



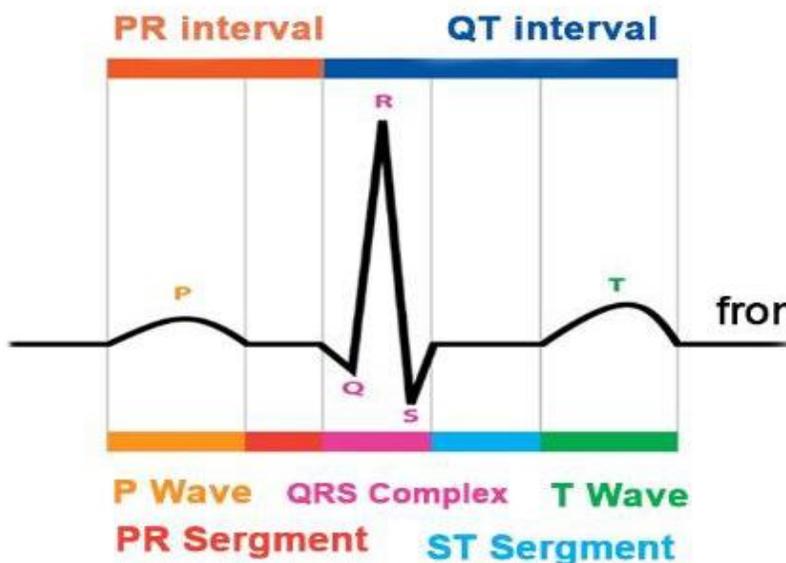
ADD 15 YEARS TO OUR LIFE
CAN WE? OF COURSE, WE CAN!

Add 15 Years |

Rs.200/\$20 ECG Test

1 of 3 Simple Noninvasive Heart Tests
Can Add 15-30 Years to Our Life

USA/INDIA Edition 2020 | ENGLISH



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Disclaimer

This book has been written to provide only the general information. Please always consult a physician before starting any prescription medicine(s).



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Preface

Every books' focus is how to medically stay healthy,

In India USA and all over world.

Medical principles are universal.

Think About It!

We have to study all year, all our subjects in the school and if we never really opened our books and miss so many classes and never paid attention, then

We cannot be in top 25% of the class. Miracles do not happen in real life.

At least in India and most of the time doctor/M.D./even community is used to crisis medicine to provide care/seek care when we have alarming symptoms.

Personally in 2020 and in coming years, those alarming symptoms should be rare before we get to 75 years to 85 years of age group.

PROVIDED:

We keep fine tuning our health (medical definition) and by gaining insight into fundamental medical knowledge and actively plan and pay attention to our:

Physical Health

Mental Health

Family Health

Social Health

Financial Health

Spiritual Health

TRUST ME,

Results will be dramatic.



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Chapter 1

Heart Is Our Lifeline

Medically and statistically heart is our lifeline.

Only heart can make us lose our life in 5 minutes,

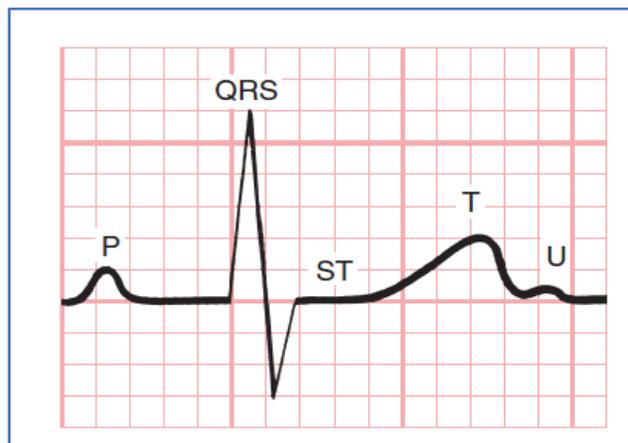
Or, if we intervene in timely fashion, instead of losing our life in 5 minutes, we can add 15 to 30 years to life (with all the advanced knowledge and technology in 2020).

There are three relatively very simple and non-invasive tests unlike cardiac catheterization (mostly done as emergency where we place a catheter/wire inside the patient's body from the groin to all the way up to the heart.

We are briefly mentioning about 3 tests here and then write separate books on each of these tests.

Simple tests, yes, but the knowledge they give us make the difference between life and death.

1. First, let us talk about the **ECG test** with which we check the electrical conductivity of the heart.

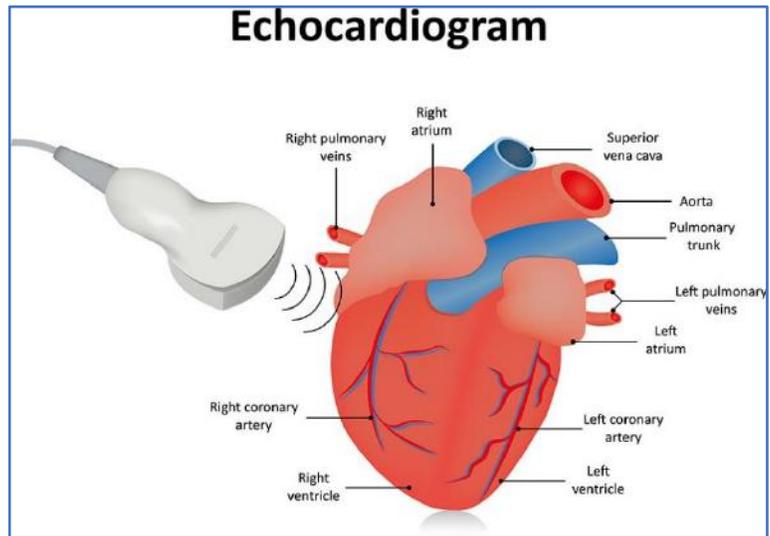




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2. Secondly, we do the ultrasound of the heart or **Echocardiogram** which tells us about:

- The functioning of the heart muscles, and
- The functioning of the heart valves as the valves allow blood flow only in one direction.



2D-Echocardiogram provides

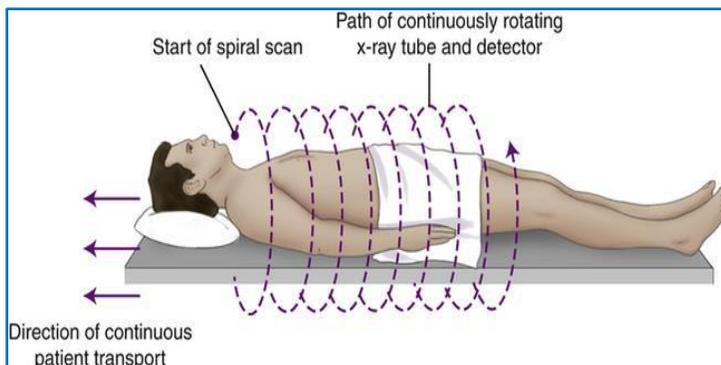
very important information. It tells us that:

- The valves are functioning well.
- The atria and ventricle are contracting well, and
- They are pushing enough blood to our body.

3. The third test of the heart is **CT Angiogram** which is equally important as it tells us about the blood supply of the heart.

For heart to function every minute of the day, 24 hours a day, it needs food and oxygen and heart has its own blood supply which provides both.

In CT angiogram, our focus is on the three arteries of the heart, which supply food and oxygen to the heart





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Chapter 2

Benefits of These 3 Simple Heart Tests

Think About It!

With the dramatic increase in the medical knowledge and technology, now we have controlled most of the infectious conditions which used to take our life away within days.

Yes, we have now lifelong so called chronic medical conditions like diabetes and hypertension.

But if we manage them well, we can really live healthy life till 85 to 90 years. To be honest, if we have none of those conditions, then our life should be about 120 years.

As we approach our wonder years, the two biggest thing that should make us worry are heart attack and cancer. Yes, they sound very scary. And they are scary if we just do nothing about them or we just go through our life.

Yes, it is a scary if we just wait for heart attack to happen or cancer affecting us. But it does not have to happen that way in 2020.

We have very cost effective, simple, noninvasive three tests of the heart which can give us all the information about the heart and if they are all normal, then there is no way we can have a heart attack over next five years. And if they are not normal, then we can always do medical intervention which can easily add 15 to 30 years to our life, at least nothing going to happen to us suddenly. Same thing applies to cancer also. Now, statistically, we doctors have collected enough information where we can anticipate that such cancer happens at such age and we can screen us for those cancers. Any cancer in stage 1 is 100% curable.



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Think About It!

In last 30 to 40 years, maximum advances have been in the field of cardiology and

in the field of oncology.

(Cardiology is for heart and oncology is for cancer).

What is very, very scary about heart is once we get a heart attack, we can lose our life in 5 minutes. In cancer, at least we have months and years or even full life with successful treatment, but we may not have such opportunity with the heart attack.

It is true that when we have a heart attack the small part of the heart may be damaged but what really happens is there is an electrical short circuiting and our heart starts beating irregularly, even though heart muscle is in a good shape to pump.

But based on the simple principle of physics if it is not beating regularly, it cannot be an effective pump and if it is not effectively pumped, then blood will not be pumped to our brain and if brain does not get oxygen for over several minutes, then over next 5 minutes we are gone.

Once our brain is gone, the recovery is not possible.

Our rest of the body may still be alive, but medically speaking we are not alive anymore.

What is even more very dramatic fact is that if we give a shock the electrical short-circuiting resets and heart starts pumping, ignoring the damaged part of the heart which still remains alive for next 72 hours or three days.

And then, we can quickly do medical intervention and stabilize the heart and also open up the damaged blocked artery and to be honest with continued heart care and medications, we can easily add 15 to 30 years to our life.



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Think About It!

If we lose our little finger of our hand, it is not going to affect our lifespan and we can still live our normal life.

The same principle applies about “heart attack”.

Whenever there is a small blockage of heart artery, a small part of our heart muscle is damaged.

But that muscle is still alive for 72 hours or for three days.

And now the technology is so good that doctors/MDs, have several advanced techniques to open the blocked artery and resupply that part and that part of heart recovers.

And the combination of all three, information from all three tests (i.e. 2D Echocardiogram, ECG and CT Angiography) gives us almost close to 100% information.

If these are all normal, then we cannot have a heart attack for the next five years and we can wait for 5 years, to repeat these tests, every 5 years.

Think About It!

Once again, I need to tell your life is a very slow process.

Things do not go wrong in one day.

It takes years and years and life happen slowly.



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Chapter 3

There are So Many Unique Facts About Our Heart

Think About It!

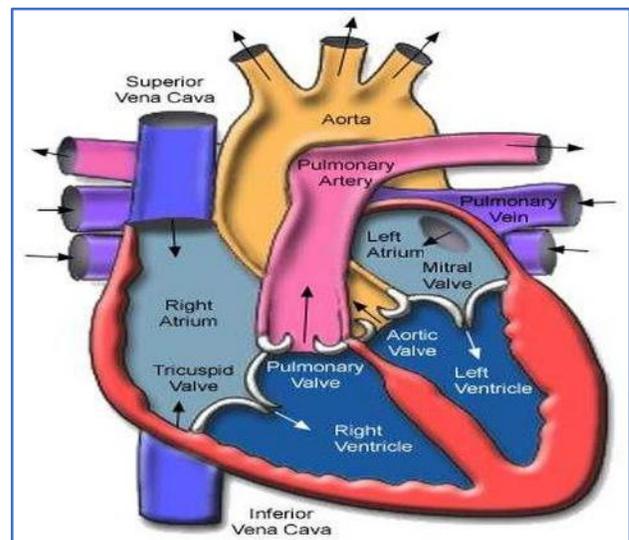
What is important to remember is that the most important action of the heart is to pump blood to the brain.

If there is no pumping of blood to the brain, then we are gone in 5 minutes.

Yes, body will be alive, but we are gone.

There are so many unique facts about our heart:

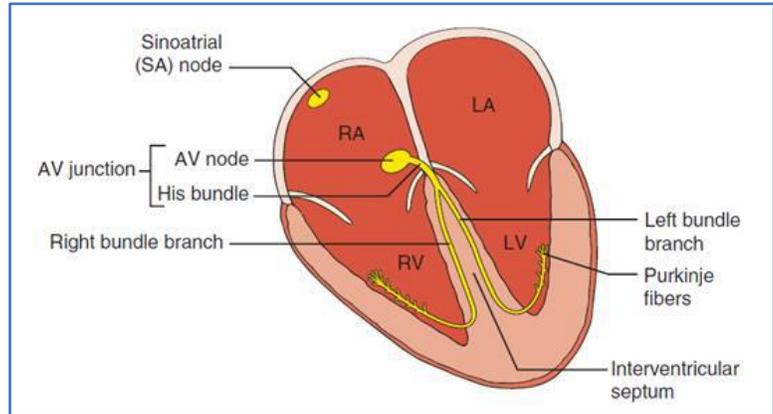
1. It is 100% muscle in shape of heart.
2. It can beat on its own outside the body and that is how we can do heart transplant (heart keeps beating outside our body).
3. Heart rate and pumping action is actually controlled by the electrical switches (**two electrical switches in the heart**).
4. Every part of the **heart is fully wired conducting electricity**.





5. There is a **method and rhythm** to the pump action.

6. Then, **there is method to the electrical conductivity** and electrical switch turns on and turn off setting the rate at which heart pumps (usually 70 beats per minute).



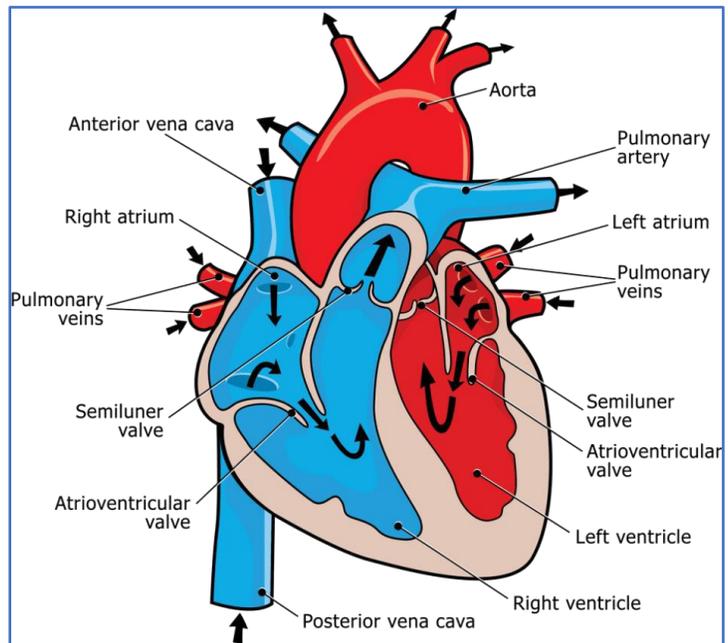
7. Also, electricity goes in one direction along the pathway.

8. Blood in heart chambers also always flows in one direction.

9. Everything is one way.

10. The blood is collected from the body and it goes to right side of the heart.

11. **The right-side** pumps to the lung for exchange of oxygen and carbon dioxide.



12. And, from lungs blood **comes back to the left side of the heart and left side of the heart then pumps blood to every part of our body.**



Chapter 4

Electrical System of Heart

Electrical System of Heart:

As I mentioned earlier, one thing which is very unique about heart is its **electrical system**.

The heart has two electrical switches.

- The first one is **Sinoatrial Node**.
- The second one is **Atrioventricular Node**.

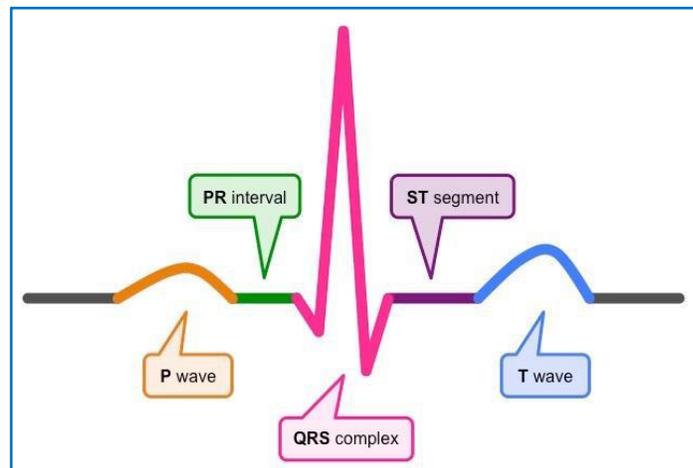
Sinoatrial node or SA node (we doctors call it SA node) lies within the wall of the right atrium, the right upper chamber of the heart.

This electrical switch turns on and off about 72 times a minute.

When it turns on or is stimulated, it sends electrical impulse which passes through in a very directed fashion to the atrial muscles and to the Atrioventricular node.

Second switch is the Atrioventricular node. It actually lies at the base of the right atrium and basically once the electric impulse reaches the atrioventricular node, it discharges and then it conducts to a bundle of

the nerves which goes down from the atria to ventricles and divides into two major branches which we call **right bundle branch** and the **left bundle branch**. These are just the name of the electrical nerves which supplies the right and left side of the ventricles.





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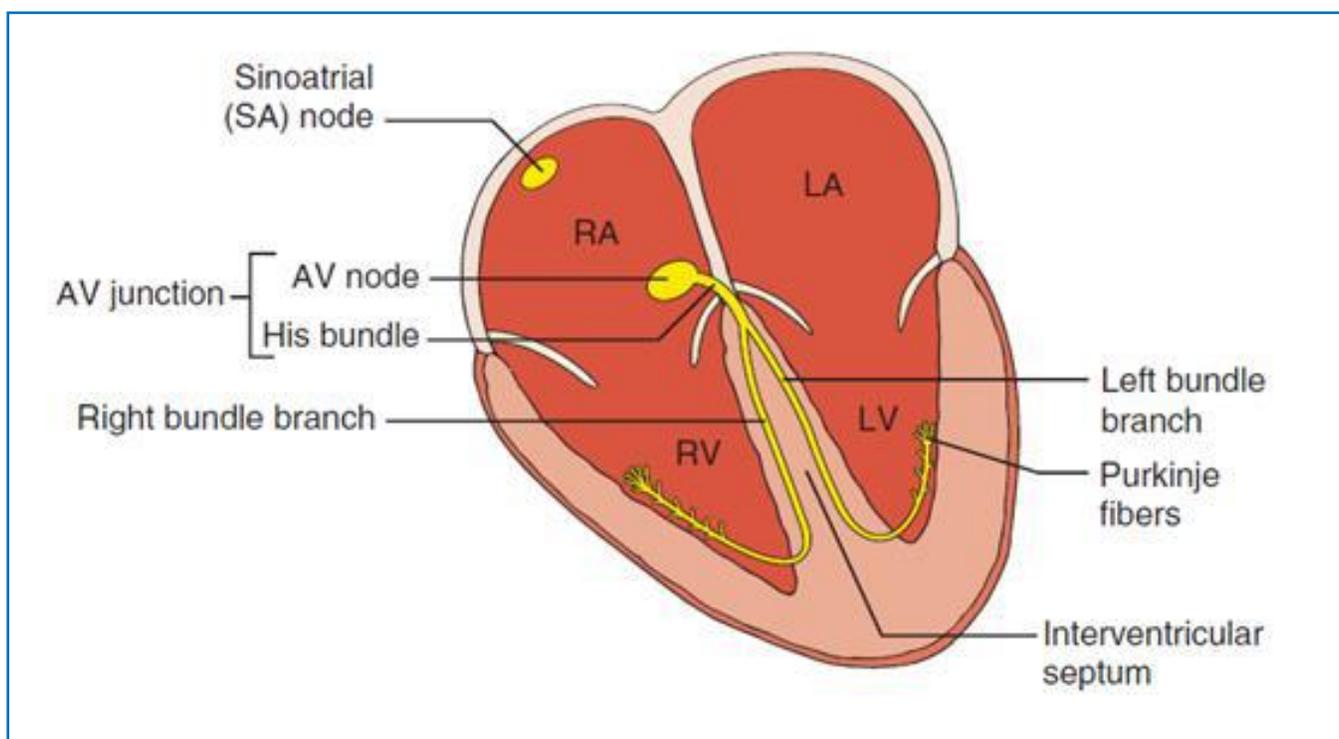
VERY IMPORTANT FACT:

If for any reason sinoatrial node is not working well, then atrioventricular node can discharge on its own though at a slower rate which is about 60 times a minute and it will continue making pushing blood to brain and heart itself to the rest of the body. While these electrical switches are capable of turning on and off on their own they having an intrinsic activity to let the heart beat at this rate but the fact is that, both electrical switches are influenced by our own nervous system so our own body nerves go to these electrical switches and affect the heart rate.



Chapter 5 ECG or EKG

ECG or EKG is just to check the cardiac electrical activity with each beat on a graphic paper.



The **sinus atrial node (sinoatrial node or SA node)** is the primary dominant pacemaker of the heart because of its automaticity.

If for any reason, the sinus atrial node is not working or depressed, then AV junction can act as a backup pacemaker and the rhythm produced is called the **escape rhythm**.



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It is a safety mechanism, so that:

- The heartbeat continues,
- Ventricles keep contracting, and
- Pushing blood to the brain and body.



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Chapter 6

Why ECG is So Important?

Think About It!

We can easily buy ECG machine for home.



It is very easy to check the EKG at home. If somebody really wants to do it, it is not very difficult at all. Any doctor or nurse can train you for how to take ECG at home. Most of the time, ECG machines come with their own software which can really read out the interpretation also.

Obviously, while those interpretations are helpful, and they are based on all the information stored/collected in the memory of the ECG machine, but we doctors obviously have to look at the whole picture and do our own assessment.

Why ECG is so important?

- One thing is it very, very inexpensive.
- It is very easy to train any nurse or medical assistant to take ECG.

From the ECG:

- We can find out the **regular rhythm of the heart** and if there is any increase in the heart rate which is called the **tachycardia**.
- Or, any **decrease in the heart rate** which is called **bradycardia**.
- Or, if there is any **irregularity in the beating of the heart**; we call it **arrhythmia**.

In a crisis:

ECG is really very helpful when person is **having chest pain** or,

We are suspecting-

- **Myocardial ischemia:** Or MI or myocardial infarction or so-called heart attack.
- **An electrolyte disorder:** ECG really helps us to tell if potassium is high or low (electrolytes).
- **Drug effect on the heart:** Some of the ECG changes are very specific to drug toxicity (drug effect on the heart) also.

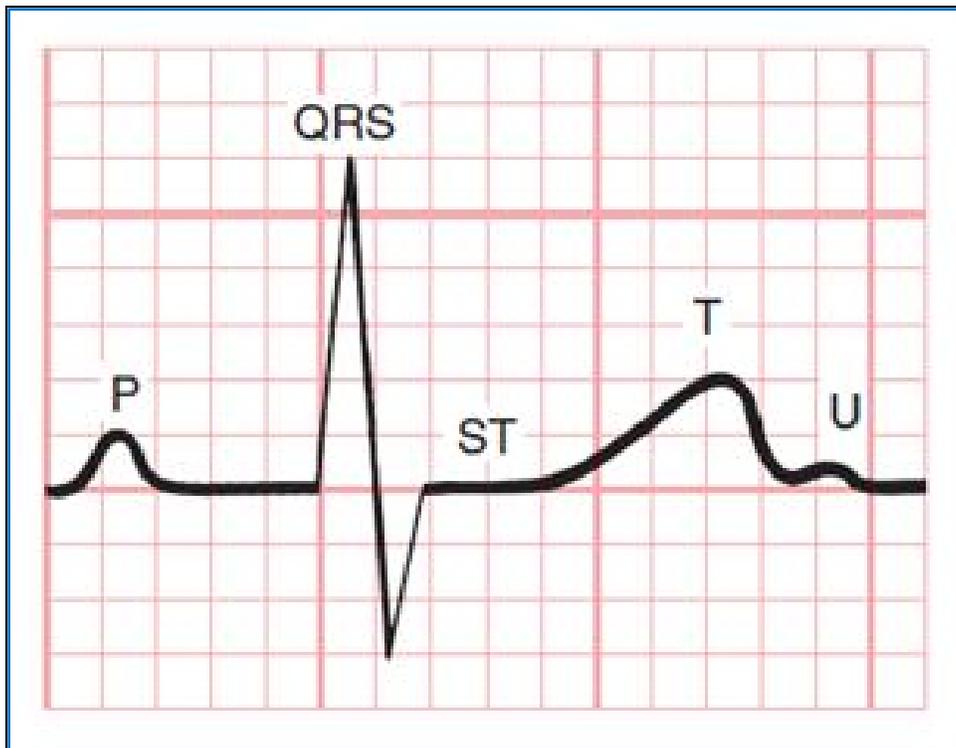
It tells us about the **hypertrophy** or **the thickening of the heart muscles** which happen if you have a hypertension for many, many years.

In this picture:

The major components of the ECG are shown.

The **P wave** which really represents the contraction of the atrial chambers.

The **QRS complex** which is the most important part of the EKG and it represents ventricular contraction of the ventricles.



The next three important parts of the ECG are:

- ST segment
- T wave
- U wave

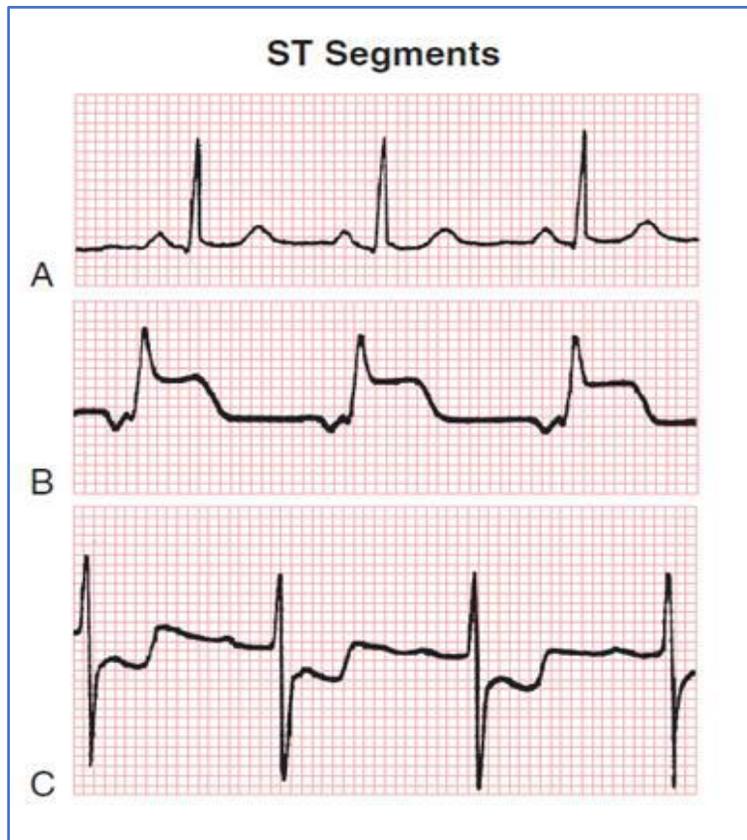
These three collectively represent (in a way) **relaxation of the ventricle muscles**, or **Ventricular Repolarization**.



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Now, in the below picture we are showing **ST segments**.

- A is the **normal ST segment**.
- B is the abnormal. We call it **ST segment elevation**, and
- C is there is **ST segment depression**.



Whenever ST segments are, these are elevated or depressed more than 1 mm, it is not normal and represent decreased blood supply to an “area” of heart.

As we see at the rhythm strip in the EKG, we can see that R waves have a very regular rate and rhythm.



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As you can see that if you put a scale and put at the tips of R waves, they exactly are equidistant. Each R wave we can say is like one beat.

This picture shows **4 beats**.

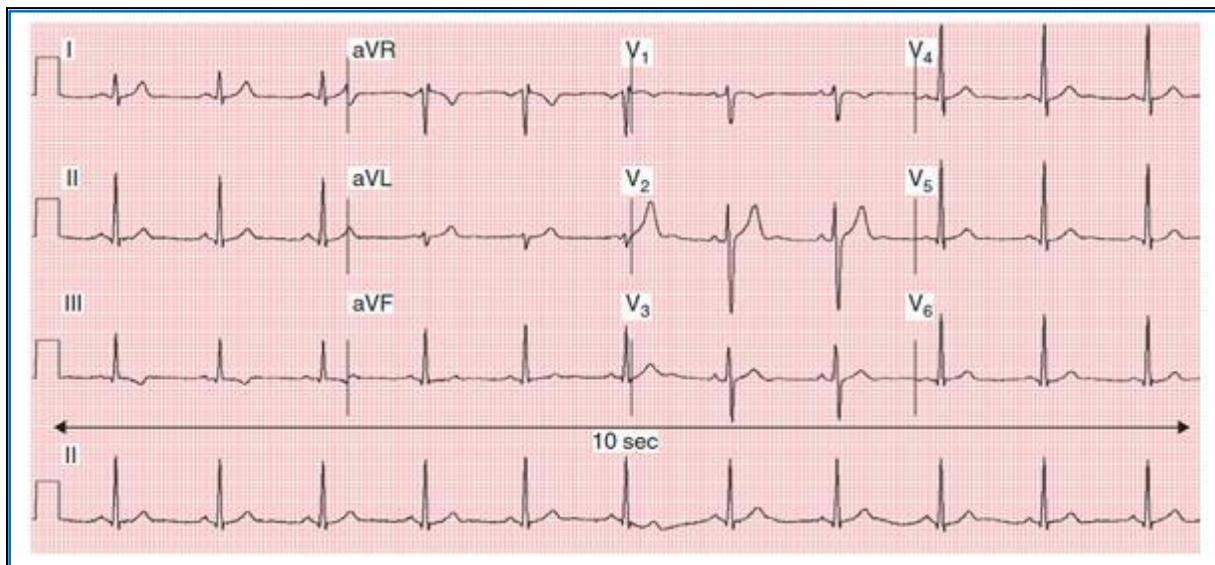


And, if you take a scale and put it and you can see also in the picture also, they exactly **follow a constant rhythm**.



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In the below picture, we show what we all do and what we call is a **12-lead EKG**.



The first three leads are called:

- Lead I
- Lead II, and
- Lead III

Next three leads are called:

- aVR
- aVL, and
- aVF

Next six leads are called:

- V1
- V2
- V3
- V4



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- V5, and
- V6



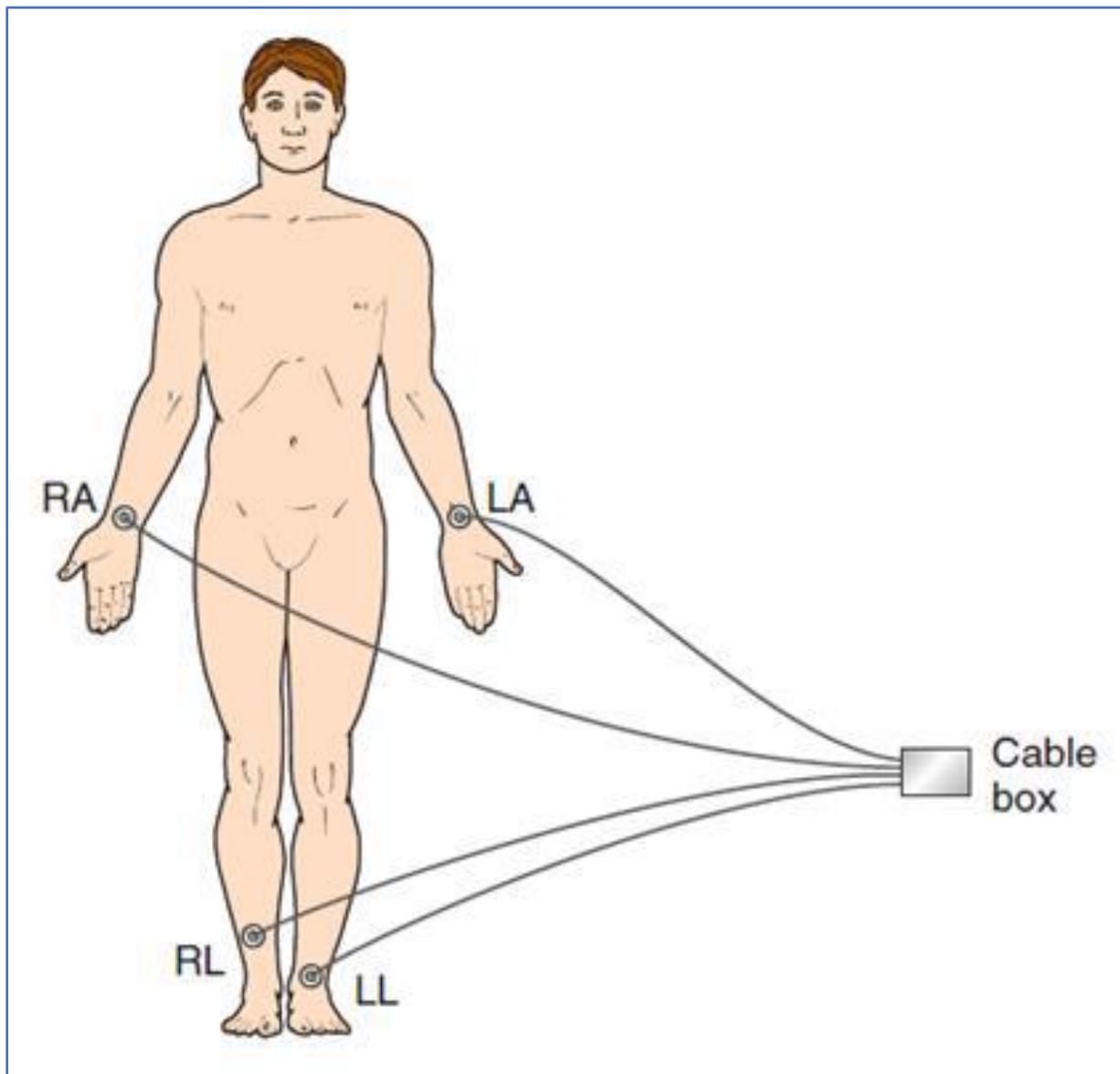
With the standard 12-lead ECG and we always take a rhythm strip also for about 10 seconds and if we really use a scale, it will show that **heart is beating absolutely at a regular pace.**



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12-lead EKG consists of six limb leads.

- Lead I, II, and III.
- Lead aVR, aVL, and aVF.



Lead 1, 2, and 3 are called the standard limb leads.

Here we put electrodes on our arms and legs and record the electrical activity.

These limb lead also need to measure what we call **Augmented Leads-**

aVR, aVL, and aVF.

The “**a**” refers to **augmented**; and

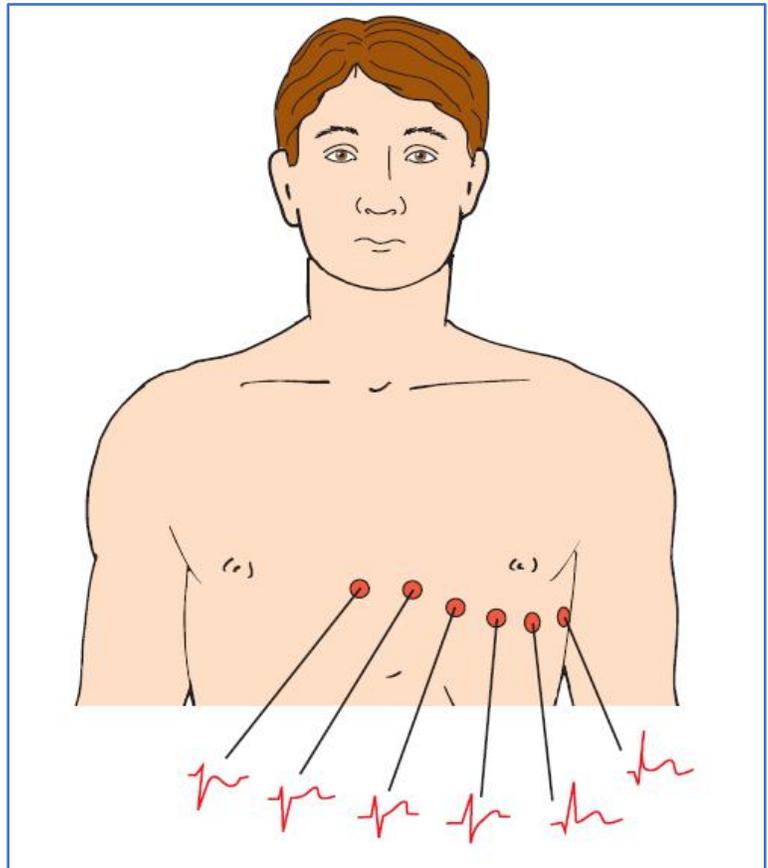
“**V**” refers to **voltage**.

R, L, and F refer to:

- The **right arm**,
- The **left arm**, and
- The **left foot**, respectively.

And six what we call **precordial leads**, or the **chest leads**:

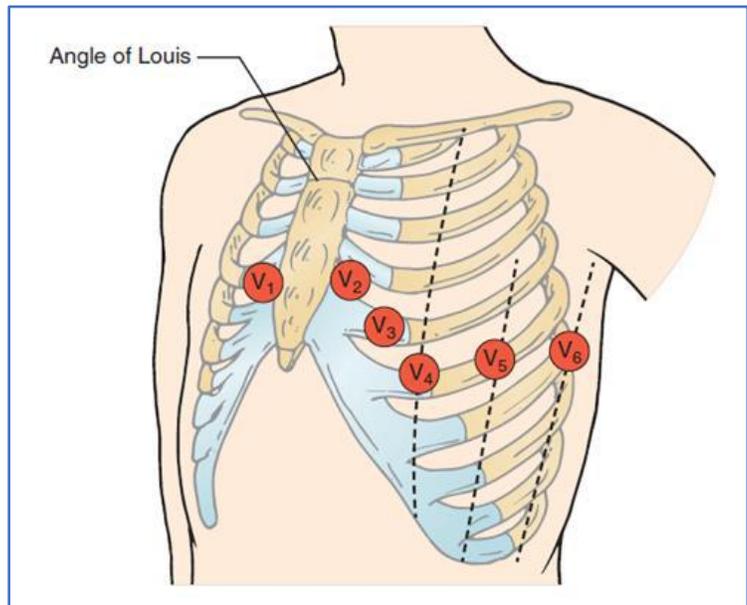
- V1,
- V2,
- V3,
- V4,
- V5, and
- V6



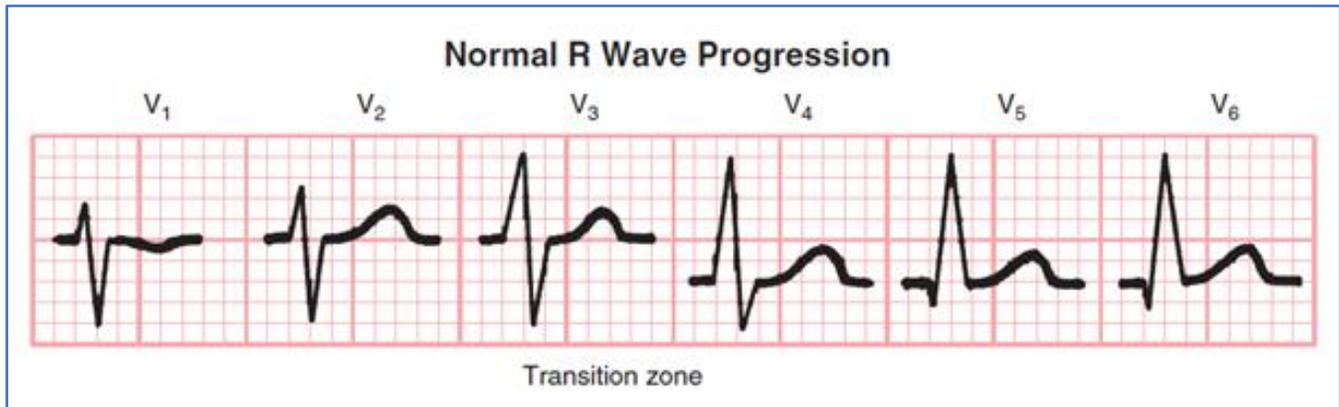


Chest lead 1-6,

We start at the fourth space in between the ribs which we call **Fourth Intercostal Space** and then we go from the right to the left as shown in the picture.



Normal R Wave Progression:



P wave represents the **atrial chamber activity**.

If P wave is large, then we can say that the right atrial chamber may be enlarged.



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As we see in the picture what we call **Normal R Wave Progression**, we see that R wave is small in chest lead V1 and **it becomes taller, taller, taller while in the V6 it is the tallest** and it is very **important clinically** for us.

If it is not happening, then something is not right.

We should all have our normal ECG in our record in **cloud these days**.
Comparing the Past and Present ECGs is such a blessing for us, doctors.

It is the minor changes which raise our suspicion and we do more testing in relation to our heart. Better Safe Than Sorry!

Chapter 7

Left Ventricular Hypertrophy

Left Ventricular Hypertrophy:

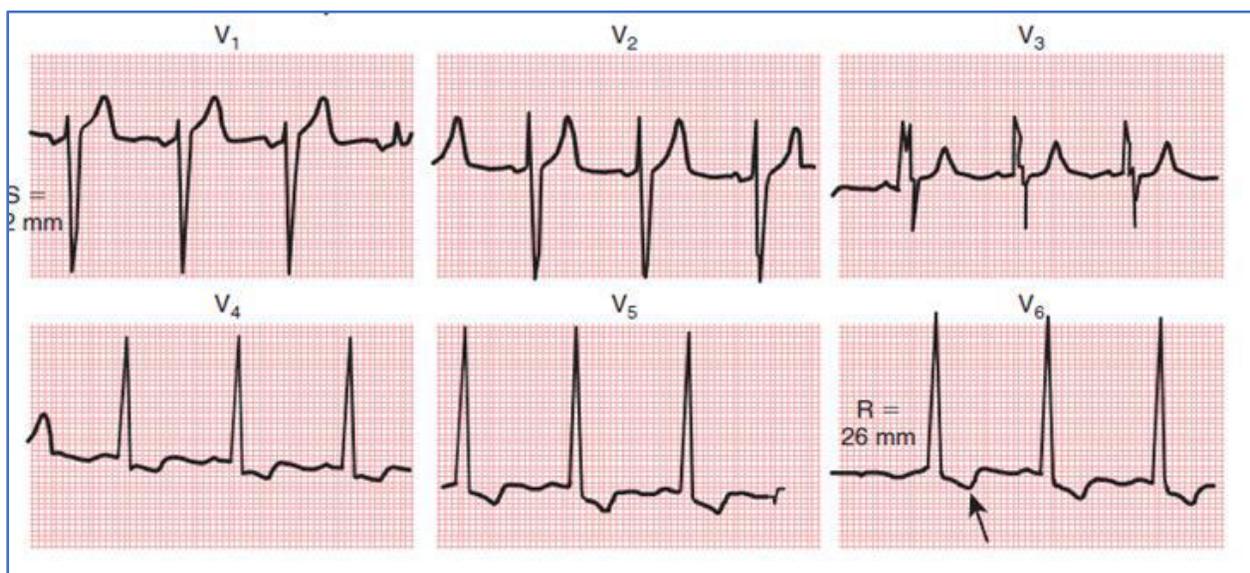
When we have hypertension for a long, long time 10 years, 15 years (hypertension usually starts around age 40 when our kidneys start retaining salt and water, but it happens very, very gradually).

If we do not do anything, blood pressure keeps going higher and higher and our heart reacts to that.

There are no symptoms as such but when we have a high blood pressure for several years, it is shown in the ECG as **Left Ventricular Hypertrophy**.

In the below picture, as you see that in **V1, V2** these downward waves which we call the **S waves** are very deep.

And then in **V4, V5**, and **V6** upward deflection are **R waves**. They are very tall.

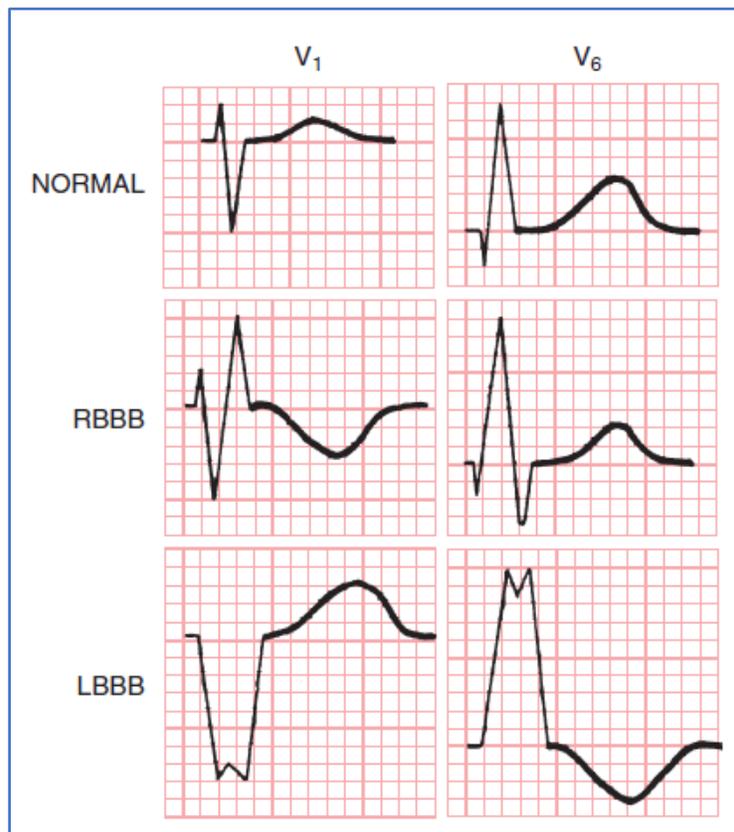


Every young doctor learns to recognize this left ventricular hypertrophy.

When we count the **depth of S wave in V1** and the **height of R wave in lead V6** and **we add them**.

If their number is more than 35 mm especially in the middle and older people, then it is **classical example of the high blood pressure for a long, long time.**

The picture below shows **Normal Conduction**.





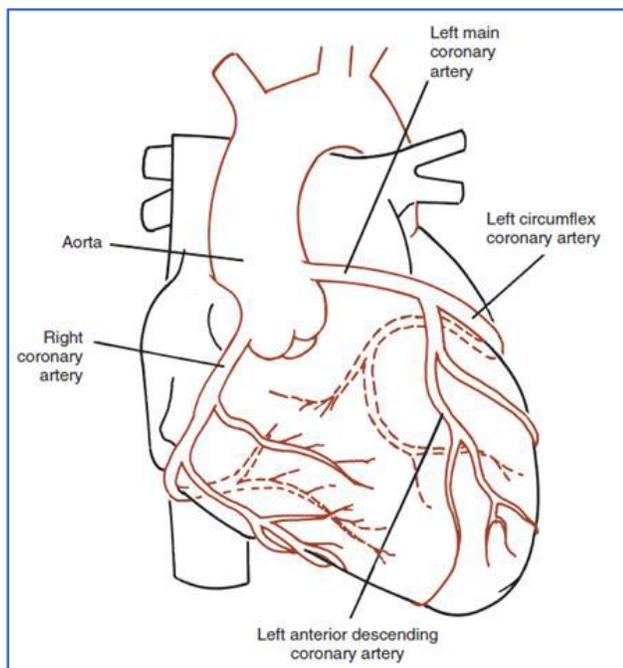
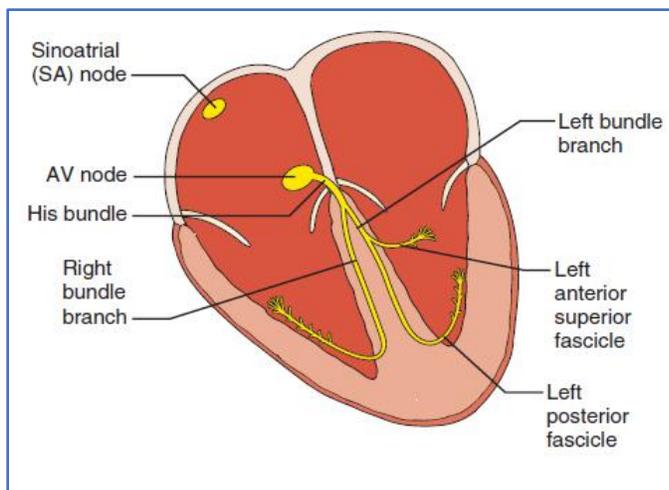
As electrical wiring enters from upper chambers to lower chambers, it divides into two branches:

- **Right bundle**, and
- **Left bundle**.

Any time for any reason there is a blockage or **fibrosis** of the bundle we can analyze this on the EKG.

And, this is the example of right bundle-branch.

and left bundle-branch block on the EKG.





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Chapter 8 Heart Attack

Think About It!

If we have your previous ECGs, then it is very easy to compare.

If your previous EKG shows normal ECG and then we see this ST segment elevation, then-

There is no question you are having a heart attack.

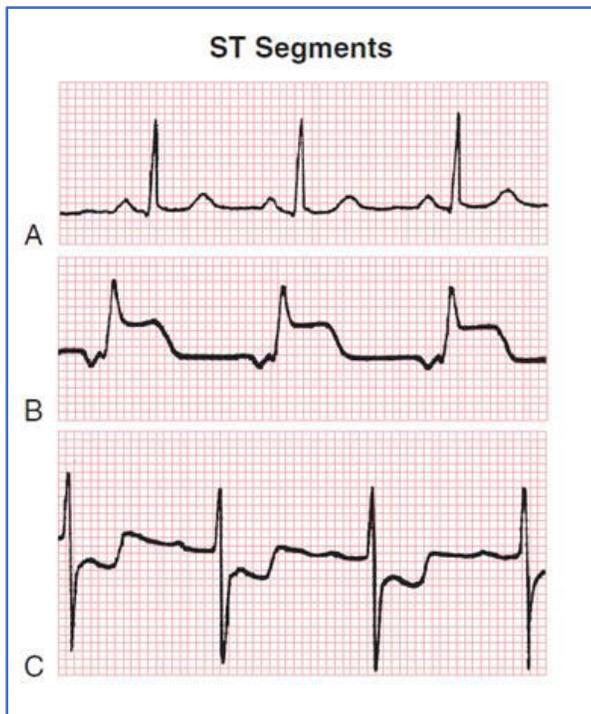
Let us talk about the heart attack or what we call **Acute MI** or **Myocardial Infarction**:

Where there is a sudden blockage or severe decrease in blood supply to one portion of the heart.

- A. We may or may not have any symptoms.
- B. Or, we may suddenly have a heart attack and may **collapse** and **die**.
- C. Or we may have severe chest pain.
- D. Or you may just feel uncomfortable or chest tightness.
- E. Or, you will just be feeling mild nausea.
- F. Or mild shortness of breath.



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And once we do an EKG, it classically shows as the **ST segment elevation**.

In this picture we see the different forms of the ST segments elevation.

In any myocardial infarction or the acute infarction or acute heart muscle injury, specific leads point to the specific area of the heart.



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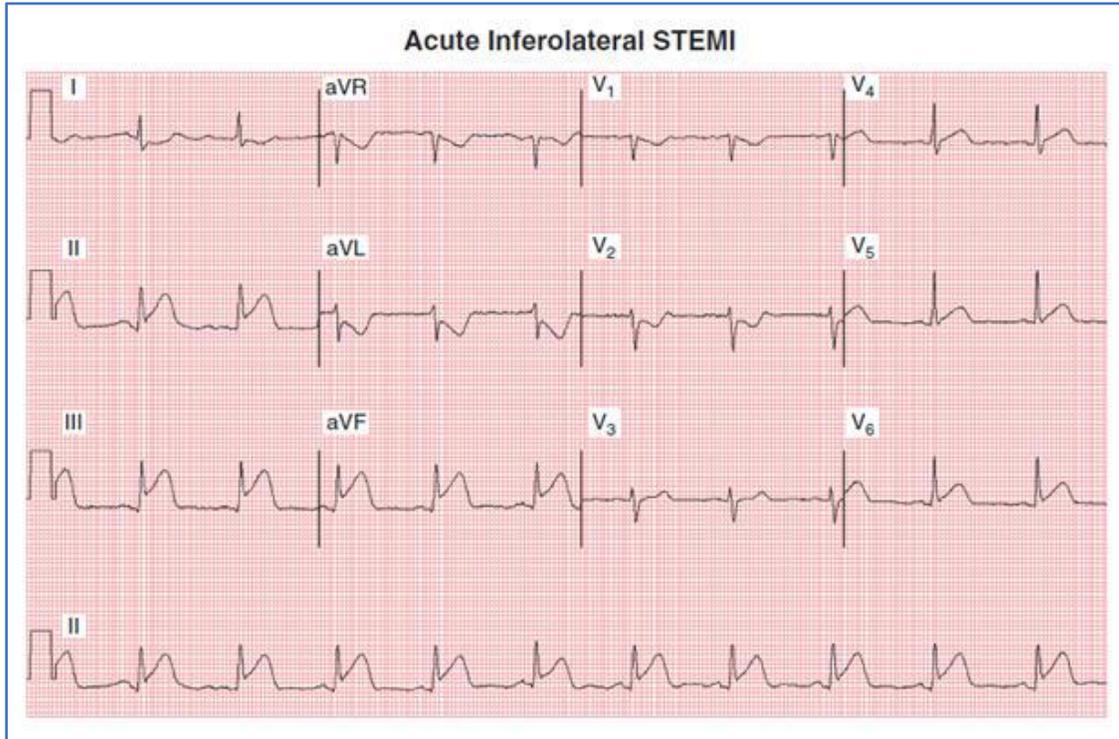
Chapter 9

Acute Inferolateral Infarction

Acute Inferolateral Infarction,

We always look at the **lead II and lead III and lead aVF.**

All these three leads show very obvious **ST segment elevation.**

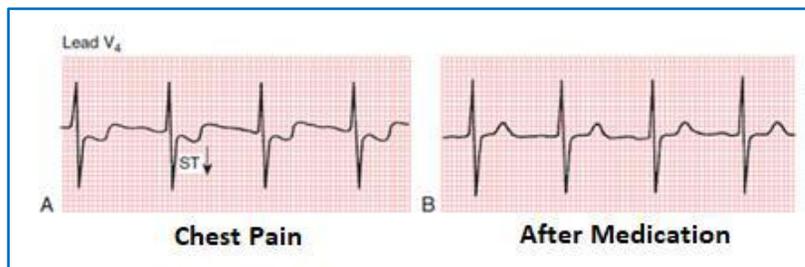


This EKG we see that if the patient is having chest pain and EKG shows the ST segment depression.



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And after a while, this patient was given medication to correct the ischemia and then follow-up EKG shows that ST segment depression has disappeared. The patient has restored circulation with the medication.



Whenever we do a treadmill test where we make a patient run on the treadmill and we constantly record the ECG strip.

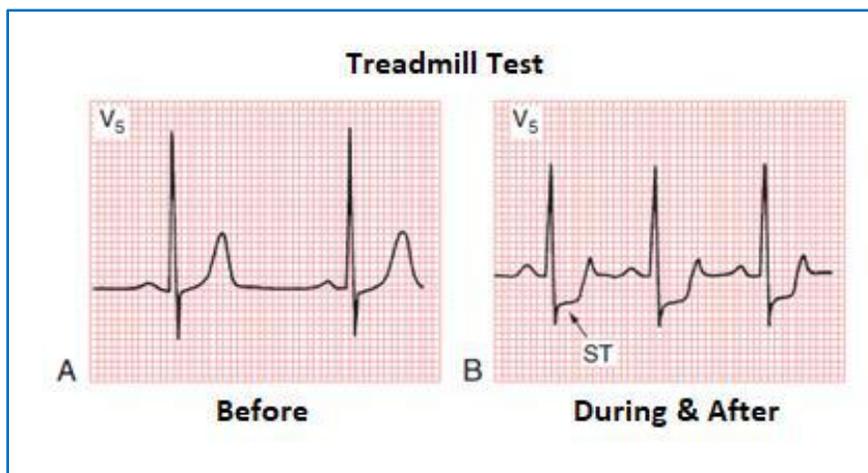
Here is a **lead V5** where:

A patient is running on the treadmill.

And then as we are watching the strip.

It starts showing what we call **ST segment**

depression, and these are the classical symptoms of **ischemia**.



It means that one of the heart arteries is blocked.

And as the patient is doing more exercise, this part of the heart is not getting enough oxygen because the heart artery is blocked.

And shown as **ST segment depression**.



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Chapter 10

A Heart Secret - We All Keep Forgetting



You have to understand one very important factor is that-

When treadmill test is positive, and we see the ST segment depression as we make you run on a treadmill.

Usually it is trying to tell us is that one of the heart arteries is **blocked more than 70%**.

For less than 70%, usually heart compensates, and we do not see any changes in the EKG.

In other words, we cannot really depend upon the exercise treadmill test to be sure that we do not have any so-called blockage in the artery or the coronary artery disease (70% or more).

To get to 70% blockage of heart it takes 10, 20, 30 years depending upon the lifestyle and personal habits.



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Chapter 11

Why I recommend Age 30 in India (~Age 40 in USA)?

The screenshot shows the New Delhi Times website. The main navigation bar includes: INDIA, SPORTS, ENTERTAINMENT, ENVIRONMENT, TRAVEL, VIDEOS, E-PAPER, CS, TECHNOLOGY, HEALTH, OP-EDS, PRESS RELEASE, WHAT THE FATAH, and SUBSCRIBE. The article title is "Heart disease higher among Indian youth than that of the west" by Editor, dated September 30, 2016. The article content is partially visible below the title.

The World Heart Day, observed across the world on 29 September would be the much needed reminder to every person throughout India to step up their lifestyle game in order to prevent the soon approaching heart calamity.

Harsh Wardhan, head of department of cardiology at Primus Super Specialty Hospital said, "At least 80 per cent of premature deaths from cardiovascular disease (CVD) can be avoided if four main risk factors — tobacco use, unhealthy diet, physical inactivity and harmful use of alcohol — are controlled. By ensuring that everyone has the chance to make healthy heart choices wherever they live, work and play, World Heart Day encourages us all to reduce our cardiovascular risk and promotes a heart-healthy planet for those around us."



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Think About It!

Why I recommend age 30 in India (~Age 40 in USA)?

[You will have to pay from your pocket even if you have insurance.]

If we really look at the statistics in India, the heart attack is becoming rampant in youngish population.

In headlines:

With population 150 lacs in Kolkata and one in four persons is prone to heart attack at age 40 which is very concerning. It means one can suddenly drop dead as age 40.

Whatever may be the reason for artery blockage,

With the latest medical knowledge and technology,

We can really add 15 to 20 to 30 years to individual's life.

I highly recommend that:

We start doing from very early age around 30 three important noninvasive simple tests which give us close to 100% information about our heart.

They are relatively very cheap both in India and in US.

In India, all three tests will cost around (Rs. 200 + Rs. 800 + Rs. 10,000) ~ Rs. 12,000.

In the US, they will cost around (\$20, \$100 to \$200 to \$300).



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CT angiogram costs around \$600 to \$800.

And if they are all normal, then we can be rest assured that we will not have a heart attack for the next five years.

We doctors are not judgmental.

Whatever may be the reason for your artery blockage.

We can help you.



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Chapter 12

ECG Also Figure Out Any

Electrolyte Imbalance and Medication Effects

EKG also helps us to figure out any electrolyte imbalance and medication effects:

1. Potassium,
2. Calcium, and
3. Several medications can affect our heart.

Potassium is really very important.

As a MD Medicine and a Kidney Doctor, I can tell you that potassium becomes very important for us.

Most of the time when kidneys are healthy and working normal,

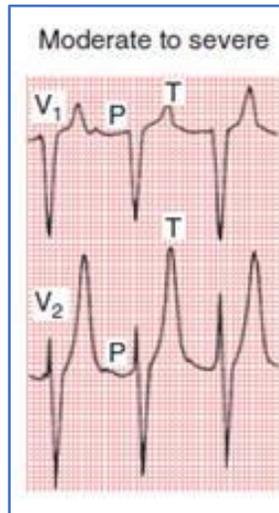
They control potassium level very, very close to the normal number.

But if kidneys are failing,

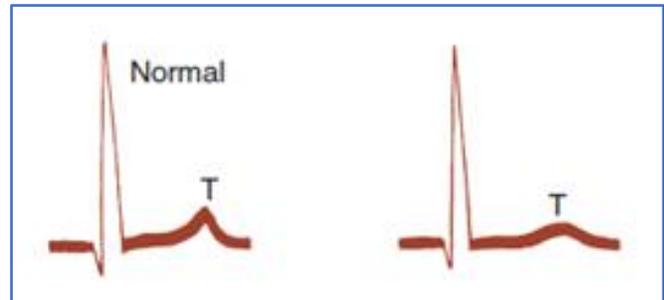
Then they are not able to manage potassium and potassium starts going up.

If it goes more than 6.2, it becomes a medical emergency.

And we see it in the EKG also, just like you see it here this is moderate to severe hyperkalemia or increased level of potassium and we see this **tall T wave** very classical of **increased level of potassium**.



On the other hand, **low potassium** shows as a flattening of the T wave as we see here. And we add to this the patient's history, we have a strong clinical suspicion also and EKG confirms our clinical suspicion along with blood test.



Obviously, important thing is once we see it on the EKG,

We can move very fast.

And manage on emergency short-term either high potassium,

Or low potassium.

As the patient is out of danger, we manage the patient on a long-term basis to correct the potassium level.



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Both very high potassium level and the very low potassium level creates a medical emergency. Patient is at the risk of dying from heart arrhythmia.

Similarly, we see the EKG changes in both-

- The increased calcium, and
- The low calcium.

We see the **specific changes in magnesium** also.

So, potassium, calcium, and magnesium, they are very important for electrical conductance of the heart.



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Chapter 13

Our Heart NOT Beating Regularly (Arrhythmia)

Think About It!

In a situation, there is fibrosis of the electrical conducting systems.

And at that time, we consider putting a pacemaker and stimulate first atria and then ventricle so that our heart keeps beating in a rhythm.

Another very important use of the ECG is the arrhythmia.

We can diagnose irregular beating of the upper chamber atria.

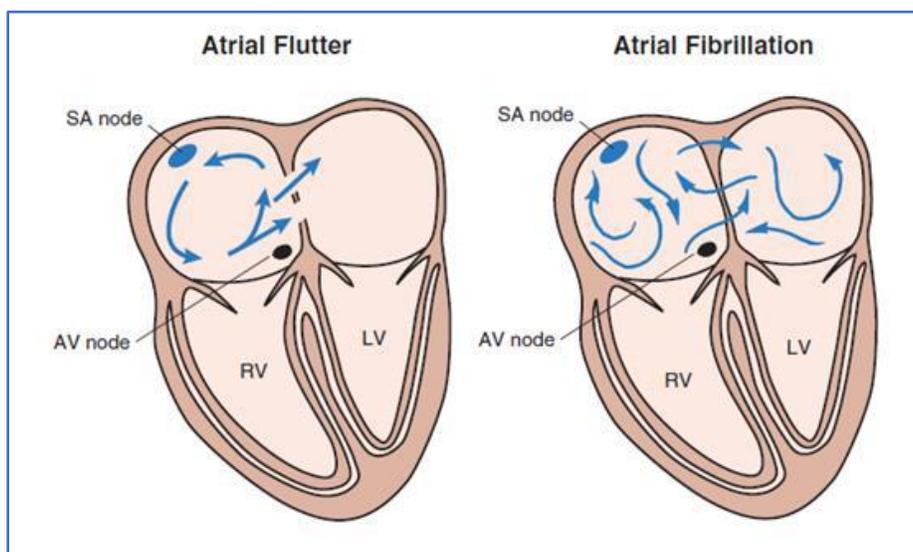
As long as ventricles are beating okay, we will be clinically stable (we will live)

But if we see the irregular beating of the ventricles then it becomes a medical emergency.

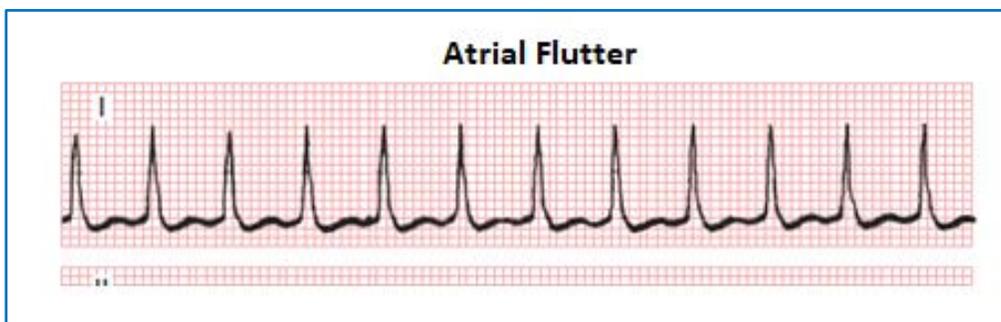


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Chapter 14 Irregular Beating of Atria - Upper Chambers of Heart



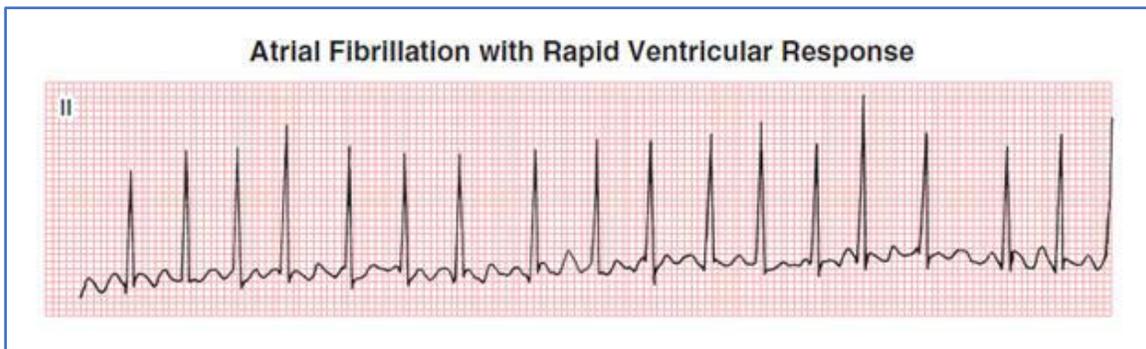
In this picture you see the **atrial flutter** where the atria beat very fast. You can see the heart rate is very high.





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And then **atrial fibrillation** where the upper chambers of heart (**Atria**) are beating irregularly.



Not every beat go through and you see that the tall waves which are reflection of the ventricular contraction, they are irregularly spaced,

- Some are going through.
- Some are not going through.

But here we can tell the ventricular rate is also very high and that is somewhat dangerous situation.

While atria may beat very fast, but we really need to control ventricular rate and anytime ventricular rate is very high, it cannot pump effectively to the brain and the body and we need to slow the ventricles down.



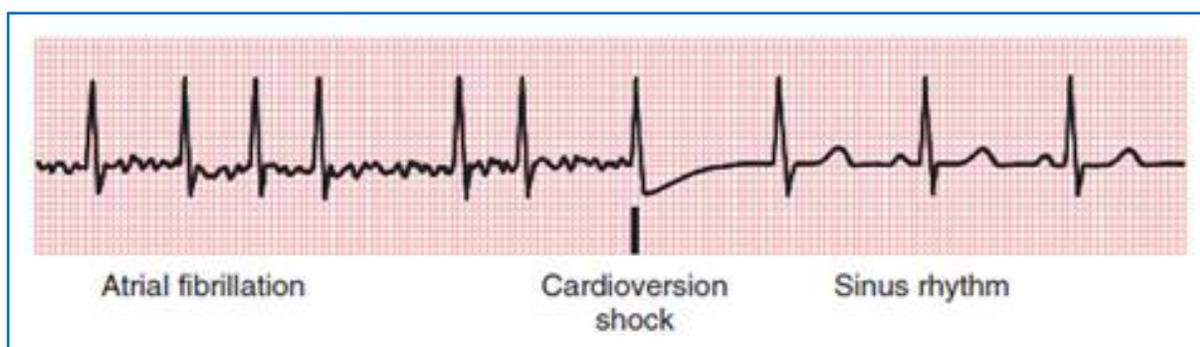
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Chapter 15

Electric Shock to the Heart in Real Life is Effective and Lifesaving

Electric shock to the heart in real life is effective and lifesaving .

We do not have any choice in emergency.



A. Whenever atrial fibrillation is new-

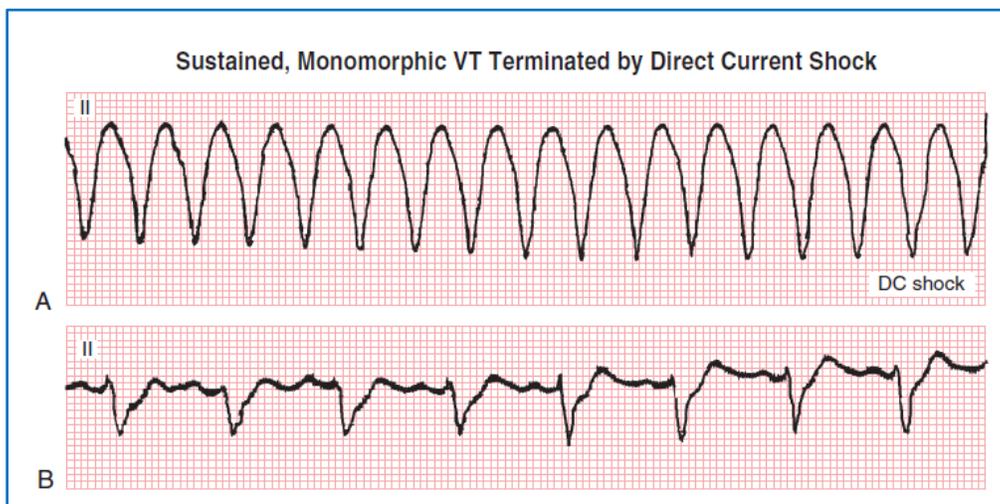
We can try an electric shock what we call **Cardioversion.**

You can see that in this the patient has electrical fibrillation and we gave him a cardiac shock and then the rhythm is restored to **normal sinus rhythm** and that is exactly what we want.

B. What really dangerous are the **Ventricular Arrhythmia and they can be really life-threatening.**



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This is a picture of the sustained or continued ventricular tachycardia, very high rate and this kind of rate is very dangerous. Eventually, the patient will collapse.

And we need to really move fast and definitely we have to try an electric shock and you can see that the patient got an electric shock and he converted to normal sinus rhythm with a controlled heart rate.

Ventricles are most important.

They are the one which pump blood to the brain and the body,

But if they are having irregular rate or beating very, very fast then they are not effective as a pump.

We may collapse or die.

This is a medical emergency.



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Chapter 16

All the Situations Which Become Medical Emergencies, We Can Easily Anticipate

All the situations which become medical emergencies, we can easily anticipate, if:

1. We do three simple, non-invasive tests for the heart.
2. The **Gold Standard Blood Tests every year** which tells us about:
 - Electrolytes,
 - Kidney function test,
 - **Function of the valves, and**
 - **The blood supply of the heart.**

And if everything with heart tests is fine, we are cool for the next five years, nothing to worry about.

- Our indirectly point to acid-base balance or imbalance.

And then which can tell us about all the function of the:

- **Electrical conduction of the heart,**
- **The function of the heart,**



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Chapter 17 If I Am Your Cardiologist

If I am your cardiologist,

I will say please enjoy your life,

But yes, keep fine tuning your health for next five years with three normal heart tests and year to year gold standard blood tests.

