



# **SNS COLLEGE OF ALLIED HEALTH SCIENCES- COIMBATORE 35**



DEPARTMENT : DEPARTMENT OF CARDIAC TECHNOLOGY

SUBJECT : 24 HOURS HOLTER RECORDING

TOPIC : HOLTER MONITOR

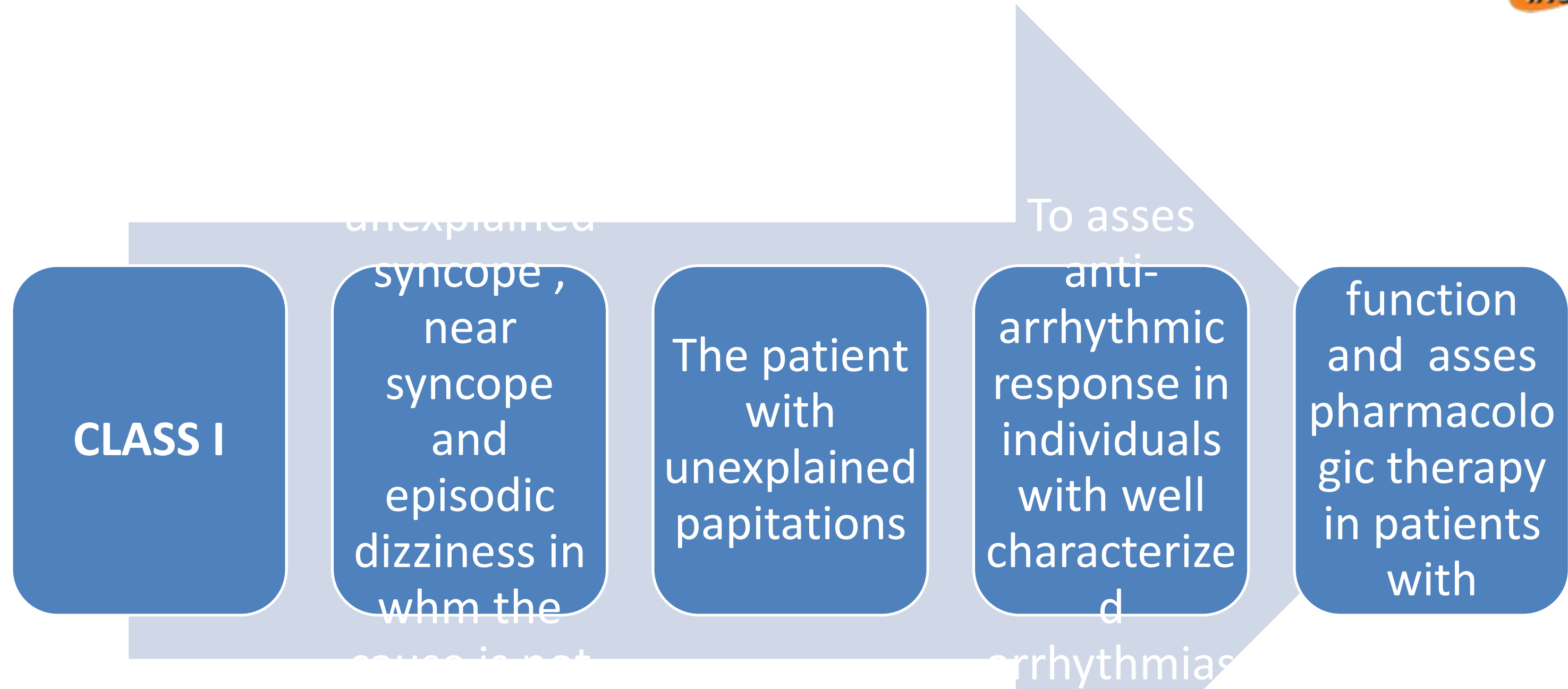


## DEFINITION

- ❑ A Holter monitor is a small, wearable device that records the heart's rhythm. It's used to detect or determine the risk of irregular heartbeats (arrhythmias).
- ❑ A Holter monitor test may be done if a traditional electrocardiogram (ECG or EKG) doesn't provide enough details about the heart's condition. If the irregular heartbeats are infrequent, a longer term monitor called an event recorder may be needed.
- ❑ Some personal devices, such as smartwatches, offer electrocardiogram monitoring. Ask your health care provider if this is an option for you.

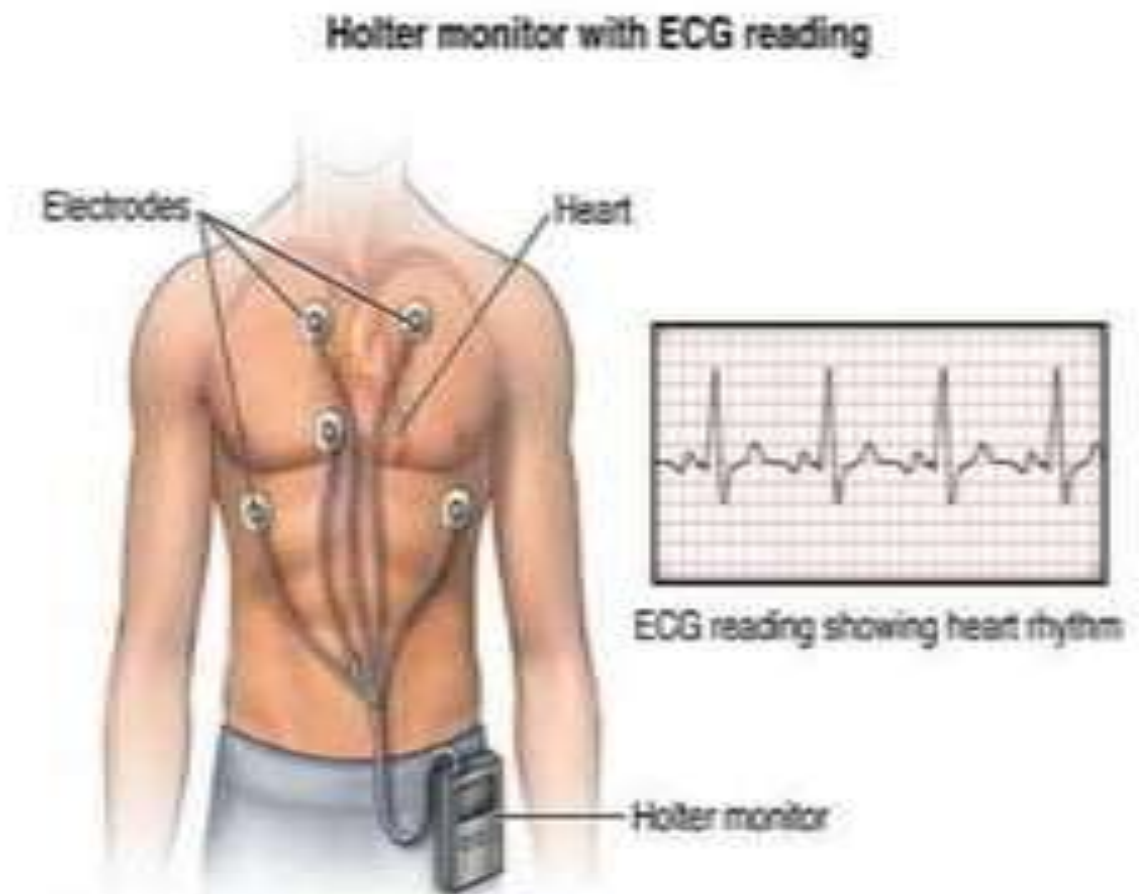


# DEFINITION



## HOW HOLTER MONITOR WORKS?

- The Holter monitor is small. It's slightly larger than a deck of playing cards.
- Several leads, or wires, are attached to the monitor. The leads connect to electrodes that are placed on the skin of chest with a glue-like gel.
- The metal electrodes conduct heart's activity through the wires and into the Holter monitor, where it's recorded.





## ❑ USES

- Patients experiencing daily symptoms
- Precise quantification of Arrhythmias

## ❑ ADVANTAGES

- 24 hrs to 48 hrs full disclosure available
- HR and AF burden graphs
- Arrhythmia counts (10 PVCs per Hour)



## ❑ DISADVANTAGES

- 24-48 hrs short duration
- Artifact may not be discovered until test get analyzed
- Prolonged application of the adhesive electrode patches may cause tissue breakdown or skin irritation at the application site.
- There may be other risks depending upon your specific medical condition.



## **Goal**

This article identifies the steps needed to prepare and hookup a patient for a Holter test.

## **Information**

Identify the electrode sites. Thoroughly shave all body hair from the electrode sites.



## ETIOLOGIES :



### **Attach the lead wires:**

- Snap the patient lead wires onto the electrodes.
- Peel the protective backing off an electrode. Attach electrodes to the patient.
- Gently set the gelled centers against the skin. Use care to avoid pressing gel out onto the adhesive. Smooth the electrode from the center to the outer edge.
- If the electrode wrinkles as it is being applied do not continue; replace the electrode with a new one.
- Form a stress loop with each electrode lead, refer to the diagram below.
- Tape the loop to the skin. Leave enough slack between the electrode and the stress loop.





## IDIOPATHIC RCM



### **Setup the hardware:**

- Screw patient lead wires onto Holter recorder.
- Verify that the patient lead wires are connected securely to the recorder.
- Write the patient's name and recorder serial number on the Compact Flash Card, or use other identifying measures.
- Insert Compact Flash Card into the recorder.
- Install brand new batteries.
- The recorder should beep once and the LCD display will activate.



## **Verify the patient is hooked up properly:**

- Press the event button to cycle through channels 1, 2, and 3 of the live ECG tracings on the LCD screen. Verify ECG amplitude, shape, and clarity on all channels.
- If the live ECG does not show satisfactory ECG waveforms, reposition electrode sites using brand new electrodes and the techniques described above.
- Instruct the patient to stand, sit, and lie while verifying the live ECG tracings. Instruct patient to walk in place. Verify no artifact or muscle noise is displayed on the recorder LCD screen.
- Otherwise, check Stress Loops and re-prep hookup sites with brand new electrodes.
- Place recorder into pouch and secure on patient.
- Write the patient's name, ID number, test date, test time, and recorder serial number into the patient diary.



## Findings we look

- Heart rate histogram
- Bradycardia events
- Ectopic beat / episode counter:  
    narrow complex, broad complex premature beats,  
    couplets, triplets, VT, SVT episodes, Pauses
- ST T changes
- QTc QT analysis
- Heart rate variability
- Rhythm strips
- Sleep apnea 24 hour trend



# HOLTER REPORT SUMMARY



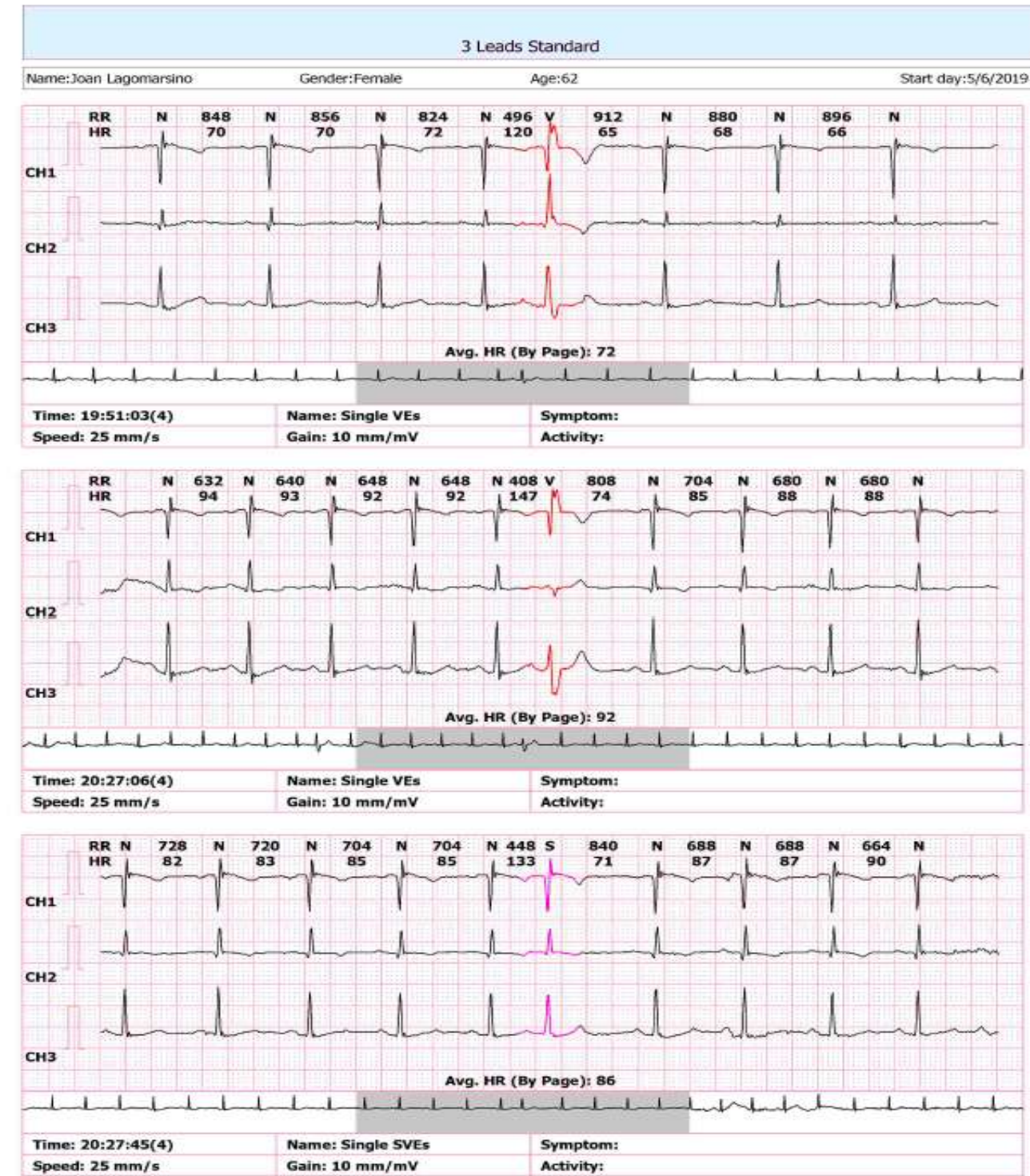
ECG Summary Report		
Patient Name: John Doe DOB: 1/5/1957 Age: 62 years Gender: Female Case ID: Inpatient No.: Bed No.: Phone: (222) 222-2222 Address: 12345 Geranium Road Levittown Pa 19 Medications: Notes:		Physician Name: Dr. Smith Phone: (222) 222-2222 Address: 2222 Middletown Blvd Indications: R00.2-Palpitations Diagnosed by: Reviewed by:
Device ID: H322222 Technician: Start Time: 5/6/2019 7:45:25 PM Duration: 72:44:38		
HR	Ventricular Rhythm	Supraventricular Rhythm
Beats 295662 Times Avg. HR 72 BPM Min. HR 40 BPM @05:09:51(2) Max. HR 151 BPM @22:25:19(1) Tachycardia 74 Times Bradycardia 368 Times Total Pauses N/A Max. Pause N/A Nighttime Average: 73 BPM Daytime Average: 72 BPM	Total VEs 3176 Times Single VEs 3046 Times VE Couplet N/A VE Run 1 Times Fastest VE Run 170 BPM @03:08:54(2) Longest VE Run 1.18 Sec @03:08:54(2) VE Bigeminy 15 Times VE Trigeminal 23 Times VE Quadruple N/A VE Percent: 1.07%	Total SVEs 2281 Times Single SVEs 2240 Times SVE Couplet 1 Times SVE Run 4 Times Fastest SVE Run 167 BPM @17:31:59(4) Longest SVE Run 8.36 Sec @17:31:59(4) SVE Bigeminy 1 Times SVE Trigeminal N/A SVE Quadruple N/A SVE Percent: 0.77%
Heart Rate Variability	Event	Others
SDNN 166.87 ms SDANN 221.14 ms rMSSD 129.89 ms pNN50 9.30 % TP 28779.78 VLF 16170.96 LF 7220.86 HF 5387.96	Total Afs N/A Af Burden N/A Max. Af N/A Total Afs N/A AF Burden N/A Max. AF N/A Long RR 30860 Times Max. Long RR 1.73 Sec @10:25:37(4)	Max Count of V/M 11 Times/Min Max Count of V/H 204 Times/H Max Count of S/M 24 Times/Min Max Count of S/H 129 Times/H User Events 8 Times RONT N/A
ST (mV)		
CH1	CH2	CH3
Depression: 1 Duration: 00:01:49 Max.: -0.12 Time: 10:50:54(4) Elevation: 0	Depression: 0 Elevation: 0	Depression: 1 Duration: 00:01:11 Max.: -0.13 Time: 22:57:24(2) Elevation: 0
Typical Strip		
19:46:33(1) Single VEs	03:08:54(2) VE Couplet(N) VE Run	19:46:18(1) Single SVEs
09:41:46(2) SVE Run	08:33:45(3) Pauses(N) SVE Couplet	10:25:37(4) Long RR
Summary: Technician's comments: Recording start time was 07:45:25 PM. Duration was 72 hrs 44 mins 38 secs. Predominant rhythm was Sinus with Intermittent First Degree AV Block. Mean heart rate was 72 BPM, max heart rate was 151 BPM, and min heart rate was 40 BPM. Longest R-R was 1.73 sec at 10:25:37 AM D4. Total VEs are 3176, with 3046 single VEs, 15 VE Bigeminy, 23 VE Trigeminy and single VE run was of 4 beats at 170 BPM. Total SVEs are 2281 with 2240 single SVEs, Single SVE couplet and 4 SVE runs. The longest and fastest SVE run was of 24 beats at 167 BPM. Episodes of artifacts noted, suggesting leads disconnection. Symptoms were noted. Overall recording quality was fair.		
Diagnosed by:		Reviewed by:

Physician must review patient data

-1-

Report Generating: 5/14/2019

Version: 8.0.7



Physician must review patient data

-34-

Report Generating: 5/14/2019

Version: 8.0.7



# DIAGNOSIS EVALUATION



## Arrhythmias that are not necessarily pathologic.

- Sinus bradycardia during rest or sleep
- Sinus arrhythmia with pauses less than 2.5 seconds
- Sinoatrial exit block
- Wenckebach atrioventricular (AV) block
- Wandering atrial pacemaker
- Junctional escape complexes
- Premature atrial or ventricular complexes.

## Arrhythmias that are warning

- Frequent and complex atrial and ventricular rhythm disturbances
- Second-degree AV block type II
- Third-degree AV block
- Sinus pauses longer than 2.5 seconds
- Marked bradycardia during waking hours
- Tachyarrhythmias



# DIAGNOSIS EVALUATION



What is the role of holter monitoring in patients with known ischemic heart disease?

- In the post–myocardial infarction patient, the occurrence of frequent PVCs (more than 10 per hour) and nonsustained ventricular tachycardia (VT) by 24-hour monitoring is associated with a 1.5- to 2.0-fold increase in death during the 2- to 5-year follow-up independent of LV function.

Diagnosis of suspected ischemic heart disease?

- Transient ST-segment depression 0.1 mV or greater for more than 30 seconds is rare in normal subjects and correlates strongly with myocardial perfusion scans that show regional ischemia.
- Although some monitors can detect and quantify ST-segment changes



# DIAGNOSIS EVALUATION






## Role of holter monitoring in stroke

- Approximately 25% of stroke remains unexplained after a thorough clinical evaluation and is labeled as cryptogenic
- Occult atrial fibrillation is identified by ambulatory monitoring in approximately, 3% to 8% of patients with cryptogenic stroke

# Pacemaker

Patient Name: <u>Pooja Test</u>	ID#
Address: _____	Age: <u>DOB</u> Sex: _____
Pacemaker: <u>Te</u>	Weight: _____ Height: _____
Specialty: _____	Referring: _____
Physician: <u>Dr. A.</u>	Physician: <u>Dr. B.</u>
Indications: _____	
Medications: _____	

PACEMAKER DATA		PACED BEATS		PACED FAILURES	
Pacemaker Type: <u>DDD</u>	Paced Beat Total: <u>114</u>	Subsyst. Capture: <u>0</u>			
Flag Type: <u>Dual</u>	Intrinsic Beat Total: <u>0</u>	Subsyst. Sense: <u>0</u>			
Cycle #/Sec: <u>24</u>	Total Paced/Intrinsic: <u>114</u>	Total Failure: <u>0</u>			
Beats/Type: <u>100%</u>	% of Paced: <u>100%</u>	% of Capture Failure: <u>0%</u>			
Beats/Type Limit: <u>100%</u>	% of Sense: <u>0%</u>	% of Timing Failure: <u>0%</u>			
Beats/Type Limit: <u>20%</u>	Analysis Mode: <u>0</u>	% Total Failure/Total Beat: <u>0%</u>			

SIGNIFICANT ECG EVENTS			
			
			
CONCLUSIONS			

- The Pacemaker report shows the following:
  - Paced Beat Total
  - Intrinsic Beat Total
  - % Paced
  - % Intrinsic
- Pacemaker Failures:
  - Failures to Capture
  - Failures to Sense
  - Beats < Lower HR Limit
  - Beats > Upper HR Limit
  - R-R Intervals > 1.5 seconds

Arrhythmia analysis for VE and SVE beats is performed on Intrinsic (normal) beats. The arrhythmia analysis includes VE Pairs, V-Runs, and SV-Runs.

All reported "Pacemaker Failures" should be immediately evaluated by a cardiologist.





**THANK YOU**