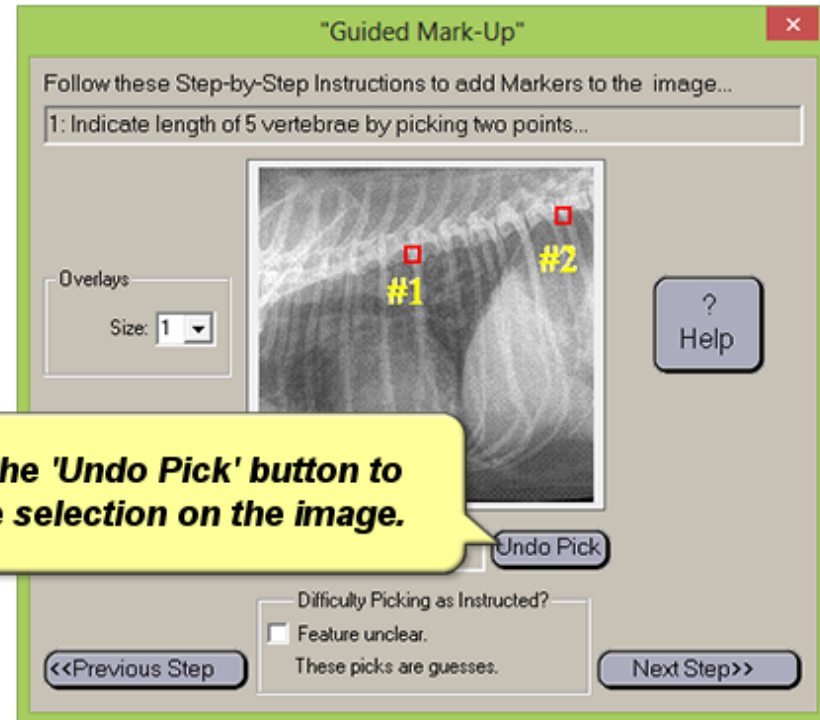


## Guided Mark-Up: VHS Analysis

**Also, at any point you are able to:**  
**1) Click the '<<Previous Step' button to move back one step at a time.**

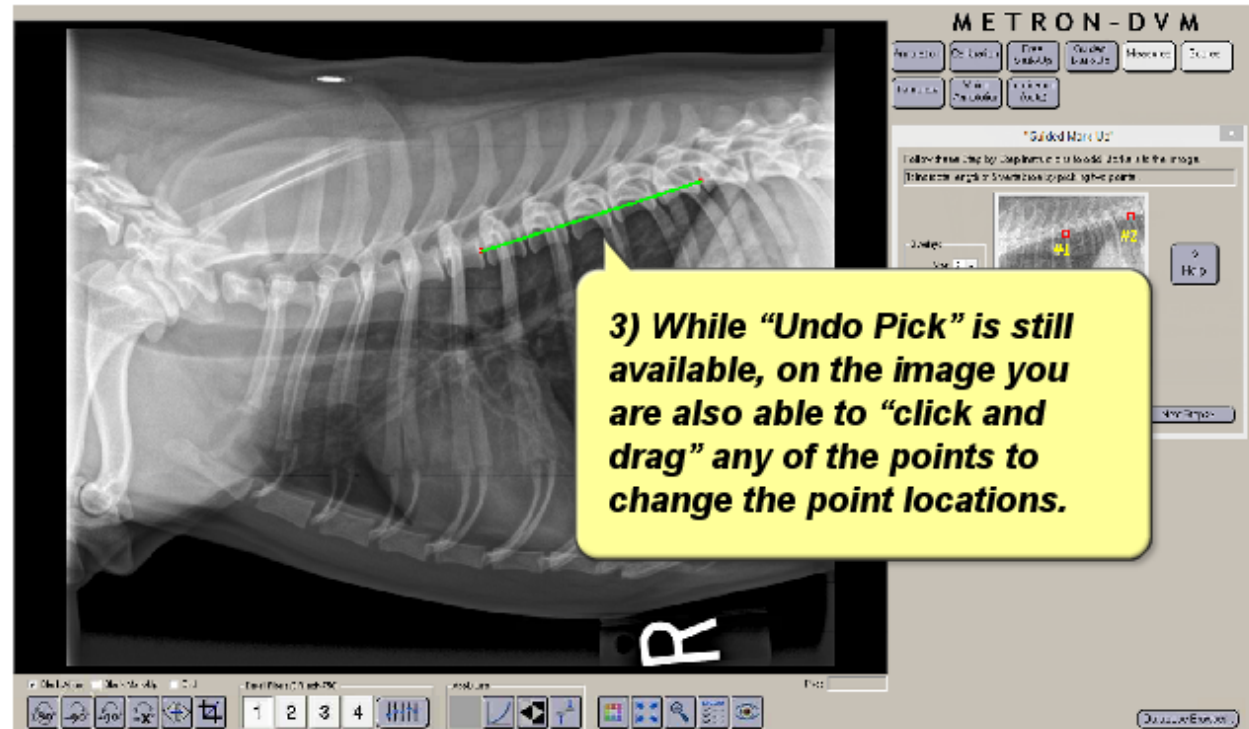


## Guided Mark-Up: VHS Analysis



**2) Click the 'Undo Pick' button to erase the selection on the image.**

## Guided Mark-Up: VHS Analysis

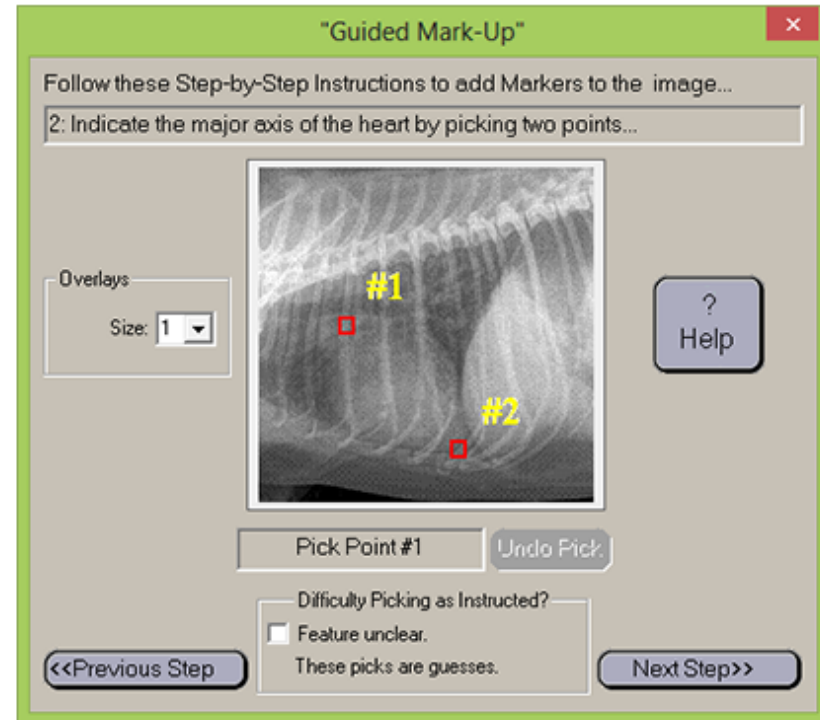


## Guided Mark-Up: VHS Analysis



## Guided Mark-Up: VHS Analysis

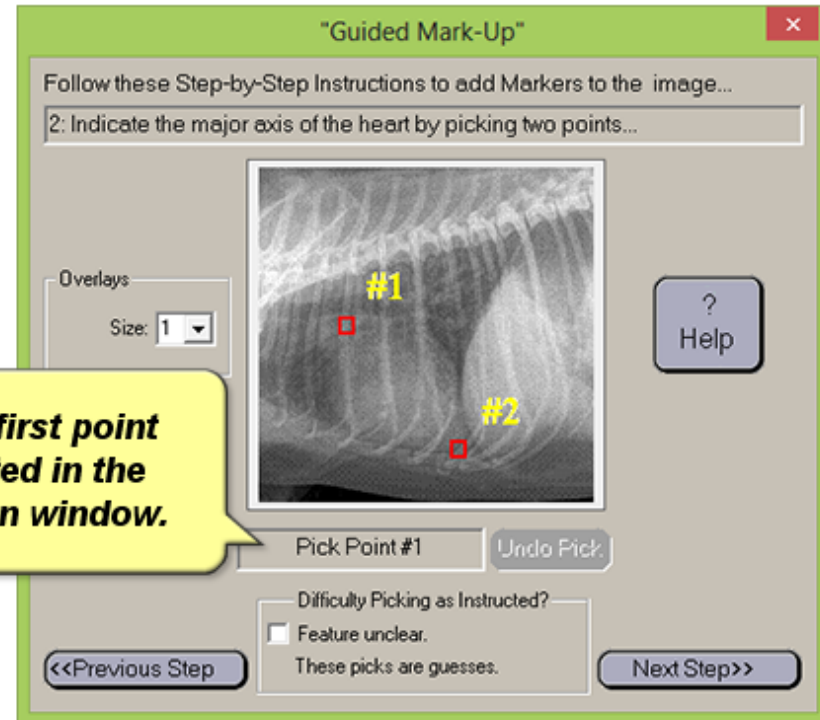
### Step 2: "Major Axis"



## Guided Mark-Up: VHS Analysis

### Step 2: "Major Axis"

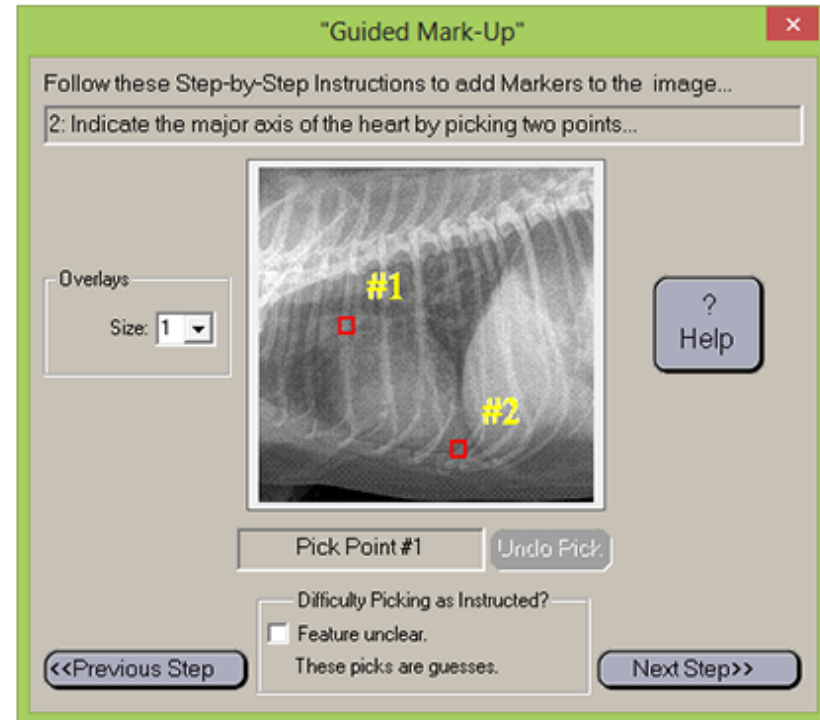
**Click the first point  
as indicated in the  
instruction window.**



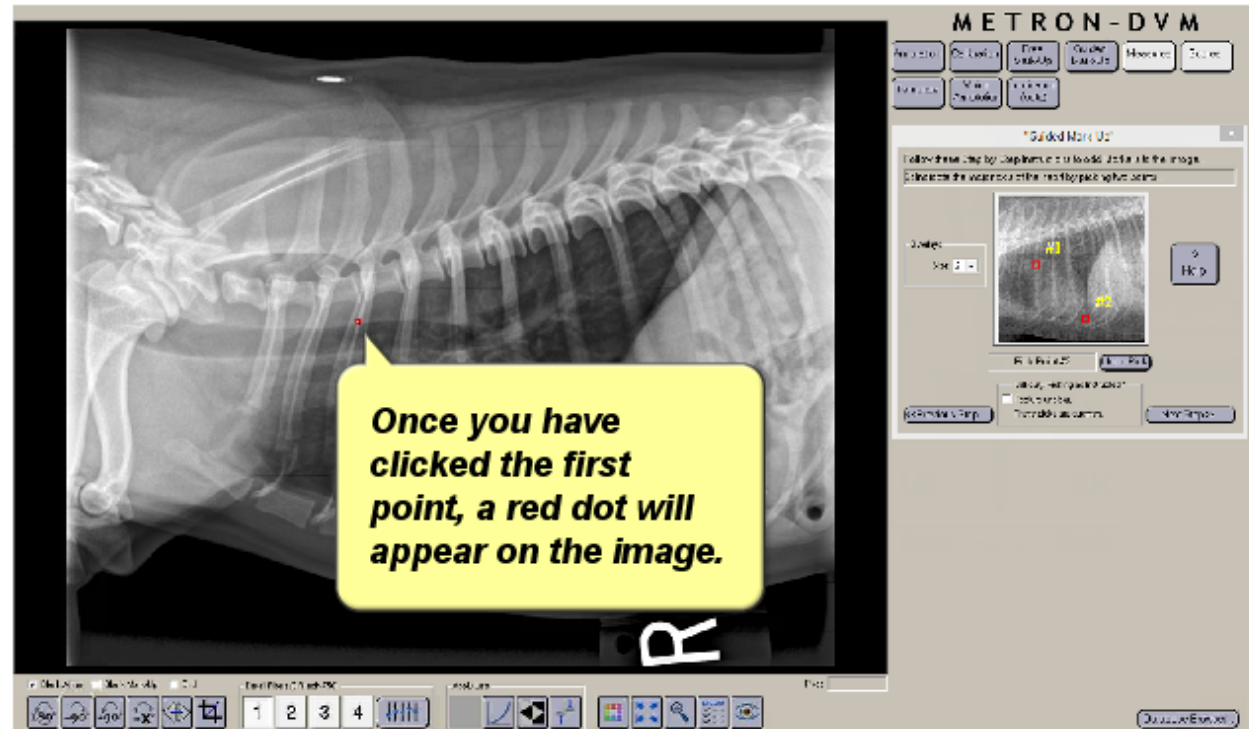
## Guided Mark-Up: VHS Analysis

### "Major Axis"

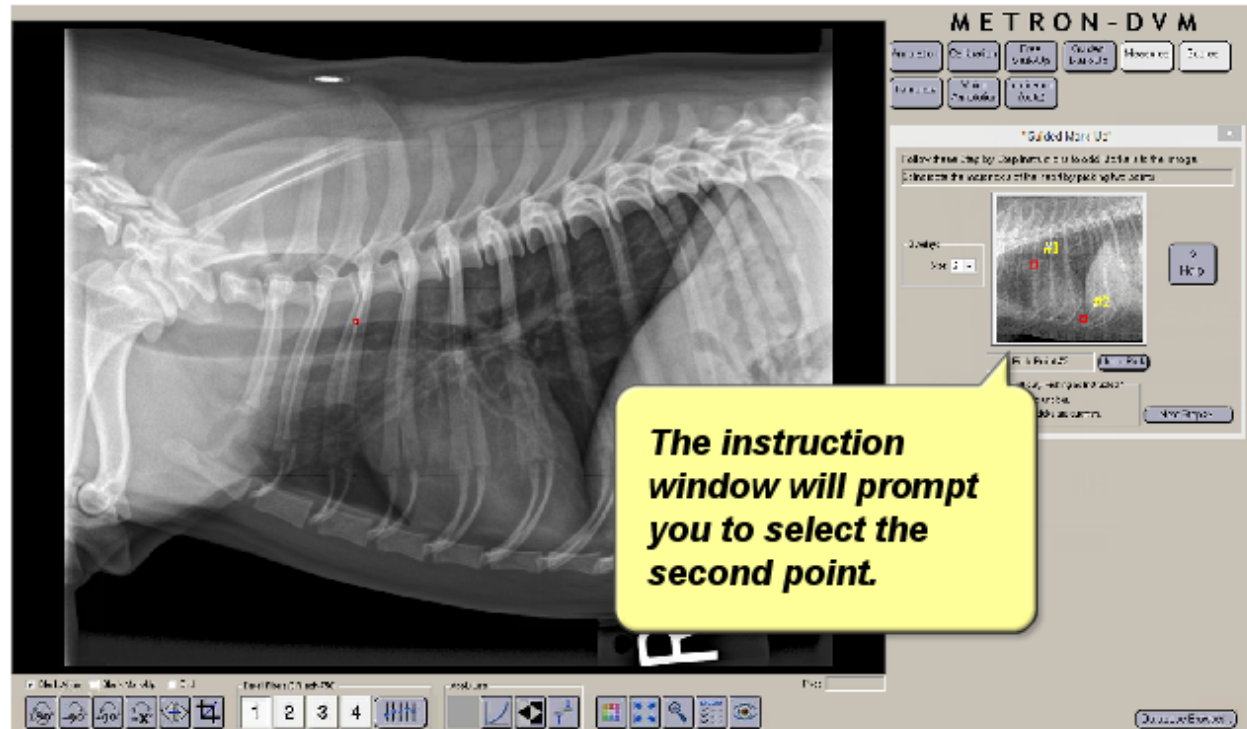
The long axis of the heart is measured from the ventral border of the left main stem bronchus (cranioventral border of the carina) to the cardiac apex (the most distant point on the ventral contour of the cardiac radiographic image). This dimension reflects the combined size of the left atrium and the left ventricle.



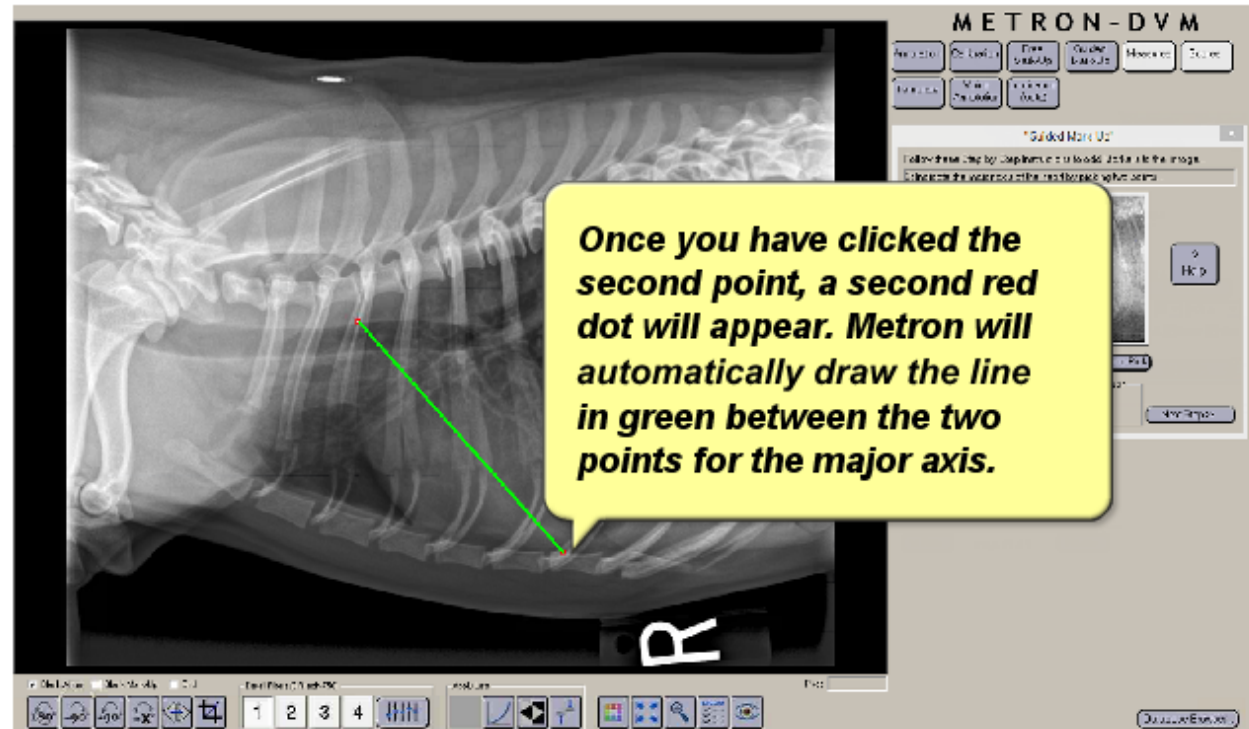
## Guided Mark-Up: VHS Analysis



## Guided Mark-Up: VHS Analysis

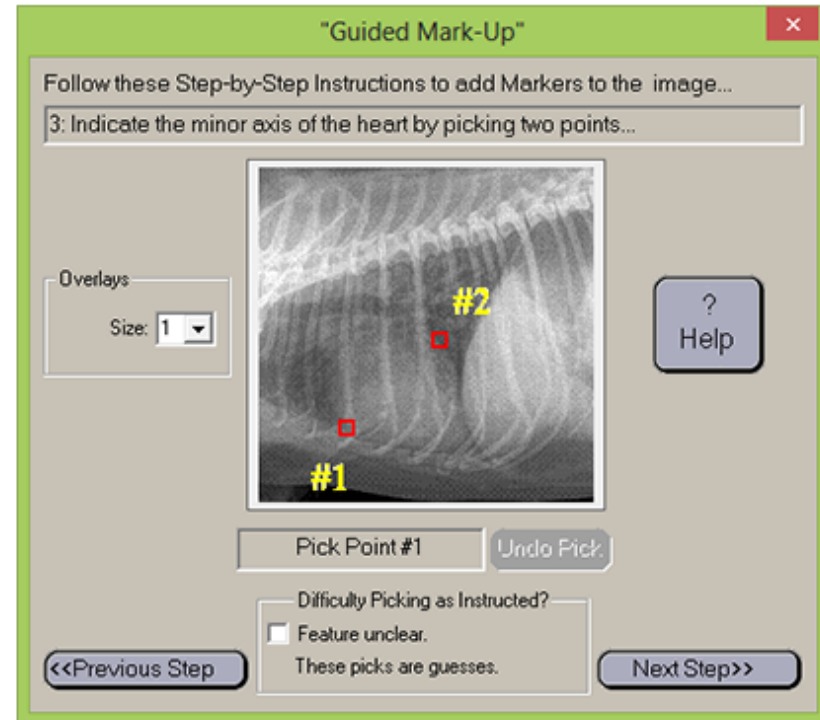


## Guided Mark-Up: VHS Analysis



## Guided Mark-Up: VHS Analysis

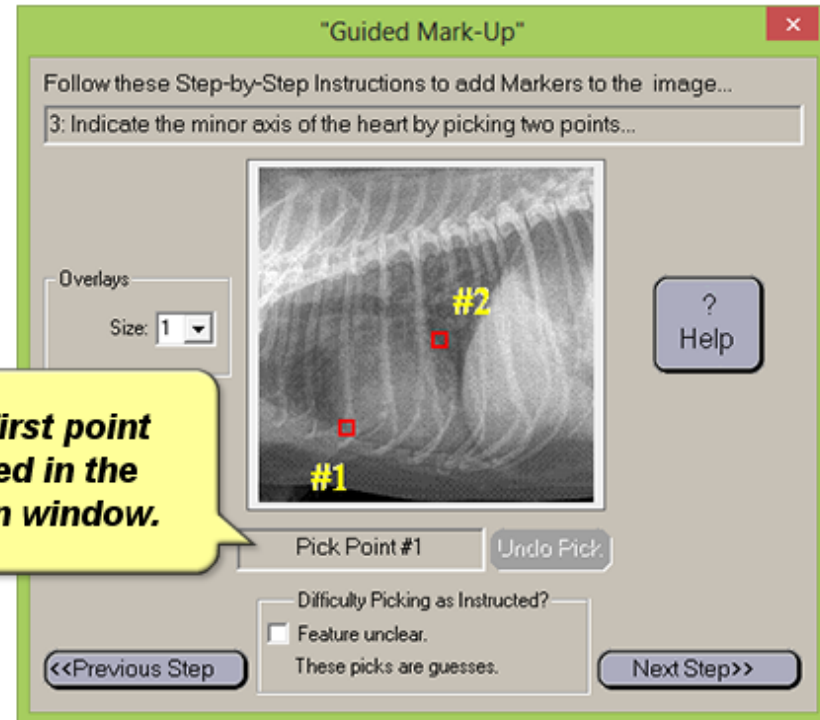
### Step 3: "Minor Axis"



## Guided Mark-Up: VHS Analysis

### Step 3: "Minor Axis"

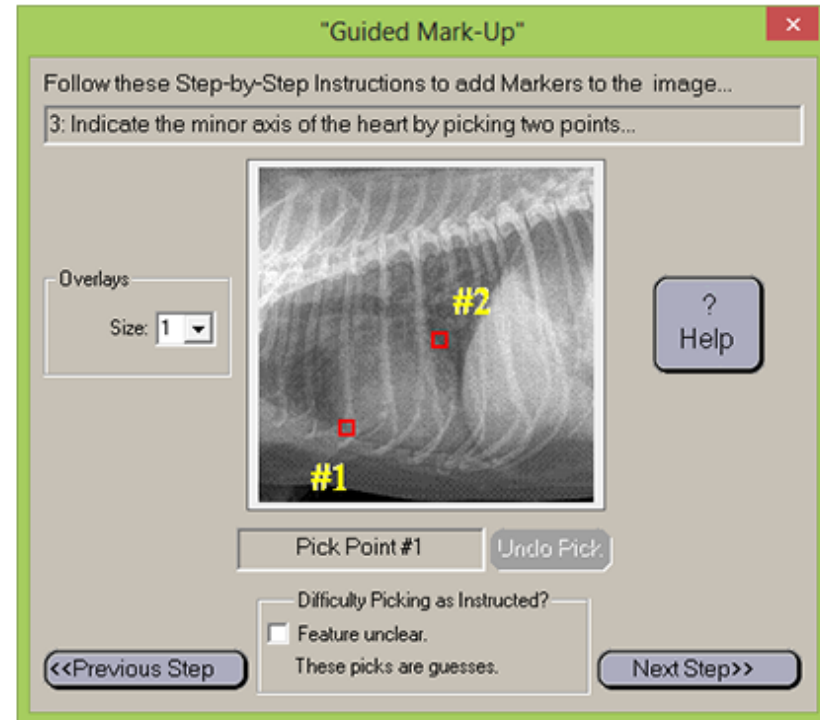
**Click the first point  
as indicated in the  
instruction window.**



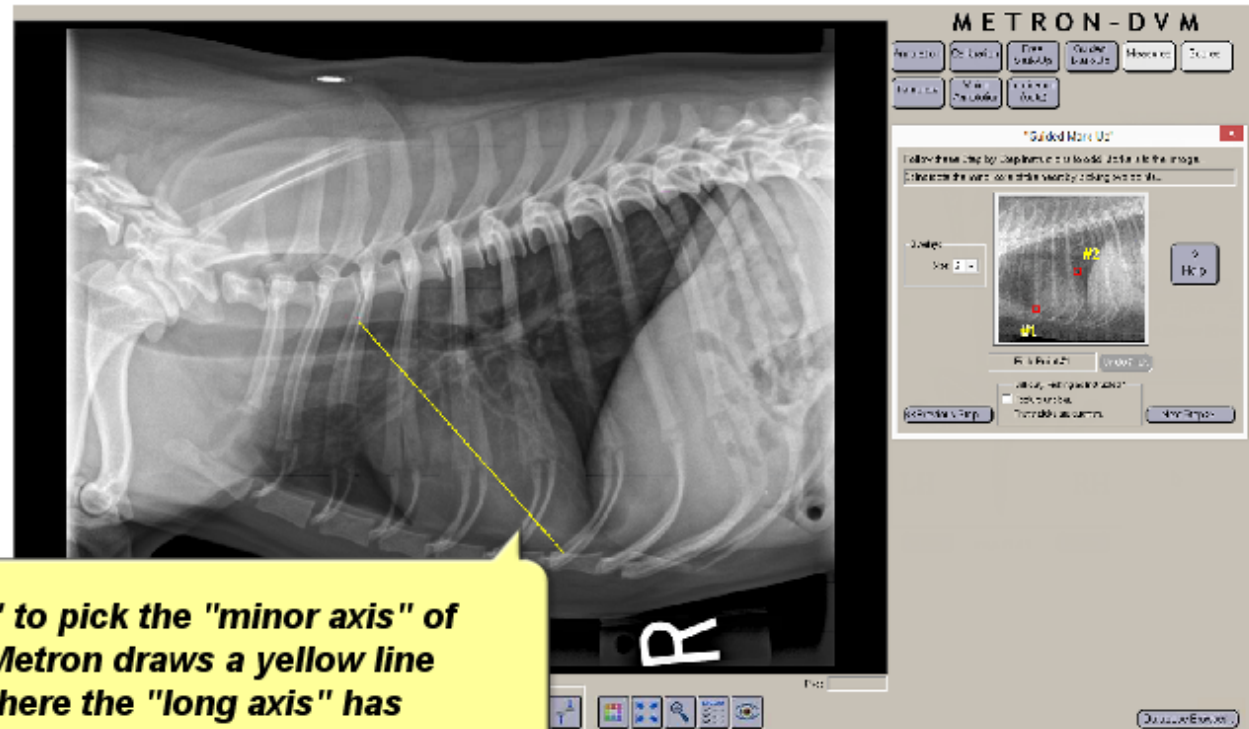
## Guided Mark-Up: VHS Analysis

### "Minor Axis"

The "Minor Axis" is measured at the widest point of the cardiac image on a line perpendicular to the long axis at the level of the caudal vena cava.

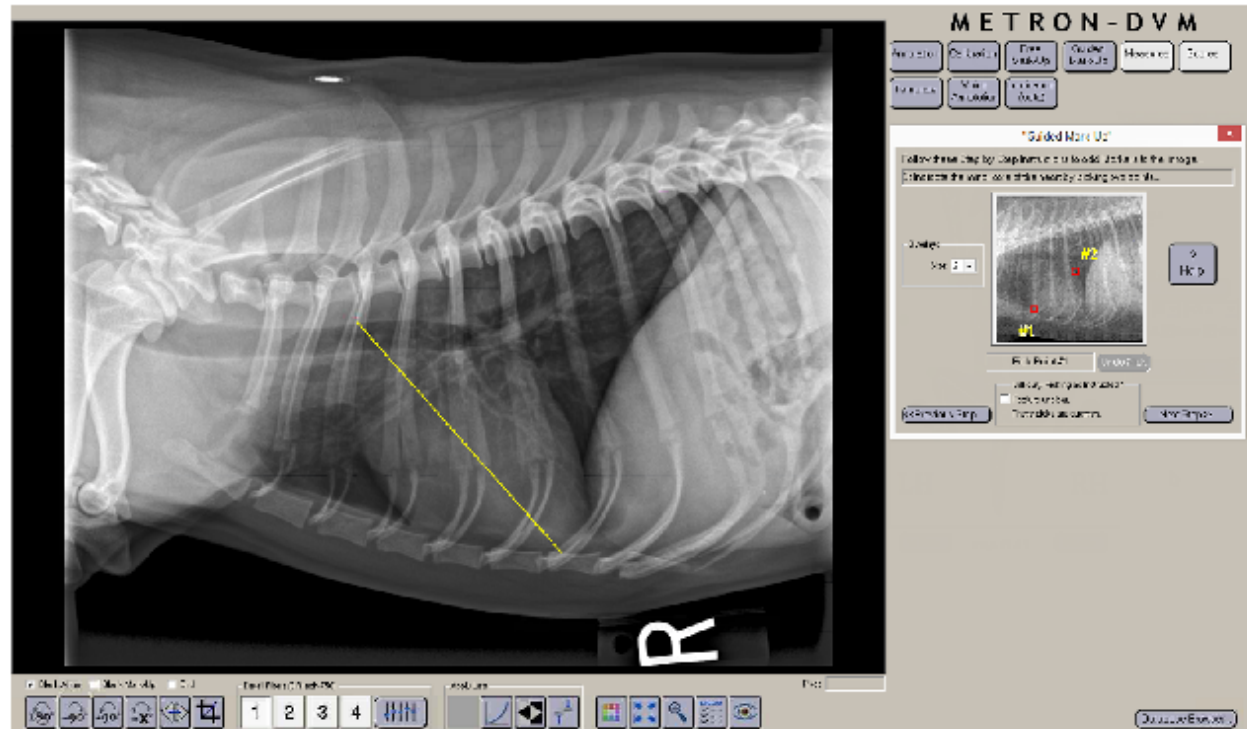


## Guided Mark-Up: VHS Analysis



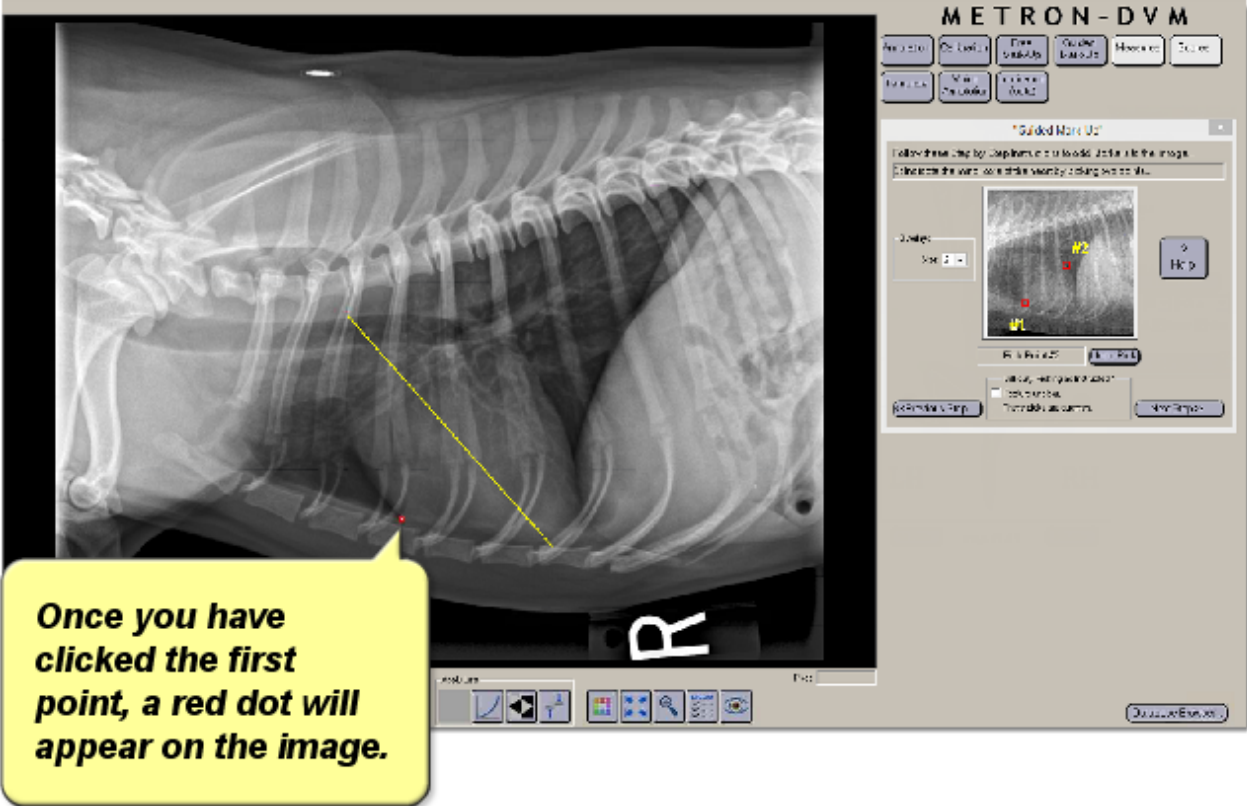
***At "Step 3" to pick the "minor axis" of the heart, Metron draws a yellow line showing where the "long axis" has already been picked. This way, the user can see, and make the new selections so the two lines are perpendicular.***

## Guided Mark-Up: VHS Analysis

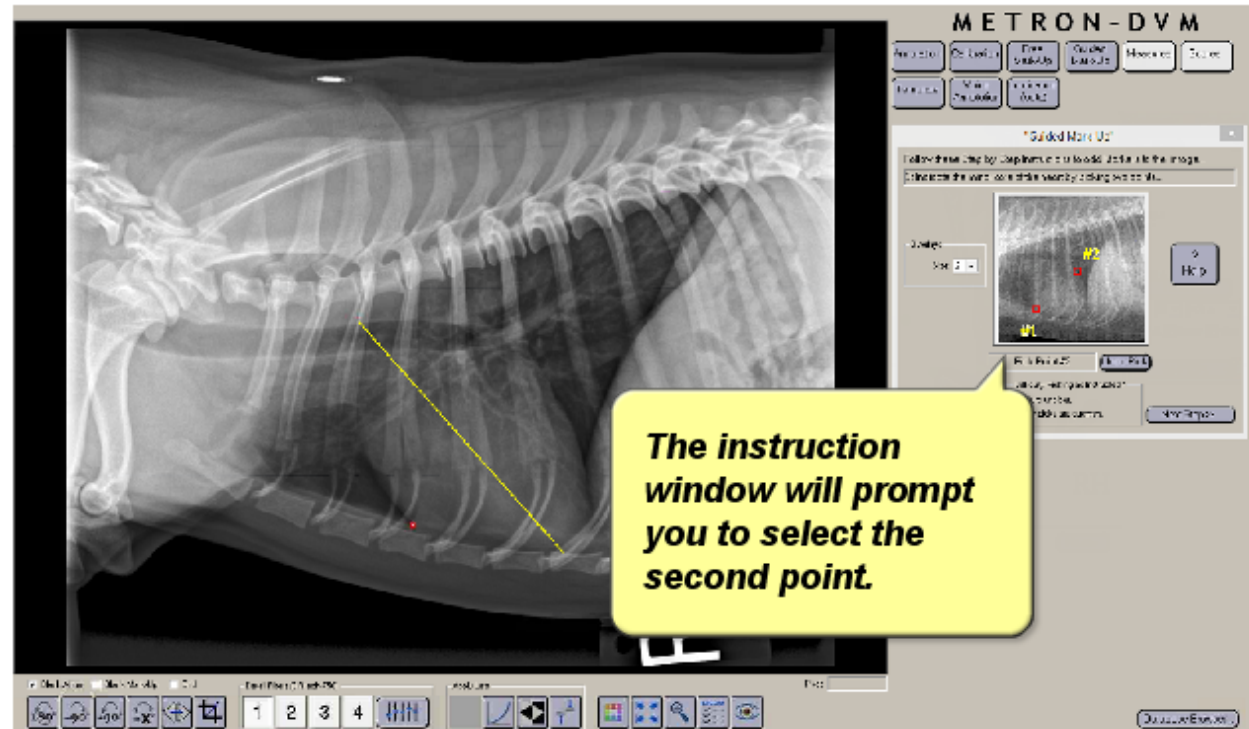


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# Guided Mark-Up: VHS Analysis



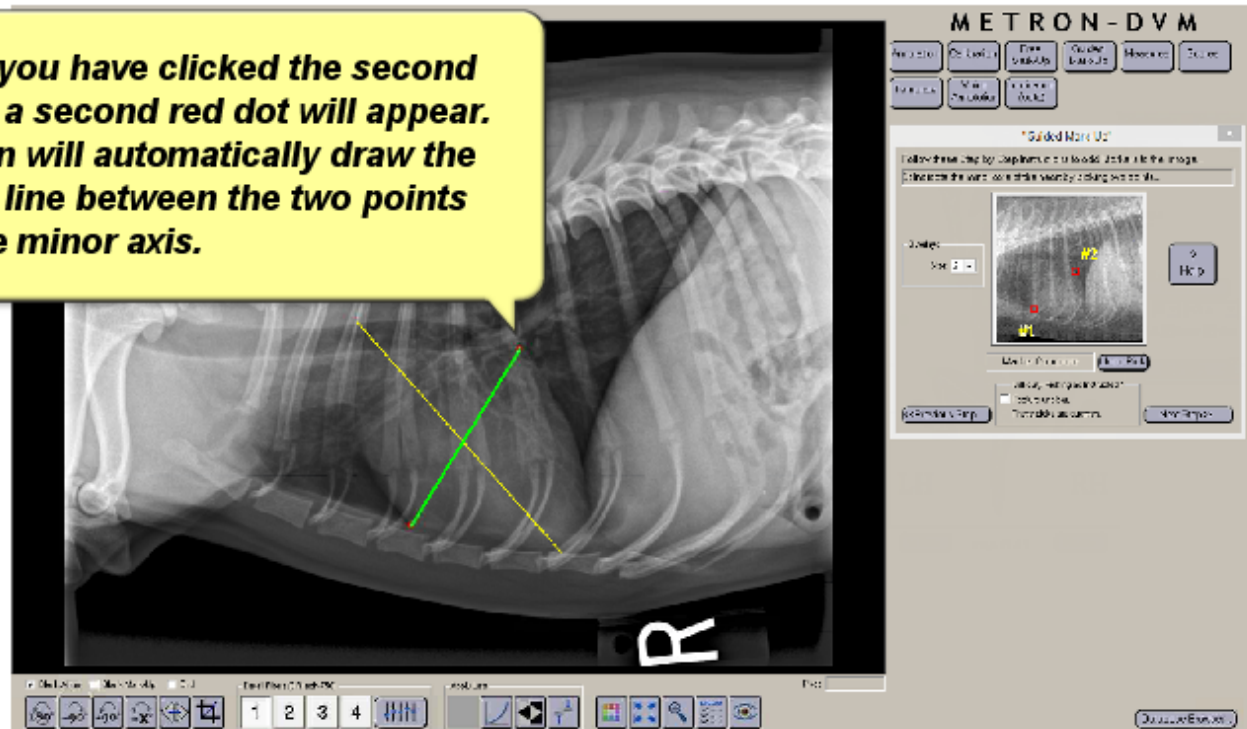
## Guided Mark-Up: VHS Analysis



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## Guided Mark-Up: VHS Analysis

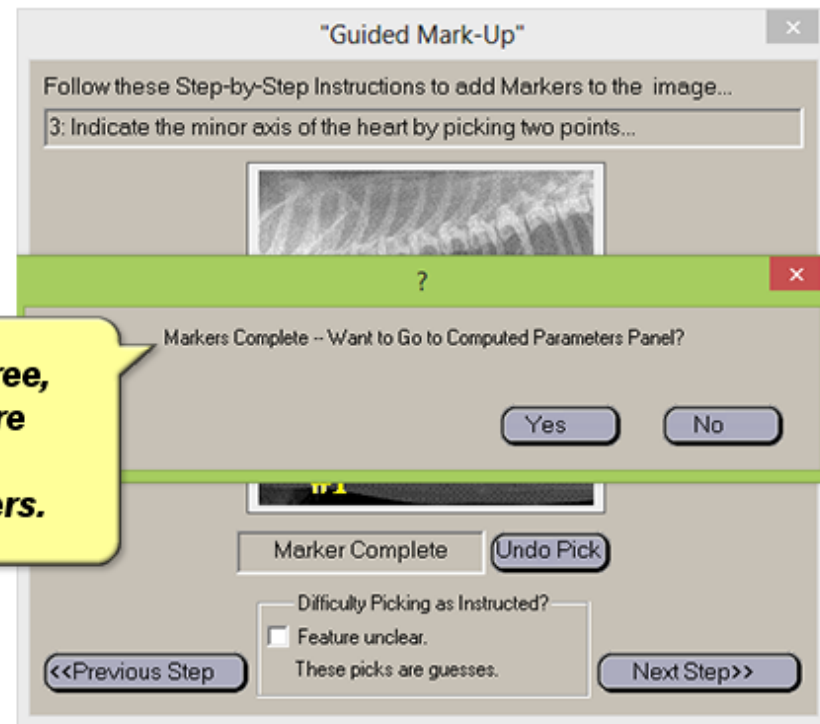
**Once you have clicked the second point, a second red dot will appear. Metron will automatically draw the green line between the two points for the minor axis.**



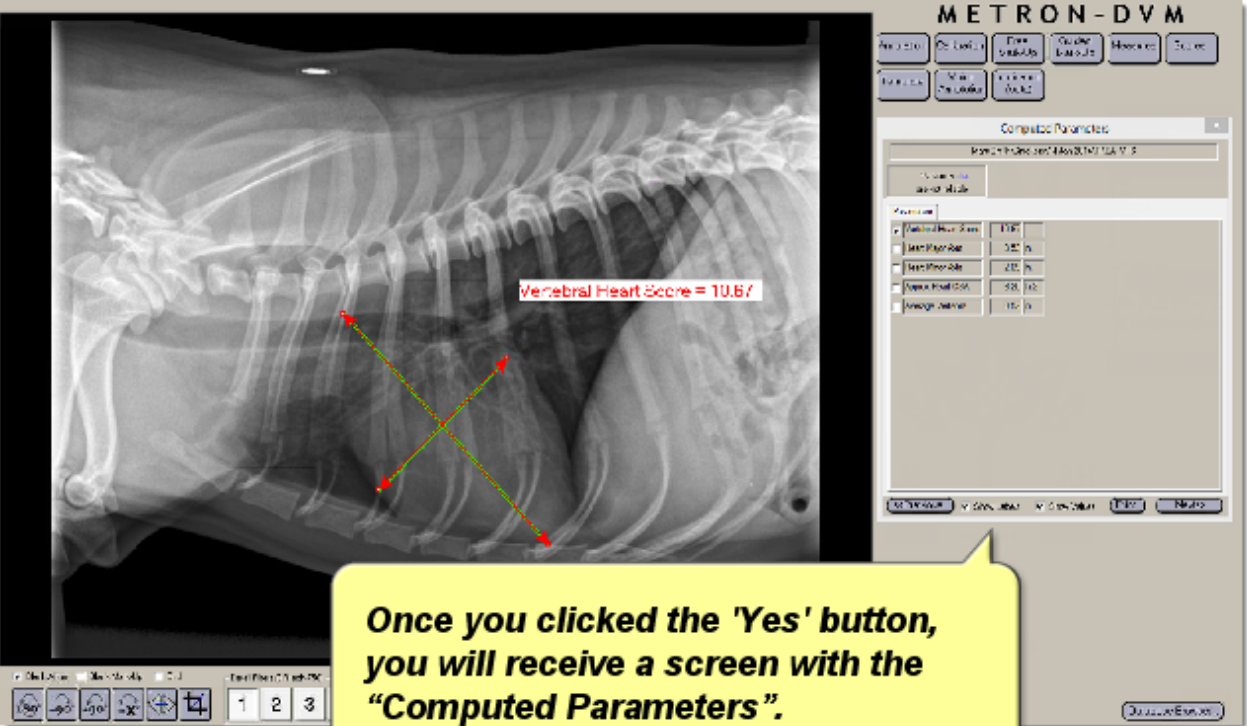
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## Guided Mark-Up: VHS Analysis

***After finishing step three, you are asked if you are ready to have Metron calculate the parameters.***



## Guided Mark-Up: VHS Analysis



**Computed Parameters**

| Parameter             | Value |
|-----------------------|-------|
| Vertebral Heart Score | 10.67 |
| Heart-Thorax Ratio    | 0.57  |
| Heart-Shoulder Ratio  | 0.27  |
| Heart-Base Ratio      | 0.58  |
| Heart-Neck Ratio      | 0.15  |

**Once you clicked the 'Yes' button, you will receive a screen with the "Computed Parameters".**

## Guided Mark-Up: VHS Analysis

**Select the check box to the left of any of the parameters and the related mark-up will be shown on the image.**

Computed Parameters

Map: SmithsGravesW14-Jan2014NCA\_VHS

Values in blue are not selectable

Parameters

|                                     |                     |       |                  |
|-------------------------------------|---------------------|-------|------------------|
| <input checked="" type="checkbox"/> | Vestibul Heat Score | 10.67 |                  |
| <input type="checkbox"/>            | Heat Major Axis     | 3.03  | in.              |
| <input type="checkbox"/>            | Heat Minor Axis     | 2.05  | in.              |
| <input type="checkbox"/>            | Approx Heat CSA     | 6.20  | in. <sup>2</sup> |
| <input type="checkbox"/>            | Average Velocity    | 0.55  | in.              |

<<PREVIOUS   ☒ Show Labels   ☒ Show Values   Print   Next>>

## Guided Mark-Up: VHS Analysis

Click on the box to the left of **"Vertebral Heart Score"** to show the heart score graphically on the image. This score is expressed in 'vertebral length units' as described in the literature.

The other four measures are of less importance, but are provided in case there is an interest in these measures in physical units.

Computed Parameters

Values in blue are not selectable

| Parameters                                                |       |                 |
|-----------------------------------------------------------|-------|-----------------|
| <input checked="" type="checkbox"/> Vertebral Heart Score | 10.67 |                 |
| <input type="checkbox"/> Heart Major Axis                 | 3.03  | in              |
| <input type="checkbox"/> Heart Minor Axis                 | 2.05  | in              |
| <input type="checkbox"/> Approx Heart CSA                 | 6.20  | in <sup>2</sup> |
| <input type="checkbox"/> Average Ventricle                | 0.55  | in              |

<<PREVIOUS Show Labels Show Values Print Next>>

## Guided Mark-Up: VHS Analysis

Click on the box to the left of **"Vertebral Heart Score"** to show the heart score graphically on the image. This score is expressed in 'vertebral length units' as described in the literature.

The other four measures are of less importance, but are provided in case there is an interest in these measures in physical units.

Computed Parameters

Next: SmithsDiagnostics\14-Jan-2014\CA\_VUE

Values in blue are not selectable

| Parameters                                                |                       |
|-----------------------------------------------------------|-----------------------|
| <input checked="" type="checkbox"/> Vertebral Heart Score | 10.67                 |
| <input type="checkbox"/> Heart Major Axis                 | 3.03 in.              |
| <input type="checkbox"/> Heart Minor Axis                 | 2.05 in.              |
| <input type="checkbox"/> Approx Heart CSA                 | 6.20 in. <sup>2</sup> |
| <input type="checkbox"/> Average Ventricle                | 0.55 in.              |

Click the 'Next>>' button.

<<PREVIOUS   ☒ Show Labels   ☒ Show Values   Print   Next>>

## Guided Mark-Up: VHS Analysis

**You are next brought to the “Computed Parameters and Rule-Based Scoring” that shows the scores for this heart and it’s rating against other heart measurements in the Metron database.**

Computed Parameters and Rule-Based Scoring

Mary Smith/Snicker/14-Jan-2014/F/CA\_VHS

Rule: Carine\_VHS Load Rule Save Rule Delete Rule

Parameters

| Parameter Name          | Value | Best when...             | Importance   |
|-------------------------|-------|--------------------------|--------------|
| Ventricular Heart Score | 10.62 | Between 8.700 and 10.700 | High Edit... |
| Heart Major Axis        | 3.55  | Between 2.499 and 3.022  | Med Edit...  |
| Heart Minor Axis        | 2.05  | Between 2.109 and 2.590  | Med Edit...  |
| Aquatic Heart CSA       | 6.20  | At Most 6.518            | Med Edit...  |
| Average Ventricle       | 0.53  | Any Value is OK          | None Edit... |

<<Previous Highlight Loss 0 % Score: 77.8 % Print

## Guided Mark-Up: VHS Analysis

The normal range (from the literature) for canine VHS is from 8.7 to 10.7 which is shown as the desired range in the Metron rule. This range could be edited by clicking the 'Edit...' button on the right hand side of the panel.

In future versions of Metron the desired range may be breed specific; users can enter their own range and use 'Save Rule' to save the various ranges as data becomes available.

Computed Parameters and Rule-Based Scoring

File: Canine\_VHS Load Rule Save Rule Delete Rule

| Parameter Name       | Value | Best when...             | Importance | Edit... |
|----------------------|-------|--------------------------|------------|---------|
| Venereal Heart Score | 10.67 | Between 8.700 and 10.700 | High       | Edit... |
| Heart Major Axis     | 5.55  | Between 2.495 and 3.022  | Med        | Edit... |
| Heart Minor Axis     | 2.05  | Between 2.105 and 2.530  | Med        | Edit... |
| Approx Heart CSA     | 6.20  | At Most 6.518            | Med        | Edit... |
| Average Vessel Area  | 0.53  | Any Value is OK          | None       | Edit... |

<<Previous Highlight Loss: 0 % Score: 77.8 % Print

## Guided Mark-Up: VHS Analysis

The normal range (from the literature) for canine VHS is from 8.7 to 10.7 which is shown as the desired range in the Metron rule. This range could be edited by clicking the 'Edit...' button on the right hand side of the panel.

In future versions of Metron the desired range will be entered in the 'Rule' tab to become

**Parameters outside the desired ranges are highlighted in red.**

Computed Parameters and Rule-Based Scoring

Mary Smith/Snicker/14-Jan-2014/F/CA\_VHS

Rule: Carine\_VHS Load Rule Save Rule Delete Rule

Parameters

| Parameter Name       | Value |      | Best when...             | Importance |         |
|----------------------|-------|------|--------------------------|------------|---------|
| Veterian Heart Score | 10.67 |      | Between 8.700 and 10.700 | High       | Edit... |
| Heart Major Axis     | 5.55  | In   | Between 2.495 and 3.022  | Med        | Edit... |
| Heart Minor Axis     | 2.05  | In   | Between 2.105 and 2.550  | Med        | Edit... |
| Apical Heart CSA     | 6.20  | In 2 | At Most 6.518            | Med        | Edit... |
| Average Vessel       | 0.53  | In   | A y Value is OK          | None       | Edit... |

<<Previous Highlight Loss 0 % Score: 77.8 % Print

## Guided Mark-Up: VHS Analysis

The normal range (from the literature) for canine VHS is from 8.7 to 10.7 which is shown as the desired range in the Metron rule. This range could be edited by clicking the 'Edit...' button on the right hand side of the panel.

In future versions of Metron the desired range may be breed specific; users can enter their own range and use 'Save Rule' to save the various ranges as data becomes available.

Computed Parameters and Rule-Based Scoring

Mary Smith/Slackert/14-Jan-2014/F/CA\_VHS

Rule: Carine\_VHS Load Rule Save Rule Delete Rule

Parameters

| Parameter Name       | Value | Best when...             | Importance   |
|----------------------|-------|--------------------------|--------------|
| Venereal Heart Score | 10.67 | Between 8.700 and 10.700 | High Edit... |
| Heart Major Axis     | 5.55  | Between 2.499 and 3.022  | Med Edit...  |
| Heart Minor Axis     | 2.05  | Between 2.109 and 2.590  | Med Edit...  |
| Approx Heart CSA     | 6.20  | At Most 6.518            | Med Edit...  |
| Average Venetia      | 0.55  | Avg Value is OK          | None Edit... |

77.8 % Print

**Based on how well each measurement aligns with the range specified by the rule, Metron computes a 'score' for this image. A score of 100% would mean that all parameters are within desired ranges.**



## Guided Mark-Up in Metron: VHS Analysis

This completes the "Guided Mark-Up in Metron: VHS Analysis" online training.  
Please feel free to view it again or select another online training session to review.



Click F11 on your keyboard to minimize the browser screen  
and click the window closed to exit this training session.

