**ECG ONE OF THE MOST USEFUL METHODS OF THE 20TH CENTURY FOR THE DIAGNOSIS OF CARDIOVASCULAR DISEASES**

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Besides coining the actual term “electrocardiogram” and in turn “ECG,” Willem Einthoven also established the general principal of ECG as we know it. The foundation of 12-lead ECG analysis is grounded in the basic understanding of Einthoven’s Triangle.

The triangle is composed of the leads I, II, and III forming the shape. Leads aVL, aVR and aVF perpendicularly intersect each side to the triangle. Together, these six leads can paint a large picture of the patient’s overall cardiac health. Using these leads to assess axis and aid in rhythm determination will greatly influence and strengthen your ability to provide thorough and factually based patient care. However, we will focus on leads I, II, and III, which are also known as the limb leads.

These limb leads are bipolar, meaning they have a positive pole and a negative pole. Lead I extends horizontally from the right arm to the left arm, with the actual left arm electrode being the positive pole. Lead II forms one of the vertical arms of the triangle and stretches from the right hand to the left leg with the electrode positioned on the left leg being the positive pole. Finally, lead III forms the other vertical arm and extends from the left arm to the left leg. Take caution here with this lead as this left arm electrode plays double duty and is now positive for the purposes of lead III.

These leads, in conjunction with the augmented limb leads (aVL, aVR and aVF), will provide you with a fairly detailed three-dimensional picture of the heart’s electrical wiring. Lead I shows left side of the heart, while leads II and III generally focus on the bottom and parts of the right side of the heart.

**Modern ECG.** Perhaps one of the most useful 20th century technologies for the diagnosis of heart disease is the electrocardiogram (EKG) machine. Although much more bulky and heavy than the modern EKG machines in use today, the first device was built at the turn of the century and was considered a huge advancement in medicine. Unlike its bulky ancestors, the modern EKG machine is lightweight and portable; most clinics have them on rolling tables that can be easily transported from room to room.

The use of electrodes for an EKG reading is a relatively new procedure. In the beginning phases of EKG technology, patients were required to place their hands and feet into sodium chloride baths, a conductive method for the faint electric impulses found in the heart. Later, electrical wires were used to transmit heart signals to the machine; eventually the electrodes we use now replaced these wires. If you look at photographs from the late 1800s, the patients look as though they are strapped into an electric chair. Modern methods have made the procedure much more simple, safe, comfortable and accurate.

Today many patients lie on an examination table, although some doctors prefer the electrodes to be attached while the patient is performing moderate exercise. Some patients may be asked to ride a stationary bike or walk on a treadmill. Exercising while attached to the EKG machine may often give the technician or your doctor a better understanding of your heart-function pattern during physical strain.

The electrodes are attached to the EKG machine through cables that produce a graph of your heart's pattern. Typically 10 to 12 electrodes are attached to the patient and lead to the EKG machine. The electrodes pick up electric impulses that are emitted through various points on the body. The EKG machine converts the impulses into readable waves. The waves are then amplified and displayed on a digital screen for the technician to monitor. While monitoring heart activity, the EKG machine continuously prints the patterns onto a graph that can later be interpreted by the attending technician or your physician.