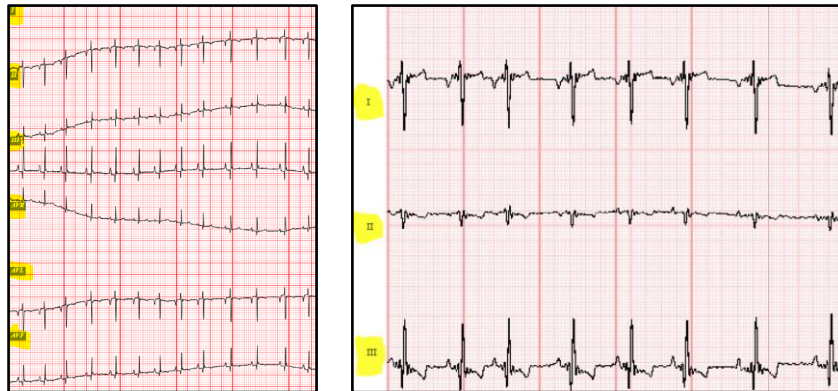# ECG BEST PRACTICES

1) ECG Leads
   - An ideal ECG tracing is a 6 lead ECG tracing (I, II, III, aVr, aVl, aVf).
   - If your machine is only able to print out one lead tracing, a lead II is recommended.
   - It is important that the lead type is visualized on the ECG for the interpreting doctor.
   - Examples of ECG leads:

2) ECG Paper Speed
   - ECG paper speed is measured in mm/sec and displays how far apart or close together ECG complexes appear.
   - It is important to know the ECG paper speed for measurements such as heart rate or to measure waveforms for chamber enlargement patterns.
   - The standard paper speeds for veterinary medicine are 25 mm/sec or 50 mm/sec. If your ECG machine is displaying an alternative paper speed, please adjust to a standard speed for better overall case interpretation.
   - Example of an ECG displaying paper speed:

3) ECG Gain
- ECG gain is measured in mm/mV and controls how tall or short ECG complexes appear.
- ECG gain is important to provide as this measurement is also used to measure waveforms for chamber enlargement patterns.
- If the gain is set too large or small, it can distort the ECG image making interpretation challenging or not possible.
- Just like when performing an X-ray, ECG gain should be adjusted for each patient so that ECG complexes are large enough to analyze but not so large that they are "cut off" at the top of the tracing or overlapping one another on a multiple lead display.
- A typical ECG gain is 10 mm/mV, this works well for most canine patients. However, if the complexes appear too large, the gain can be reduced to 5 mm/mV. Many feline patients have smaller ECG complexes and increasing the gain to 20 mm/mV may be necessary.
- Example of ECG gain displayed on the tracing:
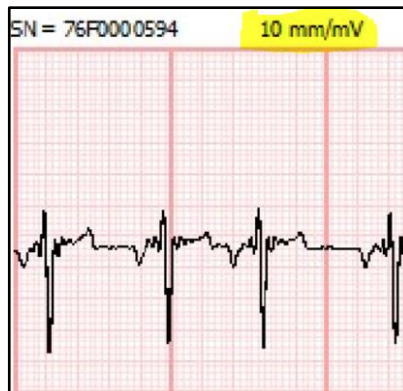
4) ECG Gridlines
- It is important to submit an ECG tracing with gridlines clearly provided. Without gridlines present, measurements of heart rate or ECG waveforms for chamber enlargement patterns cannot be calculated.
- It is important to know the patient's heart rate due determine abnormalities like a sinus bradycardia, sinus tachycardia or for pathologic arrhythmias such as atrial fibrillation (which may or may not warrant medications pending the heart rate).
- Example of ECG gridlines clearly displayed on the tracing:
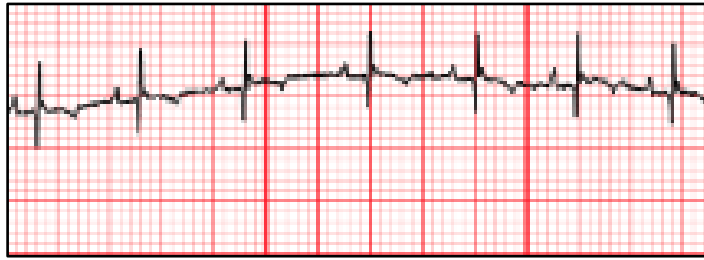
5) Examples of Poor Quality ECGS
   - Example of an ECG where gridlines cannot be visualized (important measurements cannot be performed on this ECG):
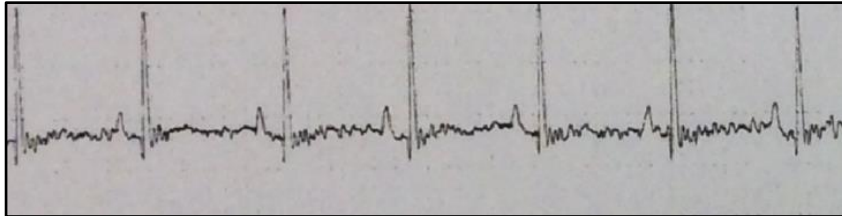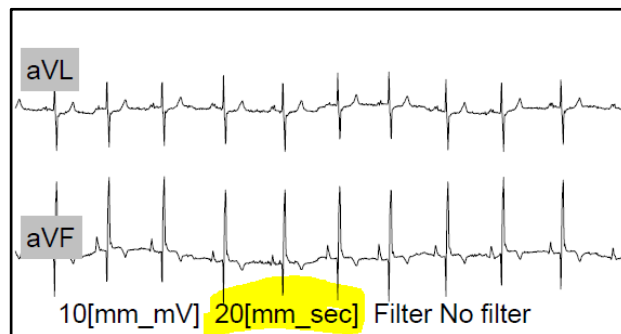

   - Example of an ECG where leads, paper speed and gain are NOT provided (important measurements cannot be performed on this ECG):

   - Example of an ECG where gain is set too high (complexes overlap one another and cannot be measured):

- Example of an ECG with atypical paper speed and no gridlines:

aVL

aVF

10[mm_mV] 20[mm_sec] Filter No filter

- Example of an ECG where gain is set too high as complexes are cut-off and hard to read:

28-APR-2022 10:11:35 25mm/sec   delay=6   (OX)HR:--- bpm   CO2_RESP: 0 bpm
ECG 20mm/mv LEAD: II