

# EKG Fundamentals

## *Approach to Tachydysrhythmias*

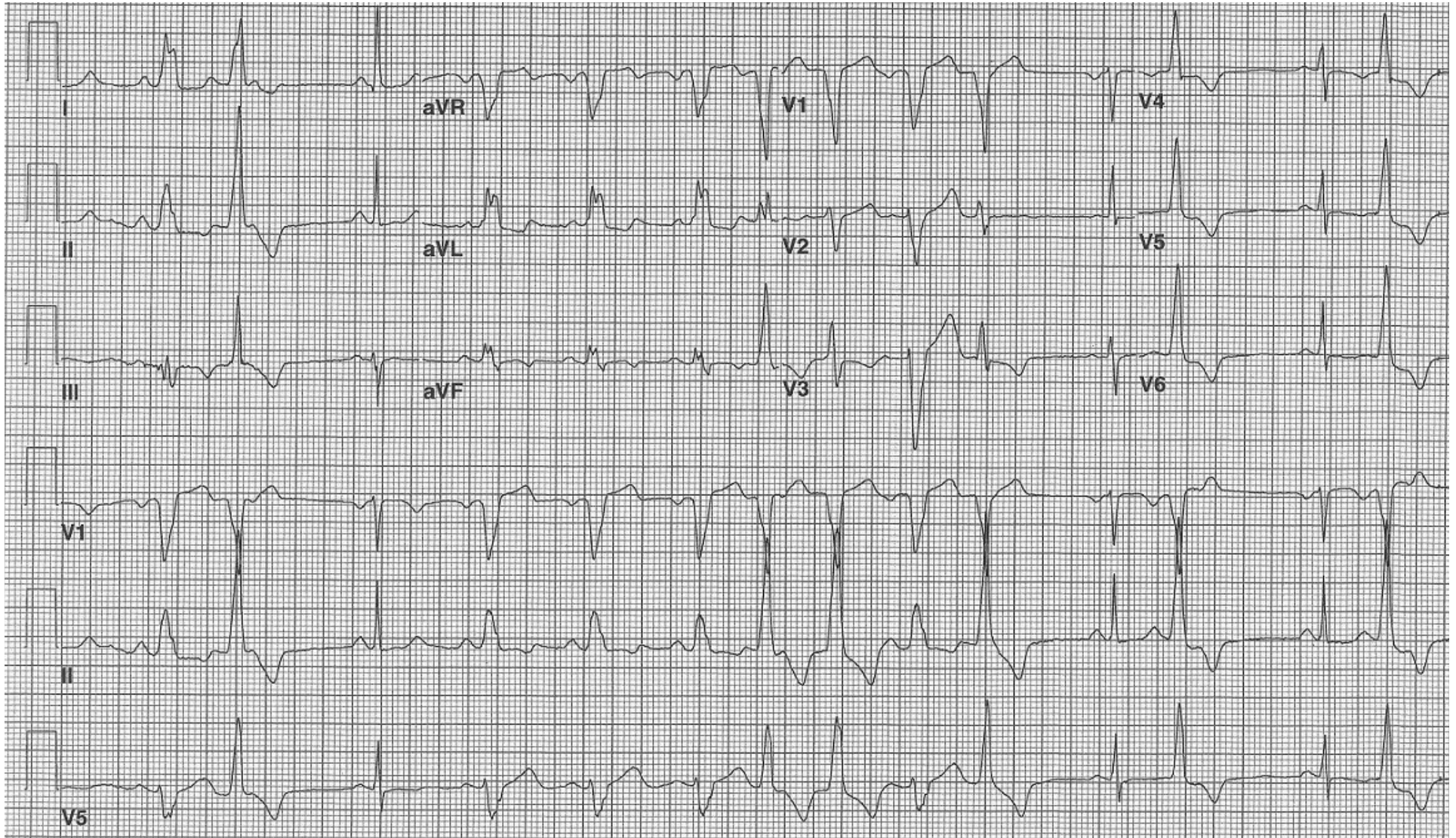
Dysrhythmia interpretation can often seem very difficult as a result of bizarre morphologies but the most successful strategy is still a systematic approach. When multiple QRS morphologies are present on the same EKG it can be quite overwhelming. One approach to simplify the situation involves careful consideration of each QRS complex individually and requires several additional steps to the systematic approach demonstrated to date.

Additionally, the characterization of tachydysrhythmias is primarily related to their origin as either supraventricular or ventricular. It is important to realize that all narrow complex rhythms have a supraventricular origin but not all supraventricular rhythms are narrow. Occasionally a bundle branch block can cause a supraventricular rhythm to be wide complex. On the other hand, all ventricular rhythms are wide complex but not all wide complex rhythms are ventricular in origin. Due to the significant risk of degeneration from ventricular tachycardia to ventricular fibrillation **all wide complex rhythms should be treated as VT until proven otherwise.**

# EKG Fundamentals

Rhythm	Atrial Waves	QRS Regularity	QRS	Ref.
<b>Sinus Tachycardia</b>	P Waves	Regular	Narrow	<a href="#">LITFL</a>
<b>Atrial Fibrillation</b>	Fibrillation Waves (may invisible) Low amplitude, rate 200- >300	Irregularly Irregular	Narrow	<a href="#">LITFL</a>
<b>Atrial Flutter</b>	Flutter Waves (may be buried in QRS) Sawtooth shape, rate 200-400	Regular (fixed AV block) Regularly irregular (variable AV block)	Narrow	<a href="#">LITFL</a>
<b>Multifocal Atrial Tachycardia (MAT)</b>	≥3 different P waves with distinct morphologies and PR intervals	Irregularly Irregular	Narrow	<a href="#">LITFL</a>
<b>Supraventricular Tachycardia (SVT)</b> <b>AV Nodal Re-entrant Tachycardia (AVNRT)</b>	May see retrograde P waves (after the QRS complex)	Regular	Narrow	<a href="#">LITFL</a>
<b>Atrioventricular Re-entrant Tachycardia (AVRT)</b> <b>Orthodromic</b> (Atria->AV Node->His->WPW->Atria)	May see retrograde P waves (after the QRS complex)	Regular	Narrow	<a href="#">LITFL</a>
<b>Atrioventricular Re-entrant Tachycardia (AVRT)</b> <b>Antidromic</b> (Atria->WPW->His->AV Node->Atria)	Unlikely to see P waves	Regular	Wide	<a href="#">LITFL</a>
<b>Ventricular Tachycardia</b>	Atrioventricular Dissociation No clear PR interval	Regular	Wide	<a href="#">LITFL</a>
<b>Ventricular Fibrillation</b>	No identifiable P waves	No identifiable QRS or T waves	Wide	<a href="#">LITFL</a>

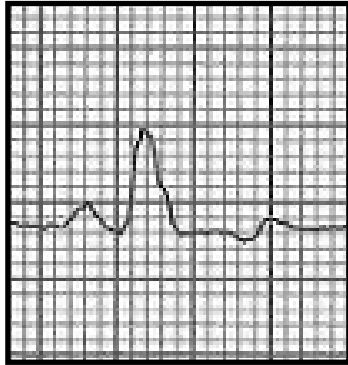
# EKG Fundamentals



## Step 1 - Find the types of beats

The first step to identifying the rhythm is to attempt to classify all of the QRS complexes on the tracing. There are 3 morphologies of QRS complexes on this ECG (best seen in II or V5).

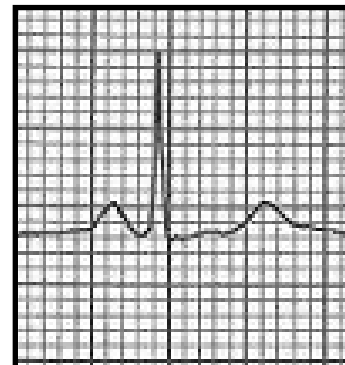
**Beat 1**



**Beat 2**



**Beat 3**



Beat 1: Wide QRS, preceded by a P, followed by an upright T

Beat 2: Borderline QRS, no preceding P, followed by an inverted T, and a compensatory pause

Beat 3: Normal QRS, preceded by a P (identical to the P of Beat 1), and followed by a flat T

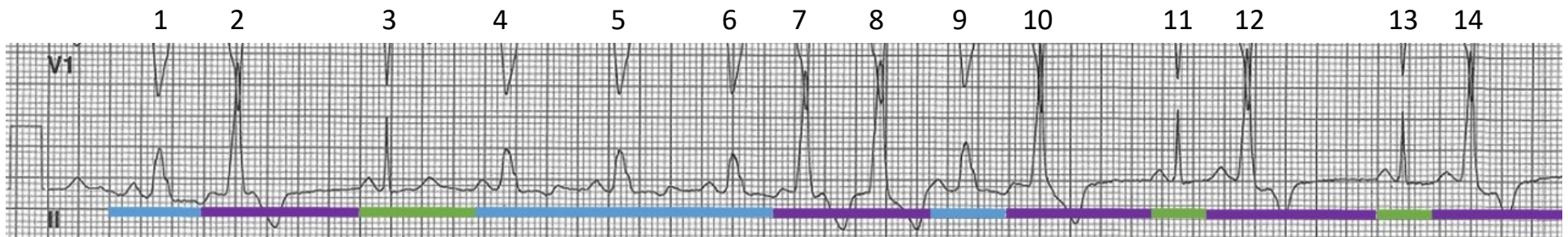


## Step 2 - Classify the Beats

**Beat 1:** Sinus Rhythm with Left Bundle Branch Block LBBB . These aren't PVCs or junctional beats because they are always preceded by a P wave. It is a LBBB because it is predominantly negative in V1.

**Beat 2:** Premature Ventricular Contraction. The features of PVCs are an absence of preceding P waves, inverted T waves (opposite from baseline), and a compensatory pause (increased duration of electrical inactivity) which always follows the last PVC in a series (even if the series is just a single PVC)

**Beat 3:** Sinus Rhythm - normal P wave and QRS but with an abnormally flat T wave.



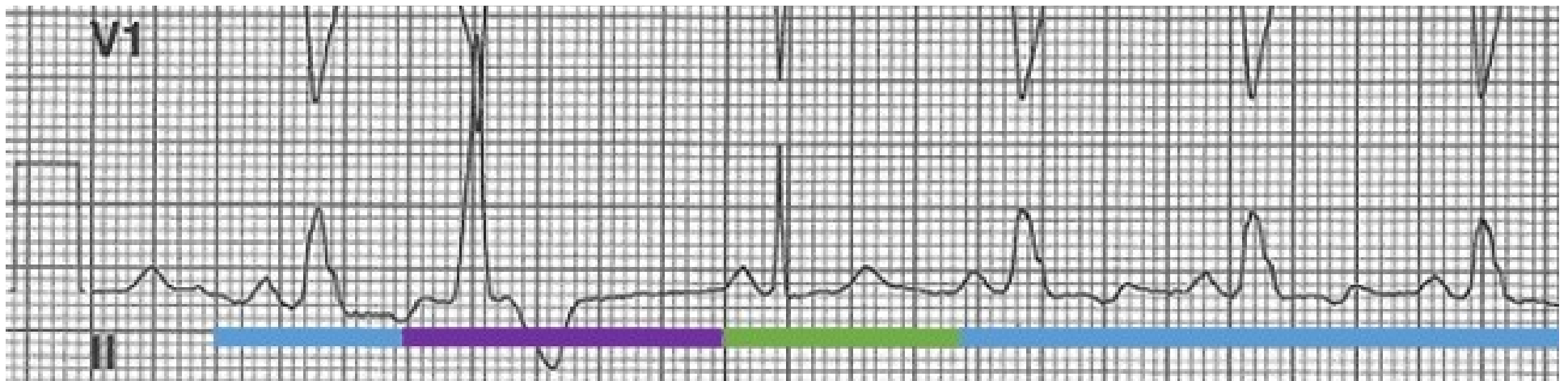
**Sinus with Rate Dependent LBBB**

**Premature Ventricular Contraction**

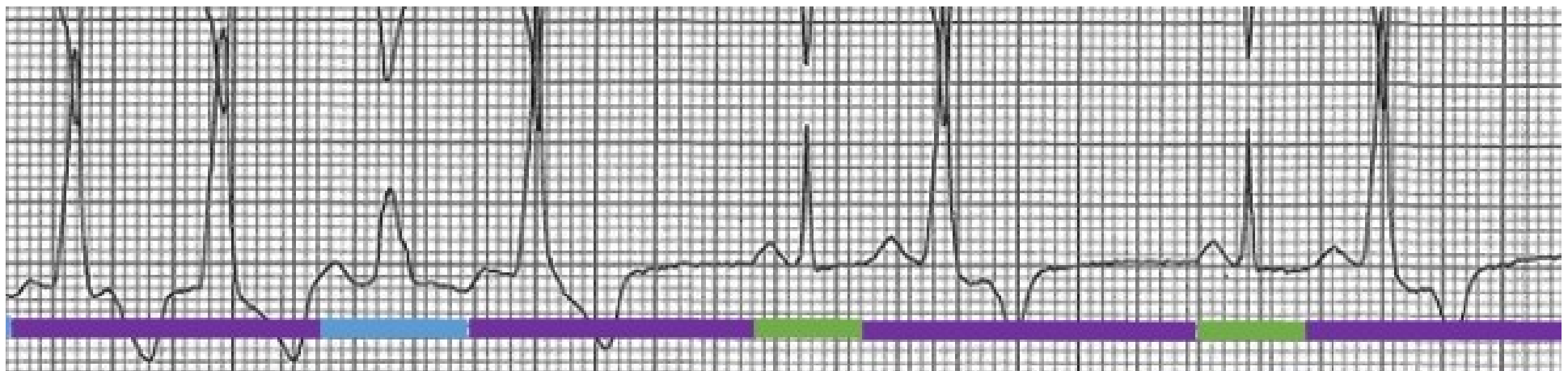
**Sinus Rhythm**

# Lead II Rhythm Strip

## First Half



## Second Half



Sinus with Rate Dependent LBBB

Premature Ventricular Contraction

Sinus Rhythm

### Step 3 - Putting It All Together

History/Clinical Picture—unknown

Rate—84

Rhythm—Sinus with LBBB Aberrancy and occasional PVCs. The LBBB isn't always present and only manifests when the rate is faster. Therefore after the PVCs and their compensatory pause the rate is slow enough to allow normal conduction.

Axis—Difficult to assess given sinus beats are only present in only I, II, and III.

P Waves—when present they have normal morphology

Q, R, S Waves—Intermittent LBBB and PVCs

T Waves—appear to have normal morphology in I, II, and III but flat in V4-6. Very limited by ectopy and aberrancy.

U Waves—None

PR Interval—normal PR

QRS Width—wide on some beats, narrow on other

ST Segment—No ST elevation or depression

QT Interval—Difficult to assess but prolonged. Easiest to assess on beats 3-6 where QT is greater than 50% of the R-R