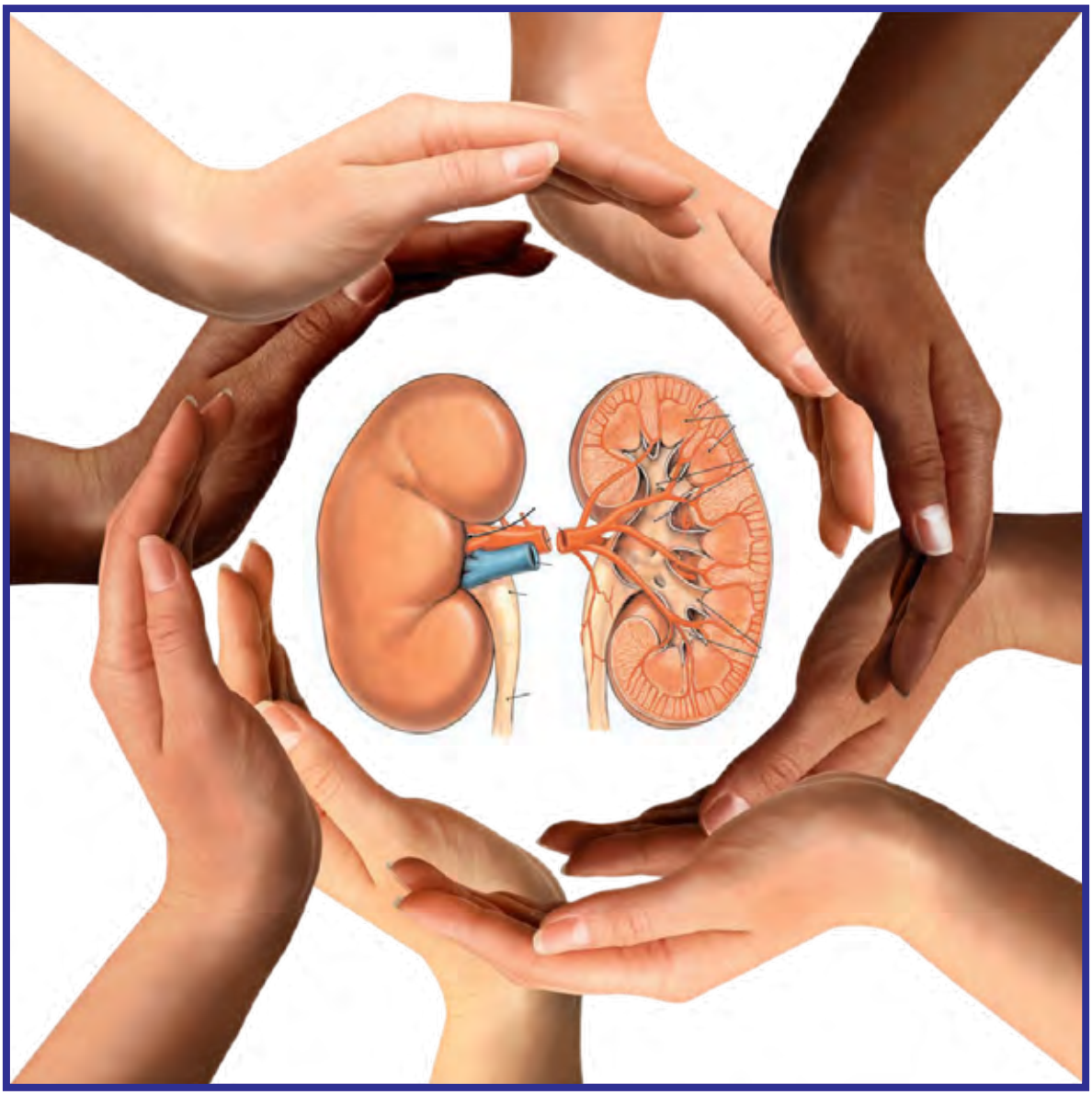
Bhagwan Mahavir Jain Relief Foundation Trust

Bhagwan
Mahavir
Jain Relief Foundation Trust



Bhagwan Mahavir Dialysis Centre

Regd. No. 148/IV/2009

King Koti District Hospital, King Koti, Hyderabad | Tel: 040 - 24761100

Bhagwan
Mahavir
Jain Relief Foundation Trust

Bhagwan Mahavir Dialysis Centre

A Unit Of the Bhagwan Mahavir Jain Relief Foundation Trust

"Live and Let Live"

It was the 'live-and-let-live' preachings of Bhagwan Mahavir —*ahimsa* or nonviolence, truth, non-stealing, and non-attachment — that brought together, in 2009, sixteen like-minded friends in the city of Hyderabad, to form what is now the "Bhagwan Mahavir Jain Relief Foundation Trust".

The Jain community's ideal of selfless service was to serve as the guiding motto of the Trust, and its singular motive was to provide assistance and dialysis support to patients suffering from kidney diseases.

The kidneys have an important role in maintaining the health of the human body. When a person is healthy, the kidneys maintain the body's internal equilibrium of water and minerals (such as sodium, potassium, etc.). The kidneys purify the blood circulating in the body, and remove 'waste' chemicals not required by the body, which are eventually excreted in the form of urine.

However, malfunction of the kidneys can lead to serious illness or even death. Dialysis is the process of removing excess water, solutes, and toxins from the blood in people whose kidneys can no longer perform these functions naturally.

For patients with chronic kidney disease (CKD) in India, regular dialysis becomes a huge drain on the family's financial and other resources, even in so-called upper middle class families. Complete treatment per patient can cost anywhere between Rs.40,000 to Rs.50,000 a month. While rich patients manage to afford such costs—and the very poor are supported by government schemes—it is the *middle income group* that suffers the most. It is for this reason that the Bhagwan Mahavir Jain Relief Foundation Trust made this their 'target group'.

Right from the outset, the Trust decided to support patients requiring regular dialysis. Typically, a patient has to undergo two to three dialysis in a week, and has to pay Rs.1,250 to Rs.4,000 per dialysis in a commercial hospital. The objective of the Trust was to relieve patients of this burden—it was therefore decided to charge only Rs. 200 per dialysis.

Today, the Bhagwan Mahavir Jain Relief Foundation Trust has 8 centres of its own, which provide dialysis services to more than 1,200 patients in the twin cities of Hyderabad and Secunderabad. In February 2021, the Trust crossed the incredible milestone of 9,00,000 dialyses, and 186 machines. In addition to regular patients, all centers of the Trust welcome below-poverty-line patients who hold *Aarogyasri* cards.

The Trust Over 12 Years

In July 2009, we started with just 6 patients and 16 dialyses per month. The sessions were conducted in private hospitals, where we utilized their spare capacity. Needless to say, the demand grew exponentially in no time at all.

In July 2011, recognizing the good work being done by the Trust, the government of the then Andhra Pradesh (pre-bifurcation), offered free space in the District Hospital,in the King Kothi locality of Hyderabad, to set up a state-of-art dialysis centre with 24 dialysis machines. Within 3 months, the centre was running three shifts daily. Today, this centre has 39dialysis machines.

Hyderabad was rapidly expanding, and patients had to travel long distances to reach the congested King Kothi area, apart from the fact that more and more needy patients were approaching the Trust for assistance. The Trust had the foresight to plan centres in different locations of the twin cities, so that patients could get their dialyses done within a short distance from their place of residence, helping them save both time and money.

In July 2012, the Trust set up a dialysis centre with 12 machines at the Ramdev Rao Memorial Hospital, Kukkatpally (about 16 km from King Kothi). In less than a year, the Trust decided to expand the center by adding 29 machines, bringing the total capacity to 41 machines—nomean achievement.

In less than five years after its inception, the Trust's philosophy of selfless service was evident in the new centres it began to set up in various corners of the twin cities. In September 2013, a new centre was set up within the premises of the Mahavir Hospital & Research Centre, in the AC Guards area, with 26 dialysis machines. Today, this centre has61 machines, including a first-of-its-kind standalone centre with 8 machines to treat Hepatitis B and HIV patients. These patients need to be isolated from regular patients.

July 2016 witnessed a landmark partnership with two institutions with similar ideologies. The Bhagwan Mahavir Jain Relief Foundation Trust partnered with the Rotary Club of Hyderabad Deccan and the Guru Nanak Medical Centre Secunderabad, to set up a 12-machinecentre at Gurudwara, in Secunderabad.

In recent years, the Trust has continued to set up new centres almost every year:

a. a 5-machine centre at the Zoi Hospital, Attapur, which operates three shifts (June 2018);

b. an 8-machine centre at the Challa Hospital, Ameerpet (July2019). This was right in the midst of the Covid-19 pandemic situation; the centre handled patients who had been diagnosed Covid-positive, but became Covid-negative after treatment. Fully single-use dialysis sets were put into service with all precautions;

c. a 10-machine centre at the Indo US Hospital, Malakpet (November2019).

d. a 10-machine dialysis centre about 60 km outside Hyderabad, at the Community Health Centre, Alair, Yadadri, Bhuvanagiri/Bhongir (June2020).

Another initiative of the Bhagwan Mahavir Jain Relief Foundation Trust has been to partner with the following local hospitals to facilitate the patients to go for dialysis closer to their residences, so that they could save time and money: C.C. Shroff Memorial Hospital, Barkatpura; Eashwar Lakshmi Hospital, Gandhi Nagar; Sri Sankalp Hospital, Nagarjuna Sagar Road, Hastinapuram; Metrocure Hospital, Malakpet.

Facilities at the dialysis centres

All centres of the Trust are equipped with state-of-the-art dialysis machines with modern dialyzer washers. Not only is the quality of dialysis high, but utmost care is taken in maintaining hygiene everywhere. Qualified and trained technicians and nursing staff are employed to provide best quality treatment to patients.

Medicine support

Besides dialysis support, the Trust has also facilitated the regular procurement of essential medicines required by the patients to maintain their haemoglobin and iron levels. The medicines are sourced directly from manufacturers at discounted rates. Erythropoietin, Iron, and Levocarnitor injections and dialysis disposables are made available to patients at discounted rates, which has resulted in savings of over Rs. 122 crore for the patients.

Registration process

Over the last 12 years of the Trust's service, no patient— irrespective of cast and creed—has ever been denied of support. In order to apply for the dialysis service, patients go through just a few simple steps: (1) filling up of the application at the main centre/head office (King Kothi Centre, Hyderabad); (2) submission of supporting documents (proof of residence, doctor's prescription, reports stating the need for dialysis; (3) approval by the Trustees.

The Trust and its Trustees

Commitment: All trustees are highly committed towards the Trust. They regularly visit the dialysis centres/associated hospitals to check that the functioning is seamless, and that the standard/quality of the treatment is consistently maintained. Close monitoring by the Trustees also instills a sense of trust and confidence among patients and their families.

Bridge between donors and patient: There are thousands of patients who are in need of treatment And there are thousands of people who have the intent and the will to help the needy, yet they don't know the right way to go about it. The Trust has successfully been acting as a bridge that leads the donors to the right patients and vice versa.

The journey continues: The Trust firmly believes in and adheres to the principles of 'Live and Let Live' of Bhagwan Mahavir, and continues to support the need worthy in every which way possible. The purpose of this booklet is to spread awareness among the general public that kidney failure is avoidable with the right treatment at the right place.

Managing Trustees

P.C.Parakh	Suresh Surana
Satish Khivsara	Vinod Kimtee
Inder Chand Jain	Shanti Bhai Shah
Rikab Parak	Prashant Shrimal
Rajender Kumar Dugar	Hanumanmal Nakhat
Swaroop Chand Kothari	Mahavir Kumar Patny
Ashok Kothari	Sushil Kapadia
Sunil Pahade	Gautam Chand Chordia

Sitting left to right: Sushil Kapadia, Swaroop Chand Kothari, Satish Khivsara, P.C.Parakh, Gautam Chand Chordia, Vinod Kimtee, Ashok Kothari, Prashant Shrimal.

Standing left to right: Hanumanmal Nakhat,Shanti Bhai Shah, Rikab Parak, Inder Chand Jain, Suresh Surana, Rajender Kumar Dugar, Sunil Pahade, Mahavir Kumar Patny.

Our Centres

District Goverment Hospital
King Kothi, Hyderabad. Tel: 040-24761100, 90522-55444.
[39 machines].

Ramdevrao Hospital
Vivekananda Nagar Junction, Kukatpally, Hyderabad. Tel: 90327-72422, 040 - 65695002.
[41 machines].

Mahavir Hospital & Research Centre
A.C. Guards, Hyderabad. Tel: 95029-81797, 80991-88424
[61 machines].

Gurunanak Medical Center
Gurudwara, Secunderabad. Tel: 83283-67187
[12 machines].

ZOI Hospital
Pillar No.145, Attapur, Hyderabad. Tel: 79810-06340
[5 machines].

Chella Hospital
Ameerpet,Hyderabad. Tel: 94909-02941
[8 machines].

Indo-US Hospital
Malakpet,Hyderabad. Tel: 99489-19144
[10 machines].

Community Health Centre
Alair, Yadadri, BhuvanagiriDistrict. Tel: 90637-09980
[10 machines].

Bhagwan Mahavir Physiotherapy Center
Hasmathgunj, Sultan Bazar, Koti, Hyderabad.

Associate Hospitals

Metrocure Hospital, Malakpet, Hyderabad. Tel:96401-40256.

C.C. Shroff Hospital, Kachiguda, Hyderabad. Tel:99480-75675.

Eashwar Lakshmi Hospital, Gandhi Nagar, Hyderabad. Tel: 93945-80705.

Sri Sankalp Hospital, Nagarjuna Sagar Road, LB Nagar, Hyderabad. Tel: 99492-04583.

Our Staff

Our highly committed staff members at all the centres form the backbone forthe operations of the Trust. Without their dedication, sincerity, and professionalism, the Trust's yeoman service to humanity would not be possible.

Contents

HEALTH IS WEALTH

It's such a famous quote that we are hearing since we were kids and have seen people using it since then and we must give credit to Ralph Waldo Emerson who quoted this. He was the first one to realize the importance of health and how crucial it is for the survival of human beings and that why he came up with this quote to make us recognize the importance of health.

Even then, many of us chose to opt for an unhealthy lifestyle, drinking, smoking, junk food, staying in bed all day, sleeping late, waking up late and what now. We think these things do not affect our health but in reality, it does, and we will know that in the future when the time will come. Therefore, before that time comes, it is really important for us to stop taking health for granted and start taking care of ourselves before it is too late.

In the end, it's about you and your health, we are in an era where nobody gives a damn about the other person, and you are the only one who can talk care of yourself so don't rely on others for your health.

Be responsible for your health because if you have health then you still can make money, but if your health is deteriorating then making wealth would be the last thing on your mind, you would want to get healthy again. If you have good health, you can enjoy your life with your loved ones, do whatever you want to do, fulfill your dreams, accomplish your goals, but if you are unhealthy then you can't do any of this except blaming yourself that why didn't you value your health?

By doing all these things you can stay healthy and become wealthy too because a healthy person can perform well and is more confident as compared to a person who is unhealthy, he will stay in bed all day, and he will not feel like doing anything except resting.

Therefore, it is very important that we do not take our health issues lightly and take good care of our health because I do not know about others but for me being healthy is true happiness.

Someone has correctly said that 'if health is gone everything is gone'. Life loses interest, in case you are deprived of health. You enjoy neither food nor the world. Even spending time joyfully becomes a big problem. A healthy person (whether rich or poor) lives more happy and peaceful life than any rich person having a diseased body. We can, therefore, say that the real wealth of a man is his health.

Health is not merely the absence of disease and infirmity but a state of complete physical, social and mental wellbeing. Health is thus a level of functional efficiency of living beings and the general condition of a person's mind, body and spirit, meaning it is free illness, injury and pain. If you are strong and healthy you can be a shining example to others and teach them how to achieve vibrant health.

In order to get good health, people should follow a healthy lifestyle. People who are not involved in the healthy lifestyle may suffer a range of health disorders like overweight, high blood pressure, heart disease, obesity, diabetes, high cholesterol, kidney problems, liver disorders and so many. An unhealthy body gets tired very easily and a tired body easily loses motivation and self-confidence.

Health is the great blessing of good. Good health is a matter of great concern. To maintain good health, healthy living and a disciplined life is a must. We should take care of our health and for this, we should always take a simple and balanced diet. Exercise is very important for attaining a healthy and disease free body cleanliness is very important. Our motto should be to keep our body clean in order to remain healthy. We should also keep our house and our surroundings clean. A clean environment leads to a clean and healthy body. It reduces the risk of catching communicable diseases. And to obtain a clean environment it is the responsibility of the people to inculcate healthy habits.

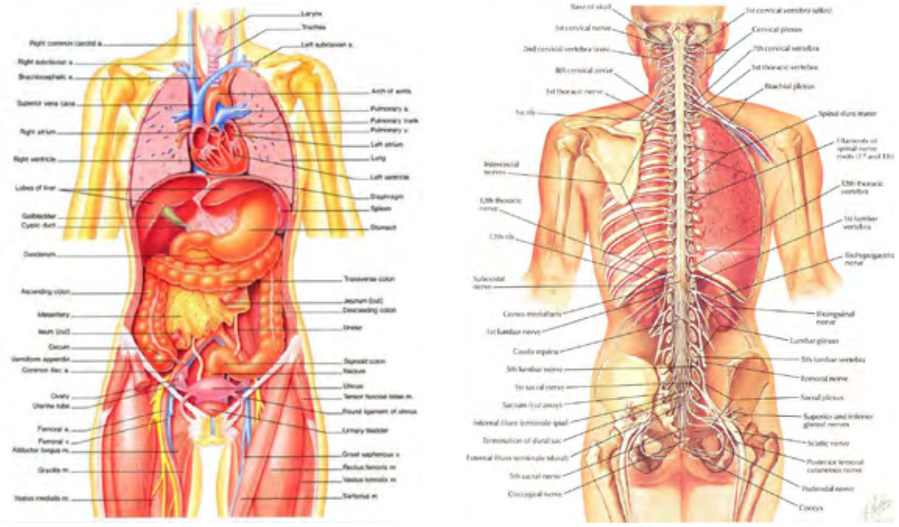
Drinking plenty of water is also a good way to keep our body healthy as it reduces the risk of infection, keeps your skin healthy, reduces the risk of heart attack, burns body fat and regulates our body temperature. We must laugh more as laughing is a therapy and a secret of good health. Any bad

habit such as smoking, drinking alcohol, bad lifestyle, etc should be avoided.

A healthy person can earn lots of money, however, an unhealthy person cannot because of the lack of motivation, interstates and concentration level. Money is the source to live a healthy life however good health is the source to live a happy and peaceful life. So, good health matters a lot, more than the money. We all should maintain our good health to be wealthy in real means.

HUMAN BODY

The human body is everything that makes up, well, you. The basic parts of the human body are the head, neck, torso, arms and legs.



There are almost 78 organs in a human body which vary according to their sizes, functions or actions. An organ is a collection of millions of cells which group together to perform single functions in our body. The cells in these organs are highly specialized and form for all the necessary actions for some specific time. Out of these 78 organs of a male or female body, skin is the largest organ with respect to its size and weight. The major organ in the body of human beings is the brain which is primarily responsible for performing all the functions and actions of the body. Other major organs of the body are given in the following list with names.

Adrenal Glands	Anus	Appendix	Bladder
Bones	Brain	Bronchi	Ears
Esophagus	Eyes	Gall Bladder	Genitals
Heart	Hypothalamus	Kidneys	Large Intestine
Larynx (voice box)	Liver	Lungs	Lymph Nodes
Mouth	Nose	Pancreas	Parathyroid Glands
Pituitary Gland	Prostate	Rectum	Salivary Glands
Skeletal Muscles	Skin	Small Intestine	Spinal Cord
Spleen	Stomach	Thymus Gland	Trachea
Thyroid	Ureters	Urethra	

BODY SYSTEMS

Our bodies consist of a number of biological systems that carry out specific functions necessary for everyday living.

The circulatory system is to move blood, nutrients, oxygen, carbon dioxide, and hormones, around the body. It consists of the heart, blood, blood vessels, arteries and veins.

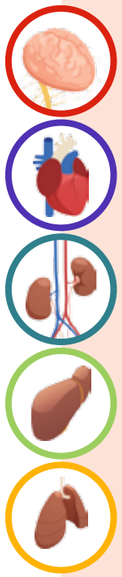
The digestive system consists of a series of connected organs that together, allow the body to break down and absorb food, and remove waste. It includes the mouth, esophagus, stomach, small intestine, large intestine, rectum, and anus. The liver and pancreas also play a role in the digestive system because they produce digestive juices.

The endocrine system consists of eight major glands that secrete hormones into the blood. These hormones, in turn, travel to different tissues and regulate various bodily functions, such as metabolism, growth and sexual function.

The immune system is the body›s defense against bacteria, viruses and other pathogens that may be harmful. It includes lymph nodes, the spleen, bone marrow, lymphocytes (including B-cells and T-cells), the thymus and leukocytes, which are white blood cells.

The lymphatic system includes lymph nodes, lymph ducts and lymph vessels, and also plays a role in the body›s defenses. Its main job is to make is to make and move lymph, a clear fluid that contains white blood cells, which help the body fight infection. The lymphatic system also removes excess lymph fluid from bodily tissues, and returns it to the blood.

The nervous system controls both voluntary action (like conscious movement) and involuntary actions (like breathing), and sends signals to different parts of the body. The central nervous system includes the brain and spinal cord. The peripheral nervous system consists of nerves that connect every other part of the body to the central nervous system.



VITAL ORGANS

Humans have five vital organs that are essential for survival. These are the brain, heart, kidneys, liver and lungs.

The human brain is the body›s control center, receiving and sending signals to other organs through the nervous system and through secreted hormones. It is responsible for our thoughts, feelings, memory storage and general perception of the world.

The human heart is a responsible for pumping blood throughout our body.

The kidneys is to remove waste and extra fluid from the blood. The kidneys take urea out of the blood and combine it with water and other substances to make urine.

The liver has many functions, including detoxifying of harmful chemicals, breakdown of drugs, filtering of blood, secretion of bile and production of blood-clotting proteins.

The lungs are responsible for removing oxygen from the air we breathe and transferring it to our blood where it can be sent to our cells. The lungs also remove carbon dioxide, which we exhale.

Fun facts

- The human body contains nearly 100 trillion cells.
- There are at least 10 times as many bacteria in the human body as cells.
- The average adult takes over 20,000 breaths a day.
- Each day, the kidneys process about 200 quarts (50 gallons) of blood to filter out about 2 quarts of waste and water.
- Adults excrete about a quarter and a half (1.42 liters) of urine each day.
- The human brain contains about 100 billion nerve cells.
- Water makes up more than 50 percent of the average adult's body weight.
- You use your eyes to see, your ears to hear and your muscles to do the heavy lifting. Well, sort of. In fact, most body parts are far more complicated than that, while some seem to have no business being inside there at all.

The body's muscular system consists of about 650 muscles that aid in movement, blood flow and other bodily functions. There are three types of muscle: skeletal muscle which is connected to bone and helps with voluntary movement, smooth muscle which is found inside organs and helps to move substances through organs, and cardiac muscle which is found in the heart and helps pump blood.

The reproductive system allows humans to reproduce. The male reproductive system includes the penis and the testes, which produce sperm. The female reproductive system consists of the vagina, the uterus and the ovaries, which produce eggs. During conception, a sperm cell fuses with an egg cell, which creates a fertilized egg that implants and grows in the uterus.

The skeletal system our bodies are supported by the skeletal system, which consists of 206 bones that are connected by tendons, ligaments and cartilage. The skeleton not only helps us move, but it's also involved in the production of blood cells and the storage of calcium. The teeth are also part of the skeletal system, but they aren't considered bones.

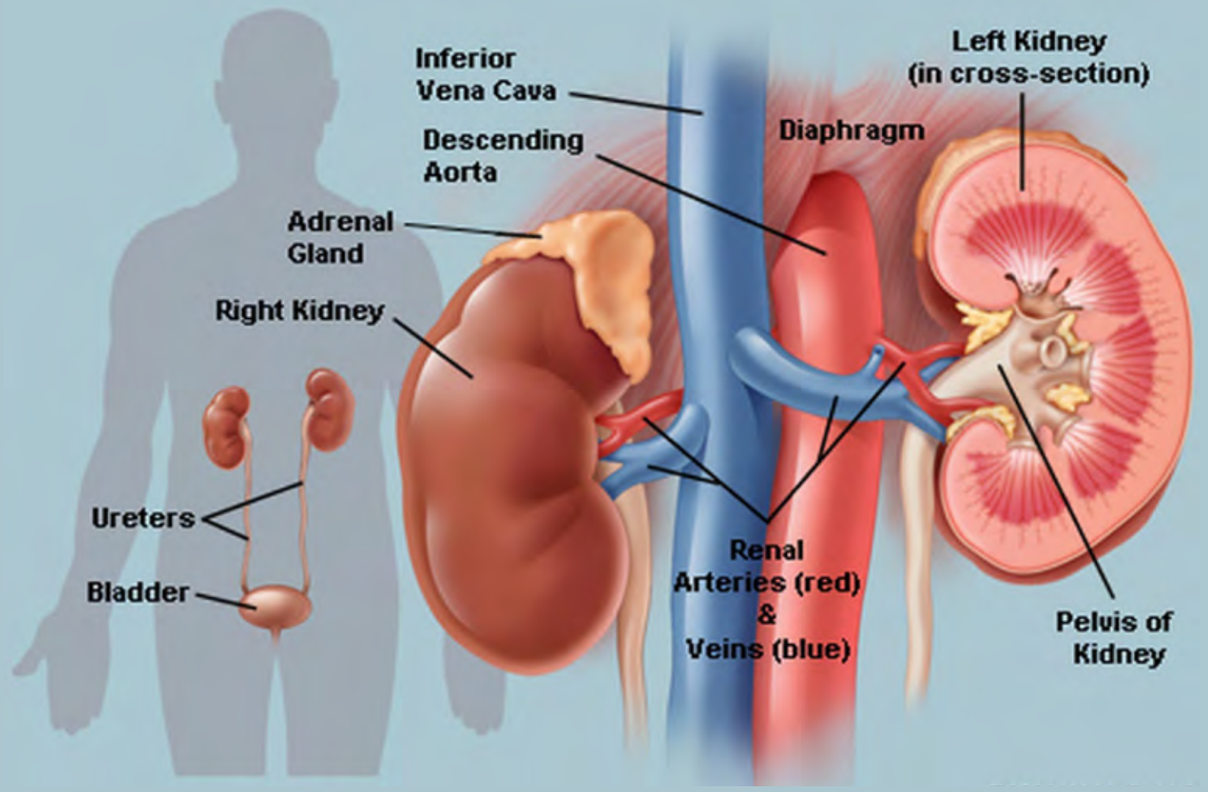
The respiratory system allows us to take in vital oxygen and expel carbon dioxide in a process we call breathing. It consists mainly of the trachea, the diaphragm and the lungs.

The urinary system helps eliminate a waste product called urea from the body, which is produced when certain foods are broken down. The whole system includes two kidneys, two ureters, the bladder, two sphincter muscles and the urethra. Urine produced by the kidneys travels down the ureters to the bladder, and exits the body through the urethra.

The skin, or integumentary system, is the body's largest organ. It protects us from the outside world, and is our first defense against bacteria, viruses and other pathogens. Our skin also helps regulate body temperature and eliminate waste through perspiration. In addition to skin, the integumentary system includes hair and nails.

KIDNEY AND ITS FUNCTIONS

The kidneys are among the most vital organs of the human body. Malfunction of the kidneys can lead to serious illness or even death. Each kidney has a very complex structure and function. They have two important functions namely: to flush out harmful and toxic waste products and to maintain balance of water, fluids, minerals and chemicals i.e., electrolytes such as sodium, potassium, etc.



Structure of the Kidney

The kidney produce urine by removing toxic waste products and excess water from the body. Urine formed in each kidney passes through the ureter, flows into bladder before finally being excreted through the urethra.

Most people (males and females) have two kidneys.

- The kidneys are located at upper and back side of the abdomen, on either side of the spine (see diagram). They are protected from damage by the lower ribs.
- The kidneys lie deep inside the abdomen so normally one cannot feel them.
- The kidneys are a pair of bean shaped organs. In adults, a kidney is about 10 cm long, 6 cm wide and 4 cm thick. Each kidney weighs approximately 150-170 grams.
- Urine formed in the kidneys flow down to urinary bladder and then through the ureters. Each ureter is about 25 cm long and is a hollow tube- like structure made up of special muscles.
- The urinary bladder is a hollow organ made up of muscles, which lie in the lower and anterior part of the abdomen. It acts as a reservoir of urine.
- The adult urinary bladder hold about 400-500 ml of urine; when filled to near capacity, a person feels the urge to pass urine.
- The urine in the bladder is excreted through the urethra during the process of urination. In females, the urethra is relatively short, while it is much longer in males.

Why are the kidneys essential for living?

- We consume different kinds and quantities and kind of food every day.
- The quantity of water, salts, and acids in our body also varies every day.
- The continuous process of converting food into energy produces harmful toxic materials.
- These factors lead to changes in the amount of fluid, electrolytes and acids in the body. The accumulation of unwanted toxic materials can be life threatening.
- Each kidney carries out the essential job of flushing out harmful and toxic by-products. At the same time, they also regulate and maintain the right balance and levels of water, acids and electrolyte.

What are the functions of the kidney?

The primary function of the kidney is to make urine and purify the blood. Each kidney removes waste materials, and other chemicals which are not required by the body. Most important functions of the kidney are described below.

Removal of waste products

- Purification of blood by removal of waste products is the most important function of the kidney.

- The food that we consume contains protein. Protein is necessary for the growth and repair of the body. But as protein is utilized by the body it produces waste products. Accumulation and retention of these waste products is similar to retaining poison inside the body. Each kidney filters blood, and toxic waste products which are eventually excreted in the urine.
- Creatinine and urea are two important waste products that can easily be measured in the blood. Their "values" in blood tests reflects the function of the kidney. When both the kidneys fail, value of creatinine and urea will be high in blood test.

Removal of excess fluid

- The second most important function of the kidney is the regulation of fluid balance by excreting excess amount of water as urine while retaining the necessary amount of water in the body, that is essential for living .When the kidneys, fail they lose the ability of removing this excess amount of water. Excess water in the body leads to swelling.

Balance minerals and chemicals

- The kidneys play another important role of regulating minerals and chemicals like sodium, potassium, hydrogen, calcium, phosphorus, magnesium and bicarbonate and maintains normal composition of body fluid.
- Changes in the sodium level can affect person's mental state, while changes in the potassium level can have serious adverse effects on the rhythm of the heart as well as functioning of the muscles. Maintenance of normal level of the calcium and phosphorus is essential for healthy bones and teeth.

Control of blood pressure

- The kidneys produce different hormones (renin, angiotensin, aldosterone, prostaglandin etc) which help regulate water and salt in the body, which plays vital roles in the maintenance of good blood pressure control. Disturbances in hormone production and regulation of salt and water in a patient with kidney failure can lead to high blood pressure.

Red blood cells production

- Erythropoietin is another hormone produced in the kidneys, it plays an important role in the production of red blood cells (RBC). During kidney failure, production of erythropoietin is decreased, which in turn leads to decreased production of RBC resulting in low hemoglobin (anemia). This is the reason why in patients with kidney failure, the hemoglobin count does not improve despite supplementation with iron and vitamin preparations.

To maintain healthy bones

- The kidneys convert vitamin D into its active form which is essential for the absorption of calcium from food, growth of the bones and teeth, and keep the bones strong and healthy. During kidney failure, decreased active vitamin D leads to decreased, growth of bones and they also become weak. Growth retardation may be sign of kidney failure in children.

How is blood purified and urine formed?

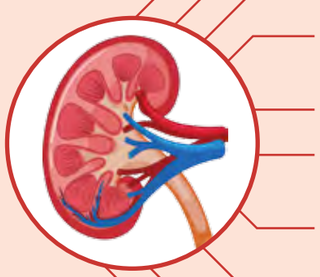
In the process of blood purification, the kidneys retain all necessary substances and selectively remove excess fluid, electrolytes and waste products. Let us understand this complex and amazing process of urine formation.

- Did you know that every minute, 1200 ml of blood enters the kidneys for purification, which is 20% of the total blood pumped by the heart? So in one day, 1700 liters of blood is purified!
- This process of purification occurs in small filtering units known as nephrons.
- Each kidney contains about one million nephrons, and each nephron is made up of glomerulus and tubules.
- Glomeruli are filters with very tiny pores with the characteristic of selective filtration. Water and small-sized substances are easily filtered through them. But larger-sized red blood cells, white blood cells, platelets, protein etc. cannot pass through these pores. Therefore such cells are normally not seen in the urine of healthy people.
- The kidney's chief function is to remove waste and harmful products and excess water in the form of urine.
- The first step of urine formation occurs in the glomeruli, where 125 ml per minute of urine is filtered. It is quite astonishing that in 24 hours, 180 liters of urine is formed. It contains not only waste products, electrolytes and toxic substances, but also glucose and other useful substances.
- Each kidney performs the process of reabsorption with great precision. Out of 180 liters of fluid that enters the tubules, 99% of fluid is selectively reabsorbed and only the remaining 1% of fluid is excreted in the form of urine.
- By this intelligent and precise process, all essential substances and 178 liters of fluid are reabsorbed in the tubules, whereas 1-2 liters of fluids, waste products, and other harmful substances are excreted.
- Urine formed by the kidneys flow to the ureters, and passes through the urinary bladder and is finally excreted out through the urethra.

Can there be variation in the volume of urine in a person with healthy kidney?

- Yes. The amount of water intake and atmospheric temperature are major factors which determine the volume of urine that a normal person makes.
- When water intake is low, urine tend to be concentrated and its volume is decreased (about 500 ml) but when a large volume of water is consumed, more urine is formed.
- During the summer months, because of perspiration caused by high ambient temperature, the volume of urine decreases. During winter months it is the other way round – low temperature, no perspiration, and more urine.
- In a person with a normal intake of water, if the volume of urine is less than 500 ml or more than 3000 ml, it could indicate that the kidneys need closer attention and further investigation.

Kidney is a High Efficiency Plant



- In humans both kidneys account for 0.5% of body weight
- But they receive 25% of cardiac output
- Cardiac output in a healthy adult is 4.9 liters min
- So, 1.23 liters of blood passes through kidneys every minute (4.9 * 0.25 = 1.23)
- Total volume of blood in a healthy adult is 6.2 liters
- It takes only 5 min for the whole blood in the body to pass through the kidneys (6.2 liters ÷1.23 liters/min = 5 min)
- No man-made machine or filter can reach such Efficiency with the given size of the filtering unit the kidney.
- Water Handling by the Human Kidney Filtered Water 180 L/day Reabsorbed Water 178 L/day
- Excreted Water 2 L/day
- Fractional Reabsorption 99.2%

Kidney diseases are divided into two major groups

- **Medical diseases:** Medical kidney diseases such as kidney failure, urinary tract infection and nephrotic syndrome are treated by nephrologists. Patients with advance kidney failure need treatment such as dialysis and kidney transplantation.
- **Surgical diseases**: Urologists treat surgical kidney diseases such as kidney stones, prostate problems and cancer of the urinary tract by surgery, endoscopy, and lithotripsy.

How do nephrologists and urologists differ?

Nephrologists are experts in the treatment of medical kidney diseases, slowing progression of kidney diseases dialysis and kidney transplantation; whereas, urologists are experts in the treatment of surgical diseases, such as surgical removal of stones, tumors, kidney and prostate cancer, etc.

Major Kidney Diseases	
Medical	Surgical
Acute kidney failure	Stone disease
Chronic kidney disease (CKD)	Bladder and Prostate problems
Urinary tract infection	Congenital urinary anomalies
Nephrotic syndrome	Cancer

Kidney Failure

Significant reduction in the ability of the kidneys to filter and excrete waste products and to maintain the electrolyte balance is called kidney failure. An increase in the values of serum creatinine and blood urea nitrogen (BUN) usually implies kidney malfunction and disease.

Kidney failure is usually divided into two types: acute kidney failure and chronic kidney disease (chronic renal failure).

Acute Kidney Failure

A sudden reduction or loss of kidney function is called acute kidney (renal) failure or acute kidney injury (AKI).The volume of urine decreases in the majority of patients with AKI. Important causes of AKI include intractable diarrhea, intractable vomiting, falciparum malaria, intractable hypotension, sepsis, certain medications (NSAIDs) etc. With proper medical treatment kidney function may be restored in most cases.

Chronic Kidney Disease

Gradual, progressive and irreversible loss of kidney function over several months to years is called chronic kidney disease or – CKD (chronic renal failure). In CKD, kidney function decreases rather slowly but continuously. After a long period of time, it progresses to a stage whereby, the kidneys stop working almost completely. This advanced and life threatening stage of disease is called the end stage kidney (renal) disease (ESKD/ ESRD).

CKD is a silent disease and often goes unnoticed. In the early stages of CKD, signs or symptoms are few and non-specific. Common symptoms of CKD may include generalized weakness, loss of appetite, nausea and vomiting, generalized swelling, high blood pressure, etc. Two most important and common causes of CKD are diabetes and hypertension.

The presence of protein during urinalysis, high creatinine in the blood and small contracted kidneys on ultrasound are important diagnostic clues of underlying CKD. The value of serum creatinine reflects kidney disease and this value increases progressively over time.

In the early stages of CKD, the patient needs appropriate medications and dietary modifications. There is no specific treatment which can cure this disease. One has to realize that as one gets older, the kidney function also decreases. Concomitant illnesses such as diabetes and hypertension, if uncontrolled can contribute to faster and progressive decline of kidney function, along with age.

The aim of the treatment is to slow down the progression of the disease, prevent complications and thereby keep the patient well for a longer period, despite the severity or stage of the illness.

When the disease progresses to an advanced stage (End Stage Kidney Disease) more than 90% of kidney function is lost (serum creatinine is usually more than 8-10 mg/dl). The only treatment options available at this stage are dialysis (hemodialysis and peritoneal dialysis) and kidney transplantation.

Dialysis is a filtering process to remove waste products and excess fluid from the body that may accumulate in the body when the kidney stops functioning. Dialysis is not a cure for CKD. In the advanced stage of CKD (ESKD), the patient needs lifelong regular dialysis treatment (unless

kidney is transplanted successfully). Two methods of dialysis are hemodialysis and peritoneal dialysis.

Hemodialysis (HD) is the most widely used form of dialysis. In HD, with the use of a special machine, waste products, excess fluid and salt are removed. Continuous ambulatory peritoneal dialysis (CAPD) isanother form of dialysis modality which can be carried out at home or at work place without the help of the machine.

Kidney transplant is the most ideal treatment option and the only curative treatment modality of end stage kidney disease (advanced stage of CKD).

Urinary Tract Infection

Burning and frequent urination, pain in lower abdomen and fever are common presentations of urinary tract infection (UTI). Presence of pus cells in urine test may suggest UTI.

Most of the patients with UTI respond well to appropriate antibiotic therapy. UTI in children needs special consideration. Delay or inadequate treatment of UTI in children can cause irreversible damage to the growing kidney.

In patients with recurrent UTI, it is important to exclude urinary tract obstruction, stone disease, abnormality of urinary tract and genito- urinary tuberculosis by thorough investigation. The most important cause of recurrence of UTI in children is Vesicoureteric reflux (VUR). VUR is a congenital abnormality, in which urine flows backwards from the bladder into one or both of the ureters, and up to the kidneys, instead of the other way around, i.e. from the kidneys towards the bladder.

Nephrotic Syndrome

Nephrotic syndrome consists of a constellation of findings namely: edema (swelling of feet), massive proteinuria (more than 3.5 grams protein in the urine per day), hypoalbuminemia (low albumin in the blood) and high blood cholesterol levels. Such patients can present with normal or elevated blood pressure as well as varying degrees of kidney dysfunction as measured by creatinine levels in the blood.

This disease shows varying responses to treatment so that it is important to establish the underlying diagnosis early on. A few patients may remain symptom free after discontinuation of the treatment but in most cases the disease recurs, i.e., there may be periods of remission alternating with relapses depending on the stage of treatment.

It is important to realize that the long term outcome is excellent in treated children with nephrotic syndrome. They live healthy lives with normal kidney function

Kidney Stones

Kidney stones are common and important kidney problems. The kidneys, ureters and bladder are common sites where stones may be found. Common symptoms of having kidney stones are severe, unbearable pain, nausea and vomiting, blood in urine, etc. However, some people who have had kidney stones, even for a long time, may not have any symptoms (silent stone), at all.

For the diagnosis of stones, abdominal X-rays and ultrasonography are the most commonly used investigations.

Most of the small sized stones pass out naturally with urine by consuming increased amounts of liquids. If a stone causes recurrent severe pain, recurrent infection, obstruction of urinary tract or damage to kidney, its removal may be necessary. The ideal method for removal of the stone depends on the size, location and the type of stone. Most common methods for the removal of stones are lithotripsy, endoscopy (PCNL, cystoscopy and ureteroscopy) and open surgery.

As the risk of recurrence of stone is as high as 50 - 80%, increasing fluid intake, dietary restriction and periodic check up are necessary for all.

Kidney stones can exist without symptoms for years.

Benign Prostatic Hyperplasia (BPH)

The prostate gland is present only in males. It is situated just underneath the bladder and surrounds the initial portion of urethra. The prostate gland begins to enlarge after the age of 50. An enlarged prostate gland compresses the urethra and causes problems in urination particularly in elderly males.

The main symptoms of benign prostatic hyperplasia (BPH) are frequent urination (especially at night) and dribbling at the end of the urination. Examination by inserting a finger in rectum (digital rectal examination, DRE) and ultrasound are two most important diagnostic methods for BPH.

A large number of patients with mild to moderate symptoms of BPH can be treated effectively for a long period with medicine. Many patients with severe symptoms and very large prostate may require endoscopic removal of the prostate gland (TURP).

Acute-on-chronic renal failure

Acute renal failure or acute renal injury may develop in patients with chronic renal disease. This is called acute-on-chronic renal failure.

This condition is often difficult to distinguish from chronic renal failure and may be life threatening. In fact most people who present with acute renal injury already have some degree of chronic renal damage.

End-stage renal disease or ESRD

This is a condition where the kidney functions are almost totally absent with GFR less than 5% of normal. The renal tissues appear dried up along with fibrosis. Dialysis or transplantation of a healthy donor kidney is required for living at this stage.

Acute Renal failure

Acute kidney failure occurs when your kidneys suddenly become unable to filter waste products from your blood. When your kidneys lose their filtering ability, dangerous levels of wastes may accumulate, and your blood's chemical makeup may get out of balance.

Acute kidney failure also called acute renal failure or acute kidney injury develops rapidly, usually in less than a few days. Acute kidney failure is most common in people who are already hospitalized, particularly in critically ill people who need intensive care.

Acute kidney failure can be fatal and requires intensive treatment. However, acute kidney failure may be reversible. If you're otherwise in good health, you may recover normal or nearly normal kidney function.

. Important causes of acute kidney failure are diarrhea, vomiting, Dehydration Excessive loss of gastrointestinal tract fluids, Excessive loss of fluid due to burn injury Decreased vascular filling. Heart failure and cardiogenic shock, Anaphylactic shock, Septic shock, drugs, diagnostic agents. falciparum malaria, hypotension, sepsis, certain drugs , Bilateral ureteral obstruction Bladder outlet obstruction.

Symptoms

Signs and symptoms of acute kidney failure may include:

- Decreased urine output, although occasionally urine output remains normal
- Fluid retention, causing swelling in your legs, ankles or feet
- Shortness of breath
- Fatigue
- Confusion
- Nausea
- Weakness
- Irregular heartbeat
- Chest pain or pressure
- Seizures or coma in severe cases

Sometimes acute kidney failure causes no signs or symptoms and is detected through lab tests done for another reason.

Risk factors

Acute kidney failure almost always occurs in connection with another medical condition or event. Conditions that can increase your risk of acute kidney failure include:

- Being hospitalized, especially for a serious condition that requires intensive care
- Advanced age
- Blockages in the blood vessels in your arms or legs (peripheral artery disease)
- Diabetes
- High blood pressure
- Heart failure.

Chronic Renal failure

Gradual, progressive and irreversible loss of kidney function over several months to years is called chronic kidney disease - CKD (chronic renal failure). In CKD kidney function reduces slowly and continuously. After a long period it reduces to a stage where kidney stops working almost completely. This advanced and life threatening stage of disease is called the end stage kidney (renal) disease (ESKD/ESRD). Chronic kidney disease is a silent disease and often goes unnoticed. In the early stages of CKD signs or symptoms are few. Common symptoms of CKD are weakness, loss of appetite, nausea, swelling, high blood pressure etc. Two most important causes of CKD are diabetes and hypertension.

Have you been told that you have kidney problems, or that laboratory tests show your kidney function is not normal? Or does your diabetes, hypertension, or another condition put you at high risk for kidney disease? Do you have a kidney transplant that is failing who are at risk for moderate to severe chronic kidney disease (CKD), or kidney failure. This Life Options document will explain the risk factors for CKD, and symptoms you should report to your doctor. We'll answer some commonly asked questions and tell you what you can do to feel your best and help prevent or slow progression to kidney failure.

When you learn about CKD, you are taking the first step toward an active role in your healthcare. Research suggests that people who are active partners in their care are more likely to live long and well.

In India, in spite of having large number of incidents of renal failure, vast majority of the patients, approximately eighty percent (80%), do not come for the treatment due to:

- Poor awareness
- Lack of facility
- Financial Limitations.

RISK FACTORS FOR CRONIC KIDNEY FAILURE

Risk factors make it more likely that a disease will develop later. There are some risk factors, like age or family history that you cannot control. But you can control other risk factors, and perhaps slow down or even prevent some diseases. For instance, controlling blood pressure (30% of hypotensive patients will be suffering with CKD) and your blood sugar may help your kidneys work longer.

First, know your risk factors for chronic kidney disease (CKD). Then, work with your doctor to prevent or delay kidney failure. Kidney Risk Factors You Can Change Diabetes. Almost 40% of new dialysis patients have diabetes, making it the fastest growing risk factor for kidney disease .Type 2 diabetes is the number one cause of kidney failure, responsible for more than one of every three new cases. Kidney disease does not have to happen every patient who is suffering with diabetes and hypertension. Good blood pressure and blood sugar control can help prevent it. Tight control can have big payoffs in reducing the risk for kidney disease.

There are many other factor which may lead to kidney failure including diabetes and hypertension

DIABETES (Type 1 and Type 2 Diabetes)

The most common forms of diabetes are now called type 1 and type 2.

Type 1 Diabetes:

Type 1 diabetes formerly called juvenile-onset or insulin-dependent **diabetes.**

Type 1 diabetes occurs when your immune system, the body›s system for fighting infection, attacks and destroys the insulin-producing beta cells of the pancreas.

Scientists think type 1 diabetes is caused by genes and environmental factors, such as viruses, that might trigger the disease.

Type 1 Diabetes is failure of the pancreas to make insulin. Type 1 usually occurs in children and/or young people, and insulin injections are needed to treat it. About one in 10 diabetics have type 1.

In Type 1 diabetes the insulin producing cells in your pancreas are destroyed by your immune system. No amount of sugar in your DIET – or anything in your lifestyle – **has caused** or can **cause** you to get **Type 1 diabetes.**

Certain viruses might promote autoimmunity. A significant number of viruses have been associated with type 1 diabetes, including enteroviruses such as rotavirus, mumps virus.

Over time, type 1 diabetes complications can affect major organs in your body, including heart, blood vessels, nerves, eyes and kidneys. Maintaining a normal blood sugar level can dramatically reduce

the risk of many complications. Eventually, **diabetes** complications may be disabling or even life-threatening.

There is no cure for diabetes, but it can go into remission. People **can** manage it with medication and lifestyle changes.

Type 1 diabetes is an autoimmune disease that develops when the body destroys the cells in the pancreas that produce insulin. This means that people with **type 1 diabetes** do not make insulin.

Type 1 diabetes is much less common than **type** 2 **diabetes** and typically arises in children. **Type 1 diabetes** (T1D) usually begins before 40 years of age, although occasionally people have been people diagnosed at an older age.

People with type 1 diabetes have traditionally lived shorter lives, with **life** expectancy having been quoted as being reduced by over 20 years. However, improvement in **diabetes** care in recent decades indicates that people with **type 1 diabetes** are now **living** significantly longer.

Type 1 Diabetes Symptoms

Signs are often subtle, but they can become severe. They include:

- **Extreme thirst**
- **Increased hunger** (especially after eating)
- **Dry mouth**
- **Upset stomach** and vomiting
- **Frequent urination**
- **Unexplained weight loss, even though you're eating and feel hungry**
- **Fatigue**
- **Blurry vision**
- **Heavy, labored breathing.**
- **Frequent infections of your skin, urinary tract, or vagina**
- **Crankiness or mood changes**
- **Bedwetting in a child who's been dry at night**

Type 2 diabetes

Type 2 is a condition where the body develops resistance to its own insulin.

It usually occurs in adults, and is related to obesity and lack of exercise. Pills and sometimes insulin are used to treat it.

Type 2 diabetes accounts for about 90% of all diabetes. Almost 40% of new dialysis patients have diabetes, making it the fastest growing risk factor for kidney disease.

Type 2 diabetes is the number one cause of kidney failure, responsible for more than one of every three new cases.

Type 2 **diabetes** is complex, and sugar is unlikely to be the only reason the condition develops.

Almost 40% of new dialysis patients have diabetes making it the fastest growing risk factor for kidney disease.

Type2diabetes is the number one cause of kidney failure, responsible for more than one of every three new cases.

Type 2 diabetes develops when the body becomes resistant to insulin or when the pancreas is unable to produce enough insulin. Exactly why this happens is unknown, although genetics and environmental factors, such as being overweight and inactive, seem to be contributing factors.

Risk Factors for Type 2 Diabetes.

Your chances of developing type 2 diabetes depend on a combination of risk factors such as your genes and lifestyle. Although you can't change risk factors such as family history, age, or ethnicity, you can change lifestyle risk factors around eating, physical activity, and weight. These lifestyle changes can affect your chances of developing type 2 diabetes.

Read about risk factors for type 2 diabetes below and see which ones apply to you. Taking action on the factors you can change can help you delay or prevent type 2 diabetes.

You are more likely to develop type 2 diabetes if you are

- **are overweight** or **obese**
- **are age 45 or older**
- **have a family history of diabetes**
- **have high blood pressure**
- **have a low level of HDL** ("good") **cholesterol, or a high level of triglycerides**
- **have a history of gestational diabetes** or gave birth to a baby weighing 9 pounds or more
- **are not physically active**
- **have a history of heart disease** or **stroke**
- **have polycystic ovary syndrome also called PCOS**
- **have a dark, thick, and velvety skin around your neck or armpits.**

Early Signs and Symptoms of Type 2 Diabetes

Type 2 diabetes is a disease in which your body doesn't make enough of a hormone called insulin or doesn't use insulin the way it should. Insulin helps carry glucose (also called sugar) to your cells. So when there's a problem with the insulin, glucose builds up in your blood. You've probably heard this called high blood sugar.

About 90% of people who have diabetes have type 2. The other two main ones are type 1, in which

your body stops making insulin, and gestational, which happens in pregnant women.

You can usually control type 2 diabetes with lifestyle changes. Some people also need medication.

You might not know that you have type 2 diabetes until it affects your health. About 1 in 4 people with the condition don't know that they have it.

Symptoms can come on slowly. They may include:

- **More thirst.** When sugar builds up in your **blood**, **your kidneys** work overtime to get rid of it. This pulls fluids from your tissues and makes you dehydrated, so you feel thirsty.
- **More hunger because diabetes** can stop glucose from getting to your cells, you feel hungry, even after you've eaten.
- **Peeing often. You'll pee more because your kidneys are working to get rid of extra sugar in your system.**
- **Dry mouth Dehydration** and peeing a lot can drain moisture from your **mouth** as well.
- **Weight loss without trying.** When you lose sugar from peeing a lot, you lose calories, too. You might lose weight even though you're eating as usual.
- **Fatigue** When your body can't use energy from food, you could feel weak and **tired**. **Dehydration** can make you feel this way, too.
- **Blurry vision** High blood sugar can make you have trouble focusing.
- **Headaches High blood sugar levels** can cause your head to hurt.
- **Loss of consciousness** after you exercise, skip a meal, or take too much medication, your blood sugar could go too low, and you could pass out.
- **Infections or sores that don't heal.** High blood sugar can slow blood flow and make it harder for your body to heal.
- **Tingling hands and feet Type 2 diabetes** can affect nerves in your hands and feet.
- **Red, swollen, tender gums.** You might be more likely to get infections in your gums and the bones that hold your **teeth** in place. Your gums may get infected or pull away from your **teeth**. **Your teeth might become loose.**
- **Type 2 diabetes is a chronic disease that affects millions of people worldwide. Uncontrolled cases can cause blindness, kidney failure, heart disease and other serious conditions.**
- **Before diabetes is diagnosed, there is a period where blood sugar levels are high but not high enough to be diagnosed as diabetes. This is known as prediabetes.**
- **It's estimated that up to 70% of people with prediabetes go on to develop type 2 diabetes. Fortunately, progressing from prediabetes to diabetes isn't inevitable.**
- **Although there are certain factors you can't change — such as your genes, age or past behaviors — there are many actions you can take to reduce the risk of diabetes.**

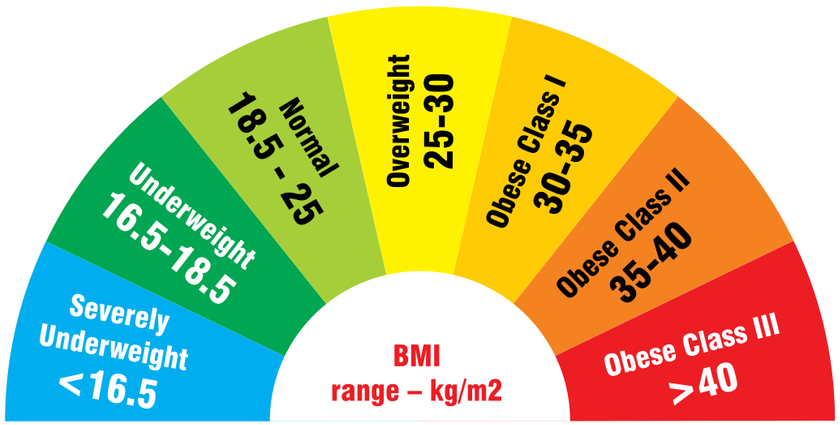
Methods to prevent Diabetes

- **Work Out Regularly.**
- **Drink Water as Your Primary Beverage.**
- **Lose Weight If You're Overweight or Obese.**
- **Quit Smoking.**
- **Eat a High-Fiber Diet.**
- **Minimize Your Intake of Processed Foods.**
- **Lose Weight If You're Overweight or Obese.**
- **Eat a balanced, healthy diet.**
- **Quit alcohol intake.**
- **Control your blood pressure**
- **Cut Sugar From Your Diet.**
- **Check your risk of diabetes.**
- **See your doctor for regular check-ups.**
- **Become an Anti**-stress
- **Be Positive**
- **Do stress releasing activities like Meditation, Prayer, Etc.**
- **Don't eat food heavily until your stomach gets filled**
- **Interact with Nature.**

Eat healthy and keep your weight in check – maintain a BMI of less than 25

How to calculate BMI

BMI = Weight (kg) / (Height (m) x Height (m))



Type 1 and Type 2 Diabetes

The most common forms of diabetes are now called type 1 and type 2. Type 1 diabetes is failure of the pancreas to make insulin. Type 1 usually occurs in children and/or young people, and insulin injections are needed to treat it. About one in 10 diabetics have type 1. Type 2 diabetes is a condition where the body develops resistance to its own insulin. It usually occurs in adults, and is related to obesity and lack

of exercise. Pills and sometimes insulin are used to treat it. Type 2 diabetes accounts for about 90% of all diabetes.

Test	What it means	Normal Levels
	Measures of Diabetes control	
Hemoglobin A1c (HbA1c)	The HbA1c measures your blood sugar control over the last 3 months. According to the National Diabetes Education Program, people with diabetes should have their HbA1c tested at least once every 6 months.	The goal is to keep your HbA1c less than 6.5%.
Glucose	Glucose is blood sugar. It is measured to determine if your body is able to digest and use sugar and carbohydrates correctly. Although high blood glucose levels are mainly found in diabetics, some medications can raise your blood glucose level. Diabetes is diagnosed if the non- fasting blood glucose is higher than 200 mg/dL.	Normal (fasting) glucose levels are 65-110 mg/ dL. In people with diabetes, the blood glucose goal before eating is 80-120 mg/ dL. After eating, the blood glucose goal is 100-140 mg/ dL.
Albumin	The level of albumin (protein) in the blood is a measure of good nutrition. Research shows that people with kidney disease who become malnourished and do not get enough protein may suffer from many complications. It is especially important for people on low protein diets to have their serum protein levels measured.	The goal is to keep your HbA1c less than 6.5%. Normal (fasting) glucose levels are 65-110 mg/ dL. In people with diabetes, the blood glucose goal before eating is 80-120 mg/ dL. After eating, the blood glucose goal is 100-140 mg/ dL. Normal serum albumin levels in healthy people are 3.6-5.0 g/dL.

HIGH BLOOD PRESSURE (B.P)

High blood pressure puts more stress on blood vessels throughout the body, including the kidney filters (nephrons). Hypertension is the number two cause of kidney failure. Normal blood pressure is less than 130/85 and this is the target for people who have diabetes, heart disease, or CKD.

Table 5.1: Estimated Normal Blood Pressure for Age

Age	Normal Systolic Range	Normal Diastolic Range
Newborn to 1 month	45–80 mm Hg	30–55 mm Hg
One to 12 months	65–100 mm Hg	35–65 mm Hg
Young child (1–5 years)	80–115 mm Hg	55–80 mm Hg
Older child (6–13 years)	80–120 mm Hg	45–80 mm Hg
Adolescent (14–18 years)	90–120 mm Hg	50–80 mm Hg
Adult (19–40 years)	95–135 mm Hg	60–80 mm Hg
Adult (41–60 years)	110–145 mm Hg	70–90 mm Hg
Older adult (61 and older)	95–145 mm Hg	70–90 mm Hg

White coat syndrome' refers to elevated blood pressure due to nervousness or anxiety when clients have their blood pressure taken by a healthcare provider. This occurs in approximately 20% of clients. Key message: have the client take their blood pressure at home with an automatic home blood pressure cuff and compare the findings. Alternatively, you can ask the client to sit quietly and leave the room while an automatic cuff takes a client's blood pressure. The automatic cuff can be programmed to take three measurements and the blood pressure documented is an average of the three readings.

Factors that influence blood pressure include age, sex, ethnicity, weight, exercise, emotions/stress, pregnancy, and diurnal rhythm as well as medication use and disease processes.

- **The general pattern is that blood pressure rises with age, so normal variations tend to be higher for older adults.**
- **Blood pressure is similar in childhood for males and females. After puberty, females have lower blood pressure than males, whereas after menopause females have higher blood pressure than males.**
- **Research has revealed that ethnicity may be a predictor of blood pressure, but this causation is not necessarily biological, but rather sociocultural. When determining risk for high blood pressure, it is important to consider ethnicity as a contributing factor.**
- **The diurnal cycle influences blood pressure to be lower in the morning and increase throughout the day until early evening. Try it out: take your blood pressure when you wake up in the morning and then again in late afternoon, and note the difference. This is one reason why healthcare providers document the time a client's blood pressure is taken.**
- Blood pressure can be higher in people who are obese because the heart has to work harder to perfuse the body's tissues.
- The sympathetic nervous system is stimulated by exercise, stress, anxiety, pain, anger, and fear, which increases blood pressure. Blood pressure returns to baseline within five minutes of rest following activity. Try it out. Have a peer take your blood pressure. Then, run on the spot or do some other cardiac activity for five minutes. Have the peer take your blood pressure again, and then lie down and rest for five minutes. Take the blood pressure again. Note the changes.
- Blood pressure varies throughout the duration of pregnancy. It decreases about halfway through the first trimester until mid-pregnancy due to progesterone effects that relax the walls of blood vessels, causing decreased peripheral vascular resistance. It returns to pre-pregnancy values toward the end of pregnancy.

Precautions in hypertensive patients

Hypertension is the second most common cause of chronic kidney disease, which is preventable. As most people with high blood pressure have no symptoms, many hypertensive patients take irregular treatment or discontinue treatment. A few patients discontinue treatment as they feel more comfortable without medicine. But this is dangerous. Uncontrolled hypertension for a long term can lead to serious problems like chronic kidney disease, heart attack and stroke. To prevent kidney disease, all hypertensive patients should take regular medication, get blood pressure

checked regularly and eat a proper diet with salt restriction. The goal of therapy is to keep blood pressure less than 130/85 mm of Hg. For early diagnosis of kidney damage all hypertensive patients should check urine and blood creatinine every year. Weight control, exercise, and medications can control blood pressure and perhaps prevent or slow the progression from kidney disease to kidney failure. What you can do Blood pressure pills must be taken as prescribed to work properly. If you can't afford to buy your blood pressure pills or have side effects, tell your doctor so he or she can suggest other options for you. Certain classes of blood pressure medications.

Some other reasons for Cronic kidney disease

Blockages scarring from infections or a malformed lower urinary tract system (birth defect) can force urine to back up into the kidney and damage it.

Blood clots or plaques of cholesterol that block the kidneys blood vessels can reduce blood flow to the kidney and cause damage.

Repeated kidney stones can block the flow of urine from the kidney and are another kind of obstruction that can damage the kidneys. What You Can Do Sometimes blockages can be repaired or opened to help save function in a blocked kidney and kidney stones can be treated. If you know or suspect that you may have a blockage, ask your doctor what can be done about it.

Overuse of painkillers and allergic reactions to antibiotics Heavy use of painkillers have been linked to interstitial nephritis,

kidney inflammation that can lead to kidney failure. Anew study suggests that ordinary use of painkillers (e.g., one pill per day) is not harmful in men who are not at risk for kidney disease.

Allergic reactions to, or side effects of, antibiotics may also cause nephritis and kidney damage.

What You Can Do If you routinely take these medications, be sure that your doctor is aware of it especially if you already have a known kidney problem.

When you are taking a new medication, report any new symptoms to your doctor.

Drug abuse Use of certain non-prescription drugs, such as heroin or cocaine, can damage the kidneys, and may lead to kidney failure and the need for dialysis.

What You Can Do If you are using these drugs, know that they can harm your health and seek help to stop taking them.

BPH is the most common cause of urinary problems in elderly male

Burning and frequent urination, pain in lower abdomen and fever are common presentations of urinary tract infection (UTI). Presence of pus cells in urine test suggests UTI.

Most of the patients of UTI respond well to antibiotic therapy. UTI in children needs special consideration. Delay or inadequate treatment of UTI in children can cause irreversible damage to the growing kidney.

Nephrotic syndrome is the kidney disease seen more frequently in children as compared to adults. Frequent attacks of swelling (edema) is the most common symptom. The presence of protein in the

urine (more than 3.5 grams per day), low blood albumin levels (hypoalbuminemia), high cholesterol levels, normal blood pressure and normal kidney function are usual features of this disease.

Delay in treatment and inadequate work up of UTI in children can cause irreversible damage to the growing kidney

Kidney Risk Factors You Can't Change.

But Should Know About Family history of kidney disease If you have one or more family members who have CKD, are on dialysis, or have a kidney transplant, you may be at higher risk.

One inherited disease, polycystic kidney disease, causes large, fluid-filled cysts that eventually crowd out normal kidney tissue.

Diabetes and high blood pressure can also run in families. Be aware of your family history and share it with your doctor. This can ensure that you are screened for risk factors regularly and get the care you need.

Premature birth about one in five very premature infants (less than 32 weeks gestation) may have calcium deposits in parts of the kidney called nephrons.

Trauma/accident Accidents, injuries, some surgeries, and certain radiocontrast dyes that doctors use to monitor blood flow to your heart and other organs can damage the kidneys or reduce blood flow to the kidneys, causing acute (temporary) kidney failure. Sometimes acute kidney failure will get better, but it may lead to CKD.

BPH is the most common cause of urinary problems in elderly male'

Certain diseases having certain diseases puts people at higher risk for kidney disease.

These diseases include systemic lupus Erythematosus (SLE)

The steroids which are used to build our body

Cancer,

AIDS,

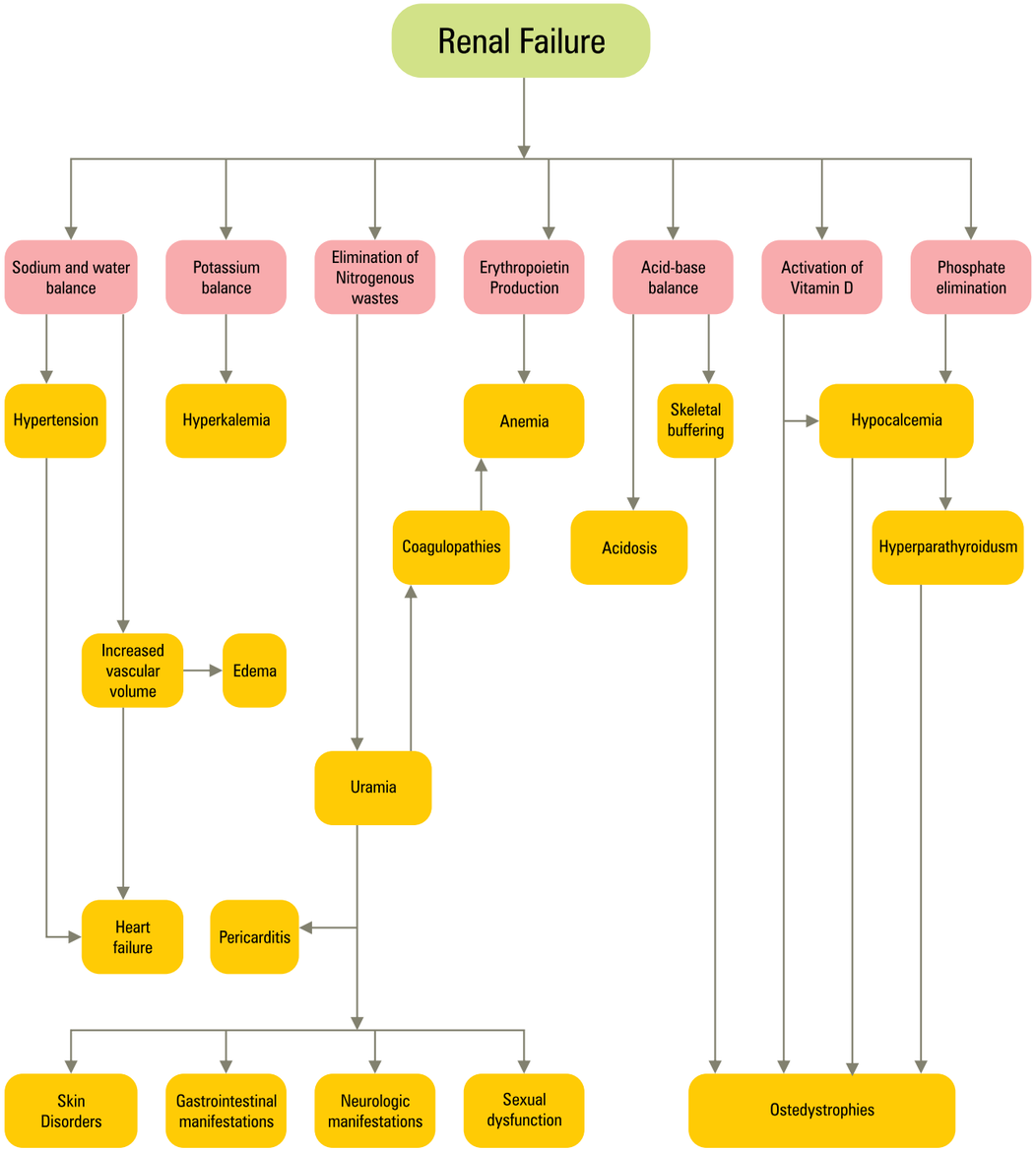
Hepatitis C,

Smoking,

High protein diet and congestive heart failure.

Make sure that you are honest with your Doctor about your Medical history. If not He / She can't help you without knowing it.

SYMPTIOMS AND SIGNS OF KIDNEY FAILURE



Test	What it means	Normal Levels
	Measures of Kidney Function	
Urine Albumin	Inside healthy kidneys, tiny filtering units called nephrons filter out wastes but keep in large molecules, like red blood cells and albumin (protein). Some kidney diseases damage these filters so albumin and other proteins can leak into the urine. Protein Albumin in the urine can be a sign of kidney disease. Albumin can be measured with a urine dipstick or a 24-hour urine collection to find out how much protein is spilling into the urine. Albumin levels can increase with heavy exercise, poor blood sugar control, urinary tract infections, and other illnesses.	In a 24-hour urine sample, a normal level is less than 30 mg/day.
Micro-albuminuria	Microscopic amounts of protein too small to be measured with a standard dipstick test can be an early sign of kidney disease especially in people with diabetes. Special dipsticks or laboratory tests can find microalbuminuria. The American Diabetes Association guidelines recommend that anyone with type 1 or type 2 diabetes have a test for microalbuminuria at least yearly.	Urine in healthy people contains less than 150 mg/L of albumin.
Blood Urea Nitrogen (BUN)	Blood Urea Nitrogen (BUN) is another measure of wastes (urea) in the blood. Urea is produced from the breakdown of protein already in the body and protein in your diet. A high BUN usually means that kidney function is less than normal, but other factors may affect the BUN level. Bleeding in the intestines, congestive heart failure, and certain medications may make the BUN higher than normal. As BUN rises, symptoms of kidney disease may appear, such as a bad taste in the mouth, poor appetite, nausea, and vomiting. In dialysis, BUN is used to measure whether a person is receiving the correct amount of dialysis. Sometimes a low BUN may also mean that you are not eating enough protein.	The normal BUN level for healthy individuals is 7-20 mg/dL in adults, and 5-18 mg/dL in children. Patients on dialysis have higher BUN levels, usually 40-60 mg/dL. The nephrologist (kidney doctor) and dietitian will help determine whether the BUN is in the correct range.

Measures Of Anemia		
Hematocrit (Hct)	Hematocrit is the percentage of red blood cells in the blood, used to check for ane-mia. Anemia shortage of oxygen-carrying red blood cells often begins at the early stages of kidney disease. It causes severe fatigue, heart damage, and other health problems. Anemia can be treated.	The normal Hct level for healthy individuals is 40% P 50% for men and 36% P 44% for women.
Hemoglobin (Hb%)	Hemoglobin is the part of red blood cells that actually carries oxygen. Both hematocrit and hemoglobin levels are measured to check for anemia.	The normal Hb% level for healthy individuals is 14 to 18 g/dL for men and 12 to 16 g/dL for women. The Hct is approximately three times the Hb level.

In chronic kidney disease (CKD), kidney function gradually declines over months to years. In the early stages of CKD, most patients remain relatively without symptoms as their bodies compensate and get used to the metabolic derangements that develop over time. When the kidney function becomes severely impaired, symptoms due to the accumulation of toxins and fluids start to develop.

What are the symptoms of chronic kidney disease?

Symptoms of CKD vary depending on the severity of the kidney damage. CKD is divided into five stages based on the level of kidney function or glomerular filtration rate (GFR). GFR can be estimated from blood levels of creatinine and is normally greater than 90 ml/min.

CKD Stage 1 (kidney function 90-100 %)

In Stage 1 CKD, the GFR is greater than 90 ml/min/1.73 m^2 but there are laboratory abnormalities like protein in the urine; evidence of structural damage to the kidneys on x-ray, ultrasound, MRI, or CT scan; or a family history of polycystic kidney disease. Patients are usually asymptomatic.

CKD Stage 2 (kidney function 60-89%)

In Stage 2 or mild CKD, the GFR is 60 – 89 ml/min/1.73 m^2. Patients are usually asymptomatic but some may complain of frequent urination especially at night, high BP, urine abnormalities on urinalysis with normal or slightly high serum creatinine.

GFR Categories in CKD			
Stage		**Description**	**Glomerular Filtration Rate (GFR)**
At Increased risk		With risk factors for CKD (diabetes, high blood pressure, family history, older age, etc.)	More that 90
1		Kidney damage (Protein in the urine) and normal GFR	More that 90
2		Kidney damage and mildly decreased GFR	60 - 89
3	3a	Mildly to moderately decreased GFR	45 - 59
	3b	Moderately to severely decreased GFR	30-44
4		Severely decreased GFR	15-29
5		Kidney failure	Less than 15

National Kidney Foundation Kidney Disease Outcomes Quality Initiative (NKF-K/DOQI) Clinical Practice Guideline for Chronic Kidney Disease

CKD Stage 3 (kidney function 30-59%)

In Stage 3 or moderate CKD, the GFR is 30-59 ml/min/1.73 m^2 . The patient may still be asymptomatic or start having mild symptoms. There may be urinary abnormalities present and serum creatinine is elevated

CKD Stage 4 (kidney function 15-29%)

In Stage 4 CKD, GFR is 15-29 ml/min/1.73 m^2 . Symptoms may be mild, vague and nonspecific, or very severe, depending on the underlying cause of kidney failure and associated illnesses.

CKD Stage 5 (kidney function less than 15%)

Stage 5 is very severe CKD with GFR of < 15 ml/min/1.73 m^2 . Also called End Stage Kidney Disease, most patients will need dialysis or kidney transplantation at this stage. Symptoms may vary from moderate to severe, with life-threatening complications.

Therapy, sign symptoms of kidney failure increase and most of the patients need dialysis or kidney transplantation.

Common symptoms of kidney diseases

- Loss of appetite, nausea and vomiting.
- Weakness, fatigue and weight loss.
- Swelling (edema) of lower legs.
- Swelling of face or around the eyes especially in the morning.
- High blood pressure, especially if severe, uncontrolled or in young individuals.
- Pallor.
- Sleep problems, lack of concentration and dizziness.
- Itching, muscle cramps or restlessness.
- Flank pains.
- Frequent urination especially at night (nocturia).
- Bone pains and fractures in adults and retarded growth in children.
- Decreased sexual drive and erectile dysfunction in males and menstrual disturbances in females.

When to suspect CKD in a person suffering from high blood pressure?

In persons with high blood pressure (hypertension) suspect CKD if:

- Age is less than 30 or more than 50 at the time of diagnosis of hypertension.
- Severe hypertension at the time of diagnosis (i.e. more than 200/ 120 mm of Hg).
- Severe uncontrolled high blood pressure even with regular treatment
- Concomitant visual disturbances.
- Presence of protein in urine.
- Presence of symptoms suggesting CKD such as presence of swelling, loss of appetite, weakness etc.

What are the complications of advanced CKD?

Potential complications of advanced CKD are:

- Severe difficulty in breathing and chest pain due to marked fluid retention in the lungs (pulmonary edema).
- Severe high blood pressure.
- Severe nausea and vomiting.
- Severe weakness
- Central nervous system complications: confusion, extreme sleepiness, convulsion and coma.

- High levels of potassium in the blood (hyperkalemia) which could impair the heart's ability to function and could be life-threatening.
- Pericarditis, an inflammation of the sac-like membrane that envelopes the heart (pericardium).

Diagnosis of CKD

CKD is commonly asymptomatic in early stages. Usually, CKD is initially diagnosed when hypertension is detected, a blood test showing elevated serum creatinine is requested or urine tests positive for albumin. A person must be screened for CKD if he is at high risk for developing kidney damage (diabetic, hypertensive, older age, family history of CKD).

Hemoglobin

Hemoglobin levels are usually low. Anemia is due to decreased erythropoietin production by the kidney.

Urine test

Albumin or protein in the urine (called albuminuria or proteinuria) is an early sign of CKD. Even small amounts of albumin in the urine, called microalbuminuria, may be the earliest sign of CKD. Since proteinuria can be also due to fever or heavy exercise, it is best to exclude other causes of proteinuria before diagnosing CKD.

Serum creatinine, blood urea nitrogen and eGFR

An easy and inexpensive way to measure kidney function is a blood level of creatinine. Together with age and sex, the serum creatinine is used in many formulas to estimate kidney function or glomerular filtration rate (eGFR). Regular monitoring of creatinine helps to assess progression and treatment response in CKD. On the basis of eGFR, CKD is divided into five stages. This staging is useful to recommend additional testing and suggestions for proper management.

Ultrasound of the kidney

The ultrasound is a simple, effective and inexpensive test in the diagnosis of CKD. Shrunken kidneys are diagnostic of chronic kidney disease. However, normal or even large kidneys are seen in CKD caused by adult polycystic kidney disease, diabetic nephropathy and amyloidosis. Ultrasound is also helpful to diagnose CKD due to urinary obstruction or kidney stones.

Other tests

CKD causes disturbances in different functions of the kidneys. To evaluate these disturbances different tests are performed such as: tests for electrolyte and acid-base balance (sodium, potassium, magnesium, bicarbonate), tests for anemia (hematocrit, ferritin, transferrin saturation, peripheral smear), tests for bone disease (calcium, phosphorus, alkaline phosphatase, parathyroid hormone), other general tests (serum albumin, cholesterol, triglycerides, blood glucose and hemoglobin A1c) and ECG and echocardiography.

When should a patient with CKD contact the doctor?

Patients with CKD should contact the doctor immediately, if he or she develops:

- Rapid unexplained weight gain, marked reduction in urine volume, aggravation of swelling, shortness of breath or difficulty in breathing while lying down in bed.
- Small and contracted kidneys, seen on ultrasound, are the hallmark sign of chronic kidney disease.
- Chest pain, very slow or fast heart rate.
- Fever, severe diarrhea, severe loss of appetite, severe vomiting, blood in vomiting or unexplained weight loss.
- Severe muscle weakness of recent origin.
- Development of confusion, drowsiness or convulsion.
- Recent worsening of well controlled high blood pressure.
- Red urine or excessive bleeding.

Treatment of Chronic Kidney Disease

1. Medical Management
    - i. **Why is medical management very important in CKD?**
    - ii. **Why do many people with CKD fail to take benefit**
    - iii. **What are the goals of medical management in CKD?**
    - iv. **What are the treatment strategies in different stages of CKD**
    - v.
2. Nine Steps of Action Plan in Medical Management
    - i. **Management of Primary Etiology**
    - ii. **Strategies to Slow Down the Progression of CKD**
    - iii. **Supportive and Symptomatic Treatment**
    - iv. **Management of Reversible Factors**
    - v. **Identify and Treat Complications of CKD**
    - vi. **Life Style Modification and General Measures**
    - vii. **Dietary Restrictions**
    - viii. **Preparation for Kidney Replacement Therapy**
    - ix. **Referral to a Nephrologist**

The three treatment options for CKD are medical management, dialysis or transplant.

- All patients with CKD are treated initially by medical management (medicine, dietary advice and monitoring).
- Severe damage in CKD (ESKD) requires kidney replacement by dialysis or transplant.

Medical Management

Why is medical management very important in CKD?

There is no cure for CKD. Advanced CKD needs dialysis or kidney transplant to maintain life. Because of the high cost and problems of availability, in India only 5 -10% of kidney patients get treatment like dialysis and kidney transplant, while the rest die without getting any definitive therapy. Therefore, early detection and meticulous conservative medical management is the only feasible and less expensive way to manage CKD and delay the need for dialysis or transplant.

Why do many people with CKD fail to take benefit of medical management in CKD?

Initiation of proper therapy at early stages of CKD is most rewarding. Most patients are asymptomatic or feel very well with proper therapy in early stages. Because of the absence of symptoms many patients and their families fail to recognize the seriousness of the disease and discontinue medicine and dietary restrictions. Discontinuation of therapy may lead to rapid worsening of kidney function requiring expensive dialysis or kidney transplantation.

In CKD with early medical management patients can live a long life.

What are the goals of medical management in CKD?

CKD is a progressively deteriorating condition with no cure. The aims of medical management are to:

1. Slow down the progression of the disease.
2. Treat underlying causes and contributing factors.
3. Relieve symptoms and treat complications of the disease.
4. Reduce the risk of developing cardiovascular disease.
5. Delay the need for dialysis or transplant.

What are the treatment strategies in different stages of CKD?

Treatment strategies and recommended actions in different stages of chronic kidney disease are summarized in this table.

Recommended Action
Regular follow up and monitoring
Life style changes and general measures:

Diagnose/treat to slow down the progression
Educate patients on disease management
Treat comorbid conditions, cardiovascular disease risk reduction
Estimate progression; treat co-morbid conditions
Evaluate/treat complications; refer to nephrologist
Educate patients on kidney replacement options Prepare for kidney replacement therapy
Kidney replacement by dialysis or transplant

Nine Steps of Action Plan in Medical Management of CKD

Management of Primary Etiology

Identifying and treating these underlying primary conditions may help prevent, delay or reverse the progression of CKD.

- Diabetes mellitus and hypertension.
- Urinary tract infection or obstruction.
- Glomerulonephritis, renovascular disease, analgesic nephropathy etc.

Strategies to Slow Down the Progression of CKD

your doctor may prescribe important and effective measures to slow down the progression of CKD such as:

- Strict blood pressure control and ACE inhibitor or angiotensin II receptor–blocker therapy.
- Protein restriction.
- Lipid lowering therapy.
- Correction of anemia.

Supportive and Symptomatic Treatment

- Water pill (diuretics) to increase volume of urine and reduce swelling.
- Drugs to control nausea, vomiting and gastric discomforts.
- Supplementation of calcium, phosphate binders, active form of Vitamin D and other drugs to prevent and correct CKD related bone disease.
- correction of low hemoglobin (anemia) with iron, vitamins and erythropoietin injections.
- Prevention of cardiovascular events. Start daily aspirin advised unless contraindicated.

Management of Reversible Factors

Search and treat reversible factors that may have aggravated or exacerbated the degree of kidney failure. By correction of reversible factors kidney failure may improve, and kidney function may return to stable base level of function. The common reversible causes are:

- Volume depletion.
- Kidney failure due to drugs (non steroidal anti-inflammatory drugs or NSAIDs, contrast agents, aminoglycosides antibiotics).
- Infection and congestive heart failure.

Identify and Treat Complications of CKD

Complications of CKD require early diagnosis and immediate treatment. The common complications which need attention are severe fluid overload, high potassium level in blood (potassium > 6.0 mEq/L), and severe ill effects of advanced kidney failure on heart, brain and lungs.

Life Style Modification and General Measures

These measures are important in reducing overall risk:

- Stop smoking.
- Maintain healthy weight, exercise regularly and remain physically active on a regular basis.
- Limit alcohol intake
- Follow a healthy eating plan and reduce dietary salt intake.
- Medications should be taken as directed by the doctor. They may be adjusted according to the severity of the kidney damage.
- Regular follow up and treatment as directed by a nephrologist

Dietary Restrictions

Depending on the type and severity of kidney disease, dietary restrictions are needed in CKD (discussed in detail in Chapter 25).

- Salt (sodium): To control high blood pressure and swelling, salt restriction is advised. Salt restriction includes: not adding salt to foods at the table and avoiding salt rich food such as fast food, papad, pickles and minimizing the use of most canned foods
- Fluid intake:Decreased urine volume in CKD patients can cause swelling and in severe cases even breathlessness. Therefore, fluid restriction is advised for all CKD patients with swelling.
- Potassium Blood potassium levels usually rise in CKD patients. This can have life-threatening effects on the heart activity. To prevent this, intake of potassium-rich foods (such as dry fruit, coconut water, potatoes, oranges, bananas, tomatoes etc.) should be restricted as advised by a doctor.
- Protein: Patients with CKD should avoid high-protein diets which may accelerate the rate of kidney damage.

Preparation for Kidney Replacement Therapy

- Protect veins of the non-dominant forearm as soon as CKD is diagnosed.
- Use of the veins of this arm should be avoided for blood collection or IV infusions.
- As kidney function deteriorates and ESKD approaches, dialysis or transplantation will be indicated. A nephrologist will discuss further treatment options with patients and their families, depending on the medical needs of the patient as well as personal preference. Dialysis modalities include hemodialysis or peritoneal dialysis.
- If hemodialysis is preferred, patients and their families should be educated and advised to have an AV fistula created – preferably 6 to 12 months prior to the anticipated need for initiating hemodialysis.

In CKD, dietary restrictions may delay the progression and prevent complications.

- A CKD patient may also qualify for pre-emptive kidney transplantation. Here, the patient receives a kidney transplant form a live donor prior to the initiation of dialysis.
- Administration of Hepatitis B vaccination in the early stage of CKD reduces risk of Hepatitis B infection during dialysis or kidney transplantation. Four double doses of recombinant Hepatitis B vaccine at 0, 1, 2 & 6 months should be given, intramuscularly in the deltoid region.

Referral to a Nephrologist

A person with CKD needs early referral to a nephrologist and pre- dialysis education to decrease morbidity and mortality. Early referral reduces the rate of progression to ESKD and may delay the need to initiate kidney (renal) replacement therapy.

Which is the most important treatment to prevent or delay the progression of CKD?

Whatever the underlying cause of CKD, strict control of blood pressure is the most important treatment to prevent or delay the progression of CKD. Uncontrolled blood pressure leads to rapid worsening of CKD and complications such as heart attack and stroke.

Which drugs are used to control high blood pressure?

The nephrologist or physician will select appropriate agents to control high blood pressure. The most common drugs used are angiotensin converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), calcium channel blockers, beta blockers and diuretics.

ACE inhibitors and ARBs are recommended as first line therapy to reduce blood pressure and also helps by slowing the progression of kidney damage, thereby, protecting the kidneys.

What is the goal of blood pressure control in CKD?

It is recommended to keep blood pressure below 130/ 80 mmHg.

Which is the best method to assess and monitor blood pressure control in CKD?

Periodic visits to a doctor help to know the blood pressure status. But buying a blood pressure instrument and using it regularly at home may be helpful to assess and monitor blood pressure control in CKD. Maintaining a chart of blood pressure recordings may help the doctor adjust drug dosages and times of administration

How do diuretic drugs help CKD patients?

Doctors may prescribe diuretic which are medicines that help to increase the volume of urine and reduce swelling and breathlessness in some patients. It is important to remember that these medicines may increase the volume of urine but do not improve the function of the kidney.

Why does anemia occur in CKD and how is it treated?

When kidneys are functioning properly, they produce a hormone callederythropoietin, which stimulates the bone marrow to produce red blood cells. In CKD with reduction of kidney function, erythropoietin production also decreases, leading to anemia.

Iron tablets, vitamins and, at times, intravenous iron injections are the first steps to treat anemia due to CKD. Severe anemia, or anemia not responding to drug therapy, needs injections of synthetic erythropoietin, which help bone marrow to produce oxygen-carrying red blood cells. Erythropoietin injections are safe, effective and the preferred method of treating anemia due to CKD. Transfusion of blood is quick and effective to correct anemia in an emergency but is not the preferred method due to the risk of infection and allergic reactions

Why does anemia in CKD need treatment?

Red blood cells carry oxygen from lungs to all parts of the body. Anemia (low hemoglobin) in CKD leads to weakness, fatigue, poor exercise capacity, breathlessness, rapid heartbeat, loss of concentration, intolerance to cold and chest pain and therefore, this needs early and proper treatment.

DIALYSIS

Dialysis is a procedure by which waste products and excess water that accumulate in renal failure are removed from the body artificially. It is a life-saving technique for patients with End Stage Kidney Disease (ESKD) or Acute Kidney Injury.

How does dialysis help people with severe kidney failure?

Dialysis helps the body by performing the following functions of failed kidneys:

- Purification of blood by removal of waste products such as creatinine, urea etc.
- Removal of excess fluid and maintenance of the right amount of water in the body.
- Correction of electrolyte and acid-base balance disturbances.

However, dialytic therapy cannot replace all the functions of a normal kidney such as production of the hormone erythropoietin needed to maintain hemoglobin levels.

When is dialysis needed?

When the kidney function is reduced by 85-90% from the normal (ESKD) waste products and fluids build up in the body. The accumulation of toxins such as creatinine and other nitrogenous waste products leads to symptoms such as nausea, vomiting, fatigue, swelling and breathlessness. These are collectively termed as uremia. At this point, medical management becomes inadequate and the patient will need to start dialysis.

Can dialysis cure chronic kidney disease?

No. Chronic kidney disease is irreversible and once a patient reaches Stage 5 (ESKD), lifelong dialysis treatments will be needed unless successful kidney transplantation is performed. On the other hand, a patient with AKI may need dialysis support only for a short period until kidney function recovers.

What are the types of dialysis?

There are two main types of dialysis : hemodialysis and peritoneal dialysis.

Hemodialysis: In hemodialysis (HD), waste products and excess fluids are removed from the blood by passing the blood through a special filter or artificial kidney called a dialyzer, aided by a dialysis machine.

Peritoneal dialysis: In peritoneal dialysis (PD), a soft tube or catheter is inserted through the skin, into the abdominal cavity and dialysis solution is infused into the abdominal cavity to remove waste products and excess fluid from the body. This is done at home, usually without a machine.

Which factors determine selection of dialysis modality in ESKD patients?

Hemodialysis and peritoneal dialysis both are effective modalities in ESKD patients. No single dialysis modality is best suited for all patients. After considering advantages and disadvantages of each dialysis modality, selection of HD or PD is made jointly by the patient, family members and the nephrologist. Major factors determining this selection are cost of therapy, age, comorbid conditions, distance of hemodialysis center, educational status, physician bias and the patient's preferences and lifestyle. Because of low cost and easy availability, hemodialysis is preferred by a large number of patients in India.

Do dialysis patients need to restrict their diet?

Yes. Common dietary recommendations for dialysis patients are restriction of sodium, potassium, phosphorus and fluid intake. Dialysis patients must follow these dietary advices but dietary restrictions are reduced after dialysis is initiated in CKD. Most patients on dialysis are advised to take more protein compared to their pre-dialysis prescriptions, with adequate calories, water-soluble vitamins and minerals. It is advisable that patients on dialysis consult a dietitian to adequately plan their diets.

What is "dry weight"?

In patients undergoing dialysis, the "dry weight" is the weight of the patient after all excess fluid is removed by dialysis. The "dry weight" may need to be adjusted from time to time as the actual weight of the patient may change. This is also known as the edema-free weight, the patient has no lung

congestion and the hemodynamic status is not compromised (BP is not low nor do they have any symptoms).

Hemodialysis

In hemodialysis, blood is purified with the help of dialysis machine and dialyzer.

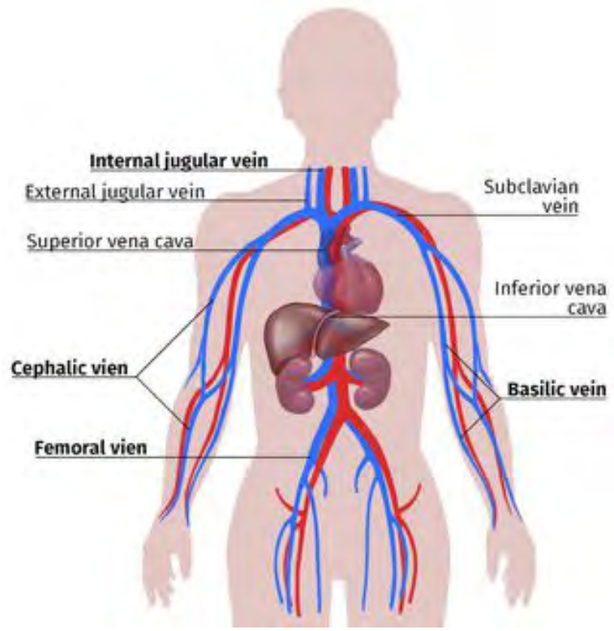
How is hemodialysis done?

Most of the time, hemodialysis is performed in hospitals or free standing dialysis centers, under the care of doctors, nurses and dialysis technicians.

- The dialysis machine pumps blood from the body to the dialyzer through flexible blood tubings. Heparin infusion or continuous saline flushing is done to prevent clotting of blood.
- The dialyzer (artificial kidney) is a special filter through which blood flows which removes extra fluids and waste products. Dialyzer purifies blood with the help of special solution called dialysate which is prepared by a dialysis machine.
- Once the blood is cleaned, the machine sends it back to the body.
- Hemodialysis is carried out usually three times per week and each session lasts for about four hours.

How is the blood withdrawn for purification and returned back to the body in the process of hemodialysis?

The three most common types of vascular access for hemodialysis are central venous catheters, native arteriovenous (AV) fistulas and synthetic grafts.

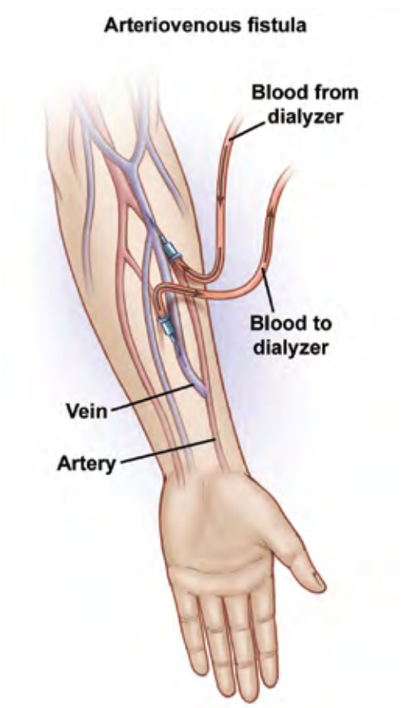


Central Venous Catheter

- As soon as the decision to start immediate hemodialysis is made, a vascular access or central venous catheter has to be inserted. The vascular access will allow the blood of the patient to leave the body and be brought to the artificial kidney or dialyzer to be cleaned or filtered.
- This method of vascular access is ideal for short-term use until a fistula or graft is ready.
- A catheter is inserted into a large vein in either the neck, chest, or leg near the groin (internal jugular, subclavian and femoral veins respectively). With this catheter more than 300 ml/min blood can be withdrawn for dialysis.
- Catheters are flexible, hollow tubes with two lumens. Blood leaves the patient's body passing through one lumen, enters the dialysis circuit, and is returned to the body via the other lumen.
- Venous catheters are immediate but temporary accesses for hemodialysis especially on emergency cases.
- Two types of venous catheters are available, tunnelled (usable for months) and non-tunnelled (usable for weeks).

AV Fistula

- The arteriovenous or AV fistula is the most common and the best method of vascular access for long term hemodialysis because it lasts longer, & is less likely to get clotted or inflected.
- An AV fistula is created in the forearm near the wrist by surgically connecting the radial artery to the cephalic vein.
- Since blood flow and pressure is higher in the artery than the vein, blood flows from the former to the latter. After a few weeks or months, the vein dilates and its walls thickens.



Such maturation of the AV fistula takes time, hence, it cannot be used for hemodialysis immediately after its construction.

- For hemodialysis two large-bore needles are inserted into the fistula, one to carry blood to the dialyzer and the other to return the cleansed blood to the body.
- AV fistula lasts for many years if maintained well. All usual daily activities can be easily performed with the hand having AV fistula.

Why does AV fistula need special care?

- Life of a patient with CKD- ESKD depends on regular and adequate hemodialysis. The AV fistula is the permanent vascular access essential for chronic hemodialysis and is also called the lifeline for the patient on maintenance hemodialysis. Special care of AV fistula ensures adequate blood delivery for a long period.
- Large amount of blood with high pressure flows in the veins of AV fistula. Accidental injury to such dilated veins can lead to profuse bleeding, and sudden loss of blood in large volume can be life threatening. So special care is mandatory to protect veins of AV fistula.

Taking Care of AV Fistula

Proper regular care and protection of AV fistula ensures adequate blood delivery for years. Important precautions to keep a fistula healthy and working for longer period are as follows:

Prevent infection

Always keep the site of the fistula clean by washing the vascular access arm daily and before each dialysis treatment. It is also important to observe aseptic technique during cannulation and throughout the dialysis process.

AV fistula is the "lifeline" in patients of CKD, without which long term hemodialysis is not possible.

Protecting the AV fistula

- Use access site only for dialysis. Do not let anyone give intravenous injections, draw blood or measure blood pressure on the arm with the AV fistula.
- Avoid injury to AV fistula. Don't wear jewelry, tight clothes or a wrist watches on the vascular access arm. Accidental injury to AV fistula can lead to sudden profuse bleeding, which can be life- threatening.
- To control bleeding, immediately apply firm pressure at the site of the bleeding with the other hand or with a tight bandage. After the bleeding is controlled, contact your doctor. Instead of making efforts to control the loss of blood, rushing to hospital for help is unwise and dangerous.
- Do not lift heavy items with the accessed arm and avoid pressure on it. Be careful; do not sleep on the arm with the A V fistula.

Ensure proper functioning of AV fistula

Blood flow through the AV fistula should be checked regularly by feeling the vibration (also called a thrill) three times a day (before breakfast, lunch and dinner). If the vibration is absent, your doctor or dialysis center staff should be immediately contacted. A blood clot may have formed inside the fistula and early detection and timely intervention to dissolve or remove the clot may salvage the AV fistula.

- Low blood pressure carries the risk of failure of AV fistula, and therefore, should be prevented.

Regular exercise

Regular exercise of AV fistula can lead to its maturation. Even afterinitiating hemodialysis, regular exercise of access arm helps to strengthen the AV fistula.

Graft

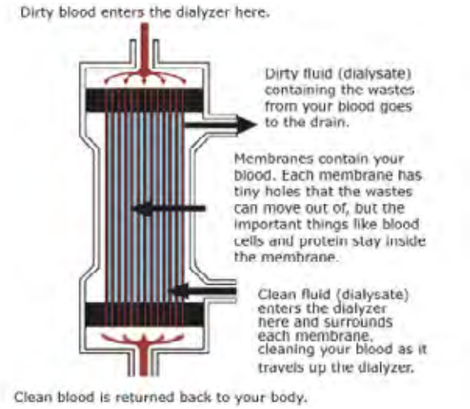
- An arteriovenous graft is another form of long term dialysis access, which can be used when persons do not have satisfactory veins for an AV fistula or have a failed AV fistula.
- In graft method, an artery is surgically connected to a vein with a short piece of synthetic soft tube which is implanted under the skin. Needles are inserted in this graft during dialysis treatment.
- Compared to an AV fistula, AV grafts are at a high risk to develop clotting, infection, and usually do not last as long as a fistula.

What are the functions of hemodialysis machine?

- The machine prepares special dialysis solution (dialysate), which is delivered to the dialyzer for cleaning of the blood.
- The machine meticulously adjusts and monitors concentration of electrolytes, temperature, volume and pressure of delivered dialysate, which are modified as per the patient's need. Dialysis solution removes unwanted waste products and extra water from the body through dialyzer
- For the safety of the patient, the machine has various safety devices and alarms such as for detection of blood leakage from the dialyzer or the presence of air in blood circuit.
- Computerized models of hemodialysis machine with display of various parameters on front screen and different alarms provide convenience, accuracy and safety to perform and monitor dialysis treatment.

The hemodialysis machine, with the help of dialyzer, filters blood and maintains fluid, electrolyte and acid base balance.

What is the structure of the dialyzer and how does it purify blood?



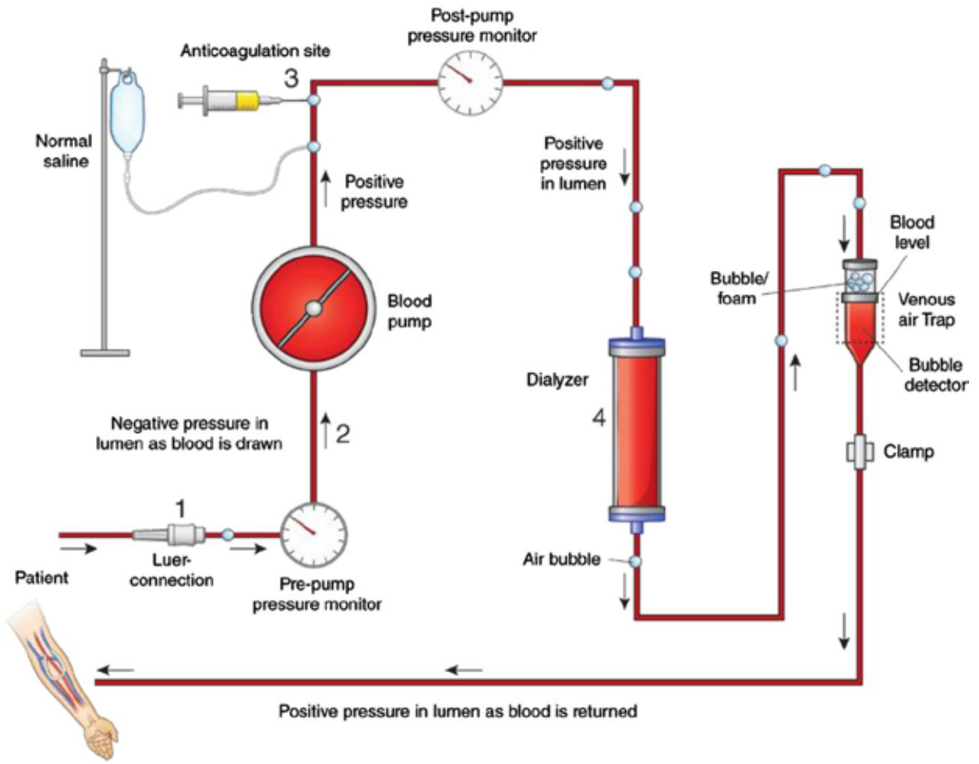
Structure of Dialyzer

- In the process of hemodialysis , dialyzer (artificial kidney) is a fi lter where purification of blood occurs.
- Dialyzer is about 20 centimeter long and 5 centimeter wide clear plastic cylinder which contains thousands of tube-like hollow fibers composed of synthetic s emi - p e rme a b l e membrane.
- These hollow fibers are connected with each other at upper and lower end of the cylinder and form the "blood compartment." Blood enters in the "blood compartment" of hollow fibers from the opening or blood port from one end and exits from the other end after purification.
- Dialysis solution enters from one end of dialyzer, flows around the outside of the fibers ("dialysate compartment") and exits from the other end.

Purification of blood in dialyzer

In hemodialysis, blood flows out from the patient through the vascular access and blood tubings into one end of the dialyzer where it is distributed into thousands of capillary-like hollow fibers. The dialysis solution enters from another port and flows around these fibers in the "dialysate compartment" of the dialyzer.

- Every minute, about 300 ml of blood and 600 ml of dialysis solution continuously flow in opposite directions within the dialyzer. The semi-permeable membrane of the hollow fibers which separates the blood and the dialysate allows removal of waste products and excess fluid from the blood to the dialysate compartment.
- Blood exits from the other end of dialyzer after purification. Dialysis solution with toxic substances and excess fluid which are removed from the blood exits from the end of dialyzer from which blood enters.
- In hemodialysis, the blood volume of the patient circulates and passes through the dialyzer about twelve times. After four hours of treatment, blood urea and serum creatinine levels are reduced substantially, excess fluids are removed and electrolyte levels are corrected.



What is dialysate and its function in hemodialysis?

- The dialysate (dialysis solution) is the special fluid used in hemodialysis to remove waste and extra fluid from the blood.
- The composition of the standard dialysate resembles normal extracellular fluid, but depending on the need of the patient, its composition can be modified.
- The dialysate is prepared by manufacturer by mixing about 30 parts of highly purified water with one part of dialysate concentrate.
- The dialysate is prepared by manufacturer by mixing about 30 parts of highly purified water with one part of dialysate concentrate.

- The water used to make the dialysate is purified sequentially by a sand filter, a charcoal filter, water softener, reverse osmosis, deionization and ultraviolet filtration. The product of these processes is water that is essentially free of dust, suspended impurities, chemical impurities, minerals, bacteria and endotoxins.
- This careful purification of water and subsequent monitoring of its quality is essential to protect patients from the risk of contaminants in the water. Each patient is exposed to about 150 liters of water during each hemodialysis session.

Where is hemodialysis done?

Hemodialysis is usually done in hospitals or dialysis centers by trained staff under the supervision of a doctor. In a few stable patients, it may be done at home. Home hemodialysis requires proper training of the patient and family members, adequate space and financial resources.

Is hemodialysis painful? What does the patient do during dialysis?

The hemodialysis procedure is not painful. There may be slight pain experience during intravenous needle insertion when the blood tubings are connected to the patient at thestart of the procedure. This outpatient requires the patient to go to the hospital or dialysis center thrice a week and going home afterwards. During the treatment, patients rest, sleep, read, listen to music or watch television. They may even take light snacks and hot or cold drinks during this time.

What are the common problems during hemodialysis?

Common problems during hemodialysis include low blood pressure (hypotension), nausea, vomiting, muscle cramps, weakness and headache. These adverse events may be avoided by appropriately accessing the hemodynamics and volume status before the dialysis session. Weight gain in between sessions should be monitored, as well as serum electrolytes and hemoglobin levels.

What are the advantages and disadvantages of hemodialysis?

Advantages of hemodialysis:

- Since treatments are done by trained nurses or technicians, patients are subjected to less burden of caring for themselves. Some patients find hemodialysis more comfortable and less stressful than peritoneal dialysis.
- Hemodialysis is faster and more efficient per unit time than peritoneal dialysis.
- Hemodialysis center provides a platform to meet and interact with other patients with similar problems. Such interaction can reduce stress and the patient can enjoy company of fellow patients.
- Hemodialysis is usually done for 4 hours, three times a week. Between treatments, patient may enjoy “free time”.
- Patients avoid the risks of peritonitis and exit-site infections.
- In some countries, hemodialysis is less expensive than peritoneal dialysis.

Disadvantages of hemodialysis:

- Inconvenience and time lost for regular travel to the hemodialysis center especially when the latter is located far from home.
- Due to fixed schedule for hemodialysis, the patient has to plan all activities around the treatment schedule.
- Frequent needle pricks and insertion during treatments can be painful. There are some measures like application of topical anesthetics to diminish the pain in some cases.
- Dietary restrictions of fluid, salt, potassium and phosphorous still have to be observed. Patients need to adhere to these limitations .
- There is a risk of contracting blood-borne infections like Hepatitis B and C.

Do's and don'ts for hemodialysis patients

- Patients with ESKD on maintenance hemodialysis need regular treatments, usually thrice weekly. Skipping or missing treatments are deleterious to health.
- Hemodialysis patients have to observe proper dietary restrictions. Fluid, salt, potassium and phosphorous restriction have to be observed. Protein intake should be regulated upon the advice of the doctor or renal dietician. Ideally, weight gain between dialysis should be kept at 2 to 3 kgs (4.4 to 6.6 lbs) only.
- Malnutrition is common in patients on hemodialysis and leads to poorer outcomes. A referral to a dietician with the supervision of the doctor is necessary to maintain enough caloric and protein intake to maintain adequate nutrition.
- Patients on maintenance hemodialysis may need to be supplemented with water-soluble vitamins like vitamins B and C. They should avoid over-the-counter multivitamins which may not contain some required vitamins, may contain inadequate levels of some required vitamins, or may contain vitamins that may be harmful for CKD patients such as vitamins A, E and K.
- Calcium and vitamin D may be supplemented, depending on blood levels of calcium, phosphorus and parathyroid hormone.
- Lifestyle changes are mandatory. General measures include smoking cessation, maintenance of ideal weight, regular exercise and limitation of alcohol intake.

When should a patient on hemodialysis consult a dialysis nurse or doctor?

The patient on hemodialysis should immediately consult a dialysis nurse or doctor in cases of :

- Bleeding from AV fistula site or catheter site.
- Disappearance or absence of vibration, bruit or thrill in the AV fistula.
- Unexpected weight gain, significant swelling or breathlessness.
- Chest pain, very slow or fast heart rate.
- Development of severe high blood pressure or low blood pressure.

- Confusion, drowsiness, unconsciousness or convulsions.
- Fever, chills, severe vomiting, vomiting of blood or severe weakness.

Peritoneal Dialysis

Peritoneal dialysis (PD) is another form of dialysis modality for the patients with kidney failure. It is widely accepted and effective. It is the most common method of dialysis done at home.

What is peritoneal dialysis?

- The peritoneum is a thin membrane that lines the inner surface of the abdominal cavity.
- The peritoneal membrane is a natural semi-permeable membrane which allows waste products and toxins in the blood to pass through it.
- Peritoneal dialysis is a process of purification of blood through the peritoneal membrane.

What are the types of peritoneal dialysis?

Types of peritoneal dialysis:

1. Intermittent Peritoneal Dialysis (IPD)
2. Continuous Ambulatory Peritoneal Dialysis (CAPD)
3. Continuous Cycling Peritoneal Dialysis (CCPD)

Intermittent Peritoneal Dialysis (IPD)

Intermittent peritoneal dialysis (IPD) is a valuable and effective dialysis option for short term dialysis in hospitalized patients with acute kidney failure, in children and during emergencies or initial treatment of ESKD. In IPD, a special catheter with multiple holes is inserted into the patient's abdomen through which a special solution called the dialysate is infused into the abdominal cavity or peritoneal space. The dialysate absorbs waste products and excess fluids from the patient's blood. After some time, the fluid is drained and the process is repeated several times in a day.

- IPD lasts for a period of 24- 36 hours and about 30 to 40 liters of dialysate solution is used up during the treatment.
- IPD is repeated at short intervals of 1-3 days, as per the need of the patient.

Continuous Ambulatory Peritoneal Dialysis (CAPD) What is CAPD? CAPDmeans :

C – Continuous: The process is uninterrupted (treatment without stopping for 24 hours a day, 7 days a week).

A – Ambulatory: The patient can walk around and performroutine activities.

P – Peritoneal: The peritoneal membrane in the abdomen works as a filter.

D – Dialysis: The method of purification of blood.

Process of CAPD :

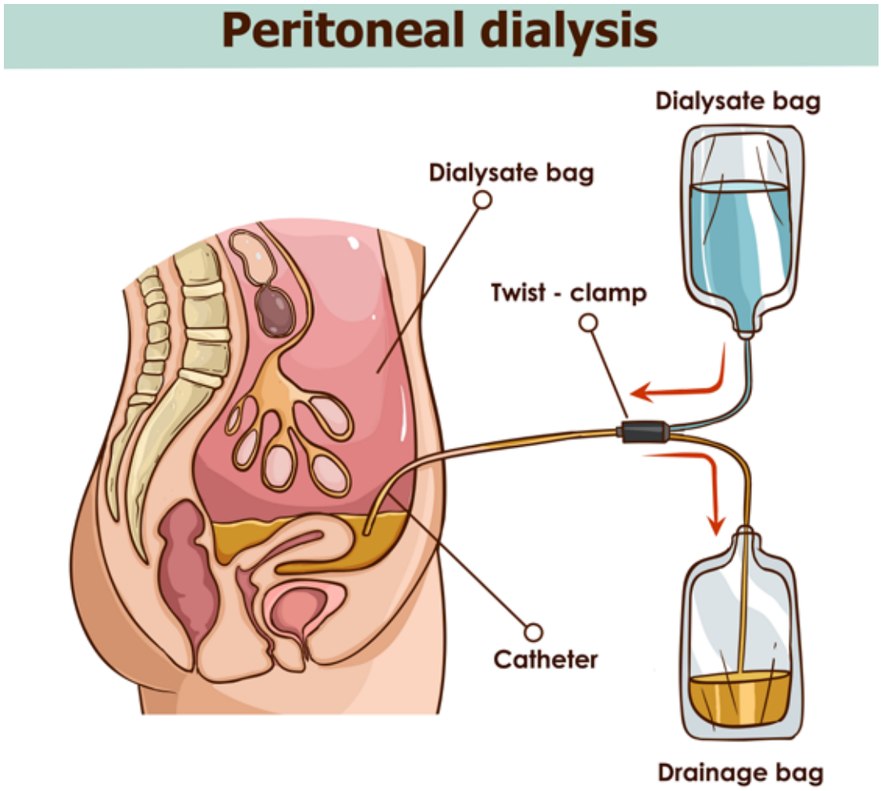
CAPD catheter:The permanent access for peritoneal dialysis (CAPD catheter) is a soft thin flexible silicon rubber tube with numerous side holes. It is surgically inserted into the patient's abdomen through the abdominal wall, about an inch below and to the side of the navel or belly button. The CAPD catheter is inserted about 10 to 14 days before CAPD starts. The PD catheter is the "life line" of CAPD patients, just as the AV fistula is to a patient on hemodialysis.

Technique of continuous ambulatory peritoneal dialysis (CAPD):

In CAPD, special fluid (dialysate) is infused into the abdominal cavity and is kept there for a period of time, after which it is drained. This process of fill, dwell and drain is called an exchange.

Fill: Peritoneal dialysis fluid from the sterile PD bag is infused by gravity, through sterile tubings connected to the PD catheter, into the abdominal cavity. Usually, 2 liters of fluid is infused. The bag emptied of PD fluid is rolled up and tucked in the patient's inner wear until the next exchange.

Dwell: The period of time in which PD fluid remains inside the abdominal cavity is called the dwell time. This lasts for about 4 to 6 hours per exchange during the day and 6 to 8 hours at night. The process of cleaning the blood takes place during dwell time. The peritoneal membrane works like a filter allowing waste products, unwanted substances and excess fluid to pass from blood into the PD fluid. The patient is free to walk around during this time (hence the term, ambulatory).



Drain: When the dwell time is completed, the PD fluid is drained into the empty collection bag (which had been rolled up and tucked in the patient's inner clothing). The bag with the drained fluid is weighed and discarded; the weight is recorded. The drained

fluid should be clear. Drainage and replacement with fresh solution takes about 30 to 40 minutes. Exchanges may be done from 3 to 5 times during the day and once during the night. Fluid for the night exchange is left in the abdomen overnight and drained in the morning. Strict aseptic precautions should be observed when performing CAPD.

APD or Continuous Cycling Peritoneal Dialysis (CCPD):

Automated peritoneal dialysis (APD) or continuous cycling peritoneal dialysis (CCPD) is a form of PD treatment done at home using an automated cycler machine. The machine automatically fills and drains the PD fluid from the abdomen. Each cycle usually lasts for 1-2 hours and exchanges are done 4 to 5 times per treatment. The treatment lasts about 8 to 10 hours, usually at night, while the patient is asleep. In the morning, the machine is disconnected and 2 to 3 liters of PD fluid are usually left in the abdominal cavity. This fluid is drained the following evening before the next treatment is started. APD is advantageous since it allows the patient to go about regular activities during the day. Also, since the PD bag is connected and detached from the catheter only once a day, the procedure is more comfortable and carries less risk of peritonitis. However, APD may be expensive in some countries and can be a rather complex procedure for some patients.

Continuous cycling peritoneal dialysis is carried out at home with an automated cycler machine. What is PD fluid used in CAPD

PD fluid (dialysate) is a sterile solution containing minerals and glucose(dextrose). Glucose in the dialysate allows removal of fluid from the body. Depending on the concentration of glucose, there are three kinds of dialysate available in India and in most areas worldwide (1.5%, 2.5% and 4.5%). The glucose concentration is selected for individual patients depending on the amount of fluid that needs to be removed from the body. Newer PD fluids are available in some countries which contain icodextrin instead of glucose. Icodextrin-containing solutions remove body fluids more slowly and are recommended for diabetic or overweight patients.

CAPD solution bags are available in different volumes ranging from 1000 to 2500 ml.

What are the common problems during CAPD?

The main complications of CAPD involve infections. The most common infection is peritonitis, an infection of the peritoneum Pain in the abdomen, fever, chills and cloudy/turbid outflow of PD fluid (effluent) are common presentations of peritonitis. To avoid peritonitis, CAPD should be done under strict aseptic precautions and constipation should be avoided. The treatment of peritonitis includes broad spectrum antibiotics, culture of the PD effluent (to help select appropriate antibiotics) and, in a few patients, removal of the PD catheter. Infection at the exit site of the PD catheter is another infection that may also develop.

Precautions to avoid infections are of utmost importance in CAPD patients.

Other problems that may occur in CAPD are abdominal distention, weakening of the abdominal muscles causing hernia, fluid overload, scrotal edema, constipation, back pain, poor outflow drainage, leakage of fluid and weight gain.

Advantages of CAPD

- Dietary and fluid restrictions are less, compared to hemodialysis treatment.
- More freedom is enjoyed, since PD can be done at home, at work or while travelling. The patient can perform CAPD on his or her own and there is no need for a hemodialysis machine, hemodialysis nurse, technician or family member to help out. Other activities may be done while dialysis is taking place.
- The fixed schedule of hospital or dialysis center visits, travel time and needle pricks associated with hemodialysis are avoided.
- Hypertension and anemia may be better controlled.
- Gentle dialysis with continuous cleaning of blood, so no ups-and- downs or discomfort.

Disadvantages of CAPD

- Infections of the peritoneum (peritonitis) and catheter exit site are common.
- The treatment may be stressful. Patients should perform treatments regularly every day, without fail, meticulously following instructions and strict cleanliness.
- Some patients experience discomfort and changes in appearance due to the permanent external catheter and fluid in the abdomen
- Weight gain, elevated blood sugar and hypertriglyceridemia may develop due to absorption of sugar (glucose) in the PD solution.
- PD solution bags may be inconvenient to handle and store at home.

What dietary changes are recommended for a patient on CAPD?

- A patient on CAPD requires adequate nutrition and the dietary prescription is slightly different from the diet of patients on hemodialysis.
- The doctor or dietician may recommend increasing protein in the diet to avoid protein malnutrition due to continuous protein loss in peritoneal dialysis.
- Enough calories should be ingested to prevent malnutrition while avoiding excessive weight gain. The PD solution has glucose which adds continuously extra carbohydrate to patient on CAPD.
- Although salt and fluid still have to be restricted, there may be less restriction than for a patient on hemodialysis.
- Dietary potassium and phosphate are restricted.
- Dietary fiber is increased to prevent constipation.

When should a person on CAPD contact the dialysis nurse or doctor?

The patient on CAPD should immediately contact dialysis nurse or doctor when any of the following occurs:

- Pain in abdomen, fever or chills.
- Drainage of cloudy/turbid or bloody PD fluid.
- Pain, pus, redness, swelling or warmth around exit site of CAPD catheter.
- Difficulty in infusion or drainage of PD fluid.
- Constipation
- Unexpected weight gain, significant swelling, breathlessness and development of severe hypertension (suggestive of fluid overload).
- Low blood pressure, weight reduction, cramps and dizziness (suggestive of fluid deficit).

What you should know about infectious diseases: a guide for hemodialysis patients and their families

As a hemodialysis patient, you want to learn all you can about your treatment and What you can do to maintain your health at its best. One important area you should know about infectious diseases. These are diseases that happen when harmful germs get into your body and make you ill. Kidney failure interferes with your body's natural immunity, making it easier for you to get some types of diseases like hepatitis or AIDS through your dialysis treatments. This booklet will give you general information about some important infectious diseases, including hepatitis B, C and HIV/AIDS, and tell you What you can do to prevent them.

Some Facts about Hepatitis B

What is hepatitis B?

Hepatitis B is a virus infection that causes liver disease. Most people fight off this infection themselves, but up to 10 percent progress to chronic liver disease and possibly liver cancer. Hepatitis B is spread by contact with the blood of an infected person. You may have an increased chance of getting hepatitis B if you

- have sex with an infected person
- inject illegal drugs
- live with an infected person and share items such as razors and toothbrushes with the person
- have been exposed to sharp instruments contaminated with infected blood, such as needles used for tattooing, body piercing and acupuncture (these needles should be carefully cleaned and disinfected before use, or disposable needles should be used)
- have hemophilia
- are a patient or work in a home for the developmentally disabled
- Your parents were born in Southeast Asia, Africa, the Amazon Basin in South America, the Pacific Islands or the Middle East. In addition, a baby can get hepatitis B from an infected mother during childbirth.

Could I get hepatitis B through my dialysis treatment?

In the early years of dialysis, there was a danger of getting hepatitis B through exposure to the blood of an infected person at the dialysis unit. However, today the chance of getting hepatitis B through your treatment is very small because of two important advances. One of these advances is the use of strict infection control measures in dialysis units. The second improvement is the availability of a vaccination for hepatitis B.

Can I get hepatitis B from a transfusion?

There is a chance to get hepatitis B as well as other blood borne infections, such as hepatitis C and HIV. How do you know if you have hepatitis B?

The only way to tell for sure is to have a blood test. Most people who get hepatitis B have no symptoms at all. However, some people may have flu-like symptoms including:

- loss of appetite
- nausea or vomiting
- fever
- extreme tiredness
- stomach or joint pain

In addition, you may have yellowing of the skin or eyes. Some people may become carriers of hepatitis B, which means they have no symptoms but can still infect others with the disease. The carrier state may last for years or even for life. Some carriers may eventually develop scarring of the liver, liver failure or liver cancer.

Are there treatments for hepatitis B?

Yes. Two drugs have been approved for the treatment of chronic hepatitis B. These are interferon alpha 2b and lamivudine. These drugs should not be given together. Overall, about 35 percent of patients treated with injections of interferon for four to six months will have a long-term response. The response to oral lamivudine, given for at least one year, may be somewhat lower.

Lamivudine is very well tolerated, but viral resistance to treatment may occur. Interferon therapy often results in loss of appetite, depression and hair thinning.

How can hepatitis B be prevented?

One of the best ways to prevent hepatitis B is vaccinated. Hepatitis B vaccination is recommended for all children (including adolescents and teens) and hemodialysis patients (their family members) and staff.

The vaccine works by causing your body to make special proteins called antibodies that protect you against hepatitis B. Your response to the vaccine depends on your age, other medical conditions you may have and your general state of health, but most people will make enough antibodies to protect them against the disease. If you are vaccinated, your dialysis care team will check your blood

periodically to make sure enough antibodies are present. If you have not yet been vaccinated, ask your dialysis staff about the vaccination.

You can also help to prevent hepatitis B by following safe sex guidelines and by avoiding high-risk behaviors such as injecting drugs.

Some safe sex guidelines are:

- Use latex condoms to prevent the exchange of bod fluids.
- Have only one sexual partner.

Is the vaccination safe?

Yes. The vaccines are made from baker's yeast and contain noninfectious particles called antigens. You cannot get hepatitis from the vaccination. These vaccines have undergone extensive clinical testing and have been used on millions of people worldwide with few side effects.

However, people with acute illness or a known allergy to yeast should not be vaccinated.

Some Facts about Hepatitis C What is hepatitis C?

Hepatitis C is a viral infection that can cause liver disease. Hepatitis C is spread by contact with the blood of an infected person. You may have an increased chance of getting hepatitis C if you

- inject illegal drugs
- received blood transfusions. Less commonly, hepatitis C may be spread by:
- passing from an infected mother to her baby during childbirth
- having sex with an infected person
- living with an infected person and sharing items such as razors and toothbrushes exposure to sharp instruments contaminated with infected blood, such as needles used for tattooing, body piercing and acupuncture (these needles should be carefully cleaned and disinfected before use, or disposable needles should be used).

Can I get hepatitis C through my dialysis treatment?

The chance of getting hepatitis C through your treatment is small because of the strict infection control measures used in dialysis units today. However, there have been some reports that hepatitis C has been spread between patients in hemodialysis units where supplies or equipment may have been shared between patients. If you are a long term hemodialysis patient, you should be tested for hepatitis C.

How do you know if you have hepatitis C?

Blood tests are available to check for hepatitis C. People who are at increased risk should be tested. The doctor may do a combination of tests to make the diagnosis.

Many people who have hepatitis C have no symptoms and feel well. For some, the most common symptom is extreme tiredness.

Is hepatitis C a serious illness?

Hepatitis C is serious for some persons but not for others. Most of the people who get hepatitis C carry the virus for the rest of their lives. Most of these persons have some liver damage, but many do not feel sick from the disease. Some of those with liver damage due to hepatitis C may develop scarring of the liver and liver failure, which may take many years to develop. Others have no long term effects.

Are treatments available for hepatitis C?

Yes. Drugs are available to treat hepatitis C. A combination of interferon alpha-2b and another drug called ribavirin has shown a better success rate than treatment with interferon alpha alone.

How can you prevent hepatitis C?

At present, no vaccine is available for hepatitis C. However, researchers are working to develop a vaccine, and it may be available in the future. In the meantime, the following steps can help to prevent hepatitis C:

- do not inject illegal drugs
- do not share toothbrushes, razors or other personal care articles that might have infected blood on them
- follow safe sex guidelines
- if you are considering getting tattoos or body piercing, make sure the tattoo artist or piercer follows good health practices such as washing hands and using disposable gloves

Some Facts about HIV what is HIV?

HIV is the human immunodeficiency virus. It can lead to a disease that causes progressive damage to your body's immune system, called acquired immunodeficiency syndrome (AIDS). This disease increases your chances of getting serious infections that people normally can resist. The most common one is caused by a parasite called Pneumocystis , which causes a kind of pneumonia that is hard to treat. People with AIDS are also more likely to develop certain cancers, such as Kaposi's sarcoma. This cancer is usually limited to the skin, but may become widespread in AIDS patients, affecting the skin, lymph nodes and abdominal organs. The first sign of Kaposi's sarcoma is red to purple bruises or sores on the body or inside of the mouth or nose. Other types of cancer may occur, including lymphoma, a cancer of the lymph nodes.

Can I get AIDS through my dialysis treatment or a blood transfusion?

The chances are very small. The strict infection control measures used by your dialysis care team protect you against this infection. All donated blood is carefully screened for the infection before transfusions are done.

Other Infectious Diseases Dialysis Patients Should Know About

- wear sterile gloves for performing sterile procedures; clean, nonsterile gloves may be used for general patient care and should be changed them between patient contacts
- Wash their hands after touching a patient or any potentially contaminated articles and before taking care of another patient.

Tuberculosis (TB) The number of cases of TB has increased over the past decade. Ask your doctor or nurse whether you should be screened for TB.

Facts about HCV & HBsAg

- More than 2 billion people infectedworldwide
- Highly infectious. 30% (HBsAg), Hepatitis C 1.8%, HIV 0.3%
- HBsAg remains viable for up to 7 days

Settings involved

30.3% Dialysis units

21.2% Medical wards

21.2% Nursing homes

15.2% Surgery wards

12.1 % out patient wards

Is dialyzer reuse safe?

Some units use the same dialyzer (artificial kidney) more than once on the same patient. This is generally considered safe if done properly. The dialyzer should be thoroughly cleaned and disinfected before each use. The dialyzer should be labeled carefully with the patient's name. Check the label on your dialyzer before each treatment. Dialyzer reuse should be avoided for patients who test positive for hepatitis B & C.

What vaccinations should dialysis patients have?

Check the following table to make sure you are up-to- date on all recommended vaccinations. Fill in the date you received each. Speak to your doctor if you have any questions about your vaccinations.

Vaccinations recommended for Adult Hemodialysis Patients

Vaccine

Hepatitis B – For all Dialysis patients includes family members & Staff

Pneumococcal (pneumonia) – For all Dialysis patients includes family members & Staff

Vaccinations Recommended for Adults With Kidney Disease, Kidney Failure, or a Kidney Transplant		
Vaccines	**Post-Transplant**	**Kidney Disease and Dialysis**
Chickenpox (varicella)	DO NOT USE	Recommended, 1 dose
Flu (influenza)	Recommended, 1 dose every year	Recommended, 1 dose eary year
Haemophilus influenza type b (Hib)	Recommended, 1 or 3 doses	Recommended, 1 or 3 doses
Hepatitis A ((HAV)	Recommended, 2 doses	Recommended, 2 doses
Hepatitis B (HBV)	Recommended, 3 doses	Recommended, 4 (0,1,2,6) doses
Herpes Zoster (shingles)	DO NOT USE	Recommended (age 60 and older), 1 dose only Persons on immunosuppressive therapy should not receive the shingles vaccine
Human papillomavirus (HPV)	Recommended (females up to age 26, males up to age 21), 3 doses	Recommended (females up to age 26, males up to age 21), 3 doses
Meningitis (meningococcus)**	Use if needed, 1 or more doses	Use if needed, 1 or more doses
Measles,mumps, and rubella (MMR)	DO NOT USE	Recommended, 1 or 2 doses if you were born in 1957 or after and have not gotten this vaccine, or do not have immunity
Pneumonia (pneumococcal)	Recommended, ask your healthcare provider about the timing and spacing	Recommended, ask your healthcare provider about the timing and spacing
Tetanus, Diphtheria-acellular Pertussis (whooping cough)	Recommended 1-time dose of Tdap, then Td booster every 10 years	Recommended 1-time dose of Tdap, then Td booster every 10 years

Kidney Transplantation

Kidney transplantation (KT) is the outcome of great advancement in medical science.

Kidney transplantation is the treatment of choice for end-stage kidney disease (ESKD). Successful kidney transplantation may offer better quality of life and longer patient survival compared with dialysis. Life after successful kidney transplantation is almost normal.

Kidney transplantation is discussed in four parts:

- Pre-Transplant Information
- Transplant surgery
- Post transplant care
- Deceased donor (Cadaveric) kidney transplant

Pre-Transplant Information

What is kidney transplantation?

Kidney transplantation is a surgical procedure in which a healthy kidney (from a living donor or deceased - cadaver donor) is placed into the body of a person suffering from end-stage kidney disease (recipient).

When is kidney transplant necessary?

Kidney transplantation is necessary for patients who are suffering from ESKD who are on dialysis (hemodialysis or peritoneal dialysis) or who are approaching ESKD but not yet on dialysis (pre-emptive KT).

When is kidney transplant not required in kidney failure?

A patient with acute kidney injury should not undergo KT. Kidney transplantation is also not done in cases where only one kidney fails and the other kidney is still functioning. Transplantation should only be done if the renal failure is irreversible.

Why is kidney transplant necessary in end-stage kidney disease?

Dialysis replaces some degree of the filtration of waste products of the kidneys. Other functions of the kidneys are not accomplished, some of which are better addressed by transplantation. Hence, kidney transplantation, when a suitable donor is available and when no contraindications are present, offers the best treatment option for complete rehabilitation of a patient with end-stage kidney failure. As kidney transplantation saves lives and enables one to enjoy almost normal life, it is referred to as the “Gift of Life”.

What are the advantages of kidney transplantation?

Major benefits of successful KT are:

- Better degree of replacement of renal function and better quality of life: The patient may achieve an almost normal and active lifestyle with more energy, stamina and productivity.
- Freedom from dialysis: Patients avoid the complications, cost, lost time and inconveniences of dialysis treatment.
- Longer life expectancy: Transplant patients have a longer life expectancy than risk-matched patients who remain on dialysis.
- Lesser dietary and fluid restrictions.
- Cost-effectiveness: Although the initial cost of a kidney transplant may be high, the expenses decrease by the second to third year post-transplant and by then, is usually less than that needed for maintenance dialysis treatment.
- There is a reported improvement in sexual life and a higher chance of fathering a child in males and becoming pregnant in females.

What are the disadvantages of kidney transplantation?

Kidney transplantation offers many benefits but also has disadvantages. These are:

- Risk of major surgery. Kidney transplantation is a major surgical procedure under general anesthesia that has potential risks both during and after the surgery.
- Risk of rejection. There is no 100% guarantee that the body will accept the transplanted kidney. But with the availability of newer and better immunosuppressant drugs, rejections are less likely than they were in the past.
- Regular medication. Transplant patients will need to take immunosuppressive medicines regularly for as long as their donor kidneys are functioning. Discontinuation, missing or not taking the full dosage of immunosuppressant drugs, carries the risk of failure of transplanted kidney due to rejection.
- Risks related to immunosuppressive drugs: Drugs that suppress the immune response and rejection may lead to severe infections. Care to avoid infections and screening for development of some forms of cancer are part of post-transplant care. There are side effects for drugs like high blood pressure, high blood cholesterol and sugar levels.
- Stress. Waiting for a kidney donor before transplant, uncertainty of success of transplant (the transplanted kidney may fail) and fear of losing function of the newly transplanted kidney after transplant, is stressful.
- Initial high cost.

What are the contraindications for a kidney transplant?

Kidney transplantation is not recommended if the ESKD patient has:

- A serious active infection
- Active or untreated malignancy
- Severe psychological problems or mental retardation

- Unstable coronary artery disease
- Refractory congestive heart failure
- Severe peripheral vascular disease
- Antibodies against the donor kidney
- Other severe medical problems.

What is the age limit for a kidney transplant recipient?

Although there is no fixed criteria for the age of a kidney transplant recipient, it is usually recommended for persons from 5 to 65 years of age.

What are the likely sources of kidneys for transplantation?

There are three sources of kidneys for transplantation:

- Living related donors: blood relatives of the recipient up to the 4th degree of consanguinity.
- Living non-related donors: like friends, spouses or relatives.
- Deceased (cadaver) donors: from victims of brain death.

Who is the ideal kidney donor?

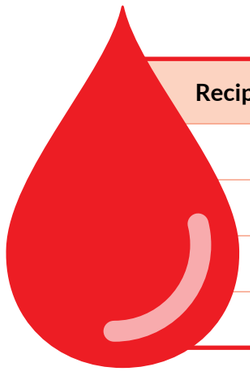
An identical twin is an ideal kidney donor with the best chances of survival after transplantation.

Who can donate a kidney?

A healthy person with two kidneys can donate one kidney as long as the blood group, tissue type and tissue cross matching are compatible with the recipient. Generally, donors should be between the ages of 18 and 65 years.

How does blood group determine the selection of a kidney donor?

Blood group compatibility is important in KT. The recipient and donor must have either the same blood group or compatible groups. Just like in blood transfusions, a donor with blood group O is considered a “universal” donor. (see table below)



Recipient’s blood group	Donor’s blood group
O	O
A	A or O
B	B or O
AB	AB, A, B or O

Who cannot donate a kidney?

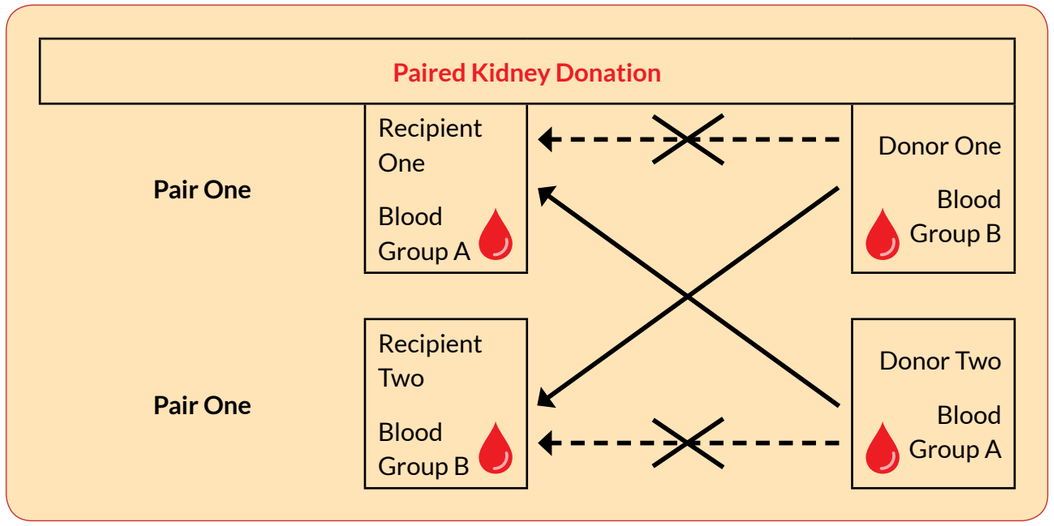
A living donor should be thoroughly evaluated medically and psychologically to ensure that it is safe for him or her to donate a kidney. A person cannot donate kidney if he or she has diabetes mellitus, cancer, HIV, kidney disease, high blood pressure or any major medical or psychiatric illness.

What are the potential risks to a living kidney donor?

A potential donor is evaluated thoroughly to ensure that it is safe for him or her to donate a kidney. With a single kidney, most donors live a normal healthy life. After kidney donation sexual life is not affected. A woman can have children and a male donor can father a child. Potential risks of kidney donation surgery are the same as those with any other major surgery. Risk of contracting kidney disease in kidney donors is not any higher just because they have only one kidney.

What is paired kidney donation?

Living donor kidney transplantation has several advantages over deceased donor kidney transplantation or dialysis. Many patients with end-stage kidney disease have healthy and willing potential kidney donors but the hurdle is blood group or cross match incompatibility.



Paired kidney donation (also known as “live donor kidney exchange”, “living donor swap” or “kidney swap”) is the strategy which allows the exchange of living donor kidneys between two incompatible donor/ recipient pairs to create two compatible pairs. This can be done if the second donor is suitable for the first recipient, and the first donor is suitable for the second recipient (as shown above). By exchanging the donated kidneys between the two incompatible pairs, two compatible transplants can be performed.

What is pre-emptive kidney transplant?

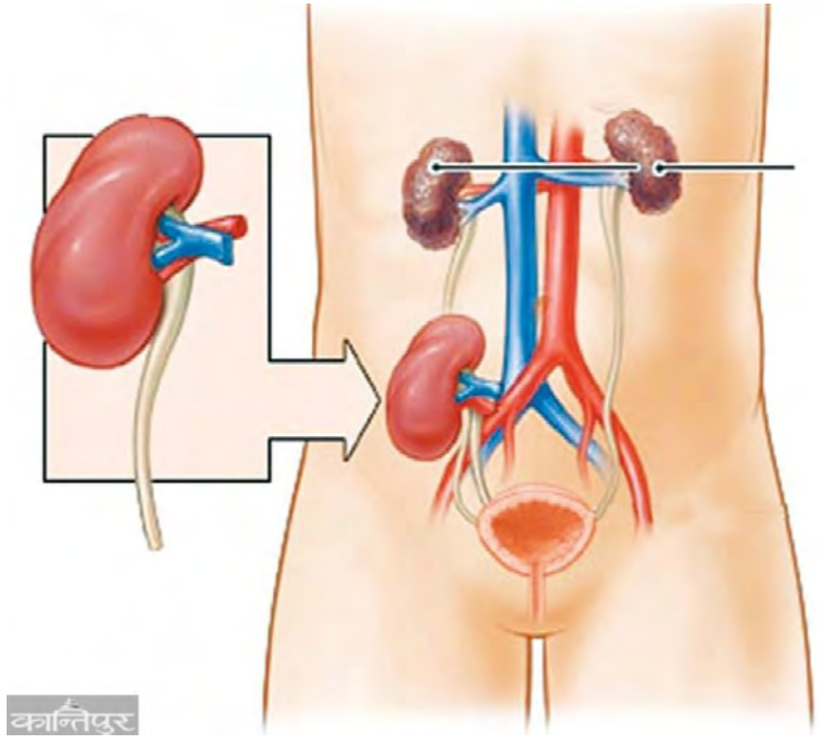
Kidney transplantation usually takes place after a variable period of dialysis therapy. Kidney transplantation may be done before the initiation of maintenance dialysis when the renal function is less than 20 ml/min. This is called a pre-emptive KT.

Pre-emptive KT is considered the best option for kidney replacement therapy in medically suitable patients with end stage kidney disease (ESKD) because it not only avoids the risks, cost, and inconvenience of dialysis, but also is associated with better graft survival than transplantation performed after initiating dialysis. Because of its benefits, one is strongly advised to consider a pre-emptive transplantation in ESKD, if a suitable donor is available.

Transplant Surgery

How is a kidney transplanted?

- Before surgery, medical, psychological and social evaluation is done to ensure fitness and safety of both the recipient and the donor (in living-kidney donor transplant). Testing also ensures proper blood group and HLA matching and tissue cross matching.
- Kidney transplantation is a teamwork of the nephrologists, transplant surgeon, pathologist, anesthesiologist and supporting medical (cardiologist, endocrinologist, etc) and nursing staff as well as transplant coordinators.
- After a thorough explanation of the procedure a careful reading of the consent form, consent of both the recipient and the donor (in living kidney donation) is obtained.



- In living-kidney donor transplant surgery, both the recipient and the donor are operated on simultaneously.
- This major surgery lasts from three to five hours and is performed under general anesthesia.

- In living-kidney donor transplant surgery, usually the left kidney is removed from the donor either by open surgery or by laparoscopy. After removal, the kidney is washed with a special cold solution and subsequently placed into the right lower (pelvic) part of the abdomen of the recipient.
- In most cases, the old diseased kidneys of the recipient are not removed.
- When the source of kidney is a living donor, the transplanted kidney usually begins functioning immediately. However, when the source of the kidney is a deceased (cadaver) kidney donor, the transplanted kidney may take a few days or weeks to begin functioning. The recipient with delayed functioning transplanted kidney needs dialysis until kidney function becomes adequate.
- After the transplant, the nephrologist supervises the monitoring and medications of the recipient. Living donors should also be screened and monitored regularly for any health issues that may develop.

Post-Transplant Care

What are the likely post-transplant complications?

The common possible complications after transplantation include rejection, infection, medication side effects and post-operative complications. Major considerations in post-transplant care are:

- Post-transplant medications and kidney rejection.
- Post-transplant medications and kidney rejection.

Post-transplant Medications and Kidney Rejection

How does post-surgical management of kidney transplantation differ from other routine surgery?

In most cases of routine surgery, post-surgical medications and care are needed for about 7-10 days. However, after kidney transplantation, lifelong regular medications and meticulous care are mandatory.

What is kidney rejection?

The immune system of the body is designed to recognize and destroy foreign proteins and antigens like harmful bacteria and viruses. When the recipient's immune system recognizes that the transplanted kidney is not 'its own,' it attacks the transplanted kidney and tries to destroy it.

This attack by the body's natural defense on a transplanted kidney is known as rejection. Rejection occurs when the transplanted kidney is not accepted by the body of the transplant recipient.

When does kidney rejection occur and what is its effect?

Rejection of the kidney can occur at any time after the transplant, most commonly in the first six months. The severity of rejection varies from patient to patient. Most rejections are mild and easily treated by proper immunosuppressant therapy. In a few patients however, rejection may be severe not responding to therapy and eventually destroying the kidney.

What medications should a patient take after transplant to prevent rejection?

- Because of the immune system of the body, there is always a risk of rejection of the transplanted kidney.
- If the immune system of the body is suppressed the risk of rejection is decreased. However, the patient becomes prone to life-threatening infections.
- Special drugs are given to patients after kidney transplantation to selectively alter the immune system and prevent rejection, but minimally impair the ability of the patient to fight infections.

Such special drugs are known as immunosuppressant drugs. At present, the most widely used immunosuppressant drugs are tacrolimus/cyclosporine, mycophenolate mofetil (MMF), sirolimus/everolimus and prednisolone.

How long does the patient need to continue immunosuppressant drugs after kidney transplant?

Immunosuppressant medications have to be given throughout life, for as long as the kidney graft is functioning. In the immediate post transplant period, several drugs are given but their numbers and dosages are gradually reduced over time.

Does the patient need any other medication after kidney transplant?

Yes. After kidney transplant, in addition to immunosuppressant drugs, antihypertensive drugs, calcium, and medications to treat or prevent infection and anti-peptic ulcer medications may be prescribed.

What are the common side effects of immunosuppressant drugs?

Common side effects of immunosuppressant drugs are summarized in the following table

Drugs	Common Side effects
Prednisolone	Weight gain, high blood pressure, gastric irritation increased appetite, increased risk of diabetes, osteo porosis, cataract
Cyclosporine	High blood pressure, mild tremor, excess hair growth, swelling of gum, increased risk of diabetes, kidney damage
Azathioprine	Bone marrow suppression, increased risk of infection
MMF	Abdominal pain, nausea, vomiting and diarrhea
Tacrolimus	High blood pressure, diabetes, tremor, headache, kidney damage
Sirolimus/ everolimus	High blood pressure, low blood cell count, diarrhea, acne, joint pain, increased cholesterol, triglycerides

What happens if transplanted kidney fails?

When a transplanted kidney fails, the patient may either undergo a second transplant or undergo dialysis.

Precautions after kidney transplant

Successful kidney transplant provides a new, normal, healthy and independent life. However, the recipient must live a disciplined lifestyle and follow precautions to protect the transplanted kidney and prevent infections. The patient has to be compliant and take prescribed medications regularly and without fail.

General guidelines to keep transplanted kidney healthy

- Never stop taking medication or modify its dosage. Remember that irregularity, modification or discontinuation of medications are some of the most common reasons for transplant failure.
- Always keep a list of medications and maintain adequate stock. Do not take any over-the-counter drugs or herbal therapies.
- Blood pressure, volume of urine, weight and blood sugar (if advised by the doctor) every day.
- Regular follow up with a doctor and laboratory tests as advised, is mandatory.
- Get blood tested in reputed laboratories only. If laboratory reports are not satisfactory, rather than changing the laboratory, it is advisable to consult your doctor at the earliest.
- In an emergency, if you need to consult a doctor who is unaware about your disease, do not fail to inform him that you are a transplant recipient and brief him about the medications.
- There are less dietary restrictions after transplantation. Meals should be taken regularly. One should eat a well-balanced diet with adequate calories and proteins as prescribed. Eat foods low in salt, sugar, and fat and high in fiber to avoid weight gain.
- Water intake should be adequate to avoid dehydration. Patients may require up to more than three liters of water a day.
- Exercise regularly and keep weight under control. Avoid heavy physical activity and contact sports e.g. boxing, football.
- Safe sexual activities can be resumed after about two months, after consulting the doctor.
- Avoid smoking and alcohol intake.
- Stay away from crowded places such as cinemas, shopping malls, public transportation and people who have infections.
- Always wear a face mask in public places and high-risk areas such as construction sites dust-laden environments, excavation sites, caves, animal care settings, farms, gardens, etc.
- Always wash your hands with soap and water before you eat, before preparing or taking medications and after using the bathroom.

- Drink filtered boiled water.
- Eat fresh home-cooked cooked food in clean utensils. Avoid eating meals cooked outside the home and raw, uncooked foods. Avoid raw fruits and vegetables for the first 3 months after transplant.
- Maintain proper cleanliness at home.
- Take good care of teeth by brushing twice a day.
- Do not neglect any cuts, abrasions or scrapes. Promptly clean them with soap and water cover them with clean dressing

Consult or call the doctor or transplant clinic in case of:

- Fever over 100 degree F or 37.8 degree C and flu-like symptoms such as chills, body aches or persistent headache.
- Pain or redness over or around the transplanted kidney.
- Significant decrease in urine output, fluid retention (swelling) or rapid weight gain (more than 1 kg in a day).
- Blood in the urine or burning sensation during urination.
- Cough, breathlessness, vomiting or diarrhea.
- Development of any new or unusual symptoms.
- Immediately contacting the doctor and promptly treating any new or unusual problem are mandatory to protect the kidney.

Why are only a few patients with kidney failure able to get kidney transplants?

A kidney transplant is the most effective and best treatment option for patients with chronic kidney disease - end stage kidney failure. There is a large number of patients who need or wish to obtain a kidney transplant. There are three important reasons for the limited feasibility of the procedure.

- **Unavailability of kidney :** Only a few patients are lucky to obtain either living (related or non-related) or deceased (cadaveric) kidney donors. Major problems are the limited availability of living donors and the long waiting list for deceased donors.
- **Cost :** The cost of transplant surgery and the post-transplant lifelong medications is very high. This is a major hurdle for a large number of patients in developing countries.
- **Lack of facilities :** In many developing countries, facilities for kidney transplantation are not readily or easily available.

Deceased (Cadaveric) Kidney Transplantation

What is deceased kidney transplantation?

Deceased (cadaver) transplantation involves transplanting a healthy kidney from a patient who is “brain dead” into a patient with CKD. The deceased kidney comes from a person who has been

declared “brain dead” with the desire to donate organs having been expressed either by the family or by the patient previously, at the event of his/her death.

Why are deceased kidney transplants necessary?

Due to the shortage of living donors, many CKD patients, though keen to have a transplant, have to remain on maintenance dialysis. The only hope for such patients is a kidney from deceased or cadaver donors. The most noble human service is being able to save the lives of others after death by donating organs. A deceased kidney transplant also helps eliminate illegal organ trade and is the most ethical form of kidney donation.

What is “Brain Death”?

“Brain death” is the complete and irreversible cessation (stopping) of all brain functions that leads to death. The diagnosis of “brain death” is made by doctors in hospitalized unconscious patients on ventilator support.

1. The patient must be in a state of coma and the cause of the coma (e.g. head trauma, brain hemorrhage etc) is firmly established by history, clinical examination, laboratory testing, and neuroimaging. Certain medications (e.g. sedatives, anticonvulsants, muscle relaxants, anti-depressants, hypnotics and narcotics), metabolic and endocrine causes can lead to an unconscious state that can mimic brain death. Such causes have to be excluded before confirming the diagnosis of brain death. The doctor should correct low blood pressure, low body temperature and low body oxygen before considering brain death.
2. Persistent deep coma in spite of proper treatment under care of experts for an adequate period to “exclude the possibility of recovery”.
3. No spontaneous breathing, patient is on ventilator support.
4. Respiration, blood pressure and blood circulation is maintained with ventilator and other life support devices.

What is the difference between brain death and unconsciousness?

An unconscious patient may or may not need the support of a ventilator and is likely to recover after proper treatment. In a patient with “Brain Death,” the brain damage is severe and irreversible and is not expected to recover despite any medical or surgical treatment. In a patient with “Brain Death”, as soon as the ventilator is switched off, respiration stops and the heart stops beating. It is important to remember that the patient is already legally dead and removing the ventilator is not the cause of death. Patients with “Brain Death” cannot remain on ventilator support indefinitely, as their heart will stop relatively soon.

Is it possible to donate a kidney after dying?

No. Death occurs after the heart and respiration stop irreversibly and permanently. Like corneal donation, after death, kidney donation is not possible. When the heart stops, the blood supply to the kidney also stops, leading to severe and irreversible damage to the kidney, preventing its use for kidney transplantation.

What are the common causes for “Brain Death?”

Common causes of brain death are head injuries (i.e. falls or vehicular accidents), intracranial brain hemorrhage, brain infarct and brain tumor.

When and how is “Brain Death” diagnosed? Who diagnoses “Brain Death?”

When a deeply comatose patient kept on ventilator and other life supporting devices for an adequate period does not show any improvement on clinical and neurological examination, the possibility of “Brain Death” is considered. Diagnosis of brain death is made by a team of doctors who are not involved in kidney transplantation .This team includes the attending physician, neurologist or neurosurgeon, who, after independent examinations of the patient, declare “brain death.” By detailed clinical examination, various laboratory tests, special EEG test for brain and other investigations, all possibilities of recovery from brain damage are explored. When no chance of any recovery is confirmed, “brain death” is declared.

What are the contraindications for kidney donation from a patient with “Brain Death?”

Under the following conditions a kidney cannot be accepted from a donor with brain death:

- A patient with active infections.
- A patient suffering from HIV or hepatitis B or C.

A patient with long standing hypertension, diabetes mellitus, kidney disease or presence of kidney failure.

- Cancer patient (except brain tumor).

Which other organs can be donated by cadaver donors?

Cadaver donors can donate both kidneys and save lives of two patients. Besides kidney, other organs which can be donated are eye, heart, liver, skin, pancreas etc.

Who comprise the team for deceased kidney transplantation?

For deceased (cadaveric) kidney transplantation proper team work is necessary. The team includes:

- Relatives of the deceased kidney donor for legal consent.
- Attending physician of the donor.
- Cadaver transplant coordinator, who explains and helps the relatives of the patient for kidney donation.
- Neurologist who diagnoses the brain death.
- Nephrologist, urologist, transplant surgeon and team.

How is deceased kidney transplantation performed?

These are essential aspects of deceased kidney transplantation.

- A proper diagnosis of brain death is mandatory.
- The donor kidneys should be confirmed to be reasonably healthy and the donor should have no systemic disease that would contraindicate donation.
- Consent to donation should be given by a relative or person who is legally allowed to do so.
- Donor is kept on ventilator and other life-supporting devices to maintain respiration, art beat and blood pressure until both kidneys are removed from the body.
- After removal, the kidney is processed properly with a special cold fluid and is preserved in ice. One deceased donor can donate both kidneys, so two recipients can be given the gift of life.
- Appropriate recipients are selected from a waiting list of patients following a protocol based on blood group, HLA matching and tissue cross matching compatibility.
- Better outcomes are expected the earlier the harvested kidneys are transplanted. They should ideally be transplanted within 24 hours of harvest. Beyond a certain length of time, they may not be viable for transplantation anymore.
- The surgical procedure on the recipient is the same for both living or deceased kidney donation.
- During the period of time between harvest and transplantation, the donor kidney sustains some damage due to lack of oxygen, lack of blood supply and cold exposure from storage in ice. Because of such injury, the kidney may not function immediately after transplantation and on occasion, short term dialysis support may be necessary while waiting for the donor kidney to recover and regain function.

Is there any payment made given to the donor's family?

None. Giving another person a new lease on life is an invaluable gift. Being a donation, the donor or the donor's family should not expect to receive any payment in exchange for the donated kidney, neither does the recipient need to pay anyone. The joy and satisfaction for this humanitarian gesture should be enough compensation for the donor or the family.

Diet in Chronic Kidney Disease

The major role of the kidneys is to remove waste products and purify blood. Besides this, the kidney plays an important role in removing extra water, minerals and chemicals; it also regulates water and minerals like sodium, potassium, calcium, phosphorus and bicarbonate in the body.

In patients suffering from chronic kidney disease (CKD), regulation of fluids and electrolytes may be deranged. Because of this reason even normal intake of water, common salt or potassium can cause serious disturbances in fluid and electrolyte balance.

To reduce the burden on the kidney with impaired function and to avoid disturbances in fluid and electrolyte balance, patients with chronic kidney disease should modify their diet as per the guidance of the doctor and the dietitian. There is no fixed diet for CKD patients. Each patient is given a different dietary advice depending on clinical status, the stage of kidney failure and other medical problems. Dietary advice needs to be altered for the same patient at different times.

Goals of dietary therapy in CKD patients

1. Slow down the progression of chronic kidney disease and to postpone the need for dialysis.
2. Reduce the toxic effects of excess urea in the blood.
3. Maintain optimal nutritional status and prevent the loss of lean body mass.
4. Reduce the risk of fluid and electrolyte disturbances.
5. Reduce the risk of cardiovascular disease.

General principles of dietary therapy in CKD patients

- Restrict protein intake to <0.8 gm/kg of body weight/day for patients not on dialysis. Patients already on dialysis require an increased amount of protein (1.0 -1.2 gm/kg body weight/day) to replace protein that may be lost during the procedure.
- Supply adequate carbohydrates to provide energy.
- Supply a moderate amount of fats. Cut down the intake of butter, ghee and oil.
- Limit the intake of fluid and water in case of swelling (edema).
- Restrict the amount of sodium, potassium and phosphorus in the diet.
- Supply vitamins and trace elements in adequate amounts. A high fiber diet is recommended.

Details of selection and modification in diet of patients with CKD

High Calorie Intake

The body needs calories for daily activities and to maintain temperature, growth and adequate body weight. Calories are supplied chiefly by carbohydrates and fats. The usual caloric requirement of CKD patients is 35 - 40 kcal/kg body weight per day. If caloric intake is inadequate, the body utilizes protein to provide calories. This breakdown of protein can lead to harmful effects such as malnutrition and a greater production of waste products. It is thus essential to provide an adequate amount of calories to CKD patients. It is important to calculate the caloric requirement according to a patient's ideal body weight, and not current weight.

Carbohydrates

Carbohydrates are the primary source of calories for the body. Carbohydrates are found in wheat, cereals, rice, potatoes, fruits and vegetables, sugar, honey, cookies, cakes, sweets and drinks. Diabetics and obese patients need to limit the amount of carbohydrates. It is best to use complex carbohydrates from cereals like whole wheat and unpolished rice which would also provide fiber. These should form a large portion of the carbohydrates in the diet. All other simple sugar containing substances should form not more than 20% of the total carbohydrate intake, especially in diabetic patients. Non-diabetic patients may replace calories from protein with carbohydrates in the form of fruits, pies, cakes, cookies, jelly or honey as long as desserts with chocolate, nuts, or bananas are limited.

Fats

Fats are an important source of calories for the body and provide two times more calories than carbohydrates or proteins. Unsaturated or “good” fats like olive oil, peanut oil, canola oil, safflower oil, sunflower oil, fish and nuts are better than saturated or “bad” fats such as red meat, poultry, whole milk, butter, ghee, cheese, coconut and lard. Patients with CKD should reduce their intake of saturated fats and cholesterol, as these can cause heart disease.

Among the unsaturated fats it is important to pay attention to the proportion of monounsaturated and polyunsaturated fats. Excessive amounts of omega-6 polyunsaturated fatty acids (PUFA) and a very high omega-6/omega-3 ratio is harmful while low omega-6/omega-3 ratio exerts beneficial effects. Mixtures of vegetable oil rather than single oil usage will achieve this purpose. Trans fat containing substances like potato chips, doughnuts, commercially prepared cookies and cakes are potentially harmful and should be avoided.

Restrict Protein Intake

Protein is essential for the repair and maintenance of body tissues. It also helps in healing of wounds and fighting against infection. Protein restriction (< 0.8 gm/kg body weight/day) is recommended for CKD patients not on dialysis to reduce the rate of decline in kidney function and delay the need for dialysis and kidney transplantation. Severe protein restriction should be avoided however because of the risk of malnutrition. Poor appetite is common in CKD patients. Poor appetite and strict protein restriction together can lead to poor nutrition, weight loss, lack of energy and reduction in body resistance, which increase the risk of death. Proteins with high biologic value such as animal protein (meat, poultry and fish), eggs and tofu are preferred. High-protein diets (e.g. Atkins diet) should be avoided in CKD patients. Likewise, the use of protein supplements and drugs such as creatine used for muscle development are best avoided unless approved by a physician or dietitian. However, once a patient is on dialysis, protein intake should be increased to 1.0 – 1.2 gm/kg body weight/day to replace the proteins lost during the procedure.

Fluid Intake

Why must patients with CKD take precautions regarding fluid intake?

The kidneys play a major role in maintaining the proper amount of water in the body by removing excess fluid as urine. In patients with CKD, as the kidney function worsens, the volume of urine usually decreases. Reduced urine output leads to fluid retention in the body causing puffiness of the face, swelling of the legs and hands and high blood pressure. Accumulation of fluid in the lungs (a condition called pulmonary congestion or edema) causes shortness of breath and difficulty in breathing. If this is not controlled, it can be life threatening.

What are the clues that suggest excess water in the body?

Excess water in the body is called fluid overload. Leg swelling (edema), ascites (accumulation of fluid in the abdominal cavity), shortness of breath, and weight gain in a short period are the clues that suggest fluid overload.

What precautions must CKD patients take to control fluid intake?

To avoid fluid overload or deficit, the volume of fluid should be recorded and followed as per the

recommendation of the doctor. The volume o fluid permitted may vary for each CKD patient and is calculated on the basis of urine output and fluid status of each patient.

How much fluid is a chronic kidney disease patient advised to take?

- In patients without edema and with adequate urine output unrestricted water and fluid intake is permitted. It is a common misconception that patients with kidney disease should take large amounts of fluid to protect the kidney. The amount of fluid allowed is dependent on the clinical status and kidney function of the patient
- Patients with edema and reduced urine output are instructed to restrict fluid intake. To reduce swelling, fluid intake in 24hours should be less than the volume of urine produced per day.
- In order to avoid fluid overload or deficit in patients without edema the allowable volume of fluid per day = urine volume of previous day plus 500 ml. The additional 500 ml of fluid approximately make up for the fluids lost through perspiration and breathing.

Why must CKD patients maintain a record of their daily weights?

Patients should keep a record of their daily weight to monitor fluid volume in the body and to detect fluid gain or loss. The body weigh remains constant when the instructions regarding fluid intake are followed strictly. Sudden weight gain indicates fluid overload due to increase in fluid intake. Weight gain warns the patients about the need for more meticulous fluid restriction. Weight loss usually occurs as a combined effect of restriction of fluid and a response to diuretics.

Useful Tips to Reduce Fluid Intake

It is difficult to restrict fluid intake, but these tips will help you:

1. Weigh yourself at the same time every day and adjust fluid intake accordingly.
2. The doctor advises you on how much fluid consumption is permitted in a day. Calculate accordingly and take the measured volume of fluid everyday. Remember that fluid intake includes not only water but also tea, coffee, milk, juice, ice cream, cold drinks, soup, and other foods with a high water content such as watermelon, grapes, lettuce, tomatoes, celery, gravy, gelatin, and frozen treats like popsicles.
3. Reduce salty, spicy and fried food in your diet as they increase thirst, leading to a greater consumption of fluids.
4. Drink only when you are thirsty. Do not drink as a habit or because everyone is drinking.
5. When you are thirsty, take only a small amount of water or try ice. Take a small ice cube and suck it. Ice stays longer in the mouth than liquid, so it is more satisfying than the same amount of water. Do not forget to account for ice as consumed fluid. For easy calculation, freeze the allotted amount of water into an ice tray.
6. To take care of dryness of the mouth, one can gargle with water without drinking it. Dryness of mouth can be reduced by chewing gums, sucking hard candy, lemon wedge or mints and the use of mouthwash to moisten the mouth.

7. Always use a small sized cup and glass for your beverages to limit fluid intake.
8. Take medicines after meals when you are taking water to avoid extra water consumption for medicine.
9. A patient must keep himself busy with work. A patient who has little to occupy himself feels the desire to drink water more often.
10. High blood sugar in diabetic patients can increase thirst. A stringent control of blood sugar is essential to reduce thirst.
11. Since hot weather increases one's thirst, any measure taken to live in cooler comfort is desirable and recommended.

How does one measure and consume the prescribed amount of fluid per day?

- Fill a container with water, equal to the exact amount of fluid prescribed by the doctor for daily intake.
- The patient must bear in mind that no more than that amount of fluid intake is permitted for the day.
- Each time the patient consumes a certain amount of fluid, the same amount of water should be removed from the water container and discarded.
- When the container has no more water, the patient will have consumed his quota of fluid for the day and should not drink anymore.
- It is advisable to distribute total fluid intake evenly throughout the day to avoid the need for additional fluid.
- Repeated daily, this method, if followed, effectively delivers the prescribed amount of fluid per day and prevents excessive fluid intake.

Salt (Sodium) Restriction in Diet

Why is a low sodium diet advised for patients with CKD?

Sodium in our diet is important for the body to maintain blood volume and to control blood pressure. Our kidneys play an important role in the regulation of sodium. In patients with CKD, the kidneys cannot remove excess sodium and fluid from the body so sodium and water build up in the body. An increased amount of sodium in the body leads to increased thirst, swelling, shortness of breath and increase in blood pressure. To prevent or reduce these problems, patients with CKD must restrict sodium intake in their diet.

What is the difference between sodium and salt?

The words sodium and salt are commonly used as synonyms. Common salt (table salt) is sodium chloride and contains 40% sodium. Salt is the principle source of sodium in our diet. But salt is not the only source of sodium. There are quite a few other sodium compounds in our food, such as:

- Sodium alginate: Used in ice-cream and chocolate milk

- Sodium bicarbonate: Used as baking powder and soda
- Sodium benzoate: Used as a preservative in sauce
- Sodium citrate: Used to enhance flavor of gelatin, desserts and beverages
- Sodium nitrate: Used in preserving and coloring processed meat
- Sodium saccharide: Used as artificial sweetener
- Sodium sulfite: Used to prevent discoloration of dried fruits The above mentioned compounds contain sodium but are not salty in taste. Sodium is hidden in these compounds.

How much salt should one take?

A typical daily intake of salt is about 10 to 15 grams (4-6 grams of sodium) per day. Patients with CKD should take salt according to the recommendation of the doctor. CKD patients with edema (swelling) and high blood pressure are usually advised to take less than 2 grams of sodium per day.

Which foods contain high amounts of sodium?

Foods high in sodium include:

1. Table salt (common salt), baking powder
2. Processed foods like canned foods, fast foods and "deli" meats3. Readymade sauces
3. Seasonings and condiments such as fish sauce and soy sauce
4. Baked food items like biscuits, cakes, pizza and breads
5. Wafers, chips, popcorn, salted groundnuts, salted dry fruits like cashew nuts and pistachios
6. Commercial salted butter and cheese
7. Instant foods like noodles, spaghetti, macaroni, and cornflakes
8. Vegetables like cabbage, cauliflower, spinach, radish, beetroot, and coriander leaves
9. Coconut water
10. Drugs like sodium bicarbonate tablets, antacids, laxatives
11. Non-vegetarian foods like meat, chicken, and animal innards like kidneys, liver and brain
12. Sea foods like crab, lobster, oyster , shrimp, oily fish and dried fish

Practical Tips to Reduce Sodium in Food

1. Restrict salt intake and avoid extra salt and baking soda in diet. Cook food without salt and add permitted amounts of salt separately. This is the best option to reduce salt intake and ensure consumption of the prescribed amount of salt in everyday diet.
2. Avoid foods with high sodium content (as listed above).
3. Do not serve salt and salty seasonings at the table or altogether remove the salt shaker from the dining table.

4. Carefully read labels of commercially available packaged and processed foods. Look not only for salt but also for other sodium containing compounds. Carefully check the labels and choose “sodium-free” or “low-sodium” food products. Make sure however that potassium is not used to substitute sodium in these foods.
5. Check sodium content of medications.
6. Boil vegetables with high sodium content. Throw away the water. This can reduce sodium content in vegetables.
7. To make a low salt diet tasty, one can add other spices and condiments such as garlic, onion, lemon juice, bay leaf, tamarind pulp, vinegar, cinnamon, cloves, nutmeg, black pepper, and cumin.
8. Caution! Avoid the use of salt substitutes as they contain high amounts of potassium. High potassium content of salt substitutes can raise the potassium levels in blood to dangerous levels in CKD patients.
9. Do not drink softened water. In the process of water softening, calcium is replaced by sodium. Water purified by reverse osmosis process is low in all minerals including sodium.
10. While eating at restaurants, select foods that contain less sodium.

Potassium Restriction in Diet

Why are CKD patients advised to restrict potassium in diet?

Potassium is an important mineral in the body that is needed for the proper functioning of muscles and nerves and to keep the heart beat regular. Normally, the level of potassium in body is balanced by eating potassium containing foods and removal of excess potassium in the urine. Removal of excess potassium in the urine may be inadequate in a patient with chronic kidney disease and can lead to the accumulation of a high level of potassium in the blood (a condition known as hyperkalemia). The risk of hyperkalemia is less in patients undergoing peritoneal dialysis compared to those on hemodialysis. The risk differs in both groups because the process of dialysis is continuous in peritoneal dialysis while it is intermittent in hemodialysis.

High potassium levels can cause severe muscle weakness or an irregular heart rhythm that can be dangerous. When potassium is very high, the heart can stop beating unexpectedly and cause sudden death. High potassium levels can be life threatening without noticeable manifestations or symptoms (and therefore it is known as a silent killer).

To avoid serious consequences of high potassium, CKD patients are advised to restrict potassium in diet.

What is normal potassium level in blood? When is it considered high?

The normal serum potassium (level of potassium in blood) is 3.5 mEq/L to 5.0 mEq/L.

When the serum potassium is 5.0 to 6.0 mEq/L, dietary potassium needs to be limited.

When the serum potassium is greater than 6.0 mEq/L, active medical intervention is needed to reduce it.

A serum potassium greater than 7.0 mEq/L is life threatening and needs urgent treatment such as emergency dialysis.

Classification of food according to potassium content:

To maintain proper control of potassium in blood, food intake must be modified as per the doctor’s advice. On the basis of potassium contents, foods are classified into three different groups (high, medium, and low potassium containing foods).

High potassium = More than 200 mg/ 100 gms of food

Medium potassium = 100 to 200 mg/ 100 gms of food

Low potassium = Less than 100 mg/ 100 gms of food

Foods with high potassium content

- **Fruits:** Fresh apricot, ripe banana, chico, fresh coconut, custard apple, gooseberry, guava, kiwi fruit, ripe mango, oranges, papaya, peach, pomegranate and plum
- **Vegetables:** Broccoli, cluster beans, coriander, drumstick, mushroom, raw papaya, potato, pumpkin, spinach, sweet potato, tomatoes and yam
- **Dry fruits:** Almond, cashew nut, dates, dry figs, raisins and walnut
- **Cereals**: wheat flour
- **Legumes:** Red and black beans and mung beans
- **Non-vegetarian food:** Fish like anchovy and mackerel; shell fish like prawns, lobster and crabs; and beef
- **Drinks:** Coconut water, condensed milk, buffalo milk, cow milk, chocolate drinks, fresh fruit juices, soup, beer, wine and many aerated drinks
- **Miscellaneous:** Chocolate, chocolate cake, chocolate ice cream, Lona salt (salt substitute), potato chips and tomato sauce

Foods with Medium Potassium Content

- **Fruits :** ripe cherries, grapes, lychees, pear, sweet lime and watermelon
- **Vegetables:** Beet root, raw banana, bitter gourd, cabbage, carrot, celery, cauliflower, French beans, okra (ladies finger), raw mango, onion, radish, green peas, sweet corn and safflower leaves
- **Cereals:** Barley, general purpose flour, noodles made from wheat flour, rice flakes (pressed rice) and wheat vermicelli
- **Legumes**: red and black beans and mung beans.
- **Non-vegetarian food:** Liver
- **Drinks:** curd

Foods with Low Potassium Content

- **Fruits :** Apple, blackberries, lemon, pineapple and strawberries
- **Vegetables :** Bottle gourd, broad beans, capsicum, cucumber, garlic, lettuce, green peas, raw mango and pointed gourd
- **Cereals :** Rice, rava and wheat semolina
- **Legumes :** Green peas
- **Non-vegetarian food :** Beef, lamb, pork, chicken and egg
- **Drinks :** Coca-cola, coffee, lemonade, lime juice in water, and soda
- **Miscellaneous :** Cloves, dried ginger, honey, mint leaves, mustard, nutmeg, black pepper and vinegar

Practical Tips to Reduce Potassium in Food

1. Take one fruit per day, preferably with low potassium.
2. Take one cup of tea or coffee per day.
3. Vegetables with potassium should be taken after reducing the amount of potassium (as mentioned below).
4. Avoid coconut water, fruit juices and foods with high potassium contents (as listed above).
5. Almost all food contains some potassium, so the key is to choose foods with a low potassium content when possible.
6. Restriction of potassium is necessary not only for predialysis CKD patients, but is also necessary even after initiating dialysis.

How does one reduce potassium content in vegetables?

- Peel and cut vegetables into small pieces.
- Wash vegetables with lukewarm water and put them in a large pot.
- Fill the pot with hot water (the quantity of water must be four to five times the volume of vegetables) and soak the vegetables for at least one hour.
- After soaking the vegetables for 2 - 3 hours, rinse them three times with warm water.
- Subsequently boil the vegetables with extra water. Discard the water.
- Cook the boiled vegetables as desired.
- Although you can reduce the amount of potassium in vegetables, it is still preferable to avoid high potassium containing vegetables or take them in small quantities.
- As vitamins are lost in cooked vegetables, vitamin supplements should be taken as per the doctor's advice.

Special tips for leaching potassium from potatoes

- Dicing, slicing or grating potatoes into smaller pieces is important. Maximizing the surface of the potatoes exposed to water by this method helps increase potassium loss from the potatoes.
- The temperature of the water used to either soak or boil the potatoes makes the difference.
- Using large amounts of water to soak or boil potatoes is helpful.

Phosphorus Restriction in Diet

Why must CKD patients take a low phosphorus diet?

- Phosphorus is a mineral essential to keep bones strong and healthy. Excess phosphorus present in food is removed from the body by urine excretion. This maintains blood phosphorus levels.
- The normal value of phosphorus in blood is 4.0 to 5.5 mg/dl.
- Patients with CKD cannot eliminate the extra phosphorus taken in food so the blood level rises. This increased phosphorus drains out calcium from the bones making them weak.
- Increase in phosphorus level can lead to many problems like itching, weakness of muscles and bones, bone pains, bone stiffness and joint pains. The stiffness of bone results in increased susceptibility to fracture.

What foods containing high phosphorus should be reduced or avoided?

Foods containing high phosphorous include:

- Milk and dairy products: cheese, chocolate, condensed milk, ice cream, milk shake.
- Dry fruits: cashew nuts, almonds, pistachios, dry coconut, walnuts.
- Cold drinks: dark colas, beer.
- Carrot, corn, groundnut, fresh peas, sweet potato.
- Animal protein: meats, chicken, fish and egg.

High Vitamin and Fiber Intake

CKD patients generally suffer from an inadequate supply of vitamins during the predialysis period due to poor appetite, and an overly restricted diet in the attempt to delay progression of renal disease. Certain vitamins – especially water soluble vitamins B, vitamin C and folic acid – are lost during dialysis.

To compensate for inadequate intake or loss of these vitamins, CKD patients usually need supplementation of water-soluble vitamins and trace elements. High fiber intake is beneficial in CKD. Patients are therefore advised to take more fresh vegetables and fruits rich in vitamin and fibers while avoiding those with high potassium content.

Designing the Daily Food

For CKD patients daily food intake and water intake are planned and charted out by the dietitian in accordance with the advice of the nephrologist.

Common principles for the diet plan

1. **Water and liquid food intake.** Fluid intake should be restricted according to the doctor's advice. Daily weight chart must be maintained. Any inappropriate gain in weight may indicate increased fluid intake.
2. **Carbohydrate:** To ensure that the body gets adequate calories, the CKD patient can take sugar or glucose containing food along with cereals provided he/she is not diabetic.
3. **Protein**: Lean meat, milk, cereals, legumes, eggs and chicken are the main sources of protein. CKD patients who are not on dialysis are advised to limit dietary protein to < 0.8 grams/kg body weight/day. Once dialysis is started, dietary intake can be increased to 1-1.2 grams/kg body weight/day. Patients undergoing peritoneal dialysis may need dietary proteins as high as 1.5 grams/kg body weight per day. While animal proteins contain all essential amino acids (hence are called complete proteins or proteins with high biologic value) and would be ideal, they should be limited especially in patients not yet on dialysis because they may accelerate the progression of CKD.
4. **Fat:** Fats may be taken in as an energy source since they are a good source of calories. Monounsaturated and polyunsaturated fats in the form of olive oil, safflower oil, canola oil or soybean oil may be taken in limited quantities. Avoid saturated fats such as those found in animal lards.
5. **Salt**: Most patients are advised to take a low salt diet. It is good to observe a "no added salt" diet. Look at food labels and go for low sodium foods but make sure that salt substitutes containing high amounts of potassium are also avoided. Check food labels for other foods containing sodium such as sodium bicarbonate (baking powder) and avoid them.
6. **Cereals:** Rice or rice products like flattened rice can be taken. To avoid monotony of taste one can rotate intake of various cereals like wheat, rice, sago, semolina, all purpose flour, and cornflakes. Small quantities of corn and barley can be taken.
7. **Vegetables:** Vegetables with low potassium can be liberally taken. But vegetables with high potassium must be processed to remove potassium before consumption. To improve taste, lemon juice can be added.
8. **Fruits:** Fruits with low potassium content like apple, papaya and berry can be taken but only once a day. On the day of dialysis , patients can take any one fruit. Fruit juice and coconut water must be avoided.
9. **Milk and milk products**: Milk and milk products such as milk, yogurt and cheese contain large amounts of phosphorus and need to be limited. Other dairy foods that have lower amounts of phosphorus include butter, cream cheese, ricotta cheese, sherbets and nondairy whipped toppings may be taken instead.

10. **Cold drinks**: Avoid dark colored sodas as they have a high phosphorus content. Do not take fruit juice or coconut water because of the potentially high potassium content.
11. **Dry fruits:** Dry fruits, groundnut, sesame seeds, fresh or dry coconut must be avoided.

Filtering Dialysis Myths from Facts

Myth: Dialysis is painful.

Fact: Depending on the form of dialysis you choose, if you are on hemo-dialysis you may have some discomfort when the needles are put into your fistula or graft, but most patients usually have no other problems. The dialysis treatment itself is painless. However, some patients may have a drop in their blood pressure that could lead to nausea, vomiting, headaches or cramps however, if you take care to follow your kidney diet and fluid restrictions these types of side effects can be avoided.

Myth: Due to time constraints and exhaustion, dialysis patients can't travel.

Fact: Dialysis centers are located in every part of the India, United States and in many foreign countries. The treatment is standardized. You must make an appointment for dialysis treatments at another center before you go. Your facility social worker can inform you about what you need to do. Regarding exhaustion, if you take care of yourself and follow your doctor's recommendations you should feel fine.

Myth: Dialysis patients do not have the time or energy to work.

Fact: Many dialysis patients can go back to work or school after they have gotten used to dialysis.

Myth: All kidney diseases are incurable

Fact: all kidney diseases are not incurable. With early diagnosis and treatment many kidney diseases can be cured. In many, it slows or halts the progression.

Myth: Kidney failure can occur if one kidney fails

Fact: kidney failure occurs only when both kidneys fail. Usually people do not have any problem if one kidney fails completely, and in such cases, value of blood urea and serum creatinine in blood tests are normal. But when both kidneys fail, waste products accumulate in the body and the raised level of blood urea and serum creatinine in blood test suggests kidney failure

Myth: In kidney disease the presence of edema suggests kidney failure.

Fact: In certain kidney diseases edema is present, but kidney function is totally normal (e.g. nephrotic syndrome).

Myth: Edema is present in all patients with kidney failure.

Fact: Edema is present in majority of patients with kidney failure, but not in all. A few patients do not have edema even in advance stage of kidney failure. So the absence of edema does not rule out kidney failure.

Myth: All patients with kidney disease should drink a large amount of water.

Fact: No. Reduced urine output leading to swelling is an important feature of many kidney diseases. So water restriction is necessary to maintain water balance in such patients with kidney disease. However, patients suffering from stone disease and urinary tract infection with normal renal function are advised to drink a large amount of water.

Myth: I am all right, so I don't think I have a kidney problem.

Fact: Most of the patients are asymptomatic (showing no symptoms) in early stages of chronic kidney disease. Abnormal values in laboratory tests are the only clue of its presence at this stage.

Myth: I feel fine, so I don't need to continue treatment for my kidney problem.

Fact: Many patients with chronic kidney disease (CKD) feel very well with proper therapy, and so they discontinue medicine and dietary restrictions. Discontinuation of therapy in CKD can be dangerous. It can lead to rapid worsening of kidney failure and in a short time such patients may reach the stage needing dialysis / kidney transplantation

Myth: My serum creatinine level is slightly above normal. But I am perfectly well so there's nothing to worry about.

Fact: Even mild increase in serum creatinine is an indicator of kidney impairment and needs attention. A variety of kidney diseases can damage the kidneys, so the nephrologist should be consulted without delay. Let us understand the importance of raised value of serum creatinine (even a little) at different stages of chronic kidney disease. Early stage of chronic kidney disease is usually asymptomatic, and increased value of serum creatinine may be the only clue of underlying kidney disease. Serum creatinine level of 1.6 mg/dl means over 50% of kidney function is already lost, which is significant. Detection of chronic kidney disease and initiation of proper therapy at this stage is most rewarding. Treatment under the care of a nephrologist at this stage of chronic kidney disease helps to preserve kidney function for a very long time. When serum creatinine level is 5.0 mg/dl, it means 80% of kidney function is lost. This value suggests seriously impaired kidney function. Proper therapy at this stage is beneficial to preserve kidney function. But it is important to remember that this is a late stage of chronic kidney

Myth: The only option for receiving dialysis treatment is to travel to a center at least three times per week for hours at a time.

Fact: Dialysis can be done in many ways: You can do hemo-dialysis which is done in a dialysis unit, a hospital or in the comfort of your own home. Or, you can do peritoneal dialysis which is done in your home. You and your doctor decide which form of dialysis and place is best for you, and based on your medical condition and your wishes.

Myth: Now my blood pressure is normal so I don't need antihypertensive pills. I feel better if I don't take antihypertensive pills, so why should I take medicine?

Fact: Many patients of high blood pressure discontinue their medicine after blood pressure is controlled, as they don't have any symptoms or they feel better without antihypertensive medicines. But uncontrolled hypertension is a silent killer which in a long term can lead to serious problems

like heart attack, kidney failure and stroke. So to protect vital organs of the body, it is essential to take regular medicine and control blood pressure properly even though no symptoms are noticed and the person feels apparent Myth: Dialysis cures kidney failure. Fact: No, dialysis does not cure kidney failure. Dialysis is an effective and lifesaving treatment in kidney failure, which removes waste products, extra water and corrects electrolytes as well as acid base disturbances. Dialysis carries out the function that kidney is no longer capable of doing. Dialysis keeps patient asymptomatic, fit and healthy in spite of severe kidney failure.

How will I find a center to dialyze at?

If you plan to visit friends or family out of town, they may be able to give you the name and address of the dialysis center nearest them. Resource publications are available at your center listing dialysis centers around the world that are willing to accept transient dialysis patients. Your care team or the patient travel coordinator at your center will be able to assist you.

What if I need to travel in an emergency?

Many dialysis centers make every effort to accommodate patients in the event of an emergency such as illness or death of a family member. Dialysis records can be faxed ahead, or you can hand carry them with you.

What information will my transient dialysis center need to safely provide dialysis for me?

Most dialysis centers require the following information in order to assess your health and plan for your treatments with them:

- The dates you need for dialysis treatment
- Your name, address, etc.
- Medical history and recent physical exam reports
- Recent lab results
- Recent ECG
- Recent chest x-ray
- Your dialysis prescription and 3 to 5 recent treatment records
- Dialysis access type
- Special needs or dialysis requirements
- Information about your general health
- Insurance information
- Where you will be staying in the area
- A list of the medications you take during treatment and at home.

This information will be sent to your destination center for review. It is important for the doctor and transient center to know as much about you as possible in order to care for your needs while visiting their center. In addition to mailing your records to the center, you should hand carry a copy with you.

How can I be sure about the quality of care I will be getting away from my regular center?

You may ask the following questions when making your arrangements for hemodialysis during your trip:

- Does the center reuse dialyzers?
- Does the center reuse bloodlines?
- What is the average treatment length of dialysis at the center?
- Can they provide the treatment time your doctor has prescribed?
- What types of dialyzers are used?
- Can you use the same type of dialyzer you use at your home center?
- What types of dialysis machine does the center have?
- Are patients permitted to eat or drink while on dialysis?
- Is public transportation available to get to the center?
- How many patients are assigned to each nurse or patient care technician?
- Can you get all the medications you get at your home center during dialysis?

What if I get sick while I am visiting another center?

Don't overdo it! Be realistic when planning activities. Allow enough time to enjoy sightseeing outings and activities without becoming overtired. Also, be sure to watch your diet and fluid intake. Before you begin your trip, you will most likely have a doctor assigned to you by your transient dialysis center. Find out how to contact the doctor when you first arrive. If you do become ill, call the dialysis center or doctor as instructed.

It is possible that a transient patient may require hospitalization. If this should happen to you, your transient doctor is prepared for this possibility and will care for you during your hospital stay. He or she will probably talk to your regular doctor to coordinate your care. You may feel more comfortable to know if this coordination has taken place. Being hospitalized while away from home can be a stressful experience for any patient, and it certainly can change your travel plans.

Preparing ahead for this possibility can help make the experience less stressful. The following suggestions may be helpful:

- Make sure your family knows your travel plans.
- Make sure you have important phone numbers with such names as your regular doctor, dialysis center, etc. Have a copy of your medical records with you while traveling.
- Make sure anyone who is traveling with you knows where you keep your records and what your medical needs are.
- Make sure to bring enough of the medications you need to take to last for the entire trip, with enough extra to deal with possible emergencies such as lost luggage or a spill. Also carry written prescriptions just in case.

What should peritoneal dialysis patients know about traveling?

Traveling is often easier for peritoneal dialysis patients because they are not dependent on the availability of a dialysis unit. Peritoneal dialysis patients still need to plan ahead and arrange for back-up medical care for their trips, as do hemodialysis patients. Typically, this would mean contacting a dialysis center in the area where you will be and asking if they would be available should a problem arise. The center may request a copy of your medical records in advance. In any case, you should always carry a copy of your records with you as well.

CAPD patients should carry enough supplies for the length of the trip, plus some extra supplies in case of problems. It may also be possible to arrange for delivery of supplies to your destination for longer stays. Make sure these supplies have arrived before you leave on your trip. CAPD patients also need to plan for adequate clean space where they may do their exchanges while traveling.

APD patients who plan to travel for one week or longer can arrange for supplies to be delivered to their destination. Smaller cycler machines are now available, which are easy to carry on airplanes and to use in hotel rooms, campers, etc.

What should diabetic patients know about traveling?

Since the unexpected may happen during a trip and meals may be delayed, you should carry glucose tablets and appropriate snacks, such as low-potassium juice boxes or hard candy, to treat low blood sugar. It's a good idea to travel with a "brown-bag" lunch or a packaged nutritional supplement in case of delays. Managing your diabetes can be made simpler by having insulin, syringes and blood glucose monitoring supplies handy.

What is cardiovascular disease?

Cardiovascular disease means having problems with your heart and the blood vessels throughout your body, including brain, lungs and legs. Heart and blood vessel disease is common in people with chronic kidney disease (CKD). Over time, the blood vessels that bring blood to the heart and brain can become blocked from a (build- up) of cells, fat and cholesterol. This reduces blood flow to the heart and brain and can cause heart attacks and strokes.

Are there different kinds of heart and blood vessel disease?

Yes. Some of the most common ones are:

- Coronary artery disease – The most common form of heart disease. It affects blood vessels of the heart and causes angina (chest pain) and heart attacks.
- Left ventricular hypertrophy – The muscle on the left side of the heart becomes thicker and does not working as well.
- Heart failure – The heart is not able to pump blood around the body as well as it should. Heart failure develops slowly over time. It can have a large impact on ability to perform daily activities.
- Stroke – Lack of blood flow to the brain. A stroke may be caused by a blood clot or bleeding in the brain from a broken blood vessel.

Do dialysis patients have an increased risk for heart and blood vessel disease?

Yes. Dialysis patients are much more likely than the general population to develop heart and blood vessel disease. This increased risk is related to kidney disease and other health problems like diabetes and high blood pressure. For this reason, it's very important for dialysis patients to follow the steps to help prevent heart and blood vessel problems (see next section). If heart and blood vessel problems occur, patients need to follow their treatment plan carefully to avoid complications like heart attacks and strokes.

Can dialysis patients do anything to help prevent heart and blood vessel disease?

Yes. Take steps to control health problems that can lead to heart and blood vessel disease, especially diabetes and high blood pressure. Follow a healthy lifestyle-eat the right foods, exercise regularly and stop smoking.

Here are some steps that can help prevent heart and blood vessel disease. Speak to your doctor about them. The doctor and other members of your health care team will work with you to develop a care plan that meets your needs.

Control blood sugar if you have diabetes

Check your blood sugar as often as your doctor tells you to. Follow your treatment plan of medications, diet and exercise.

Keep high blood pressure controlled

Follow your treatment plan carefully to control high blood pressure. The blood pressure pills usually preferred for people with CKD are called angiotensin converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs). They help to protect your heart. Be sure to follow your fluid and sodium (salt) limits to keep fluid from building up in your body and increasing your blood pressure. Ask your health care team about other steps to help prevent fluid (build-up).

The target blood pressure for dialysis patients before a dialysis treatment is less than 140/90. The target blood pressure after a dialysis treatment is less than 130/80. Ask your doctor or nurse if your blood pressure readings are on target. If you check your own blood pressure at home, keep a record of your daily blood pressures and show this to your doctor at each visit. If your blood pressure readings are not on target, ask your doctor what can be done to improve them.

Reduce high cholesterol levels

High blood levels of fats like cholesterol increase your chance of developing heart and blood vessel problems. You will have blood tests to check for total cholesterol and other fats in your blood. If your levels are too high, you may need to follow a low-fat diet and exercise more. Some patients may also need to take pills (such as a Statin) to help lower cholesterol.

Follow a heart-healthy diet

Your diet should have the right amount of protein and calories to keep you at a healthy weight. Your doctor and dietitian may also ask you to:

- Reduce foods that are high in saturated fats and cholesterol like eggs, whole milk, cheese and fried foods.
- Eat more foods that are rich in heart-healthy omega-3 fatty acids. These include cold water fish like salmon, albacore tuna, lake trout and sardines, and other foods like flaxseed oil, canola oil and walnuts.

If you are on a protein or potassium modified diet, speak to your doctor and dietitian before making any changes in your diet.

Increase physical activity

Be sure to ask your doctor about an exercise program that is right for you. Regular exercise helps you:

- Lower high cholesterol levels
- Control blood sugar levels if you have diabetes
- Reduce high blood pressure
- Lose excess weight
- Improve the fitness of your heart and lungs
- Increase your energy level
- Improve emotional well-being.

Treat anemia

CKD patients often develop anemia-a low red blood cell count. This makes you feel tired and can lead to a heart problem called left ventricular hypertrophy.

This is a thickening of the muscle on the left side of the heart. Anemia can be treated with a hormone called erythropoietin (EPO) and extra iron. Correcting anemia helps to keep your heart healthy.

Keep important minerals—calcium and phosphorus—in balance.

These important minerals get out of balance when you have CKD. As a result, bones lose calcium and weaken over time. Some calcium may end up in parts of your body where it does not belong, like your heart and blood vessels. This makes your blood vessels get stiffer and narrower. When this happens, you are more likely to have a heart attack or stroke. You may need to:

- Follow a diet that is low in high-phosphorus foods like cola drinks, dairy foods, dried beans and peas and nuts and seeds. Discuss this diet with a registered dietitian.
- Take medications called phosphate binders. These help to keep your blood phosphorus level in a healthy range.
- Take an active form of vitamin D if your doctor orders it for you.

Speak to your doctor about taking aspirin to prevent heart attacks

Your doctor may ask you to take aspirin to help prevent heart attacks. Sometimes aspirin can cause

bleeding problems. Ask your doctor what signs and symptoms you should look for to check for bleeding problems caused by aspirin.

Reduce high homocysteine levels

Homocysteine is an amino acid that is made in your body. High levels of homocysteine in your blood are associated with an increased chance of having heart and blood vessel problems. Getting enough folic acid, vitamin B6 and vitamin B12 helps keep homocysteine levels in the normal range. Ask your doctor to give you the name of a vitamin that contains the right amounts of folic acid, vitamin B6 and vitamin B12 for people with kidney disease.

Stop smoking if you are a smoker

If you are a smoker, ask your doctor about a program to help you quit.

Smoking makes you more likely to develop heart and blood vessel disease.

Maintain emotional well-being

At times, dialysis patients may feel depressed, angry or upset. These feelings can make it harder for you to follow your treatment plan, improve your health and return to your normal routine. They may also increase your chance of developing heart disease or of making it worse. It's important to get treatment if you have these feelings. Talk to your dialysis social worker or your doctor to find out if counseling and/or medications may be helpful.

Should dialysis patients have tests for heart and blood vessel disease?

Yes. To check how well your heart is working, you should have:

- An electrocardiogram (ECG) when you first start dialysis and then once a year after that.
- An echocardiogram when you first start dialysis.
- If these tests show any problem, you may also need to have:
- A stress echocardiogram (a type of echocardiogram that includes exercise, usually on a treadmill) or a nuclear imaging test. These are done to check for a blocked artery.
- An angiogram (an x-ray of the heart or arteries) to locate a blocked area and help plan treatment.

What type of treatment will I need if I have heart and blood vessel disease?

Your treatment will depend on the exact type of heart and blood vessel disease you have. See the chart to find out about some of the treatments used for the most common types of heart and blood vessel disease. If you have a different type, your doctor will speak to you about the treatment you need.

What if I have more questions?

You should speak to your doctor and other members of your health care team.

NUTRITION

Now that you are beginning hemodialysis, there may be many changes in your daily life. Your doctor has probably told you that you may need to make some changes in your diet. The renal dietitian at your dialysis center will help you plan a diet for your special needs.

Why do I need to be on a special diet?

Because your kidneys are not able to get rid of enough waste products and fluids from your blood and your body now has special needs, you will need to limit fluids and change your intake of certain foods in your diet. How well you feel will depend on:

- eating the right kind and amounts of food from your diet
- having the hemodialysis treatments your doctor orders for you
- taking the medications your doctor orders for you. Your diet is very important to your care. It is important that you have the right amount of protein, calories, fluids, vitamins and minerals each day. Your dietitian will help you plan your meals to make sure you get the proper balance.

How will I know if I am eating right to keep me healthy?

Because you are on dialysis, you have some very special needs. Eating well helps you stay healthy. Eating poorly can increase your risk of illness. Your dietitian will talk with you about how well you are eating.

Some questions you might be asked:

- Have you noticed a change in the kind or amount of food you eat each day?
- Have you had any problems eating your usual or recommended diet?
- Have you lost weight without trying?
- Have you noticed any changes in your strength or ability to take care of yourself?

Your dietitian or nurse might look at the fat and muscle stores in your face, hands, arms, shoulders, and legs. Your dialysis care team will look for changes in your blood level of proteins, and especially one called albumin. A change in this protein can mean that you are losing body protein.

What if I have high cholesterol?

Changing your diet may help lower the cholesterol level in your blood. Your dietitian will talk with you about the kinds of fat and animal foods you eat. Also, your doctor may decide you need a special medication to reduce the cholesterol in your blood.

What if I have diabetes?

In some cases, you may need to make only a few changes in your diet to fit your needs as a kidney patient. For example, some of the free foods you have been using may need to be limited on your kidney diet. Your dietitian will help develop a meal plan especially for you.

Is there anything else I should know?

The following important tips can be helpful with your diet:

- Fresh or plain frozen vegetables contain no added salt. Drain all the cooking fluid before serving.
- Canned fruits usually contain less potassium than fresh fruits. Drain all the fluid before serving.
- Non-dairy creamers are low in phosphorus and can be used in place of milk.
- Labels on food packages will give you information about some of the ingredients that may not be allowed in your diet. Learn to read these labels.
- To help you avoid salt, many herbs and spices can be used to make your diet more interesting. Check with your dietitian for a list of these.

Renal failure: A patient with chronic ureania, usually requires 2 or 3 treatments per week. Each lasting for 4 to 8 hours. During each treatment the patients blood will makes a number of round trips through the dialysate solutionin the artificial kidney laundering it to maintain normal blood levels of life sustaining substances that the patients own kidney can no longer accomplish.

Objectives of Dietary Management

1. To maintain protein & K.cal balance
2. To prevent dehydration of fluid over load
3. To maintain acceptable serum phasphorous & calcium levels
4. To maintain normal potassiom & normal blood levels
5. To control of infection is an underlying goal Protein A protein allowance of 1 gm/Kg body weight provides.

- For nutritional needs
- Maintenance positive nitrogen balance
- Does not produce excessive nitrogen wastes
- Replace the amino acid loss during each dialysis treatment

At least 75% of this protein allowance should consist of proteins of high biological value such as egg, meat, fish and poultry but little if any milk.

Calories: Carbohydrates and fats are supplied in generous amounts to provide the needed energy for daily activities and to provide the needed energy for daily activities and to prevent tissue protein break down 40 K.Cal/Kg lean body weight. Majority of kilocalories should be supplied by simple carbohydrates and with controll of complex carbohydrate.

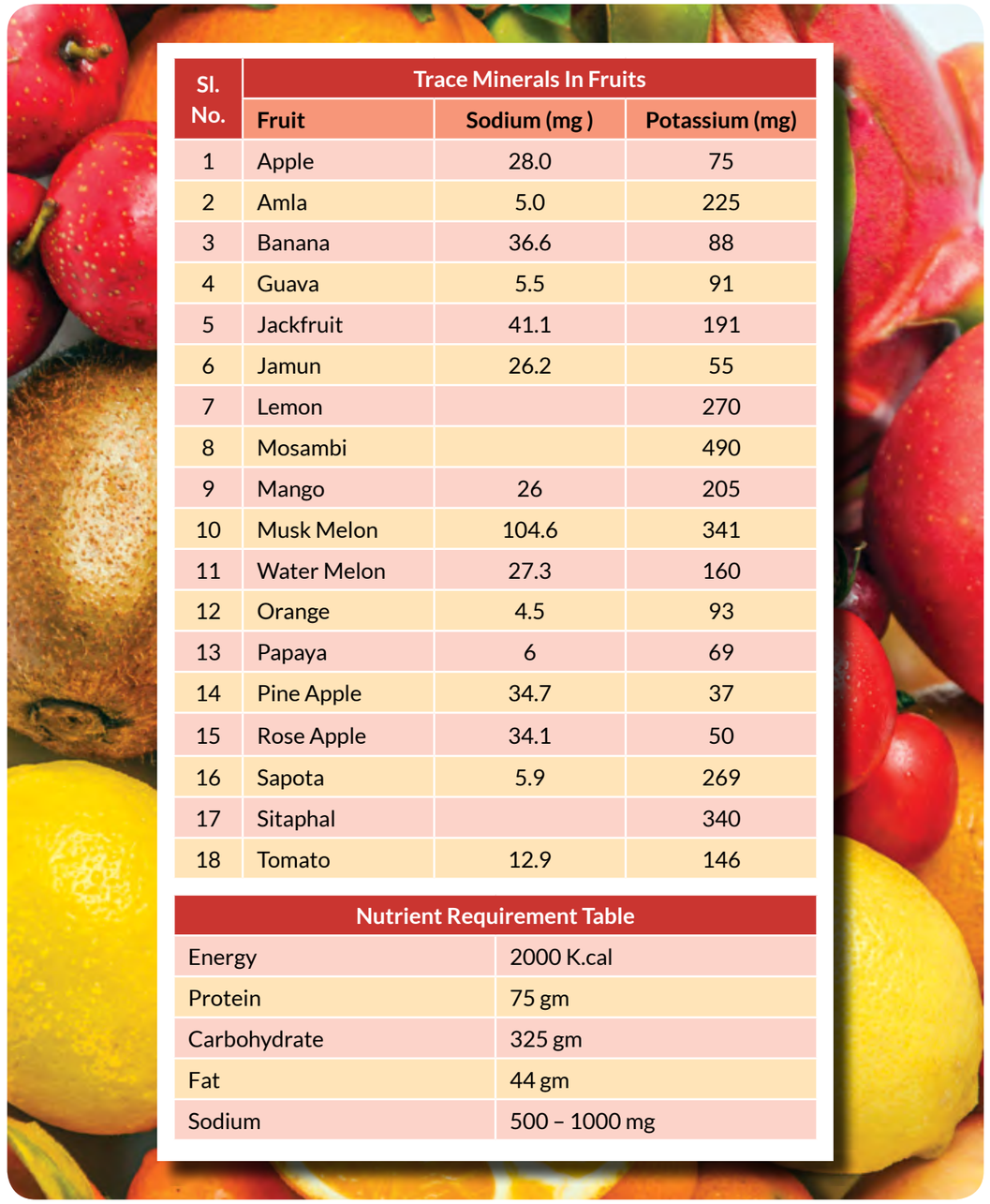
Water balance: Fluid is usually limited to 400 – 500 ml/ day and amount equal to urinary output if any. The total intake must account for additional fluid in the foods consumed as well as in foecal fluid lossess.

Sodium: To controll body fluid retantion and hypertension sodium should be limitted to 1000 – 2000

mg/day. The restriction helps to prevent pulmonary edema or congestive heart failure from fluid overload.

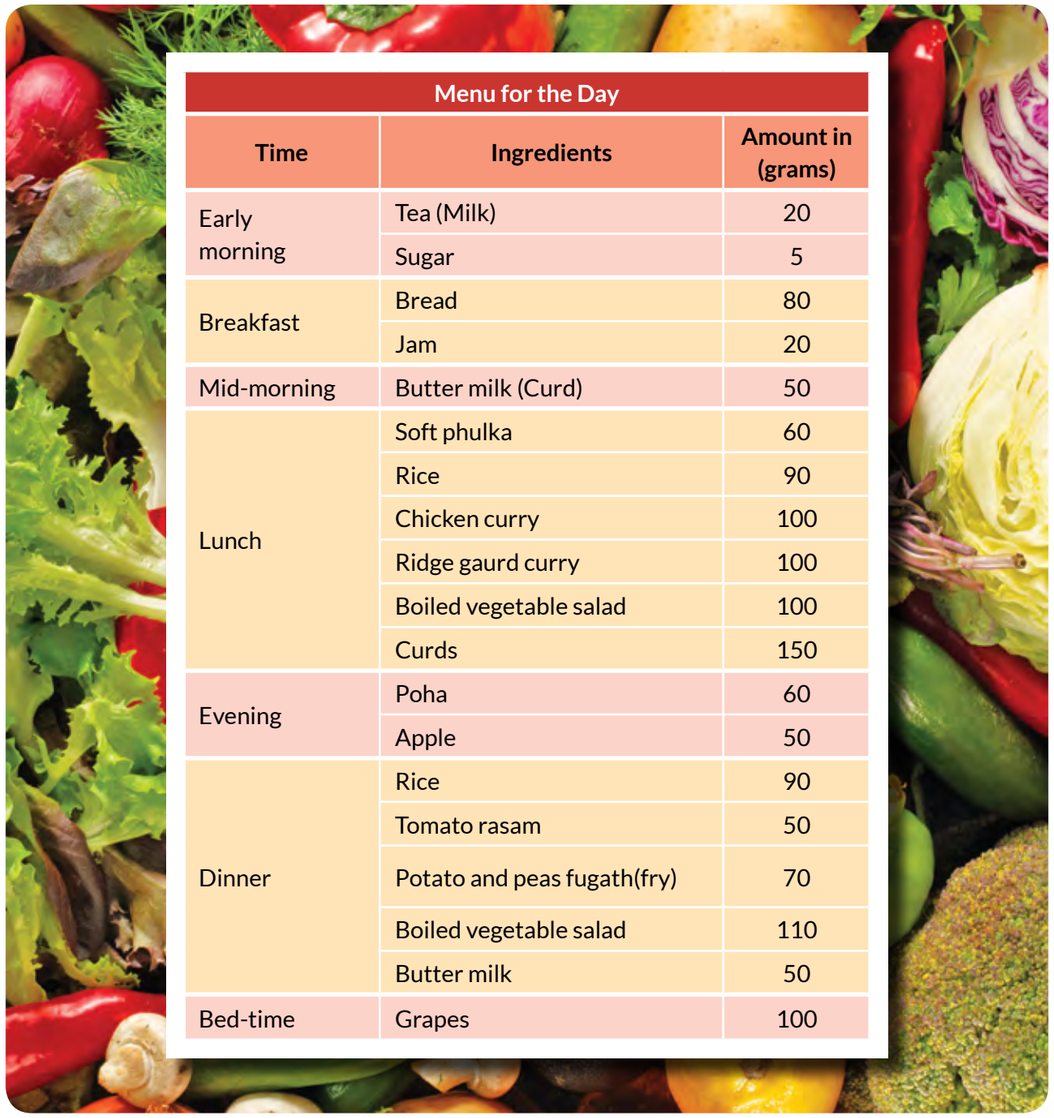
Potassium: Restriction is necessary to prevent hyperkalemia potassium accumulation can cause cardiac anrhythmias or cardiac arrest 1500 - 2000 mg/day.

Vitamins: During the dialysis treatment water soluble vitamins from the blood are lost in the dialysate. A daily suppliment of all the water soluble vitamins is usually given.



Sl. No.	Trace Minerals In Fruits		
	Fruit	Sodium (mg)	Potassium (mg)
1	Apple	28.0	75
2	Amla	5.0	225
3	Banana	36.6	88
4	Guava	5.5	91
5	Jackfruit	41.1	191
6	Jamun	26.2	55
7	Lemon		270
8	Mosambi		490
9	Mango	26	205
10	Musk Melon	104.6	341
11	Water Melon	27.3	160
12	Orange	4.5	93
13	Papaya	6	69
14	Pine Apple	34.7	37
15	Rose Apple	34.1	50
16	Sapota	5.9	269
17	Sitaphal		340
18	Tomato	12.9	146

Nutrient Requirement Table	
Energy	2000 K.cal
Protein	75 gm
Carbohydrate	325 gm
Fat	44 gm
Sodium	500 – 1000 mg



Menu for the Day		
Time	**Ingredients**	**Amount in (grams)**
Early morning	Tea (Milk)	20
	Sugar	5
Breakfast	Bread	80
	Jam	20
Mid-morning	Butter milk (Curd)	50
Lunch	Soft phulka	60
	Rice	90
	Chicken curry	100
	Ridge gaurd curry	100
	Boiled vegetable salad	100
	Curds	150
Evening	Poha	60
	Apple	50
Dinner	Rice	90
	Tomato rasam	50
	Potato and peas fugath(fry)	70
	Boiled vegetable salad	110
	Butter milk	50
Bed-time	Grapes	100

Food acts as a fuel for our body. One must be aware of the diet tips for kidney patient because diet & nutrition tips for kidney patient can do wonder in terms of making their recovery smooth & easy. Let us know the answers for the questions that frequently come across your mind.

The more we learn about different perspectives of diet, the more we understand how essential every nutrient is. Especially when we get diagnose with chronic kidney disease & come across too many dietary restrictions, it truly becomes a difficult nut to crack situation. Because what to eat & what not to creates huge dilemma.

Let us find solution of all those questions which might look silly but needs to be resolved to gain deep insight.

Tips to remember

Eat a balanced diet with adequate protein intake Eat small and frequent meals

Go for regular follow-ups with your doctor and dietitian do not skip your meals

Get your blood parameters checked regularly for better control

Lifestyle changes like exercising, avoiding smoking, alcohol and eating a kidney-friendly diet can help people with kidney diseases stay healthy.

Help from a dietitian is very important for people with kidney disease.

1. How can I get enough vitamins and minerals?

You can get enough vitamins and minerals by eating a wide variety of foods each day. However, kidney disease and dialysis change the amount of vitamins and minerals your body needs. Also, your special diet may limit some food choices that would normally give you important vitamins and minerals.

If so, you may need to take special vitamins or minerals instead. Be sure to:

- Take only the vitamins and minerals your doctor recommends, because some vitamins and minerals may be harmful to people with kidney failure.
- Check with your doctor before taking any herbal supplements or medicines you can buy without a doctor's prescription. Some may be harmful to people with kidney disease.

2. What can you do to help prevent unwanted weight gain or highblood sugar?

Some people on peritoneal dialysis may gain unwanted weight over time. This happens because the dialysis fluid used for exchanges contains a sugar called dextrose.

Solutions that contain more dextrose help to remove extra fluid from your blood. However, dextrose contains calories, which can lead to unwanted weight gain. And if you have diabetes, the extra sugar from your dialysis solution can cause your blood sugar to rise.

- Ask the dietitian at your dialysis center for help planning meals that will prevent extra weight gain and high blood sugar.
- If you've been told to limit sodium and fluid, be sure to follow these instructions carefully. This can help prevent the need for higher sugar solutions in your dialysis fluid.
- Ask your doctor if you need to change your prescription to help control blood sugar.

3. How will I know if I am getting enough calories and nutrients?

Your doctor will give you blood tests and urine tests. These will help show whether you are getting enough nutrients. Your dietitian may also interview you to find out about the foods you eat. You may also be asked to keep a food diary. Your dietitian may ask you questions about your food intake and looks at the fat and muscle stores in your body.

The dietitian notes:

- Changes in your weight
- Changes in the tissues around your face, arms, hands, shoulders and legs
- Your food intake
- Your activity and energy levels
- Problems that might interfere with eating.

4. How many calories do I need?

Everyone is different. But remember, calories are like “fuel” – they provide your body with the energy you need to live. They are important because they:

- Help you stay at a healthy body weight
- Give you energy to do your daily tasks and remain active
- Help your body use the protein in food to build muscles and tissues. Without enough calories, your body will “waste” protein to provide you with energy, instead of using protein to build your muscles and tissues.
- Hence keep in touch with your doctor & dieticians to know about your daily calorie requirement.

5. What happens when phosphorus levels are high in your blood?

- When Phosphorus builds up in your blood your blood calcium level drops and calcium is pulled out of the bones. Over time, your bones can become weak and break easily.
- A high level of phosphorus in your blood may also cause calcium to build up in your blood vessels, heart, joints, muscles and skin where it doesn’t belong.
- This may cause serious problems, such as: Damage to the Heart and other Organs Poor Blood Circulation

Bone Pain Skin Ulcers.

6. What is Food Diary?

Your dietitian may ask you about what you eat because they want to see if you are eating the right amount of protein, calories, vitamins and minerals. Hence they recommend maintaining a diary of everything you eat each day. This record book of your daily dietary intake is termed as Food diary.

7. What should I do if I am not getting enough nutrients?

As a person with kidney failure, it may be difficult to get enough nutrients from food, especially if you are on a limited-protein diet. Many people with kidney disease also find it hard to eat enough calories each day. They may have a poor appetite. Nutritional supplements can help you get the calories and nutrients you need. Supplements can come in the form of liquid drinks, shakes, juices, bars, soups,

cookies, puddings and more. Many supplements are available, but some nutritional supplements are made just for people with diabetes and/or kidney failure.

Discuss with your doctor or dietitian which are most suitable for you. Do not take any supplements without their advice.

8. What if I have loss of appetite or feeling of fullness?

It is important to get good nutrition even when you don’t have an appetite. You still need calories, nutrients and protein. Get help from your dietitian. You may be told to try a nutritional drink or you may be given other ideas.

Remember, not all people with kidney failure have the same dietary needs. Depending on what you eat and whether or not you are on dialysis therapy, you may need less protein, but someone else might need extra protein. Or, you may need extra calories, but someone else might need fewer calories.

Your dietitian will help you choose the right supplements for you

- Eating smaller meals 5-6 times a day
- One can follow 3 meals and 2 snack patterns.
- Get help from the dietitian for an individualized diet chart
- Try nutritional supplements after consulting the doctor
- Increase variety in the food
- Do not skip your meals, especially breakfast.
- Eat your Breakfast like a King, lunch like a prince and dinner like a pauper
- An early dinner is the way to a healthy life.
- As an in between snack one can have low K fruits, roasted chana, plain popcorns, steamed snacks like idlis, dhoklas, sprouts.
- The last thing the patient may want to think about is food.
- Weight loss may occur during this time
- Suggestions to help him feel better and to keep up daily good nutrition:

Have small, frequent meals.

Avoid liquids at mealtime. They should be taken 1 hour before or 1 hour after meals.

Eat a cracker or piece of dry toast after resting, but before getting up.

Avoid fried or fatty foods.

Rest following meals.

Avoid cooking odors; they may increase your nausea.

Suck on hard candy.

9. These foods may be easier to eat when you feel nauseated:

- Custard
- Dry toast
- Jelly
- Mashed potatoes
- Kheer
- Ice cream
- Cold milk

*Diabetic patients should add sugar free to the desserts

10. What should I do if I have Constipation?

- A regular lifestyle helps have more regular bowel habits.
- Avoid keeping irregular hours
- Daily physical activity
- Raw (unrefined) bran can be added to food
- Part of the fluid allowance can be used as a warm beverage first thing in the morning or before going to bed in the evening. Warm water, tea, or coffee work well
- Eat fibre rich foods like whole cereals and pulses, sprouts, vegetables and fruits like papaya
- Patients should always respond to their urges
- Check with the doctor about a laxative

11. What if I have diabetes?

You may need to make a few changes in your diet if you have kidney failure. For example, you may need to:

- Avoid sugar, sweets
- Eat fewer potassium-rich fruits and vegetables
- Eat more protein
- Eat fewer refined carbohydrates (white bread, rice, suji, maida, pasta and similar foods).

Work with your dietitian to make a meal plan that is right for you.

Ask your doctor how to test your blood sugar level. Check your levels often and try to keep them under control. With kidney failure, your dosage of insulin or other medications may need to change.

Contact your doctor if your blood sugar levels are too high or too low.

12. How can you get higher quality protein if you are vegetarian?

Most vegetarian diets are not rich in higher quality protein. Eating a variety of foods and getting enough calories can help. Without enough calories, your body will break down the protein you eat to create energy instead.

- Use cereal and pulse combination in the ratio 5:1 For example: 5 kg wheat flour + 1 kg soybean or chana flour
- Cooking/ heat treatment improves the digestibility of proteins (Example: Steaming of Sprouts)
- Use of fermented products (Example: Dhokla, Idli)
- Diet should contain adequate CHO and fat to provide energy to prevent protein from being used to provide energy
- Skimmed milk is a rich source of protein as compared to whole milk
- Butter milk of good quality can also serve as a source of good quality protein

Talk with your dietitian about the best sources of vegetable protein with lower amounts of potassium and phosphorus.

13. What is leaching and when it should be done?

Leaching is a process of soaking raw or frozen vegetables or dals in water for at least two hours before cooking to “pull” some of the potassium out of the food into the water. To leach dals and vegetables:

- Wash and then peel and cut the raw vegetable into thin slices.
- Rinse the cut vegetables in water.
- Soak the vegetables or dals for at least two hours or overnight. Use a large amount of unsalted warm water (approximately 10 parts water to 1 part vegetables or dals). Drain the soaking water.
- Cook vegetables as desired.

Leaching should be done only when the potassium is high, i.e. more than 5.5 mEq/L.

14. What fruits are safe to eat in kidney disease?

Apple, papaya, guava, pear, pineapple, jamun and orange: 100 – 150 g/ day.

15. Why is Albumin so important?

Albumin is a type of protein in your blood. It is checked by a blood test. If your albumin level is too low, it may mean you are not eating enough protein or calories. Or, it may mean that albumin is being lost in the urine, in which case eating more protein won’t help. If your albumin level continues to be low, you have a greater chance of getting an infection, not healing properly, not feeling well, and being hospitalized. Your doctor or dietitian will tell you if you need extra protein.

Awards

Rotary International – 2011
Vocational Excellence Award

Rotary International – 2016
Humanitarian Service Award

Sakshi Media Group, Sakshi Excellence Awards,
Jury's Special Recognition Award Healthcare, 2018.

Bhagwan Mahaveer Foundation (based in Chennai).
21st Mahaveer Awards, Excellence in the Sphere of Medicine 2018.
Award received from Shri M. Venkaiah Naidu, Vice President of India.

Donation online

Account no: 75360100005875
Bhagwan Mahavir Jain Relief Foundation Trust
Bank of Baroda, Bank Street Branch, Hyderabad, Telangana.
IFSC: BARB0VJBASS (fifth character is a zero).

Centres in other Indian cities

Coimbatore, Tamil Nadu:
Shree Mahaveer Welfare Society, Jain Medical and Dialysis Centre
20-23, Thiruvenkadam Street, (Near Central Theatre), Opp Mettupalayam Road, Coimbatore 641 002, Chennai.
[Contact : 0422-4274626; Mahesh 98430-47377].

Mount Abu, Rajasthan:
J. Watumull Global Hospital and Research Centre / Radha Mohan Mehrotra Global Hospital Trauma Centre
Delwara Road, Mount Abu 307 501, Rajasthan.
[Contact: Dr. Partap Midha 94141-53717; Umesh Kumar Bhartiya 94142-06491].

Chennai, Tamil Nadu:
Shree Jain Medical Relief Society, Khivraj Chordia Memorial Dialysis Centre
Mylapore, Chennai 600004, Tamil Nadu.

Chennai, Tamil Nadu:
Anchibai Hemraj Katariya Dialysis Centre
Perambur, Chennai 600011, Tamil Nadu.

Chennai, TamilNadu:
Bhagwan Mahaveer Dialysis Centre
Sowcarpet, Chennai 600079, Tamil Nadu.

Chennai, Tamil Nadu:
Kewalchand Mohanbai Daga Dialysis Centre
Kodambakkam, Chennai 600024, Tamil Nadu.
[Contact: Ashok Kumar Mehta 98410-35399].

Bhuj–Kutch, Gujarat:
LNM Group Lions Hospital and Research Centre
Commerce College Side Road,Rawalwadi Relocation Site, Bhuj–Kutch, Gujarat.
[Contact: Bharath Mehta 98252-25416].

Akola, Maharashtra:
Smt. Basantibai Laxminarayan Chandak Research Foundation Trust, Akola Dialysis Centre
Ramdaspeth, Akola 444005, Maharashtra.
[Contact: Shyam Laxminarayan Chandak 86683-22616 / 80871-24661].

Raichur, Karnataka:
M.K. Bhandari Dialysis Centre
Raichur, Karnataka.
[Contact: Ajay Kumar 98802-95000].

New Delhi:
Bhagwan Mahavir Relief Foundation Trust, Medi Dialysis Centre
Plot no.11,Industrial Area, FC-33, Jasola, New Delhi 110 025.
[Contact: Bhajarang Bhothra 98186-66062].

Indore, Madhya Pradesh:
Bhagwan Mahavir Dialysis Centre, Bhagwan Mahavir Relief Foundation Trust
Robert Nursing Home Gate no.3, Old Sihora Road, Indore 452001, Madhya Pradesh.
[Contact: Ravi Bafna 98270-23466].

Mumbai, Maharashtra:
Haryana Foundation and Reaserch Centre
Haryana Bhawan, Sector no.6, Near Amba Matha Temple, Kandivili(W), Mumbai 400067, Maharashtra
[Contact: Sathyapal Jain 99676-50014].

Mysuru, Karnataka:
Jain Charitable Trust, Bhagwan Mahavir Dialysis Centre
Opp K.R.Mills, Mysuru 570003, Karnataka.
[Contact: Praveen Jain 98451-11190].

Mysuru, Karnataka:
Jain Milan Dialysis Centre (a unit of Jain Milan Charitable Trust)
Bamboo Bazaar, Mysuru, Karnataka.

Pune, Maharashtra
Kumar Dialysis Centre
783 Bhawani Peth, Opposite Nishat Talkies, Pune, Maharashtra
[Contact: Kumar 97672-56577].

Nellore, Andhra Pradesh:
Jayabharath Hospital
Door No: 16/2884, Near VRC, South Railway Station, Somasekharapuram, Nellore 524003, Andhra Pradesh.
[Contact: 76598-53974].