RAO'S COLLEGE OF PHARMACY
NELLORE

PHARMAG

THE COLLEGE MAGAZINE

Application of Technology in Medicine

Aiming to incorporate technology in medicine for better treatment & life-style

INSIDE

- Telemedicine
- Alzheimer's Trackers
- Artificial Muscles
- Implantable devices
- Wearable Technology

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RAO'S COLLEGE OF PHARMACY, NELLORE

EDITOR'S LETTER

EDITOR-IN-CHIEF

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Everything human mind imagines is achievable but only thing stops this is a 'reason'. Imagination and execution without reason opens up new possibilities

At this pandemic outside and scientists busy with developing vaccines and others fighting covid-19, we @ Rao's are engaged in nurturing those future scientists. We share our knowledge through 'PHARMAG'.

Pharmag is a monthly publication that seeks to expand readers' science and medical awareness while also encouraging them to incorporate the principles in everyday life for a healthy lifestyle. Pharmag benefits readers by increasing their general knowledge of illnesses and potential therapies using technology. The journal also strives to keep readers up to date with treatment developments and scientific advances in the treatment of different diseases. It also allows people to use the internet and mobile devices to access healthcare more easily and quickly.

EDITORIAL TEAM

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CONTENTS

WEARABLE TECHNOLOGY

G.V. Lokesh

Wearable Devices	Function
Smart health watches	Heart rhythms, Parkinson's disease
Wearable ECG Monitors	Atrial fibrillation & Automatic tracking for walking, Running, Swimming, Biking
Wearable blood pressure monitors	Blood pressure & Step count, Distance travelled, Calories burned
Biosensors	Body movements, Heart rate, Respiratory rate & Temperature
Wearable fitness trackers	Physical activities & Heart rate

Wearable technology is defined as technology based gadgets that can be worn by a person or a patient that includes monitoring and tracking of information related to health and fitness. Now a days, micro-sensors that are present in the range of wearable systems are smoothly implanted into textiles, consumer electronics are inserted in fashionable clothes to monitor for patient's regular movements and activity patterns. The design for broadband operations can be done by using belt-worn personal computers with a head mounted display, computerized watches.

Advantages:

a) Remote patient monitoring
b) Early diagnosis
c) Adherence to medication
d) Saving health care cost
e) Information registry

Wearable technology is a contemporary key for providing standard public health at a minimum work. This technology is becoming very important in the medical field that gives a framework to clinical applications. The applications of this technology are suitable and popular in several fields of short-term and long-term health monitoring. This technology makes the future easy, safety and healthy.

TELEMEDICINE

U. Sai Preethi, K. Pallavi

It is the distribution of health-related services and information through electronic information and telecommunication technologies i.e., Radio, Telephone, T.V, Data communication and Computer networking. It allows long-distance patient and clinical contact, care, advice, reminders, education, interventions, monitoring and remote admissions.

Benefits of Telemedicine: Improved access, Cost efficiencies, Improved quality of health services, Patient demand, Reduce travel time and related stress for the patients.

Remote Consultation: Generally for the purpose of diagnosis of a patient remotely by primary physician.

Remote Expertise: Generally it allows most experienced physicians to assist their health conditions without leaving patient's present condition.

Services provided by Telemedicine:

« Primary Care and specialist referral services.
« Remote patient monitoring.
« Consumer medical and health information.
« Intervention in chronic disease management.
« Medical education provides.

OTC MEDICINES

K. Lahari, S. Meghana rao

OTC refers to a medication which can be purchased without a prescription directly from medical store. These drugs are also referred as prescription de controlled drugs. These are primarily used for symptomatic relief but not as substitute for prescription drugs.

OTC medication examples:

Topical antibacterial and antifungal drugs: Bacitracin, clotrimazole.
Pain reliever drugs:Acetaminophen Naproxen etc.
Smoking cessation: Nicotine patch.
Topical dermatological drugs: Capsaicin, permethrin.
Proton pump inhibitors :Omeprazole.
Anti – diarrhoeal drugs:loperamide.
Vitamins:calciferol, ferrous sulphate.
Antihistamine: cetirizine.
Eye care drugs: refresh gel.

Risks of OTC:
Inaccurate dx
Drug toxicity
Failure to follow instructions on the label
Delayed in needed therapy

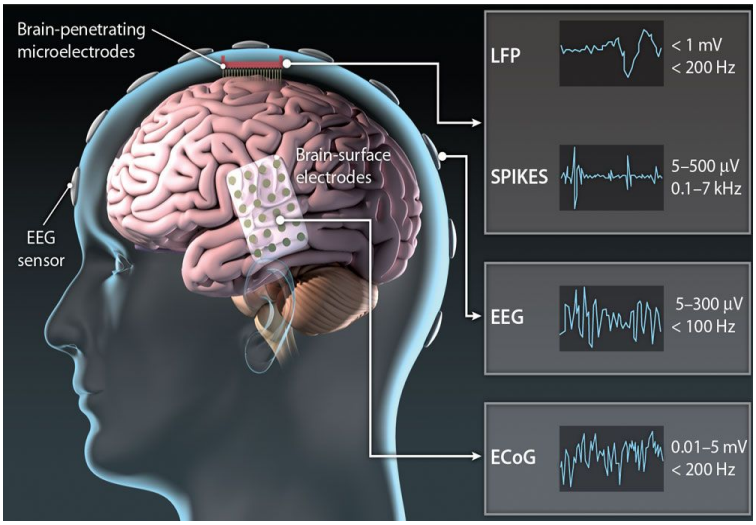
Benefits of OTC:
cheap price
No limit for purchase
Decreased visiting frequency
Easy accessible
Self care

Banned OTC Combinations in India

Anti-diarrhoeal formulations with neomycin
Fixed dose of iron with strychnine and arsenic yohimbine
Fixed dose combination of azithromycin +levofloxacin
Fixed doses of omeprazole and ondansetron
Fixed dose with vitamin c with tetracycline

WIRELESS BRAIN SENSOR

CH Rohith*



The utilization of wireless brain sensors, to detect brain activity patterns can help, diagnose, analysis and control conditions related to brain disorders.

There are several types of sensors for the diagnostic procedure, to treat and for surgery. The "wireless brain sensors" is modern brain computer technology for Neuroscientists, to learn how brains operate and Neurosurgeons to perform surgeries without intervention. Wireless brain sensors are gadgets that detects intracranial pressure and temperature during moderate traumatic brain injuries (or) those who are suffering with Parkinson's disease (PD). The devices are comprised mainly of poly lactic co-glycolic acid (PLGA) and silicone, which transfer particular pressure and temperature ranges, and too other information.It can be located into brain at different areas during operations.

GLUCOMETER

T. Shamitha Goutham

Glucometers are widely used in hospitals, out-patient clinics, emergency rooms, home self-monitoring. It provides fast results of blood glucose levels. These are utilized by a diverse population of patients including all ages and their medical conditions. Most glucometers today use an electrochemical method. Test strips contain a capillary that sucks up a reproducible amount of blood. The glucose in the blood reacts with an enzyme electrode containing glucose-oxidase. Calorimetric method is a technique where the total amount of charge generated by the glucose oxidation reaction measured over a period of time. Amperometric method is used by some meters and measures the electric current generated at a specific point in time by the glucose reaction. The calorimetric and amperometric methods give an estimation of the concentration of glucose in the initial blood sample.

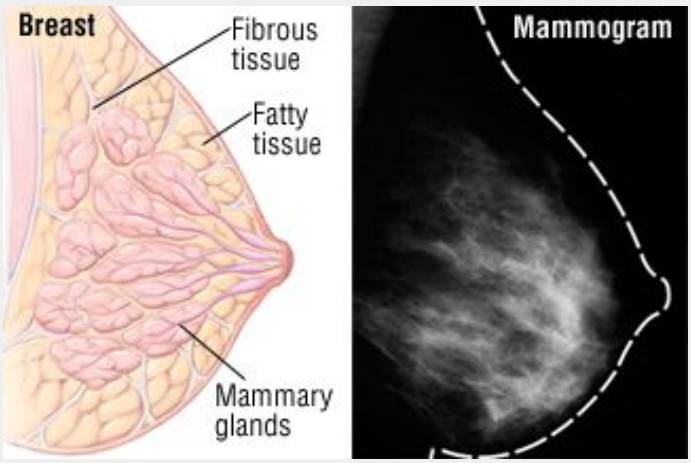
Factors affecting glucometer performance: Operator techniques, Environmental exposure, Patient factors like Medication, Oxygen therapy, Anaemia, Hypotension etc.

The glucometer provides accurate values and valuable information. Regular checkup is done with the help of home self-monitoring glucometer device.

TECHNOLOGY IN CANCER Dx

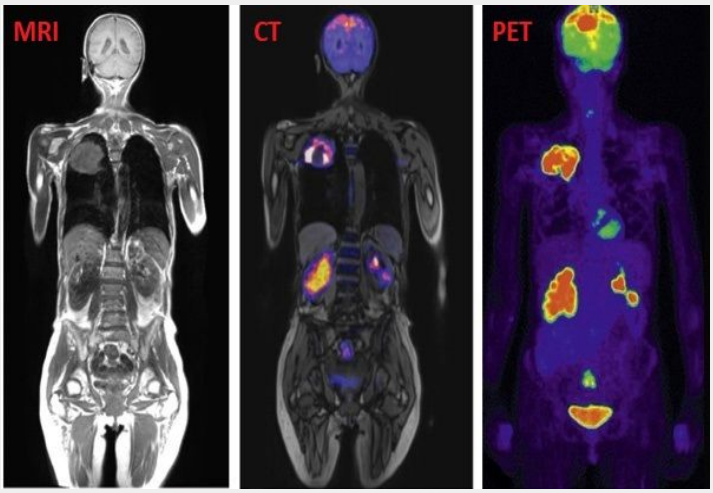
P. Theja sree, P. Arshiya, A. N. Kalyani

Fighting cancer is the challenge of life time for patients, physicians and researchers in oncology. In this article we gave you a few impressions of scenarios employing technologies to support and improve cancer research and therapy. Chemotherapy and radiotherapy employs the most common digital techniques for the treatment of cancer now-a-days. Digital technology and microscopic concepts are the most preferable mode of cancer diagnosis. Digital technology is one of the prompt techniques which can provide an accurate and optimized solution. Different imaging techniques like Magnetic Resonance Tomography, Mammography, Sonography, Ultrasound and biopsy histological images are playing an important role in computer aided cancer diagnosis.



VMAT Radiation Therapy: It is a new intensity-modulated radiation therapy technique that combines the fully digital linear acceleration, 3D volumetric imaging and advanced treatment planning expertise. This powerful trio delivers focused radiation in shortest time with minimum dose to targeted organ.

Magnetic Resonance Imaging: In this technology, with the use of magnetic and radio waves, comprehensive and detailed cross-sectional images are produced of the body. As there is no use of X-rays, there is no exposure to radiation.

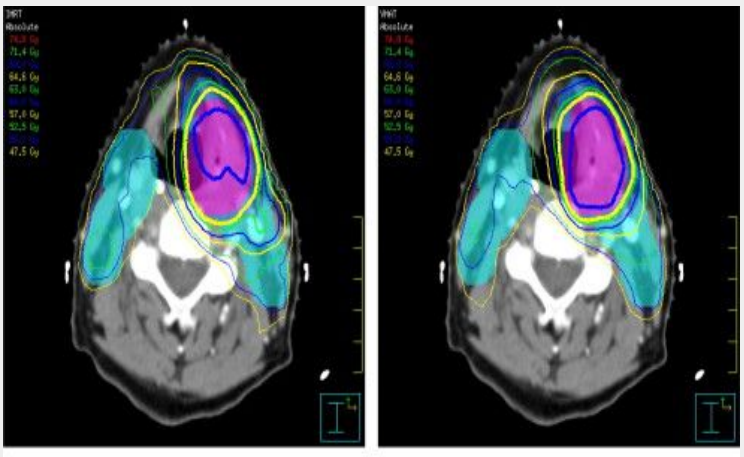


Mammography: It is also called as mastography, it is the process of using low-energy X-rays (Usually around 30kvp) to examine the human breast for diagnosis and screening. The goal of mammography is the earlier detection of breast cancer.

Sonography: It is a diagnostic medical test that uses high frequency sound waves also called ultra sound waves-to bounce of structures in the body and create an image.

Ultrasound Scan: An ultrasound scan is a medical test that uses high frequency sound waves to capture live images from the inside of your body.

PAP Test: It is the most common test used to look for early changes in cells that can leads to cervical cancer.This test is also called as pap smear.



(a) IMRT (b) VMAT

WHAT AFTER PHARM.D

P. Thanuja, P. Gnana Jyothi, K. Priyanka Sharon, V.V. Bhavana

Pharm. D stands for Doctor of pharmacy which is a 6- year professional degree that has now been recognized by PCI. Pharm. D has a wide spectrum of subjects. In addition to the core subjects of pharmacy, the learning of patient health care services are also included in the curriculum of the degree. Owing to the vast range of courses under this degree, Pharm.D has a wide scope in India as well as abroad.

MSc (Master of Science): It is a 2 year Postgraduate degree The eligibility criteria for an MSc degree is a minimum of 50-60% marks in UG level along with a valid GATE score to get admission in MSc course.

M.D: Full form is Doctor of Medicine. In us and some other countries MD denotes a professional graduate.

MBA HCS: Full form is Master of Business Administration in Health care services. It includes 3 year graduation

MPH (Master of Public Health): It is master of medical science in public health. It focuses on public health practice.

Ph.D: Ph.D. stands for Doctor of Philosophy. A Doctorate degree achiever can use a Dr. Title in front of his/her name and referred as a doctor.

PHARM.D JOB PROFILES

Clinical pharmacist
Hospital staff pharmacist
Medical writer
Pharmaceutical advisor
Medical safety physician
Supply logistics leader
Drug safety Associate
Hospital Pharmacy Director
Clinical Scientist for Research
Patient safety Physician
Medical Science Liaison
Scientific Director

GOVT SECTOR

Government Hospitals
Pharmacovigilance
Staff Selection Commissions
CRPF
Government Colleges
Sports Authority Of India
Clinical and Medical Affairs Director

BIOINFORMATICS

T. Selvi, Sk. Afreen

Bioinformatics is a rapidly developing branch of biology which derives knowledge from computer analysis of biological data and consists of the information stored in the genetic code but also experimental results from various sources, patient statistics and scientific literature.

Types of sequences in nucleotide sequence databases

cDNA sequences: It is a molecule obtained by reverse transcription of an RNA molecule. It represents that part of the genome that is transcribed into RNA.

Genomic DNA sequences: These are the sequences which represent the complete genome of organisms.

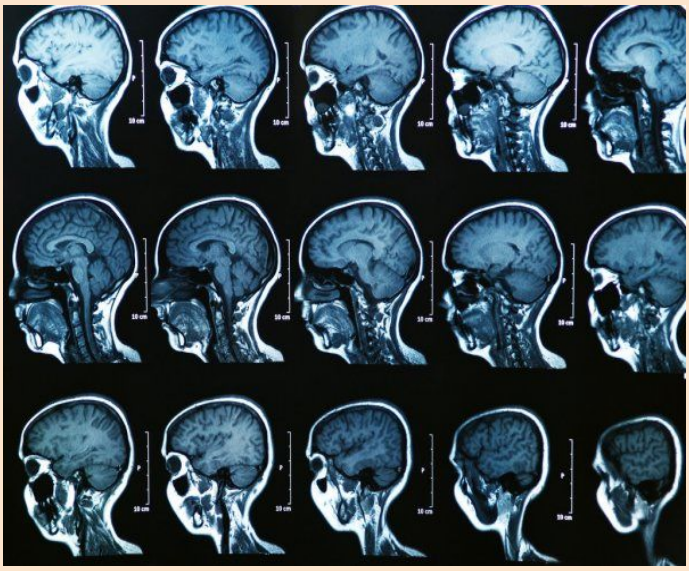
Expressed Sequence Tag [EST] sequences: The sequences that are obtained by sequencing only a part of cDNA molecules produced using mRNA. They are dubbed as 'TAGS' because they can be used as probes for the isolation of the concerned genes from the genomic DNA.

Genomic Sequence Tag [GST] sequences: GSTs sequence developed by sequencing the DNA fragments on either side of the points of cuts.

Organelles DNA sequences: The DNA found in mitochondria(mt DNA) and chloroplasts[cp DNA]

Applications of Bioinformatics

- Sequence mapping of biomolecules[DNA, RNA and Proteins].
- Identification of nucleotides sequences pf functional gene.
- Prediction of functional gene products.
- Binding of sites that can be cut by restriction enzymes.



MRI SCAN

T. Shamitha Goutham, D.E.P. Jessica, K.S. Pragathi Reddy, G. Nandini

Magnetic Resonance Imaging (MRI) is a non-invasive imaging technology that produces 3D detailed anatomical images. It is often used for diagnosis, monitoring and treatment of diseases.

Uses of MRI: MRI scanners are particularly well suited to image non-bony parts and soft timer of the body. They differ from CT and X-rays. The brain, spinal cord, nerves as well as muscles, ligaments, tendons are seen clearly than in regular x-rays and CT scan. Hence MRI is used to image knee and shoulder injuries. It can also be used to diagnose aneurysm and tumours.

Precautions: The patients and individuals before entering they need to remove the items which include

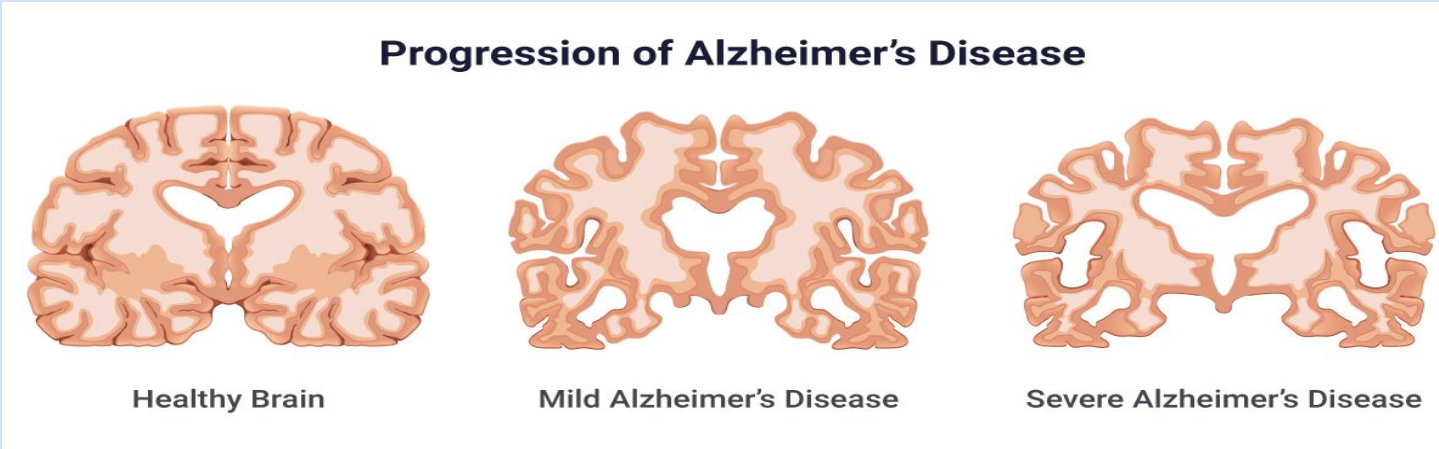
Purse wallet, Money Clip, credit cards, cards with metallic strips, Electronic devices, Hearing aids, Metallic jewellery and watches, any article of clothing but that has metallic fillers and threads, buttons, maps and hooks.

Conclusion: MRI is a safe method that can help scientists learn a lot about the brain structure, functions and how two are linked. It is costly but effective. It also helps to know where the exact site of cause for diagnosis and treatment purpose.

ALZHEIMER'S TRACKING DEVICES

R. Charishma, N. Pravallika

Device	Speciality
Angel sense	Angel sense provides care givers a comprehensive view of their loved ones activities, comings and goings
Gps smart sole	Gps smart sole fits into most shoes and allows caregivers to track their loved one from any smartphone tablet or web browser
I Traq	I Traq is a tracking device that can be used to track pretty much anything from loved ones It also has a temperature sensor
Medic Alert safety home	This device was originally created to help emergency responders. Treat patients who could not speak for themselves
Pocket finder	Pocket Finder was founded in 2005 by a single parent who wanted to know whereabouts of his young son, Their slogan " If you love it, locate it"
Project Lifesaver	The mission of project Lifesaver to " to provide timely response to save lives and reduce potential injury for adults and children who wander due to Alzheimer's and others related condition"
Revolutionary Tracker	Bring an unparalleled level of functionally, capability, ease of use and relevant presentation of information to give people the ability to extend communication, knowledge and care for their loved ones
Safe link	Safe link is another Gps tracking system available for people with Alzheimer's Increase safety for the elderly promote independent living and ultimately lead to a healthier lifestyle
Trax	Trax is touted as the world's smallest and lightest live GPS tracker.



ARTIFICIAL MUSCLE FIBRES

G. Chenchu Lakshmi

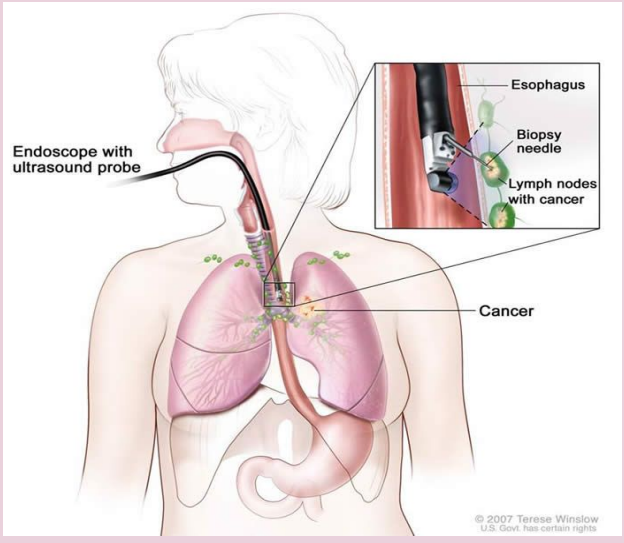
Artificial muscles, also known as muscle-like actuators(or) materials (or) devices that mimic natural muscle and can change their stiffness, reversibly contract, expand (or) rotate within one component due to an external stimulus(such as voltage, current, pressure (or) temperature. Materials used for manufacturing of artificial muscle include elastomers, conducting polymers, ironically conducting polymers & carbon nanotubes. Artificial muscles can lift 650 times their own weight. Artificial muscle provides convenience. A new artificial muscle PAM (Pneumatic Artificial Muscle) has the advantages of simple structure, good flexibility, large output, lightweight & similar mechanical properties to biological muscle.

Uses: Artificial Muscle technologies have wide potential applications in biomimetic machines, including robots, industrial actuators & powdered exoskeletons. EAP - based Artificial muscle offer a combination of light weight, low power requirements, resilience & agility for locomotion & manipulation.

Advantages: Artificial muscle constructed from ordinary fishing line & sewing thread can lift 100 times more weight & generate 100 times more power than human muscle of the same length & weight.

ENDOBRONCHIAL ULTRASOUND

Sk. Aaliya



Benefits: 1. EBUS provides real time imaging of surface of the airways, blood vessels. 2. EBUS is performed under moderate sedation or general anaesthesia. 3 Patients recover quickly can usually go home the same day.

A new innovation in bronchoscopy. Technical development in last 2 decades has made it possible for pulmonologists to do endobronchial ultrasound. Endobronchial Ultrasound (EUBS) is minimally invasive but highly effective procedure used to diagnose lung cancer, infections and other disease causing enlarged lymph nodes in the chest. Bronchoscopy has become the most commonly performed invasive procedure by pulmonologists. EBUS used to allow the physician to perform a technique known are transbronchial needle aspiration (TBNA) to obtain tissue. Samples from the lungs and surrounding lymph nodes without conventional surgery the samples can be used for diagnosing lung cancer, detecting infections. It is accurate, safe and is being used for an increasing number of indications. Radial probe EUBS can be used to evaluate airway invasion by tumors and analysis of peripheral pulmonary lesions. Linear lesions EUBS provides real-time guidance. Although EUBS is very costly so far all the studies have shown that is cost-effective. In India where tuberculosis is so prevalent it needs to be seen. Whether EUBS wish mirror the high accuracy found in studies from developed countries.

PACEMAKER

K. Devika

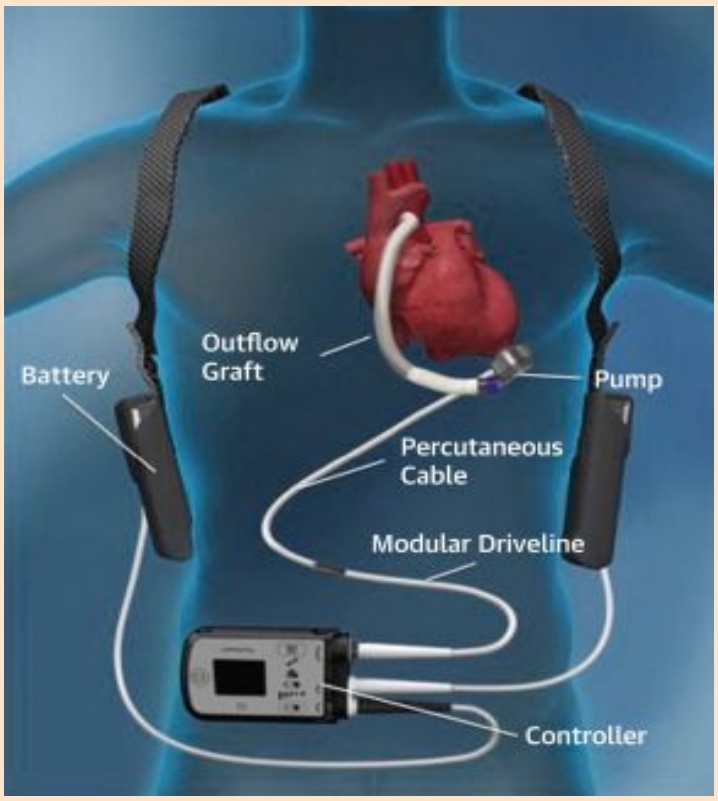
A pacemaker is a small battery operated device.This device senses when your heart is beating irregularly or too slowly. It sends a signals to your heart that makes your heart beat at a correct pace. Newer pacemaker weigh as little as 1 ounce [28gms]. Most pacemakers have 2 parts- 1. The generator contains the battery and the information to control the heart beat. 2. The leads are wires that connects the heart to the generator and carry the electrical messages to the heart. A pacemaker implanted under the skin. This procedure takes about 1 hour in most of the cases.

There are 2 kinds of pacemakers used only in emergencies. They are- (1) Transcutaneous pacemaker (2) Transvenous pacemaker.

VENTRICULAR ASSISTIVE DEVICE

K. Guru Ajay

A Ventricular assist device (VAD) is a mechanical pump. When one of the heart's natural pumps (a ventricle) does not perform well, a VAD is used to increase the amount of blood that flows through the body. Having a VAD implant allows most people with advanced heart failure to return to a fuller life. The heartware HVAD pump is surgically implanted in your chest, in a sac around your heart known as the pericardial space. The small size of the pump allows it to be implanted using a smaller incision than required with the older VAD technologies. The HVAD pump is connected directly to your heart at the bottom of the left ventricle, where it draws oxygen-rich blood through the pump and pushes into your aorta. Once blood reaches the aorta, it cal flow to the rest of the body.

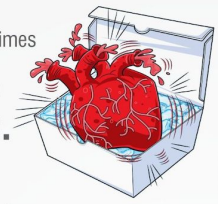


Living with the HVAD system: The controller is a mini computer that monitors the pump. It provides text messages and audible alarms to help you manage the system. The controller runs on two batteries or one battery combined with electricity from a wall or car outlet. Two fully charged batteries can run the controller for 8 to 12 hours. The HVAD system comes with several batteries, a battery charger and multiple power adaptors.

Advantages of VAD: 1. A VAD can be used to temporarily your heart or as a permanent support. 2. By receiving the heart's workload, a VAD can prolong life and improve symptoms such as fatigue and breathlessness. 3. Patient may be able to exercise and return to work. 4. In some patients, the VAD allows the heart to receiver.

LETTING YOU KNOW

Your heart beats about 100,000 times in a day. In an average lifetime, the human heart beats more than **2.5 billion times.**



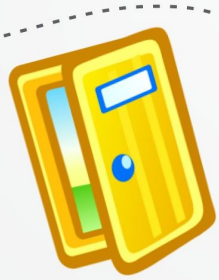
Our heart pumps about **1 million barrels** of blood during an average lifetime – enough to fill three super tankers.

The heart has its own electrical impulse. Hence, it can continue to beat even when separated from the body, as long as there is a **steady supply of oxygen.**

It is the hardest working organ of the body. The heart supplies purified blood to almost **7.5 trillion cells** of the human body everyday.

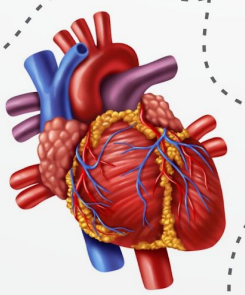
The amount of energy produced by the human heart is enough to drive up to the **moon from the earth and back.**

A woman's heart beats faster than a man's heart. While the average heart rate is **70 per minute in men**, it is **78 per minute in women.**



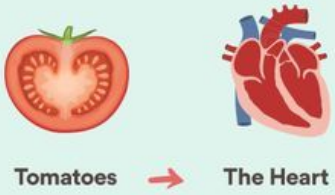
The Lub Dub of the heart is nothing but the sound of **opening and closing** of valve doors.

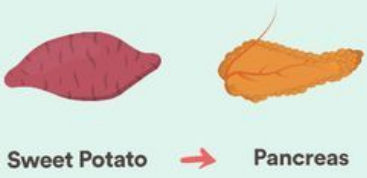
Ancient Egyptians believed that the heart is the seat of spirits. Hence, it is often considered to **be the seat of all emotions.**



Raymond de Viessens, a French anatomy professor, was the first person to describe the anatomy of the heart in **1706.**

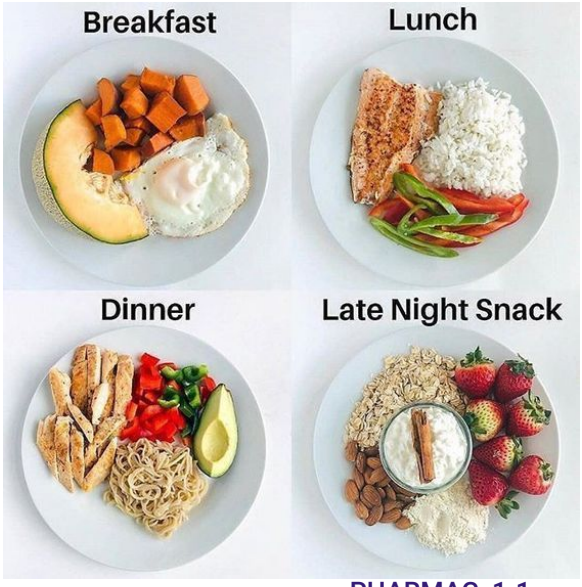
Most people think that the heart is located on the left side of the chest. However, it is located centrally in the **middle of the chest.**





Caloric Density

Stretch receptors are located throughout the stomach. When they are triggered by food, they send signals to your brain to tell you to stop eating. With high fiber, whole plant foods, you can eat the most quantity for the least amount of calories.



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