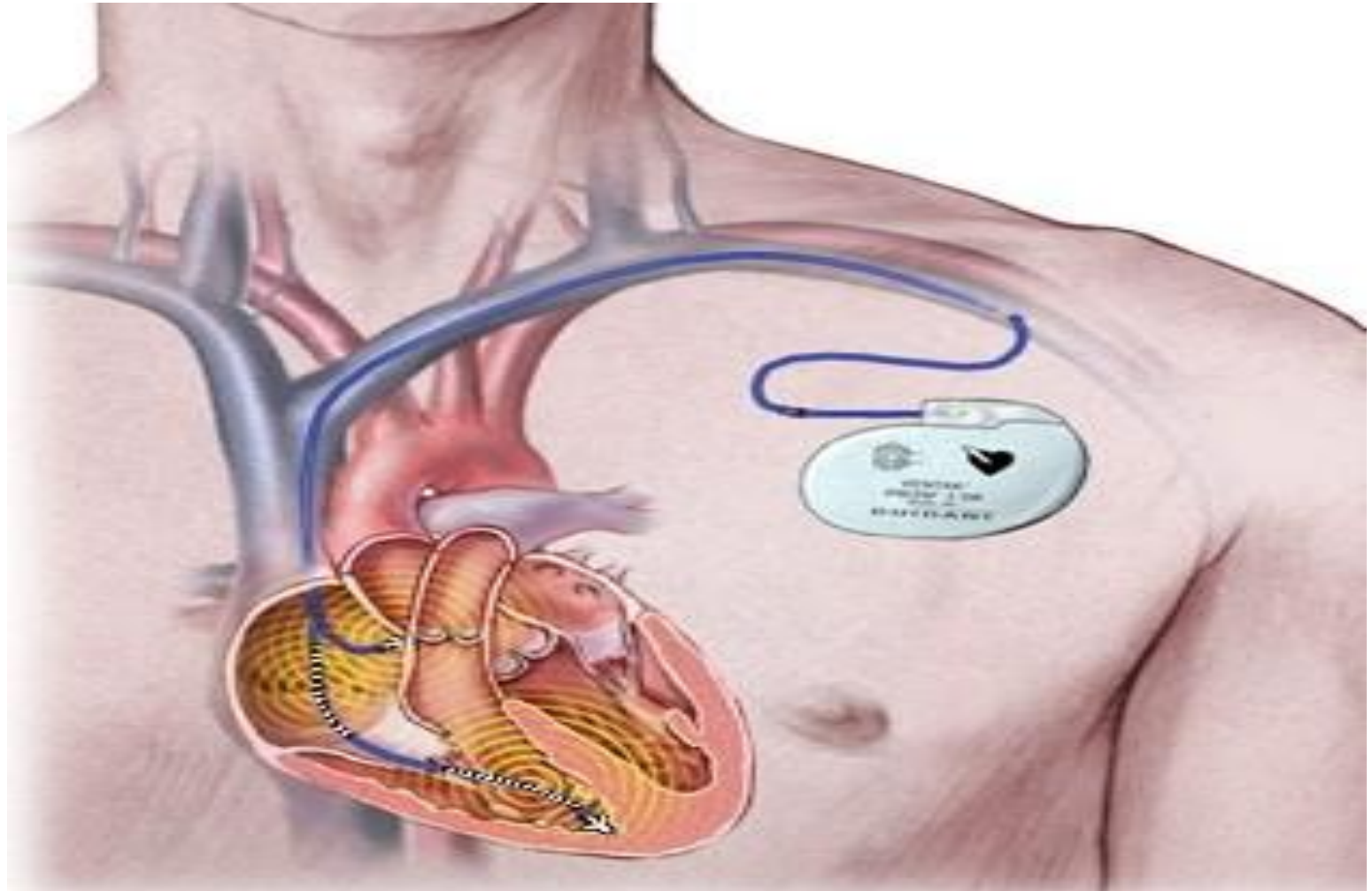


ASSISTING AND THERAPEUTIC EQUIPMENTS

Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy- Heart – Lung machine – Audio meters – Dializers.

Pacemakers



(Cont...)

A **pacemaker** (or **artificial pacemaker**, so as not to be confused with the heart's natural pacemaker) is a medical device which uses electrical impulses, delivered by electrodes contacting the heart muscles, to regulate the beating of the heart. The primary purpose of a pacemaker is to maintain an adequate heart rate, either because the heart's native pacemaker is not fast enough, or there is a block in the heart's electrical conduction system. Modern pacemakers are externally programmable and allow the cardiologist to select the optimum pacing modes for individual patients. Some combine a pacemaker and defibrillator in a single implantable device. Others have multiple electrodes stimulating differing positions within the heart to improve synchronisation of the lower chambers of the heart.

(Cont...)

A pacemaker has two components: 1) the battery, which is called a pulse generator and 2) the pacemaker leads or wires which permits communication between the pulse generator and the human heart.

A pacemaker is a device used to stimulate the heart to contract in an organized fashion.

Pacemaker indications include heart block and very slow heartbeats, enough to produce symptoms.

(Cont...)

The pacemaker generator or battery will deliver an electrical impulse through the pacemaker wires to the heart.

A pacemaker will usually last between 5 to 12 years. The longevity of the pacemaker depends on how often it is used, type of pacemaker system and the amount of energy required to stimulate the patient's heart. Most systems are dual chamber pacemakers, which means that it will sense and pace (stimulate) the upper chamber (right atrium) and lower chamber (right ventricle) of the heart in a synchronized way. Some patients have a single-chamber unit, which will only pace the ventricle (or atrium).

(Cont...)

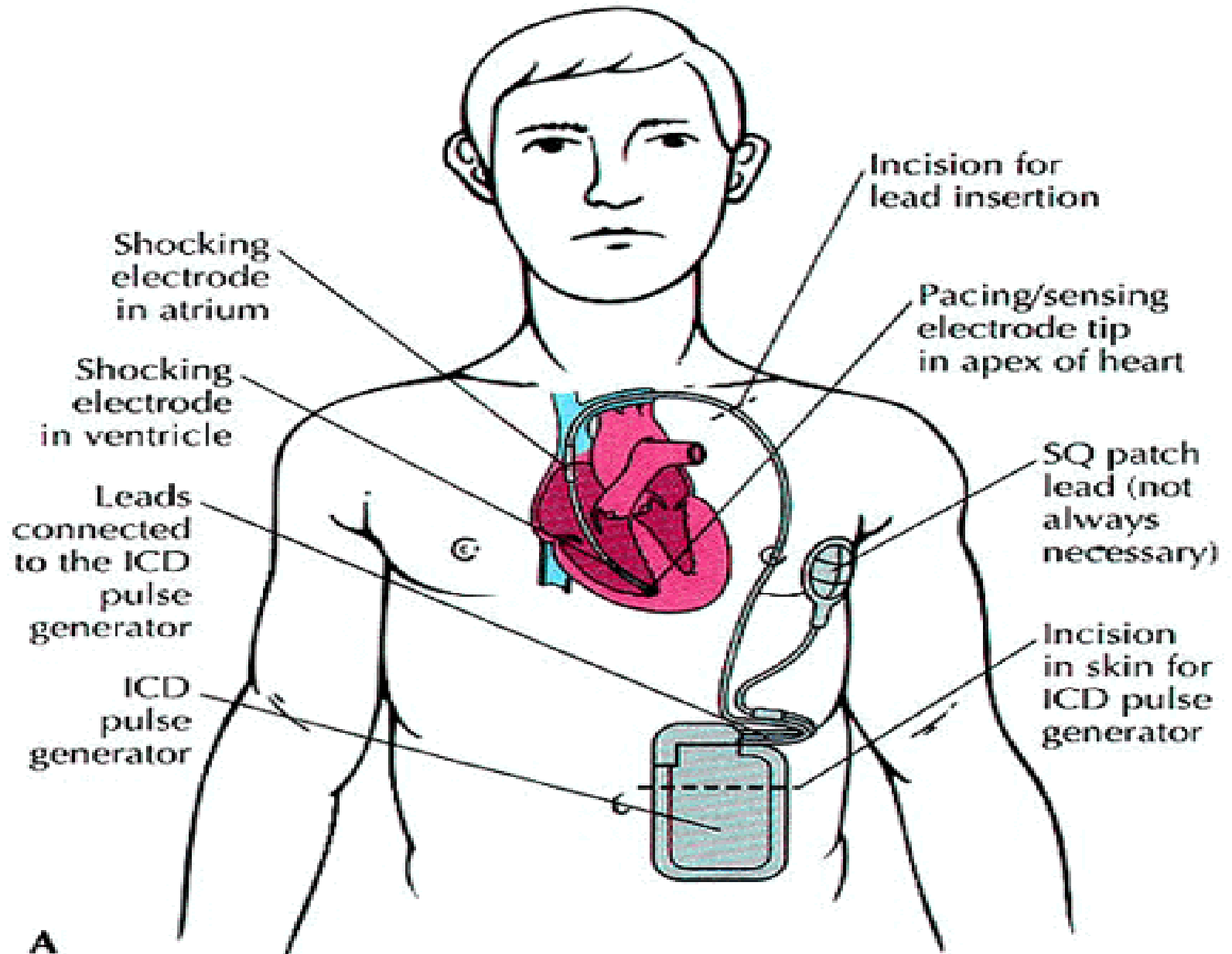
Please keep the incision site clean and dry. Check the incision site for swelling, wound separation, drainage or unusual tenderness. Please notify us for any of these signs or if you develop any fever. The incision site may show some local redness for a few days. We should be notified if it becomes too red or if it involves a large area.

Defibrillators

Defibrillation is the definitive treatment for the life-threatening cardiac arrhythmias, ventricular fibrillation and pulseless ventricular tachycardia. Defibrillation consists of delivering a therapeutic dose of electrical energy to the affected heart with a device called a defibrillator. This depolarizes a critical mass of the heart muscle, terminates the arrhythmia, and allows normal sinus rhythm to be reestablished by the body's natural pacemaker, in the sinoatrial node of the heart.

Defibrillators can be external, transvenous, or implanted, depending on the type of device used or needed. Some external units, known as automated external defibrillators (AEDs), automate the diagnosis of treatable rhythms, meaning that lay responders or bystanders are able to use them successfully with little, or in some cases no training at all.

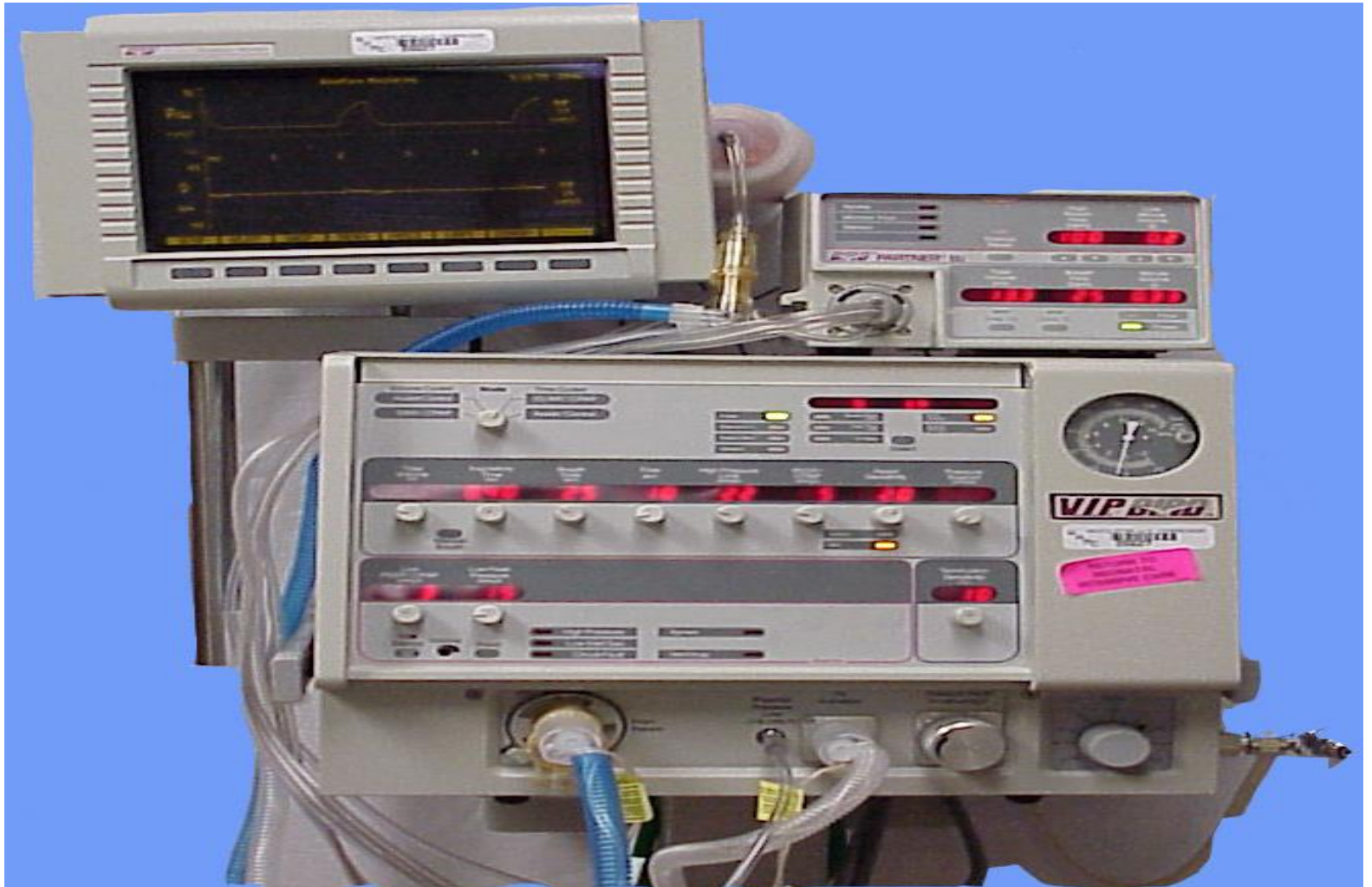
Defibrillators



Heart Defibrillators



Ventilators



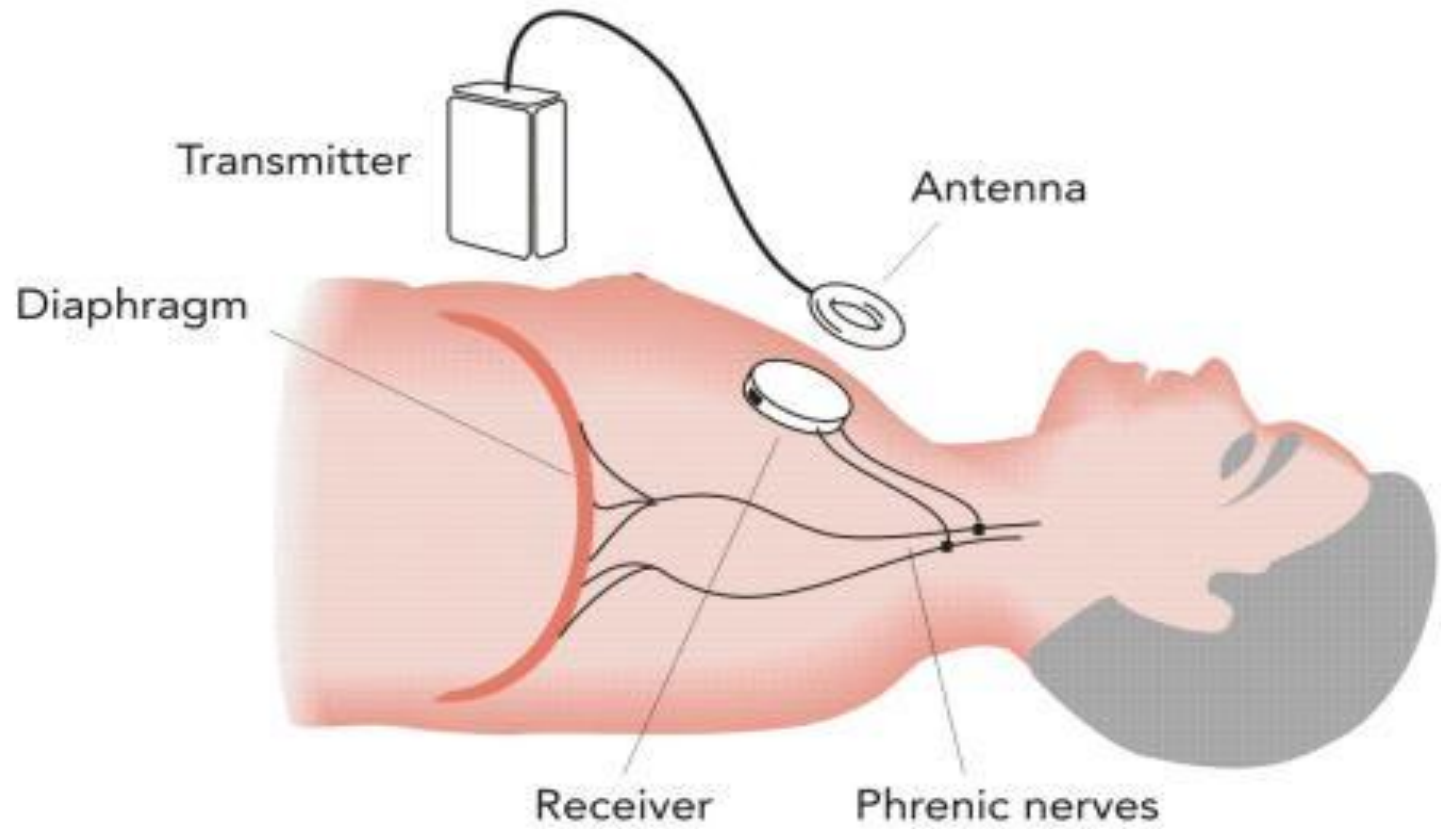
(Cont...)

A medical ventilator may be defined as any machine designed to mechanically move breathable air into and out of the lungs, to provide the mechanism of breathing for a patient who is physically unable to breathe, or breathing insufficiently.

While modern ventilators are generally thought of as computerized machines, patients can be ventilated indefinitely with a [bag valve mask](#), a simple hand-operated machine. After [Hurricane Katrina](#), dedicated staff "bagged" patients in [New Orleans](#) hospitals for days with simple bag valve masks.

Ventilators are chiefly used in [intensive care medicine](#), [home care](#), and [emergency medicine](#) (as standalone units) and in [anesthesia](#) (as a component of an [anesthesia machine](#))

Nerve stimulators



Muscle stimulators



(Cont...)

Electrical muscle stimulation (EMS), also known as **neuromuscular electrical stimulation (NMES)** or **electromyostimulation**, is the elicitation of muscle contraction using electric impulses. The impulses are generated by a device and delivered through electrodes on the skin in direct proximity to the muscles to be stimulated. The impulses mimic the action potential coming from the central nervous system, causing the muscles to contract. The electrodes are generally pads that adhere to the skin. EMS is both a form of electrotherapy and of muscle training. It is cited by important authors^[1] as complementary technique for sport training, and there is published research^[2] on the results obtained. In the United States, EMS devices are regulated by the FDA

Diathermy

Diathermy is the use of high frequency electric current to produce heat.

Used to either cut or destroy tissue or to produce coagulation.

Mains electricity is 50 Hz and produces intense muscle and nerve activation.

Electrical frequency used by diathermy is in the range of 300 kHz to 3 MHz.

Patients body forms part of the electrical circuit .

Current has no effect on muscles.

Monopolar diathermy

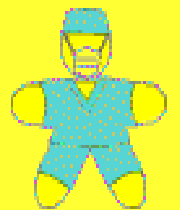
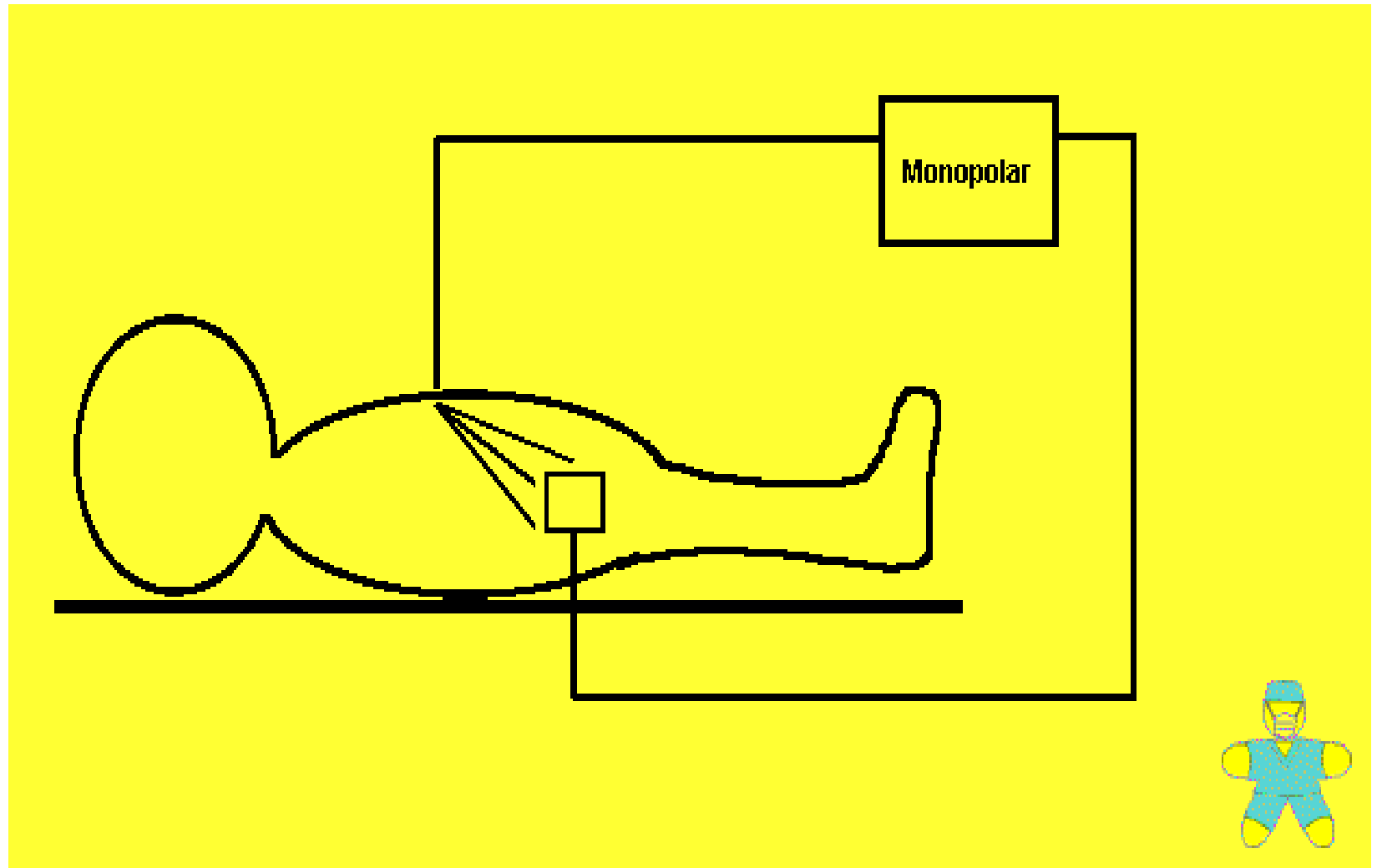
Electrical plate is placed on patient and acts as indifferent electrode

Current passes between instrument and indifferent electrode

Localised heating is produced at tip of instrument

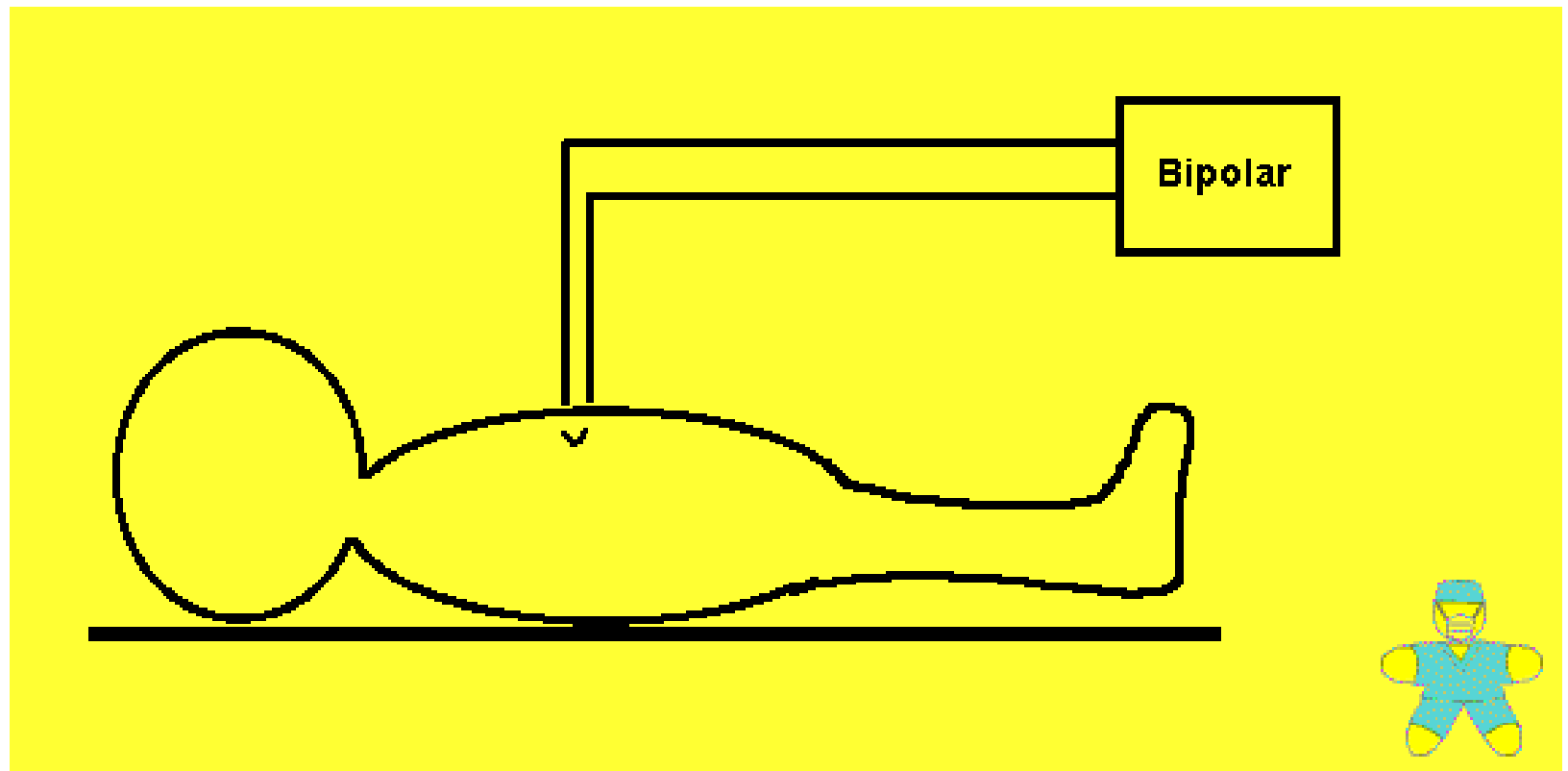
Minimal heating effect produced at indifferent electrode

Monopolar diathermy



Bipolar diathermy

Two electrodes are combined in the instrument (e.g. forceps)
Current passes between tips and not through patient



Effects of diathermy

The effects of diathermy depends on the current intensity and wave-form used

Coagulation

Produced by interrupted pulses of current (50-100 per second)

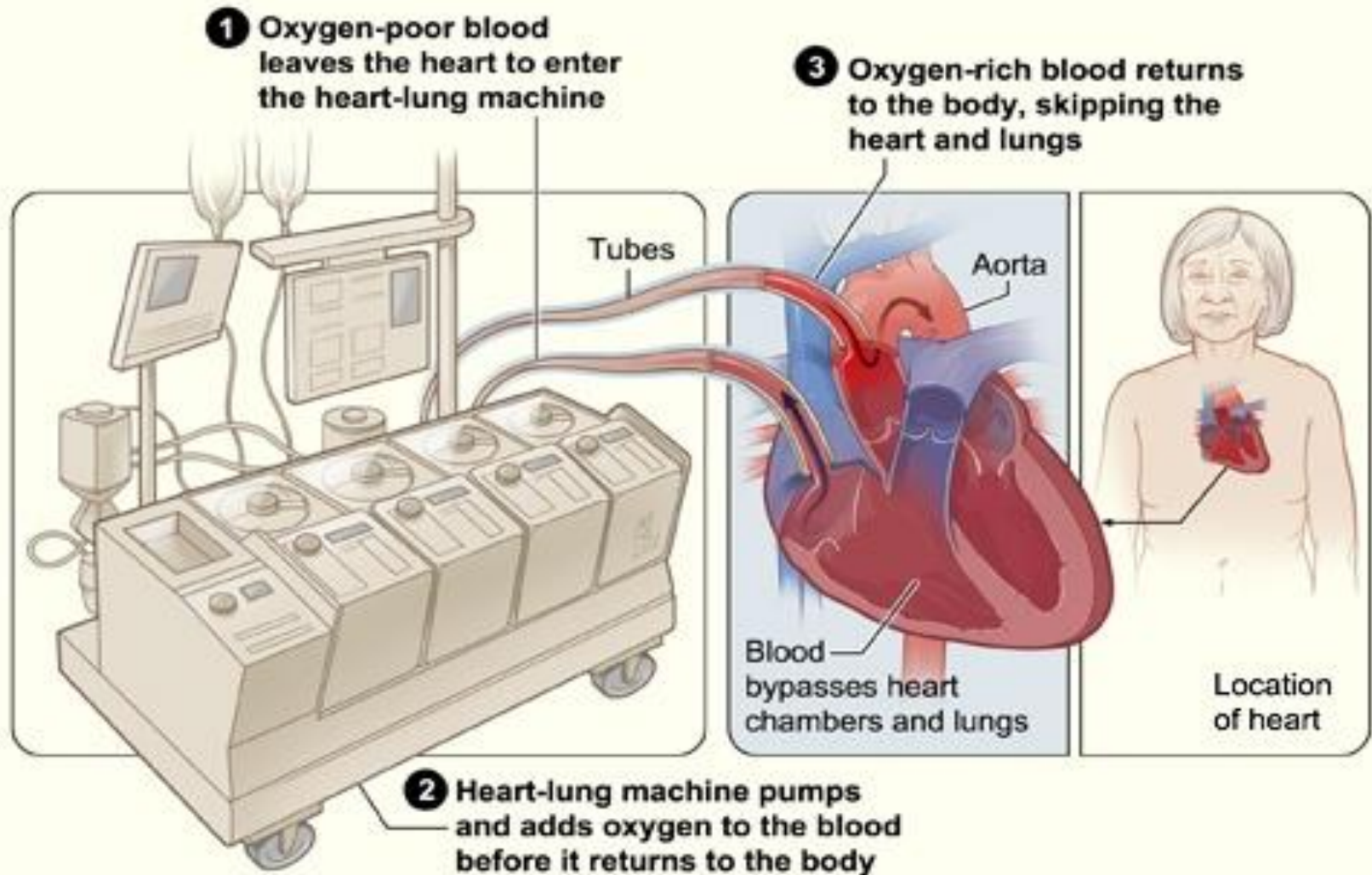
Square wave-form

Cutting

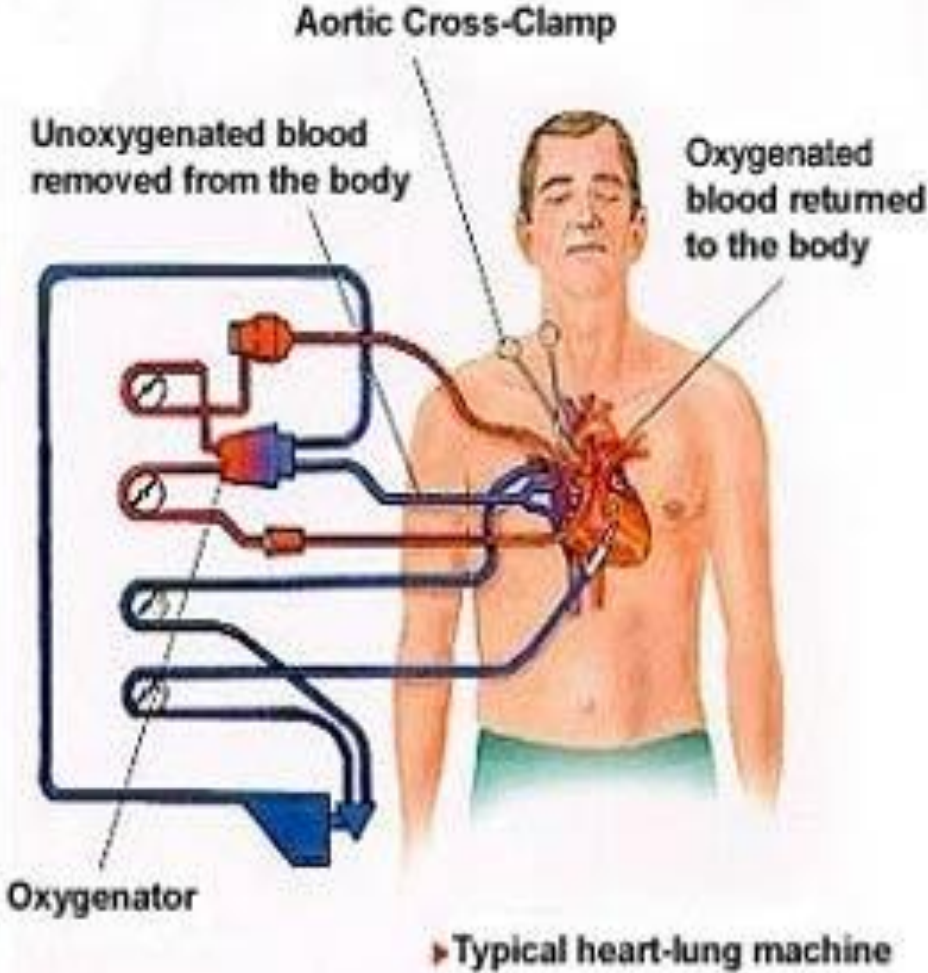
Produced by continuous current

Sinus wave-form

Heart – Lung machine



Heart – Lung machine



(Cont...)

The principle of the heart-lung machine (also known as pump-oxygenator or cardiopulmonary bypass) is actually quite simple. Blue blood withdrawn from the upper heart chambers is drained (by gravity siphon) into a reservoir. From there, the blood is pumped through an artificial lung. This component is designed to expose the blood to oxygen. As the blood passes through the artificial lung (also known as an oxygenator), the blood comes into intimate contact with the fine surfaces of the device itself. Oxygen gas is delivered to the interface between the blood and the device, permitting the blood cells to absorb oxygen molecules directly.

(Cont...)

Now the blood is red in color, indicating its rich content of oxygen destined to be delivered to the various tissues of the body. Finally, the heart-lung machine actively pumps the red blood back into the patient through a tube connected to the arterial circulation. The heart-lung circuit is a continuous loop; as the red blood goes into the body, blue blood returns from the body and is drained into the pump completing the circuit.

Audio meters



(Cont...)

An **audiometer** is a machine used for evaluating hearing loss. The invention of this machine is generally credited to Dr. [Harvey Fletcher](#) of [Brigham Young University](#). **Audiometers** are standard equipment at [ENT](#) clinics and in [audiology](#) centers. They usually consist of an embedded hardware unit connected to a pair of [headphones](#) and a feedback button, sometimes controlled by a standard PC. Audiometer requirements and the test procedure are specified in [IEC 60645](#), [ISO 8253](#), and [ANSI S3.6](#) standards.

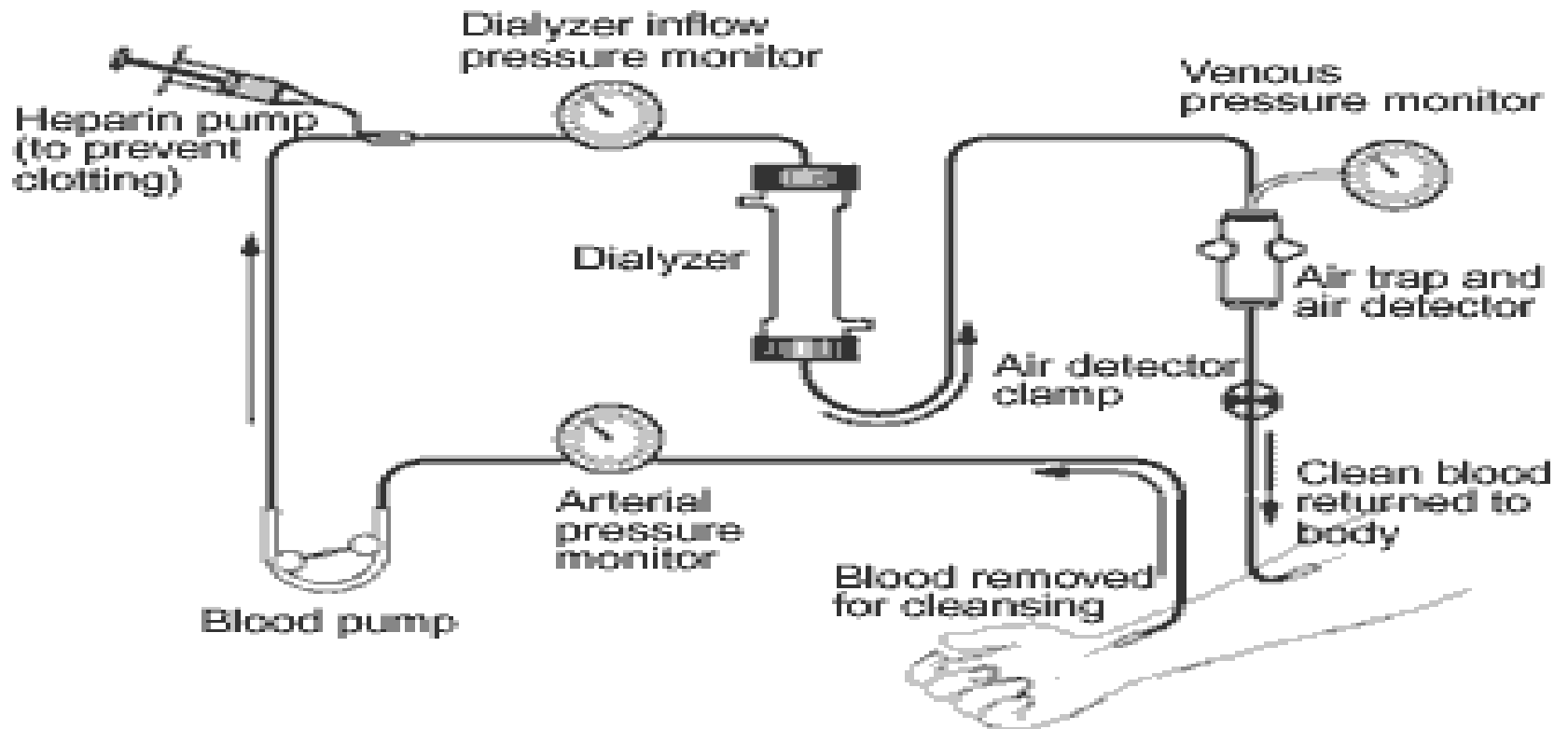
An alternative to hardware audiometers are software audiometers, which are available in many different configurations.

Screening PC-based audiometers use a standard computer and can be run by anybody in their home to test their hearing, although their accuracy is not as high due to lack of a standard for calibration. Some of these audiometers are even available on a handheld Windows driven device.

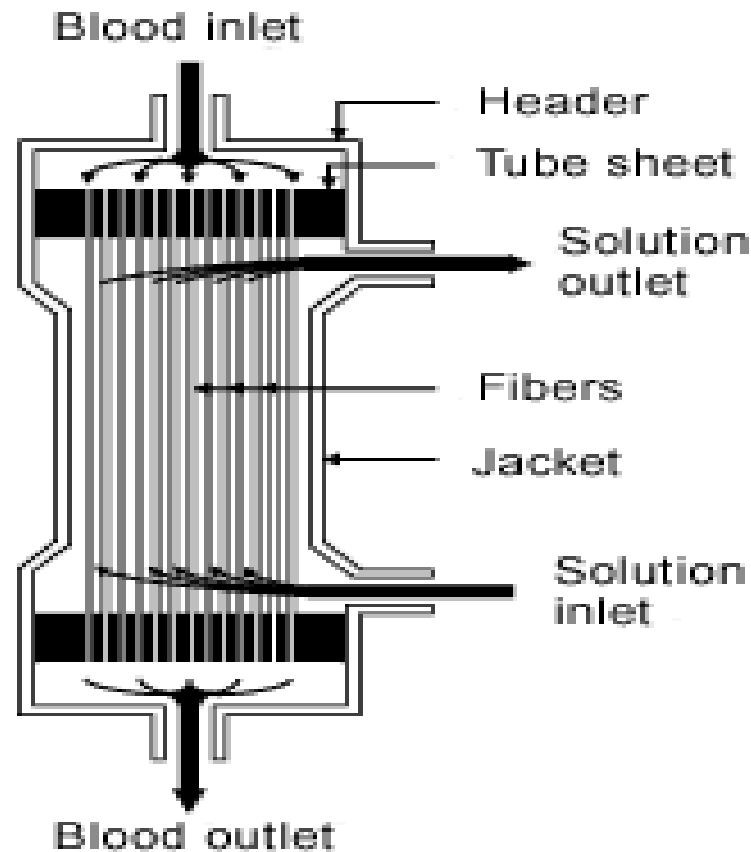
Clinical PC-based audiometers are generally more expensive than software audiometers, but are much more accurate and efficient. They are most commonly used in hospitals, audiology centers and research communities. These audiometers are also used to conduct [Industrial Audiometric Testing](#). Because these audiometers can be calibrated to 1/10 of a dB, calibration is more accurate than hardware audiometers. Some audiometers even provide a software developer's kit that provides researchers with the capability to create their own diagnostic tests.

Dialyzers

The function of the Baxter dialyzer was simply to filter the patient's blood during dialysis. The recalled dialyzers were sterile, single use dialyzers for patients suffering from either acute or chronic renal failure.



The process of dialysis repair is simply an added manufacturing step to redeem defective dialyzers. First, the header caps of the dialyzer are taken



off and one end of the dialyzer is submerged into a PF5070 bath. The blood compartment then becomes introduced to PF5070 to prime the dialyzer. With the bottom still submerged in PF5070, air is pumped into the dialysate compartment under pressure. This allows the inspector to visualize the air bubbles that show up on the upper end of the dialyzer. The air bubbles approximate the area where the leakages in the dialyzer are, which then allows the areas of leakage to be manually sealed up. Once the leaks in the fibers are sealed, the once defective dialyzers are returned to the production line with the other non-defective dialyzers.

THANK YOU