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DIS - 11.

DIABETIC FOOT

Looking after your feet

Most people pay no particular attention to foot care. As a diabetic, however, you must take special care of your feet to keep them in good condition. If you do not look after your feet properly, ulcers may form; these could become infected. In serious cases, gangrene can develop and amputation of toes, the foot or lower leg may be necessary. The chances of such problems can be minimised with a simple routine of daily foot care. Following the guidelines in this leaflet can help you stay mobile without relying on others for help.

Daily foot care

Examine your feet every day for blisters, cuts and scratches. If you find a change in the condition of your feet report it to your doctor immediately. If you have problems seeing the soles of your feet because of arthritis or obesity, use a mirror to help you, or ask a friend or relative to check your feet. Go to the clinic immediately if you notice any of the following danger signs:

* Swelling.
* Colour change of a nail, toe, or part of a foot.
* Pain or throbbing.
* Thick hard skin or corns.
* Breaks in the skin, including cracks or blisters.

The list below contains recommendations to help you keep your feet healthy. If you do not understand them, ask your doctor for advice. He will be pleased to help you.

Wash (do not soak) your feet daily in warm water using mild soap. Dry thoroughly, especially between the toes, by applying light pressure. Do not rub your feet dry.

If you have dry skin on your feet, you may use a little moisturising lotion, but do not apply the lotion between your toes.

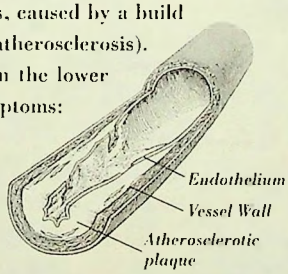
Cut toe nails straight across. Do not cut down the sides of the nail.

How does diabetes affect feet?

Circulation problems

Diabetes can lead to narrowing of the arteries, caused by a build up of cholesterol and fat in the arteries (atherosclerosis). This can lead to poor circulation of blood in the lower legs and feet, and to any of the following symptoms:

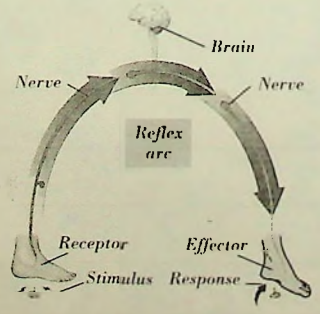
* Cold feet.
* Painful legs (usually the calf muscles) when walking.
* Thick nails, often infected with fungi.
* Pain at night or when lying down.
* Slow healing of foot injuries.
* Shiny appearance of the skin.
* Gangrene.



In atherosclerosis, cholesterol and fats build up inside the arteries and reduce blood flow. Eventually, the fatty deposits cause hardening of the arterial walls.

Damage to the nerves in your feet

The feeling in your feet may change because diabetes can damage the nerves (neuropathy) which transmit signals to and from your feet. This can cause pain in the feet, especially at night. As nerve damage progresses, your feet will become numb. This can be very serious because you may not notice cuts, blisters or sores until they become infected.



If nerves in your legs and feet are damaged, your feet will have reduced feeling. Your nervous system will not be able to send normal pain signals to your brain. Therefore, you may feel no pain when you injure your feet.

Minor injuries

If you wear ill-fitting shoes, or shoes which have rough edges inside them, corns and calluses may develop. Commercial corn preparations contain mild acid and are too harsh for your feet. To remove corns and calluses soak your feet in lukewarm water for 10 minutes and then gently rub off excess tissue with a towel or file. Avoid 'bathroom surgery' — do not cut off corns and calluses.

Prevention is always the best option: wearing comfortable shoes is most important, but exercises such as curling and stretching the toes several times a day can help prevent callus formation. When walking, adjusting your gait so that you finish each step on your toes, not on the balls of your feet, will also help to prevent callus formation.

Athletes foot, which causes itching and skin peeling between the toes or thickening of the toenails, should be treated immediately by your doctor.

Proper first aid is important, even for apparently minor injuries to the feet. Avoid strong antiseptics (e.g. tincture of iodine), which may irritate the skin. Cover injuries with sterile gauze, using paper tape if necessary. Do not apply adhesive tape to the skin. From the time of injury until recovery, affected feet should be raised for as long as possible; i.e. sit with your feet resting on a footstool.

Minimising problems

As a diabetic you should be in regular contact with your doctor, who will closely monitor the condition of your feet. Notify your doctor immediately if there is any change in the state of your feet.

Careful control of your blood sugar level with diet, exercise and medication (as prescribed by your physician) will keep your diabetes in check. You should also use a strict daily foot care routine. This will minimise your risk of developing serious foot and leg problems in the future.

Footwear DOs

* Purchase shoes which fit properly. Do not expect your shoes to stretch.
* Carefully check the insides of shoes for rough edges.
* Leather shoes are best, but all shoes which let your feet breathe, such as sports shoes, are good for your feet.
* Wear cotton or woollen socks which allow your feet to breathe.

Footwear DON'Ts

* Do not walk barefoot, even inside your home.
* Avoid open-toed shoes.
* Do not wear plastic shoes.
* Do not wear shoes without socks/stockings.

Cold feet

As well as delivering oxygen and essential nutrients around the body, blood keeps the body warm. When the circulation of blood is restricted, the amount of heat transported around the body is also limited. This means that extremities, such as your feet, will quickly feel cold. To ensure maximum blood flow to your feet, adhere to the following rules:

Keep warm — wear warm socks/stockings. Blood vessels contract when they get cold, and blood flow is therefore reduced.

Avoid smoking — tobacco contracts the blood vessels and reduces blood circulation.

Do not sit too close to a fire or radiator — because of reduced feeling in your feet you may not realise when your feet are adequately warmed; and may damage your feet with too much heat.

It is not advisable to sit with crossed legs. This compresses arteries in the leg and reduces blood supply to the feet.

My instructions and recommendations are:

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Scientific Communications

DIS-11.

HEALTH ISSUES

New light on diabetes

A conference in Chennai emphasises the need for governments to allocate more funds and resources for research on a vaccine for diabetes and other treatment methods.

ASHA KRISHNAKUMAR

DIABETES is a silent killer. It does not kill directly but weakens the body surreptitiously and leaves it susceptible to a variety of complications. A diabetic is two to four times more prone to heart disease and stroke than others. Seventy per cent of diabetics suffer mild to severe nerve damage, often leading to limb amputation. Diabetes is the main cause of end-stage renal failure and blindness. Yet the cause of diabetes is not fully understood.

According to the International Diabetes Federation, India has nearly 33 million diabetics, the largest number for any country. This figure is expected to double in the next 10 years. According to the WHO, diabetes is a chronic disease in which the body either does not produce or properly use insulin, a hormone that is needed to convert sugar, starch and other carbohydrates in food into energy. Until 1997, diabetes was classified as insulin-dependent diabetes mellitus (IDDM) and non-insulin dependent diabetes mellitus (NIDDM), based on the kind of treatment. In 1998, the World Health Organisation recommended the re-classification of diabetes as Type I (a and b) and Type II, based on etiology (the origin and cause) of the disease.

There are two forms of Type I diabetes. In Type I(a), diabetes is caused by an auto-immune process, that is, a process in which the body's immune system attacks and destroys the insulin-producing cells of the pancreas. With glucose unable to enter the cells, it builds up in the blood, and the cells starve to death. Typically, Type I acute onset diabetes takes two months to two years (called the 'honeymoon' period) to show up. The cause of the other, rarer, form, Type I(b) diabetes, is not yet known. Its progression is slow. The diagnosis of Type I(a) diabetes is made by estimating the auto-antibody markers.

In countries such as India, where the facility for the estimation of auto-antibody markers is not available, the diagnosis is done clinically. The acute onset variety of auto-immune diabetes (which presents itself harshly as in the case of Ketoacidosis coma) is diagnosed as IDDM, while the slowly progressing form (otherwise called the latent auto-immune diabetes of the adult or LADA) gets diagnosed as NIDDM. The preferred treatment for auto-immune diabetes (the acute or the slowly progressing one) is the administration of insulin. But when the diabetes is diagnosed as NIDDM, the tendency is to treat it with orally administered tablets, and the patient usually ends up requiring insulin within three to five years. The beta cells, sick due to the attack by auto-immune T-cells, are stimulated by the oral tablets to secrete more insulin. This makes them work harder and ultimately exhausts them.

But studies on LADA patients in Japan (Kobayashi *et al*, *Diabetes*, 1996) show that had they been treated with insulin instead of oral tablets, they would have become auto-antibody negative, attained euglycemia and become normal within five years compared to patients treated in conventional ways. Administering insulin to LADA patients allows their beta cells to rest and recover. These patients, however, may continue to receive very low doses of insulin, to suppress the immune response to a beta cell attack.

According to Dr. C.B. Sanjeevi, Associate Professor, Department of Molecular Medicine, Karolinska Institute, Stockholm, who was in Chennai in mid-February to chair the Fifth International Congress of the Immunology of Diabetes Society, while 30-35 per cent of diabetics in India are of Type I (who are classified as cases of NIDDM and test positive for auto-antibodies), only 2 per cent get classified as insulin-dependent by the still widely followed IDDM/NIDDM classification (95 per cent of the cases are classified as Type II and 3 per cent, malnutrition-induced). (That 30-35 per cent of NIDDM cases test positive for auto-antibodies is borne out, according to Dr. Sanjeevi, by two Indian studies – "The Prevalence of auto-antibody markers in patients with young onset diabetes in North India", Singh A.K. *et al*, *Diabetic Medicine*, April 17, 2000, pages 275-280; and "HLA and antibody studies on Diabetics in Eastern India, Sanjeevi C.B. *et al*, *Tissue Antigens*, July 1999, pages 83-87.)

The onset of Type I diabetes is usually in childhood; in fact, the risk of developing it is higher than that of any other severe chronic disease, and is the highest during puberty – between 10 and 12 years for girls and between 12 and 14 years for boys. It is genetically transmitted too and among children the symptoms can mimic influenza.

K. GAJENDRAN

Vice-Chancellor of Dr. M.G.R. Medical University M. Anandakannan, Prof. Hans Wigzell, Chairman, Committee for the Nobel Prize for Medicine and Physiology, Prof. Rolf Zinkernagel, the 1996 Nobel laureate for Medicine and Physiology and Dr. C.B. Sanjeevi, Associate Professor, Department of Molecular Medicine, Karolinska Institute, Stockholm.

The sodium system and the steam water system have operated satisfactorily.

Coming to full power, the designated rating is 40MWt or 13MWe. The power that we can generate from the core depends on the size of the core. The present core is of small size and so the core itself limits the power. Although we did not have any data on how the fuel will behave, it has, to our pleasant surprise, behaved very well. We have raised the power from 10 MWt to 14MWt.

The question is why we have not gone up to 40 MWt. The core has behaved well and the fuel burn-up today is 60,000 MW days per tonne compared to 25,000 which was targeted in the preliminary calculations. This itself has shown that the core can be used for a longer duration – once the second large core is installed the power can be raised to 40 MWt.

▶ *But there were technical problems in fuel-handling systems...*

After we take the fuel burn-up to 100,000 MW days per tonne, we will discharge the fuel core and receive a new one. Once the new core comes, the size will be bigger and the quantity will be more.

▶ *Is a mega jump from the 13MWe FBTR to 500 MWe Prototype Fast Breeder (PFBR) realistic?*

It is a big step. There is no doubt about it. Various considerations had gone into such a decision taken 10 years ago. We are not the first to build such large capacity breeder reactors. The biggest breeder was Superphenix of 1,200 MWe in France.

The second reason is we have 500 MWe coal-fired thermal power stations in our country. So experience is available on the conventional side of 500 MWe: design capability, manufacturing ability, site installation, and so on. Besides, for 500 MWe reactors, we are already building on the conventional side the turbines, condensers, transformers, switchyards, circulating water systems, and so on. Similarly, for the 500 MWe PHWR, we are building the steam generators, calandria, end-shield and so forth for the third and the fourth units at Tarapur. So our industry has the capability. There are good industries such as Larsen and Toubro, BHEL, MTAR and Walchandnagar. We have a programme to develop manufacturing technology and we are spending Rs.50 crores on it.

The third reason is when we go for a higher size reactor, the unit energy cost comes down and we can be economically competitive with other sources of energy.

When a decision was made to go for breeder reactors, we had a collaboration agreement with France. For political reasons, France discontinued it. Though that help dried out, we decided to go in a big way for R&D. In the R&D, we have placed a large number of contracts with educational institutions, CSIR (Council of Industrial and Scientific Research) laboratories and others. The in-house R&D, BARC R&D, and outside R&D give us the confidence to go for 500 MWe breeder reactors. The design and the R&D remain practically the same for 250 MWe or 500 MWe reactor.

▶ *What is the status of the PFBR now?*

The design of the PFBR nuclear steam supply systems is the responsibility of the IGCAR. This is being done for the past 10 years. The most challenging task so far is building the capability to analyse the conditions during the normal operations of the reactor and under accident conditions. This includes developing the computer codes, safety criteria, and documents.

An important point in designing such a complex high technology project is the ability to take decisions. We have made a good presentation of various things and we are confident that we will take the right decisions in this centre.

We have now prepared a preliminary safety analysis report and submitted it to the Atomic Energy Regulatory Board (AERB) for review which is in progress. On the design side, preparation of manufacturing specifications and drawings for the nuclear steam supply system have also been done.

For the balance of the plant, which consists of civil structure, steam water supply system, electrical systems and conventional auxiliaries, we have appointed two consultants – Development Consultant Limited, Calcutta for the power island, and Tata Consultants Limited for the nuclear island. The design work is in full swing.

The site evaluation including its seismicity, rainfall, groundwater movement, flooding level during cyclones and geotechnology has been completed. Experts did these studies and data has been presented to the AERB. The AERB has cleared the site (Kalpakkam).

▶ *So everything is getting ready and you are on course for building the PFBR.*

Safety analysis has been completed with a high level of confidence. We have done all the plant dynamic studies for the PFBR. We are half-way through the reliability analysis of the critical system. we have done the core-distributed accident study analysis, and accidents due to external events such as flooding and cyclones. We are now submitting the final documents to the AERB and we are confident of getting the AERB's clearance by March 2001. We have the AERB clearance for the site. We have prepared the Environment Impact Assessment report and it is now ready for submission to the Tamil Nadu Pollution Control Board. It will then go to the Union Ministry of Environment and Forests. In six months, both these clearance will come.

Coming to the R&D, all our facilities hear are operational in various aspects of materials development. We have test facilities for hydraulics, sodium, components and structural mechanics. Laboratories for non-destructive testing, post-irradiation, fuel chemistry, sodium and reprocessing are all operational.

We have also identified R&D institutions outside: the Indian Institutes of Technology at Chennai, Mumbai and New Delhi; Structural Engineering Research Centre (SERC), Chennai; and CSIR laboratories (TBRL, Chandigarh; Plant Control Research Institute, Palakkad) and a defence laboratory. All this will come to a fruition by the middle of 2001.

An important development is that we are starting the testing of the control rod drive mechanism, which has been received at the site. M. Rajan (Head, Sodium Technology Division, Engineering Development Group, IGCAR) has completed the work on the heat and mass transfer: a big sodium facility is there.

On the manufacturing technology side, we have placed orders with BHEL, Tiruchi; L&T; MTAR Technologies Private Limited, Hyderabad; and Kirloskar Brothers Limited, Pune, for doing developmental work. We have given them each a package. All these will come to a fruition by the middle of 2001. Many industries were involved in building the FBTR, 80 per cent of the work was done in India. So people are experienced in the preparation of specifications, procurement of materials, manufacturing and so on. For the PFBR, we are doing the same components on a larger scale.

The Union government is enthusiastic about starting the construction work on the PFBR. Its importance has been realised. The Department of Atomic Energy is enthusiastic. We will start the construction by December 2001 in the Ninth Plan itself. The government has provided Rs.100 crores for 2001-2002. Everything depends on us now and we will push everybody. ■

Diabetes in Asia

ASHA KRISHNAKUMAR

INDIA has the largest number of diabetics in the world and, according to the World Health Organisation (WHO), soon one out of every four diabetics in the world will be an Indian. The number of diabetics in the country is expected to double in the next 10 years.

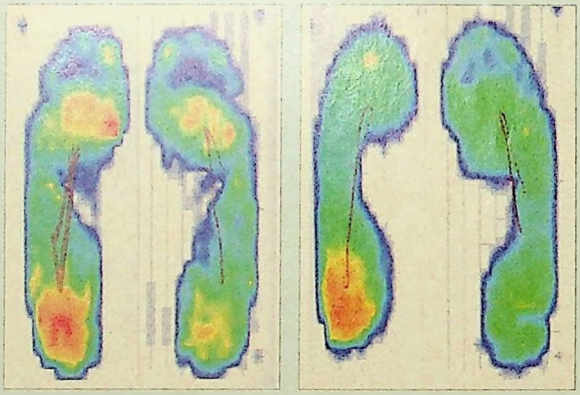
According to the first national Urban Diabetes Study conducted recently by the Diabetes Epidemiology Study Group in a population of 11,216 in six cities, the incidence of diabetes is 13.2 per cent and that of impaired glucose tolerance, 14 per cent. There has also been an alarming increase in the incidence of diabetes in the last few years which trend, according to the study, would continue. Thus diabetes prevention and management is crucial for India, as also other Asian countries where malnutrition, infection, changing lifestyles and so on are major issues.

To understand the disease in the context of the socio-economic and cultural aspects of developing countries, the Chennai-based Diabetic Research Centre and M.V. Hospital for Diabetes, in collaboration with several national diabetes associations in Asia, conducted in Chennai in mid-February a two-day international conference on "Diabetes in Asia". The conference, attended by 600 diabetologists and health-care providers from Asia and Africa, as also by experts from the United Kingdom, the United States, and the WHO, focussed on early diagnosis, prevention of acute and chronic complications, and the management of the disease, particularly in the developing countries.

According to conference chairman Dr. A. Ramachandran, managing director of the Diabetes Research Centre and M.V. Hospital for Diabetes, the disease does not receive the attention it deserves in public health policy. "The morbidity and mortality due to diabetes is only bound to worsen unless the health-care system addresses the complications arising from diabetes," he says.

Although it is not fatal by itself, diabetes leaves the body open to various complications – neuropathy and vascular problems being the most common.

PICTURES COURTESY M.V. DIABETIC CENTRE



Precautionary measures against diabetic foot include the use of appropriate footwear. (Top) The scan of a patient's foot showing the pressure points; (above left) foot pressure with patient's own footwear and (above right) wearing footwear developed by the M.V. Diabetic Centre and the Central Leather Research Institute.

Diabetes affects the body's healing ability. The most common vascular problem in Asia is the diabetic foot, which accounts for over 50 per cent of all non-traumatic amputations. The Diabetic Research Centre is one of the few institutions in India that specialise in the early diagnosis and treatment of the diabetic foot.

Prolonged diabetes affects the blood vessels and nerves in the feet, leading to loss of sensation. This causes high pressure points or "callus" on the feet, which thicken the skin and ultimately result in ulcers. When the pressure on the feet increases, the patient tends to get easily injured. These ulcers do not heal quickly; often they become gangrenous, necessitating the amputation of the toe, the feet, or even the leg.

According to Dr. Vijay Viswanathan, conference secretary and Joint Director of M.V.Hospital for Diabetes and Diabetes Research Centre, diabetic foot occurs frequently – usually within three years of the first infection. Thus, early diagnosis is crucial. For early diagnosis and treatment there are devices to detect loss of sensation (neuropathy), such as monofilaments (which determine the protective sensation in the feet) and biothesiometer (an electronic device to determine the vibration perception threshold). Both can be used even by general practitioners and offer reliable prognosis. According to Dr. Vijay Viswanathan, the detection of pressure points under the feet helps predict the chances of ulcers.

There are also devices to detect the reduction in the blood circulation in the legs, or peripheral vascular diseases, such as Doppler test and Duplex scanning. Foot Scan, another computerised device to detect high pressure areas under the feet, is useful in taking precautionary measures.

Precautionary measures are best taken by using appropriate footwear. M.V. Diabetic Centre, along with the Central Leather Research Institute (CLRI), has developed special footwear, made of customised moulded insoles.

These footwear, which use lightweight polyurethane foam, are three-layered – a tough insole for cushioning, a midsole to absorb shocks and distribute the load evenly, and an outsole to give good grip. According to B.N. Das, Assistant Director and Head of the Shoe Design and Development Centre, CLRI, the footwear distributes the pressure in the feet and reduces substantially the friction between the shoe and the feet. Studies are on to see if these special footwear also reduce ulcers. ■

'A cure, or prevention, appears possible'

Interview with Dr. C.B. Sanjeevi.

"Diabetes is not fatal by itself, but it leads to severe complications," says Dr. C.B. Sanjeevi, Associate Professor, Department of Molecular Medicine, Karolinska Institute, Stockholm, and the Chairman of the Fifth International Conference of the Immunology of Diabetes Society.

Dr. Sanjeevi, who has published over 70 papers in major international journals, is on the review panel of several major journals on diabetes such as *Diabetes, Diabetologia, Diabetes Medicine and Diabetic Care*, and from a number of journals on immunology. He is a member of the Scientific and Abstract Review Committee of the European Association for the Study of Diabetes (EASD), the largest body of diabetes researchers in the world. He has won international awards, including from the EASD and Juvenile Diabetes Foundation International. At present he works on the immunology and genetics of auto-immune diseases, with special reference to the prediction strategy in respect of and vaccine approach to Type I diabetes.

In Chennai, Dr. Sanjeevi spoke to **Asha Krishnakumar** on the disease, its treatment and the research efforts. Excerpts:

▶ *What are the symptoms of diabetes and, clinically, what happens to people who have the disease?*

Type I diabetes is immune-mediated and treated with insulin. The immune system cells contain antibodies produced from B- and T-cells. There are cell- and antibody-mediated immune systems. The immune system primarily protects the body from invading organisms, such as pathogens, bacteria, viruses, toxic chemicals and so on, that enter it through food and air or through an injury (in this case the pathogens can enter the body directly through the blood stream).

The immune system is present throughout the body – in the blood vessels, tissues and cells (primarily the T- and the B-cells). Whatever agents enter the body first react with the immune system. On identifying a foreign matter, the T-cells send signals for reinforcements and all of them attack and destroy the invading pathogen. The immune cells 'are educated' to know what belongs to the body and what does not.

The T-cells identify some of the proteins in the beta cells which they do not 'know', and attack them. But these proteins are generally covered and not easily 'seen' by the T-cells. They are identified only when they are for some reason uncovered, for example, when bacteria or virus enters the body and attacks specific tissues.

The identification of the protein in the beta cells by the T-cells happens because of genetic factors and infection. Some genes make the body susceptible to the disease. If a person gets a viral infection, the virus destroys the growth of some insulin-producing beta cells, the contents of which are then released. The T-cells see them as foreign bodies and get activated after interacting with the susceptible genes and send signals for more T-cells to attack the contents of the cells released because of the viral infection. In this attack, the healthy beta cells also get killed. This process continues till all the beta cells ultimately get killed. The speed of the destruction of the beta cells is determined by the presence of the number of genes that contribute to the disease.

If the process happens rapidly – from a few months to within a year or two – it is called acute onset and is part of Type I diabetes. In some instances, the genetic factors may not be adequate to push the events to happen so rapidly. It may take several years for all the beta cells to die and the disease to manifest. Unfortunately, until 90 per cent of the beta cells die, there may be no symptoms. Even then, it would be apparent only under stress, such as after a surgery, an infection and so on. There is another form of Type I diabetes, where the progress of the disease is slow because of several factors in the environment that are not yet clearly known.

Type II diabetes occurs when the beta cells do not secrete adequate insulin or when the insulin does not for some reason convert all glucose into energy. Medicines are generally prescribed to induce the beta cells to produce more insulin. And where the insulin is not active, diet is controlled or altered. Some patients may also require insulin.

▶ *What are the types of diabetes and the treatment methods?*

Diabetes was classified as insulin-dependent diabetes mellitus (IDDM) and non-insulin dependent diabetes mellitus (NIDDM), based on its treatment, until 1997. In 1998, the World Health Organisation recommended the classification of diabetes as Type I (a and b) and Type II, based on etiology (the origin and cause) of the disease.

In countries such as India, where the estimation of auto-antibody markers is not done routinely, the diagnosis is made on the basis of clinical criteria.

▶ *Why is the auto-antibody marker test not routinely done in India?*

Solely because of the absence of the facility to diagnose the auto-immune form of diabetes. Insulin assay that is done in India only helps find out how much insulin the beta cells secrete. It does not reveal the health of the beta cells.

▶ *Diabetes is not fatal, but what are the complications it can lead to?*

Diabetes by itself is not fatal, but if the blood sugar level is allowed to remain high, it glycosolates certain tissues. That is, over a period of time glucose gets deposited on tissue walls, thickening them with plaque and making it difficult for blood to flow. This results in complications as it may prevent blood from flowing freely into the brain and lead to a stroke, or to the heart and cause a heart attack, or to the small arteries and lead to a loss of sensation, and so on. Thus, the implications of diabetes are severe.

By keeping the blood sugar level under control, the complications can be delayed. But, now, with considerable research going on in various areas of Type I diabetes, a cure, or prevention, appears possible. ■

Type II diabetes is a metabolic disorder that results from the body's inability to produce enough insulin or properly use the insulin produced. It occurs in two forms. First, owing to obesity, unhealthy lifestyle or the consumption of the wrong kinds of food. The second type is caused by the inability of the beta cells in the pancreas to secrete enough insulin. Often, Type II diabetes can be controlled through diet restrictions and changes. But many patients may also need oral medication and/or insulin.

Type II diabetes is common among the elderly and may not show up until very late. Thus many people are not aware of their being diabetics until the condition becomes severe and leads to complications. The incidence of Type II diabetes is under-reported as usually only the complications, such as heart or renal failure, get reported.

Then there is the rare type called gestational diabetes – a temporary form of insulin resistance that usually occurs during pregnancy as a result of excessive hormone production, or the pancreas' inability to make the additional insulin that some women need. Gestational diabetes is found in 2 to 5 per cent of pregnant women and usually disappears after child-birth. However, women with this problem are at a higher risk of developing Type II diabetes later.

There are "other specific types" of diabetes – those caused by genetic transmission, surgery, drugs, malnutrition, infection and illnesses.

According to Prof. Rolf Zinkernagel, the 1996 Nobel laureate for Medicine and Physiology, the incidence of immune-mediated diseases such as diabetes, as also their types, varies with age, ethnicity, sex, genetics and the environment. Thus, for example, in the United States Type II diabetes is more common among African-Americans (1.7 times) than the population in general, and native Americans and Latin Americans are twice as prone to diabetes as the general population. Type I diabetes affects children and adolescents, especially girls. In India, diabetes is reported more among the urban population (10 per cent) than the rural population (between 2 and 4 per cent).

THE Chennai conference, which brought together some 200 international experts on diabetes and immunology, discussed the progress in research and devised methods to interpret the results.

It was revealed at the conference that research on the disease is at an advanced stage and various groups are trying different vaccine approaches for its prevention. Some researchers have reached the second phase of clinical trials while others are trying the DNA (deoxyribonucleic acid) route to find a vaccine. Simultaneously, population screening is going on in several parts of the world to predict the occurrence of the disease and to identify people who would benefit from vaccines. According to Prof. Hans Wigzell, Chairman, Committee for the Nobel Prize for Medicine and Physiology and President, Karolinska Institute, a vaccine for diabetes (for Type I) can be expected in less than five years.

A vaccine for diabetes will especially benefit the high-risk groups – the first-degree relatives of diabetics, women who develop diabetes during pregnancy, and children born to older women. The cost of the vaccine, according to Dr. Sanjeevi, would depend on who develops it. If a government institution does it, the price would be low, but if a private biotechnology company does it, then it would be different. Several companies, such as Peptor in Israel and Diamed Therapeutics in Sweden, have reached the second phase of clinical trials of their vaccines.

The U.S. is close to completing the Diabetes Prevention Trial I (DPT I). The largest such programme in the world, the DPT, which covers 90,000 people (first-degree relatives of Type I diabetics), is run by the National Institutes of Health and involves several institutions across the country. Insulin was administered in small doses to those with auto-antibody markers but who had not developed diabetes. According to Prof. Desmond A. Schatz, Medical Director, Diabetes Centre, College of Medicine, University of Florida, the trials are being carried out on two categories of people – high- and medium-risk groups. While the trials on the former were over and the results would be known in May, the results of the trials on medium-risk group trials are expected by mid-2003.

Another major trial, ENDIT (European Nicotinamite Diabetes Intervention Trial), is under way across the Continent. Under this, a particular component identified in the vitamin groups that is found to prevent beta cell deaths is administered to the test group. This pre-diabetes intervention prevents the onset of full-blown diabetes. This trial is to conclude in 2003.

Apart from the work on treatment and prevention, several groups are working on a cure such as islet transplantation (that is, replacing dead islets with live ones). The University of Alberta, Edmonton, Canada, has developed an efficient technique – called the Edmonton Protocol – of islet isolation from cadavers. As the pancreas is at the bottom of the abdomen, during organ harvest from brain-dead persons, doctors go to it last. As a result, the percentage of live beta cells decreases drastically. The researchers at Edmonton have come up with a technique to go to the pancreas first thereby recovering more number of live beta cells. Millions of live islets are necessary for one diabetic. Islet isolation from one cadaver can benefit up to two diabetics, depending on the live beta cells harvested. While many centres in the world specialise in human islet transplantation, some scientists are also working on xeno-transplantation – from pigs, whose islets are of the type closest to that of humans. (The commonly used insulin is also the porcine variety.)

At the Chennai conference, the major presentations included those by Dr. Rolf Zinkernagel (on immunity and auto-immunity), Dr. Jay Skyler (on DPT I, the largest interventional trial in the U.S.), Dr. Franco Bottazo (on islet cell antibodies), Drs. Ake Lernmark, George Eisenbarth and Jerry Palmer (GAD65, IA2 and insulin antibodies), Dr. Jonathan Lakey (on the Edmonton Protocol), Drs. H. Edlund, N. Kenyon, A. Peck and D. Pipeleers (on stem cell approach for Type I cure), and Dr. V. Seshiah (on malnutrition-modulated diabetes).

Apart from governments, research on diabetes is funded by many organisations such as the Juvenile Diabetes Foundation International, which has pumped in a lot of money and resources. The U.S. government has allotted $100 million to enable 10 U.S. universities to adopt the Edmonton Protocol of islet isolation.

Says Rolf Zinkernagel: "While a lot is understood about the immune system's relation with the diseases with quick onset, the slow-progressing ones, such as diabetes and tuberculosis, are the ones we need to concentrate our efforts on." According to Hans Wigzell, governments should realise the urgency for research in these areas and allocate more funds in money and resources. Although all research is for public good, it matters who produces the vaccines, as that would determine the price. And this is why governments need to be educated on investing in vaccine research, which would finally lead to a fall in private as well as public health costs. ■

The power crisis and a paradigm crisis

After having been taken for a ride by the ideology of centralised electrification, people are now being taken on another, equally dangerous spin by the ideology of privatisation.

WALDEN BELLO

IN many developing nations today, state-owned centralised power systems are mired in mismanagement, corruption and debt. And in country after country, influential multilateral agencies such as the Asian Development Bank (ADB) and the World Bank have come up with a cure-all: privatisation and deregulation. This is the case in India, Thailand, and the Philippines.

Yet the state ownership versus privatisation debate obscures the complexities of the crisis of power generation and delivery in the Third World. For what is behind the troubles of giant agencies such as the Electricity Generating Authority of Thailand (Egat) and the National Power Corporation (Napocor) in the Philippines is not the natural inefficiency of state-managed enterprises but the crisis of the paradigm that underpins them: centralised electrification.

Centralised technologies are inextricably linked with the politics of domination of countries by central elites – by technocrats, urban elites and local and foreign big business. Behind the crisis of these technologies is the unravelling of a long-time developmentalist alliance among technocrats, multilateral agencies and private corporations dedicated to foisting devastating technologies on developing nations in the name of a vision of modernity and the search for profitability. The power industry, in particular, illustrates this destructive symbiosis of modernity and profitability.

One of the earliest expressions of the sense that generation and distribution of power was a central test of modernity was made by Lenin in 1921, when he defined socialism as Soviet Power plus Electricity. But it was not only Leninists who equated electric power with the desirable society. Jawaharlal Nehru, the dominant figure in post-Second World War India, called dams the temples of modern India, a statement that, as author Arundhati Roy points out, has made its way into primary school textbooks in every Indian language. Big dams have become an article of faith inextricably linked with nationalism. To question their utility amounts almost to sedition.

THE technological blueprint for power development for the post-Second World War period was that of creating a limited number of power generators – giant dams, coal or oil-powered plants, or nuclear plants – at strategic points which would generate electricity that would be distributed to every nook and cranny of the country. Traditional or local sources of power that allowed some degree of self-sufficiency were considered backward. If you were not hooked up to a central grid, you were backward. Centralised electrification with its big dams, big plants and big nukes became the rage. Indeed, there was an almost religious fervour about this vision among technocrats who defined their life's work as missionary electrification or the connection of the most distant village to the central grid.

It was, it must be noted, a grand mission that was supported in India, Thailand, South Vietnam and the Philippines by millions of dollars worth of grants from the U.S. Agency for International Development (USAID). Not surprisingly, this generosity was not unconnected to the less than salutary mission of pacifying rural areas permeable to communist agitation.

In any event, in the name of missionary electrification, India's technocrats, Arundati Roy observes in her brilliant essay, 'The Cost of Living' (*Frontline*, February 18, 2000), not only built new dams and irrigation schemes but also took control of small, traditional water-harvesting systems that had been managed for thousands of years and allowed them to atrophy. Here Roy expresses an essential truth: that centralised electrification pre-empted the development of alternative power systems that could have been more decentralised, more people-oriented, more environmentally benign, and less capital intensive.

Centralised electrification, like every ideology, served certain interests, and these were definitely not those of the ordinary masses. The key interest groups were:

* key bilateral and multilateral development agencies. In Asia, the World Bank and the ADB became the biggest funders of centralised power technologies for export to Third World countries while USAID supported rural electrification. Centralised power development provided a grand rationale for the existence and expansion of these institutions into giant bureaucracies;
* big multinational contractors like Bechtel or Enron, which made tremendous profits building dams or providing power consulting services;
* exporters of power plants, including nuclear plants, like General Electric and Westinghouse, whose costs were subsidised by government export agencies like the U.S. Eximbank, with the taxes of citizens in the developed countries;
* powerful local coalitions of power technocrats, big business and urban-industrial elites. Despite the rhetoric about rural electrification, centralised electrification was essentially biased toward the city and industry. Essentially, especially in the case of dams, it involved expending the natural capital of the countryside and the forests to subsidise the growth urban-based industry. Industry was the future. Industry was what really added value. Industry was synonymous with national power. Agriculture was the past.

Aside from being an element in counterinsurgency programmes, rural electrification was simply a small concession to the countryside to pacify opposition to

DIS-11.

CoverStory

Diabetes, the Silent Killer, has become a pandemic in the country. Now it is stalking our children

KIDS with diabetes

DINESH PARAB

DELHI DURBAR

By SANDEEP PHUKAN

In and out of jams

Where there is traffic, there are bound to be traffic jams. On Diwali, to their great disgust, mobile phone users discovered cellular traffic jams. No one could send SMS greetings as all routes were busy and frustration peaked northward when mobile phone screens flashed the stock reply: Message not sent. But what you see is not what you get, as a Hutch subscriber discovered. Determined to send her greeting to her friend, she kept resending the message. After seven such failed attempts, she got an SMS from the friend. "Is everything OK? Uv msgd diwali greetings 7 times." Well, the more the merrier.

Illustrations/BHASKARAN

General's drill

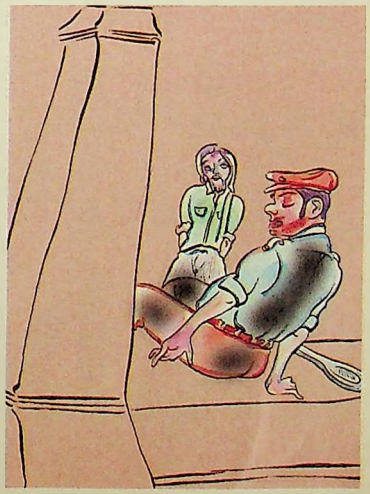
Punctuality is not the forte of politicians. But B.C. Khanduri, Union minister for road transport and highways, is an exception to the rule. The former Army major-general invariably arrives at official meetings ahead of schedule. His reputation nearly suffered a crack on November 2, when his car was caught in the throng of pre-Diwali shoppers on the roads. But despite being nearly half an hour late for the meeting, he was still the first person at the venue—even before the hosts!

Carrot on a stick

The city is getting yet another cellular operator, Idea—a consortium by Birla, Tata and AT&T. But what's good news for users is bad news for the competition. Faced with the possibility of an exodus of existing subscribers, mobile phone companies are at their enticing best. While Hutch has promised a free holiday in Thailand for lucky subscribers who prefer to remain with it, Airtel has a host of lucky gifts on offer—from a C-class Mercedes to a holiday in Australia. And the longer a subscriber stays with Airtel, the greater are the chances of winning. Little wonder people say an 'idea' can change your life!

In high spirits

With student elections at Jawaharlal Nehru University round the corner, campus security has been tightened. No visitor or vehicle is allowed in without being personally screened by senior security officer Dipanjan Chakraborty and Group 4 Securitas, a private security agency. But Diwali brought with it a lessening in the efficiency. A visitor found a guard inebriated and when Chakraborty went to check it out, the guard asked him to put it down to Diwali spirit. Hardly amused, Chakraborty suspended him, ensuring that his evening of lights was suitably dimmed.



By STANLEY THOMAS

It's Saturday evening and Mumbai pulsates with a restless energy. Shashank Joshi is restive too as he takes an emergency call at his clinic in Opera House, a business hub in the city. Then, as neon signs flicker to life and shoppers vie for space with sedans on the streets, he grabs his satchel and cell phone and dives into his California Gold Maruti. As it races toward suburban Bandra, the slight-built endocrinologist sits back sporting a lilac shirt and lots of worry lines.

Just past seven, he jumps off the car and rushes into the lobby of Lilavati Hospital, one of Mumbai's snazziest. He swerves past groups of relatives, a giant Ganesha statue and turns into a corridor. For a moment he locks eyes with the priest at the entrance of the prayer room on the way, but doesn't stop. In seconds he is in the casualty and heads towards a curtained enclosure. A white-coated assistant steps aside, another woman with red-rimmed eyes makes way, and Dr Joshi comes face to face with Varun Chandok.

The six-year-old boy sitting at the edge of the bed with a blank look has been brought in by his panicky parents from Chembur, another suburb. Suspicious of his listlessness, frequent thirst and urge to ease the bladder umpteen times, they had got a blood test done. The result left them in a daze. Varun's blood glucose level measured 475 milligram/decilitre, far higher than the normal reading that ranges between 80 and 120 mg/dl.

Joshi knows the boy is in a precarious condition and that, if his blood sugar level is not controlled, he can slip into diabetic ketoacidosis, a condition akin to coma. For now he keeps the information to himself, as the woman with red-rimmed eyes, Varun's mother, turns to him pleadingly: "He has never had a health problem before."

As her eyes turn misty again and Varun's father chews his nail endlessly, Joshi's mind races to the case of Bharat Gandhi, a teenager who was brought to him with diabetic ketoacidosis and needed to be put on the respirator. If only he could tell Varun's parents that their child too was showing symptoms of ketoacidosis.

Such children are normally rushed to doctors with complaints of weakness and polyuria—excessive urination as in the case of Varun—besides nausea, low blood pressure caused by dehydration, weight loss and sometimes abdominal pain. These are children caught in a bind: their blood glucose level shoots up while insulin—the hormone that deposits glucose (sugar) from the blood into cells in the body to use as energy—plays hide and seek. Fast depleting insulin had caused Varun's body to break down fat instead for energy, in the process creating chemicals called ketones. And excessive ketones in the blood stream had led to ketoacidosis, a life-threatening condition.

Pushpalatha

"I don't want to go to school," she says. Her teacher thrashes her almost daily because she grabs her lunch box soon after reaching class. Excessive hunger and thirst characterise many of the Type 1 diabetics.

Bharat Gandhi

The Type 1 diabetic was rushed to hospital in coma six months ago and had to be hooked on to the respirator. The cricket-crazy lad again slipped into a mini coma three months ago when he went on a picnic and skipped an insulin dose.

Photos/KISHORE

Shantala Shamarao

She was diagnosed with Type 1 diabetes four years ago, when in class three. Poor control over sugar levels meant frequent hospitalisation. "I used to take a lot of sweets on the sly," grins the girl whose dream is to become a doctor.

As Joshi asks the duty doctor to put him on human insulin injections the boy, steadfast till now, breaks into sobs at the sight of the syringe. He had already been jabbed several times during the day for various tests. Joshi's eyes soften at the boy's agony but he knows that Varun stands little chance without the insulin.

Four hours later, as he hungrily tears into a roti, the worry lines are intact on Joshi's face. "Varun's glucose level is fluctuating, plunging to 45 then shooting up to 376. Tests have indicated serious problems."

Worry lines are appearing on the faces of doctors across the country these days. And parents can't stop worrying themselves sick as the dread D-word is mentioned by the doctors. "I have got children two weeks old with diabetes," says Dr V. Mohan, director of the MV Diabetes Specialities Centre in Chennai. "Type 1 diabetes can happen anytime from birth to age 15. Type 2 diabetes traditionally used to start at around 55-60. Now we are getting that too at the age of 10, 12...15!"

Studies in Chennai and elsewhere have indicated that Type 1 cases are increasing by the year. It may not have reached the staggering numbers seen in Japan and the US "but if you go to elite schools in the country, diabetes is already happening," says Mohan, hinting at the lifestyle changes among the affluent that have caused a spurt in Type 2 cases among the young. "But it is only half a decade before it happens in the middle and lower level schools of the country." Other predictions are more alarming: the next decade, says one, could see diabetes in one Indian child in five. "There is a 100 per cent increase in the rate of diagnosis of Type 1 diabetes," says Joshi. "It is an epidemic among adults, and it is an epidemic among children."

Whatever the figures, India's children are being stalked by the Silent Killer which has already become a pandemic in the country. Ironically, Children's Day on November 14 is also World Diabetes Day. India already has 32.7 million diabetics, more than any other country. And the disease is showing no signs of let-up. In 1995, the World Health Organisation reported 19 million cases in India. It was to be 25 million this year, but the revised figures added seven million more. By 2025, WHO estimates some 57 million patients in the country. Which means, over three decades, there will be a 300 per cent increase in the number of diabetics. "Indians with close family members who are diabetics face the risk of getting diabetes at a much younger age, and the complications they face are far more critical," says Dr Shishir Kumar, senior diabetologist at Bombay Hospital.

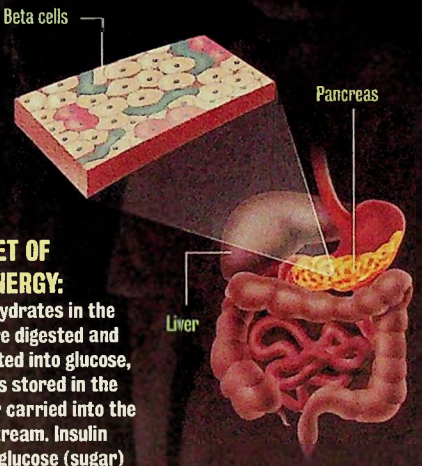
No one seems to be safe any more. A recent survey done in six Indian cities indicated that 12 per cent of the population could be diabetic. More worrying, says Dr Anil Kapur, vice-chairman of the World Diabetes Foundation, is the finding that 14 per cent of the people in Indian cities have pre-diabetes, or impaired glucose tolerance. In fact, 66 per cent of Indians are not diagnosed yet.

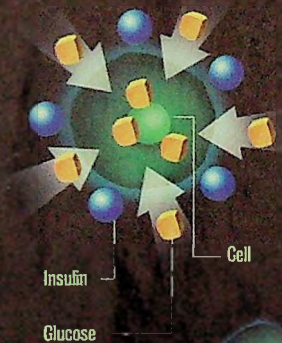
Put the two figures together—the diabetics and the pre-diabetics—and the pandemic becomes apparent. "It means that one out of eight Indians living in a large city has diabetes, and that one out of four either has diabetes

Cellular confusion

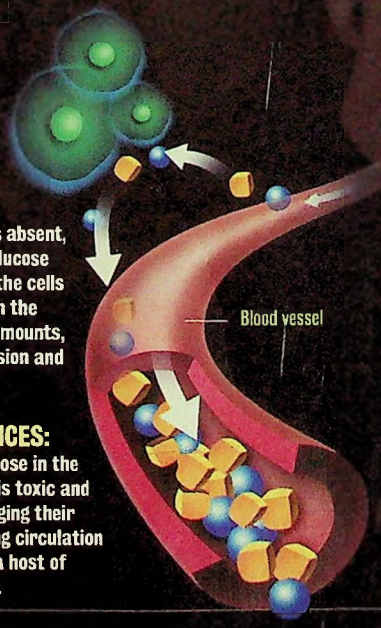
Type 1 diabetics are insulin dependent for life because their body stops producing the hormone that helps convert food into energy. The beta cells in the islet tissues of their pancreas, which secrete the hormone, are damaged. Insulin antibodies—components of the immune system that would normally help fight infection—turn rogue and attack the child's own beta cells.

SYMPTOMS: Excessive thirst and frequent urination are the most common. Others include slow healing of cuts, unexplained weight loss, fatigue and blurred vision.





SECRET OF MY ENERGY: Carbohydrates in the food are digested and converted into glucose, which is stored in the liver or carried into the bloodstream. Insulin guides glucose (sugar) to the cells which convert it into energy.



BLOCKADE: When insulin is absent, or deficient, glucose cannot enter the cells and remains in the blood in high amounts, causing confusion and even coma.

CONSEQUENCES: Excessive glucose in the blood vessels is toxic and ends up damaging their walls, affecting circulation and creating a host of complications.

COMPLICATIONS

Diabetics face blood vessel defects in the eye called microaneuryms, besides retinal detachment.

They are more likely to get cardiovascular diseases. Ulcers and wounds which don't heal could lead to amputations.

Impaired blood vessels to the kidneys cause high blood pressure and kidney failure.

They are also vulnerable to other diseases caused by autoimmune response—when the body does not recognise its own cells and destroys them—such as underactive thyroid.

RISK FACTORS

The risk of getting T1 diabetes is 10-20 times higher if an immediate relative has the disease. And if one child has Type 1 diabetes, its siblings have a 10 per cent risk of developing it.

WHAT TO EAT: Include more fibre and less fat to control blood sugar levels; take more of cereals, dals, whole wheat atta, leafy vegetables; avoid vegetables wth higher content of starch such as beetroot and potatoes and fruits such as bananas, grapes and mangoes.

Graphics/N.V. JOSE

or is at a great risk of getting it," says Kapur.

The figures are alarming for reasons other than the huge numbers involved. Experts say that Type 2 diabetes, the kind that normally used to hit people closer to retirement, is occurring in Indians at least a decade earlier than people in the west. In India the mean age of onset of diabetes is 42 years. With studies indicating a six-year gap between the onset of diabetes and its detection, most Indians seem to be a candidate by the mid-30s.

Try telling that to Timothy. With two young children diagnosed with Type 1 diabetes, or Insulin Dependent Diabetes Mellitus (IDDM), the young Bangalorean walks with a heavy heart. Daughter Aksa, 6, was diagnosed four years ago and son Samuel, 4, showed symptoms 18 months ago. Today, the world of Timothy and his wife revolves round the two young diabetics in the family. "Aksa was taken to hospital with fever and when the tests were done, the doctor said she had diabetes. I had no clue what diabetes was," says Timothy, who makes a living driving an autorickshaw in the Garden City. It was double trouble when Samuel too was diagnosed. "We were devastated," Timothy says.

While the majority of patients in India, as elsewhere, have adult onset Type 2 diabetes, or Non Insulin Dependent Diabetes Mellitus (NIDDM), even a minuscule percentage of child diabetics translates into huge numbers in a country with 32.7 million diabetics. "On a global scale, the rapid spread of Type 2 diabetes is worrying," says Mads Krogsgaard Thomsen, chief science officer at Copenhagen-based insulin producer Novo Nordisk. "But on an individual, personal level, Type 1 diabetes is far more serious. It is a crippling disease because it attacks you very young."

Often it cripples the family too. "Many parents cannot accept the fact that their child is a diabetic," says Kapur. "They go from one doctor to another in search of the 'right' diagnosis. They waste valuable time." Emotional problems are followed by economic ones. Timothy took a loan of Rs 50,000 to buy his autorickshaw and the bulk of the money is still to be repaid. He spent Rs 25,000 on getting the various tests done on his children before the Novo Nordisk Education Foundation (NNEF) stepped in to provide free insulin to the children, among 800 children it is helping countrywide.

Many others just cannot afford the treatment. It costs more than Rs 1,500 a month to supply a young diabetic's requirement of insulin, syringes, and pay for the frequent pathological tests. Sudha was eight when Dr Sharad Pendsey met the newly diagnosed Type 1 diabetic. He recalls explaining to her parents the importance of insulin. "I found Sudha's poor and illiterate parents very attentive. Finally her father asked me, 'Doctor, does Sudha have to take insulin every day for the rest of life?' I said yes. 'What would happen if she stopped taking insulin?' 'She would go into a coma,' I explained, 'and if left unattended she would die.' He nodded calmly and I was happy that my counselling had had the desired effect."

One month later, Pendsey learnt that Sudha had died. Her father had stopped giving her insulin, knowing full well what the result would be. Stunned by such cases, Dr Pendsey and his wife Swati formed the Diabetes Research Education and Management Trust (DREAM), whose aim is to help poor children, especially girls, with diabetes. DREAM has so far sponsored scores of children, who are provided with free insulin, syringes and blood sugar monitoring strips.

There are social problems to be faced by the young battling a debilitating disease. "Can she get married?" is a question that Pushpalatha's mother, Yamuna, frequently poses to Shashikala Thirunathan of NNEF. Pushpalatha, 6, often comes home complaining of ill-treatment in school because of her

Narasimha Murthy

The 14-year-old has been living with diabetes for the last six years but dealing with the social stigma is proving more difficult. "Classmates taunt me saying 'sugar, sugar' when I am around and they avoid me."

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Come, play with DiaBetNet

By LITTA JACOB

It need not be the dread 'D' word for the juvenile diabetic any longer. Instead, a child can now 'play' diabetes down. Vikram Sheel Kumar, a master's student at Harvard Medical School and MIT's joint division of health sciences and technology has figured that out.

Kumar worked on the assumption that motivating children to test their blood glucose levels frequently is not exactly a cakewalk. So he roped in faculty adviser Prof. Alex Pentland and together they designed and conceived a computer game—DiaBetNet—in which children punch in their glucose, insulin and carbohydrate levels at least three times a day and predict their glucose level at the end of the day.

Just as kids play *Super Mario* or *Tetris* on their Game Boys to get the highest score, Kumar felt that participants would be eager to increase their DiaBetNet scores. "They will play the game and say, 'Hey, I got that right!' said Kumar. "This way, there will be something to look forward to."

It takes a mix of meal planning, exercise and insulin injections to keep Type 1 diabetics properly regulated. That's where DiaBetNet comes in. The Handspring (a hand-held wireless device) helps check glucose levels and teaches children how food and exercise affect glucose, and to use that knowledge to win.

The children must wear a wireless accelerometer that determines how much they exercise by measuring their vertical motion. Each child will also carry a blood glucose meter that will plug into the serial port of a Handspring. When a drop of blood is fed into the meter, the reading will be sent wirelessly through the Handspring to a computer at the lab.

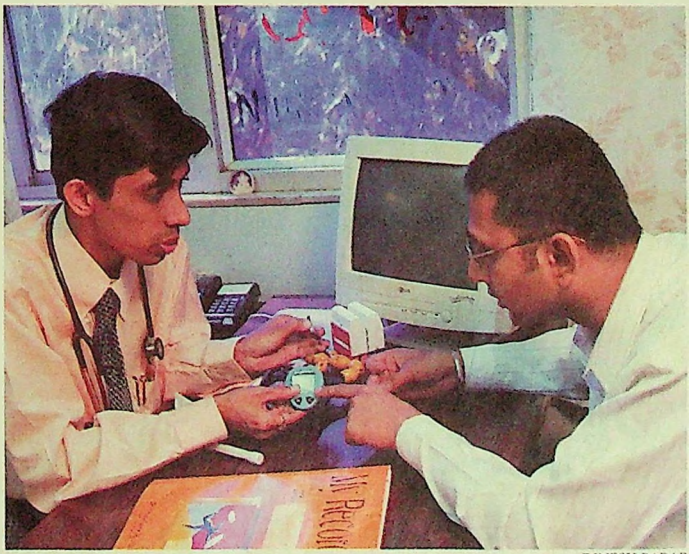
For the first three blood tests of each day, the glucose level appears on

Kumar designed DiaBetNet (in pic) for kids to punch in their glucose, insulin and carbohydrate levels and to predict their 'scores'.

diabetes-induced behaviour. "I don't want to go to school," she says. Her teacher thrashes her almost daily because she grabs her lunch box soon after reaching class. Excessive hunger and thirst characterise many of the Type 1 diabetics but her teacher, though not unaware of the condition, refuses to understand her agony. Yamuna's complaints to the principal have yielded little results.

H.M. Narasimha Murthy, 14, has been living with diabetes for the last six years—he points to the spots on either side of his stomach where he jabs himself six times a day with insulin—but dealing with the social stigma is proving more difficult. "Classmates taunt me saying 'sugar, sugar' when I am around and they avoid me," he says.

For a disease that causes so much physical and mental distress, experts have very simple explanations, and sometimes none. They know a lot about how Type 1 grips a child, but are



DINESH PARAB

There is a 100 per cent increase in the rate of diagnosis of Type 1 diabetes, says Dr Joshi (left, in pic). "It is an epidemic among adults, and an epidemic among children."

the hand-held device as a number. The guessing game begins later when, rather than showing the number reported by the glucose meter, the Handspring displays a graph summarising the child's physical activity, carbohydrate level and prior glucose data for the day. The more accurately the child then predicts his glucose level, the higher the score. The most correctly predicted result is rewarded. It is even possible to challenge other members of the project on the Internet through the Handspring.

The clinical trials for DiaBetNet was completed with the Joslin Diabetes Center at Harvard Medical School and the MIT Media Lab and the results were presented at the Diabetes technology conference in Atlanta in October. Forty children between the ages of 7 and 18 with Type I diabetes participated in the four-week trial. They were split into a 'game' group and a 'no game' group. Kumar and his associates were thrilled with the results—it showed how DiaBetNet was feasible and successfully used by the majority of the patients.

"Beyond establishing feasibility for a wireless system for diabetes management, we wanted to determine whether an interactive game could motivate children to test their glucose levels more often each day," said Kumar. "Though the size of our study was small we did note that patients in the 'game' group checked more often each day than patients in the 'no game' group and that the mean glucose levels of those in the 'game' group were less than those in the other group. It gives us reason to run a longer-larger clinical trial to establish how long-lasting these effects could be." Kumar and a few colleagues have founded a company called Dimagi, in Massachusetts, for producing the commercial version of DiaBetNet in the US. "But before it reaches markets like India, we need to do testing to establish its relevance given the basic availability of diabetes management products (insulin, glucose test kits, disposable glucose strips) in the country," said Kumar. "One of the motivations for founding Dimagi was to build a health technology think-tank and we are eager to work with diabetes care providers in India to solve some of these basic problems." DiaBetNet aims to create a diabetic community for children. Children get points not only for predicting their own and others' glucose levels but also for offering useful advice on strategy. Data for every player will be available on a DiaBetNet Web site, as well as rankings of the top players and teams. Kumar said that a stream of advice and sympathy would rally children when they find their scores dropping. "Kids like the ability to predict others' levels, to be a part of this larger community, and to be able to learn about their illness," he said. ■

not sure why. So much is clear that Type 1 diabetes is an autoimmune disease where the immune system attacks and destroys the insulin-producing beta cells in the pancreas. "It is a disease that is irreversible," says Krogsgaard. "Once the cells are destroyed they will never come back."

Experts say there is a genetic disposition and probably environmental factors that trigger the disease. Scientists have recently found evidence that suggests a viral link to diabetes. Their studies revealed a marked difference between the way the bodies of healthy individuals and those newly diagnosed with diabetes respond to a virus known as Coxsackie B4. "The belief is that when the virus hits you, it somehow triggers the immune system into attacking the beta cells," says Krogsgaard. "But we don't know for sure." The finding, however, raises the possibility of developing a vaccine for the disease.

Some experts also suggest that those who are too early off breast milk, and too early on to cow's milk, face a heightened risk of getting T1 diabetes. The fact remains that Indians are genetically vulnerable to getting diabetes. During his research in Britain, Mohan found Indians in that country with higher insulin levels in their blood. "If they had higher insulin level and the same glucose levels as the Europeans, it means the insulin is not working. They have insulin resistance."

Says Krogsgaard: "In India, once we go out of the cities like Chennai and Mumbai we find only 3 per cent of the rural population suffering from Type 2 diabetes. But when the same people move to urban areas, the number goes up to 12 per cent." This is because we are genetically predisposed toward turning everything we eat into fat. In the old days we had what researchers call the 'thrifty' or 'distress' genes which deposited fat we ate in the body for times of famine. "The body was genetically tuned to store fat," explains Joshi. "And in times of famine it used to utilise that fat to get energy. Now we don't need the fat-storing genes, not at a time when food is in abundance."

However, the 'thrifty' genes continue to store fat, leading to obesity in some. "And when you become increasingly obese the body becomes insulin resistant," explains Krogsgaard. "In the beginning the pancreas will compensate by making more insulin needed for a healthy body. But beta cells become stressed and exhausted and they stop producing enough insulin. Then you have T2 diabetes."

Another important risk factor is the waist-hip ratio. A lot of Indians tend to collect fat in the abdominal region. "That is a high risk for diabetes," says Kapur. "In the west if you have a body mass index of more than 27 then you are considered obese. In India, when one moves from a BMI of 23 to 24, which is still in the normal range, people are becoming diabetic."

The results were startling when Mohan did a comparative study of two sets of diabetic parents from India and

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Presenting SmartScan™, a compact blood glucose monitoring system. So sophisticated, you'll love to use it and so discreet, you can use it anytime, anywhere.

With SmartScan™, it's possible to monitor your blood glucose levels on a regular basis and maintain it within target* levels. This way, it not only helps you prevent diabetic complications but also ensures a better quality of life, today and tomorrow. So, you can always look forward to a healthy future.

Simple, 3 step testing procedure.

Insert test strip
(Meter turns on automatically)

Apply sample

Read result

Feature rich.

• Slender, lightweight and contoured • Fits perfectly in the palm of your hand • Accurate results just in 15 secs • Small sample size - 2.5 µl • Touchable test strips • Confirms sufficient sample size • Large, easy-to-read display • No cleaning necessary • 150 test memory with date and time • Automatic 14-day average

Why is frequent monitoring important for you?

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Ask your doctor about how easily the SmartScan™ meter fits into your busy life. Because staying in control is the smartest choice you can make.

SmartScan™

COMPACT BLOOD GLUCOSE MONITORING SYSTEM

The future is waiting

* Your target levels may differ. Ask your doctor

† Diabetes Control and Complications Trial

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Ogilvy Healthcare 351

Testing time

AS HIGH BLOOD glucose levels are the root of most of the complications of diabetes, maintaining glycaemic control is central to treatment. A host of devices are currently available—both to monitor blood sugar levels and to administer insulin. Regular

testing will help diabetics find out what happens to glucose levels when they eat certain kinds of food, or exert on the playground.

Companies are introducing newer and high-tech monitoring systems that are smart, discreet and accurate. These systems, such as Lifescan's SmartScan, consist a blood glucose meter and test strips which measure the glucose level with just a drop of blood. In just 15 seconds!

Novo Nordisk revolutionised the treatment of diabetes when it introduced its state-of-the-art insulin delivery system NovoPen, about the size of a fountain pen. Today it is used by some 2 million people round the world. The company recently introduced Innovo, another prefilled insulin pen with features such as built-in memory and display to show when the last dose was taken.

To help reduce the pain and fear associated with injections, the company has even launched a unique product: PenMate, which hides the needle tip thus reducing needle phobia.

Europe. Over a period of time, one child out of four of the European parents developed diabetes, and a second child faced a risk of getting it later. In the case of the Indian parents, two of the children already had diabetes at the time of initiating the study, and the chances of the other two getting it was about 95 per cent.

But genes alone do not explain the surge in the number of diabetics in India. "The explosion of cases now is coming from environmental factors," says Mohan. The most important factor is physical inactivity, he adds. The Chennai Urban Population Study (CUPS) looked at a middle income group and a low income one in the city. "We found that the low income group (monthly income: Rs 1,500) who ate less and exercised more had half the levels of diabetes of the middle income group (Rs 8,500 pm). By the time income increased five times, the risk of getting diabetes doubled.

Obviously, affluent Indians and their kids are paying a price for those frequent visits to fast food joints and the crates of cola that they have been downing, often plonking themselves in front of their television sets to become perpetual SOBs: Seated On Butts. Add high calories to the competition at work and school and the cocktail is explosive. "The stress of preparing for exams is enough to trigger diabetes in some kids," says Mohan. "Once you have stress, counter regulatory hormones such as cortisol and glucagons increase in the blood. All these are anti-insulin hormones."

Not only will an Indian live with diabetes for a longer time, he is more vulnerable to getting complications at an early age. Any diabetic, after 10 to 15 years of getting the disease, has a much higher risk of developing diabetic eye complications leading to blindness, kidney failure, neuropathy, and cardiovascular disease leading to heart attacks. "By the time he's 25 he could get a heart attack, eye trouble and kidney complications needing dialysis," says Mohan. The Indian genetic profile is such that many of the diabetics will be at greater risk of getting heart disease than a T2 diabetic elsewhere.

Progress in patches

By THOMMEN JOSE

Advances in medicine and technology have made it possible for diabetics to lead long, productive lives. Though a cure is yet to be found, researchers are devising methods of administrating insulin other than through injections.

PILLS: A new polymer that can allow the development of insulin pill has been discovered. When the polymer is used as a pill coating, it allows insulin to get into the bloodstream without being destroyed by the digestive system. But there are apprehensions on the efficacy of an insulin pill as dosing is often variable. Two different drug companies have pills that are in the early stages of development and it could be two years or more before they hit the market.

SKIN PATCHES: There are two steps in

The Silent Killer also bleeds society. Imagine the economic burden on the family if a 35-year-old man with two kids has to undergo dialysis because of diabetes complications. Imagine the burden on society, with a million people like that who will not be able to work because of their condition.

The direct cost of treatment with tablets and insulin in 1995 was estimated at Rs 19,000 crore. By 2025, it will cost Rs 57,000 crore. "If you add complications, at a very conservative estimate that only 10 per cent of these diabetics are going to need further treatment for complications, then the cost will be a staggering Rs 126,000 crore," estimates Mohan. "Who's going to pay? Will the government pay? Will private industry pay? Will the individual pay? No one can pay this kind of money. It means people will die simply because they cannot afford the treatment." Like Sudha.

People like Krogsgaard and Mohan

using patches. The patients first stick an electronic adhesive patch, powered by a small battery, on their skin. The cells on the skin surface are painlessly vapourised creating microscopic openings through which the medication can be delivered. Then, a small patch which contains insulin is stuck on to the skin.

INHALERS: Inhaled insulin is currently on clinical trials and could soon hit the market. These insulin pumps are the size of a small flashlight. Rapid action insulin, which is inhaled, coats the mouth, throat and tongue and passes quickly into the bloodstream.

Sugar monitors

NO MORE PAIN: The AtLast Blood Glucose System, with a lancing device and a blood glucose meter, allows patients to monitor their blood sugar minus the pain of sticking their fingers for blood samples. It uses a disposable test strip to obtain blood samples from areas that have fewer nerve endings like the forearm, thigh or upper arm, so that it does not hurt as much as a fingerstick.

WATCH THAT LEVEL: The GlucoWatch

Biographer is a wristwatch-like device that is intended to be used along with fingerstick blood tests. The watch extracts fluid through the skin by sending out tiny electric currents. It can be worn for 12 consecutive hours and it produces three measurements every hour, even while diabetics are asleep. If glucose levels are perilously low, it will sound an alarm.

New promises

ISLET CELL TRANSPLANT: This new technique has shown some promise in treating people with Type 1 diabetes. Also known as the 'Edmonton' technique, it uses cells from two or more donor pancreases. The cells are transplanted into the patient and special medications are given to prevent their rejection. One drawback is that though the patient need not take insulin again, the medications to prevent rejection has side-effects and must be taken for a lifetime.

VACCINE: The world's first drug that stops the destruction of pancreatic beta cells in humans has been developed. It could prevent the incidence of Type 1 diabetes in people at high risk and could also halt the progress in newly diagnosed patients. Tests showed that three injections of the compound administered within six months of diagnosis successfully arrested the progression. After treatment, the patients produced insulin and required fewer injections. There were no major side-effects, either. To be marketed post-2004.

GENE THERAPY: Researchers have identified a gene called SHIP2 which apparently regulates insulin. This discovery makes it a potential target for gene therapy for the treatment of Type 2 diabetes.

are, of course, working overtime to come up with ways so that people don't die of diabetes. "Research in the field of T2 diabetes at the moment is the most promising in the sense that the understanding of the mechanism of the action of insulin has become much clearer today than it was a few years ago," says leading international diabetologist Christian Binder. "New drugs will come in the next 5-10 years."

There is much excitement about research in islet-cell transplantation to help diabetics make up for the loss of insulin-producing islet cells in the pancreas. Shortage of donors is one reason more such transplantations have not taken place. "So we can cover only up to 2 per cent of the need this way," says Krogsgaard.

His team has developed a molecule, NN 414, which, when it goes into the body, circulates to the pancreas. In the beta cell when insulin is secreted out into the blood stream, a lot of other molecules also travel

Many parents cannot accept the fact that their child is a diabetic, says Dr Anil Kapur of the World Diabetes Foundation.

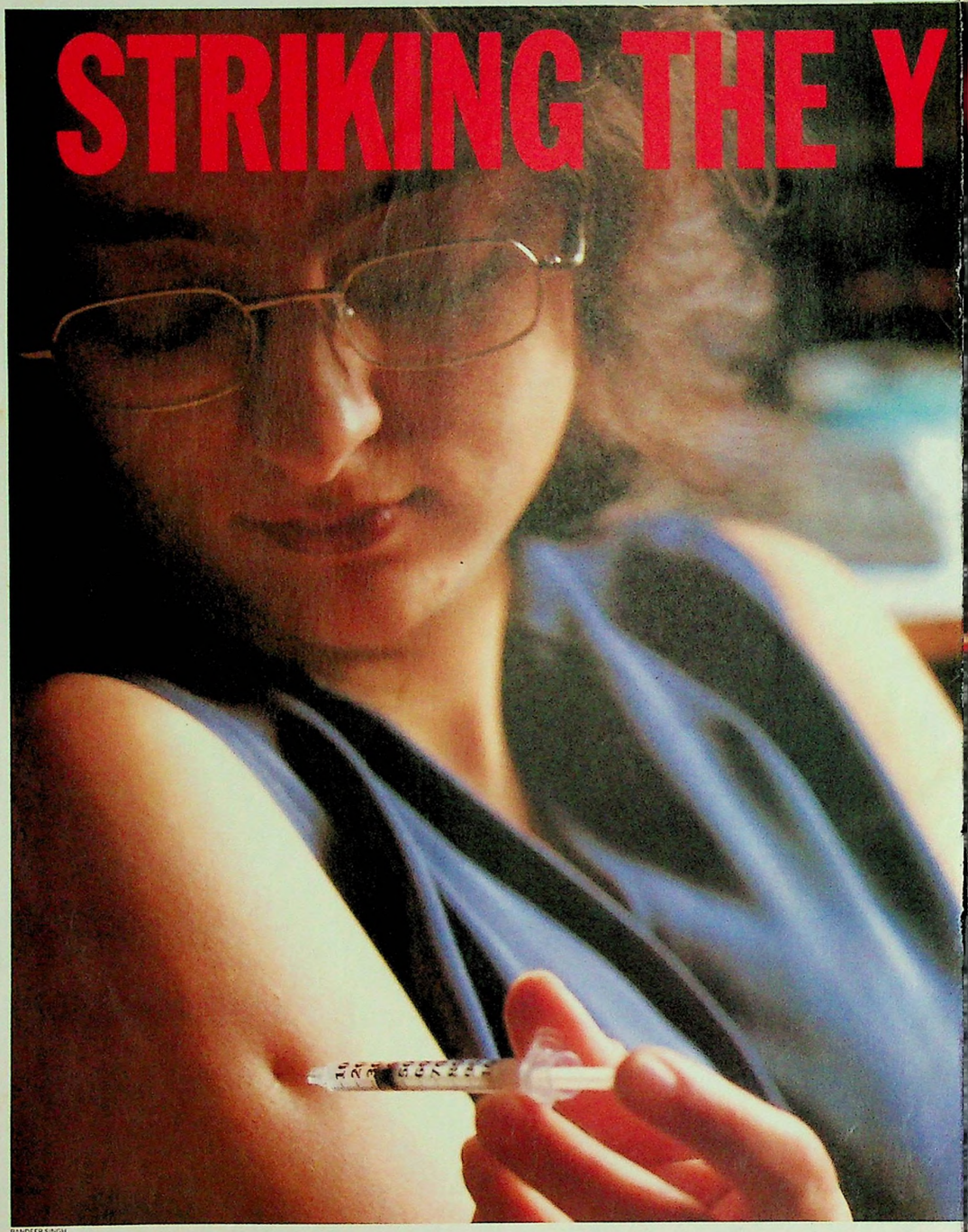
along with it. These molecules are believed to be the ones that trigger the immune system to kill the cells. "By resting the beta cells, when we give the person insulin, we hope the immune system will shy away from killing the cells. Patients will then be able to treat themselves with insulin and they will also have some beta cell reserve," explains Krogsgaard.

Any breakthrough in research *(box, above)* will come as a welcome shot to the likes of Varun. Since being diagnosed with Type 1 diabetes, he had plunged into coma. "Fortunately, he is now out of coma but will need insulin three times daily with close diet and blood sugar monitoring," says Joshi.

Varun is back home. In two weeks his world has turned upside down but the lad is determined to pull through. Even endure the daily jabs till the time researchers come up with something that will restore the joys of childhood. ■

DIS-11.

STRIKING THE YOUNG



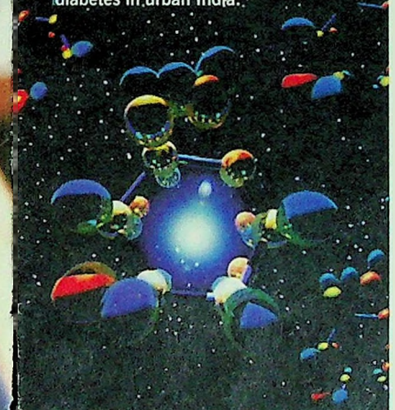
BANDEEP SINGH

WHY INDIANS ARE MORE PRONE

IN THE GENES: Indians are prone to the Insulin Resistance Syndrome, which is caused by abdominal fat, thin arteries and high blood pressure.

STOREHOUSES OF FAT: One theory says Indians have 'thrifty' genes, which enabled survival during famine by storing fat in the abdomen. Now, this tendency to store can lead to diabetes.

CHANGING LIFESTYLES: Rapid lifestyle changes and lack of physical exercise has led to a spurt in the incidence of diabetes in urban India.



"Diabetic complications grow with age so I want to do as much as I can now."
Tamanna Varma, 25

The investment manager has been fighting diabetes since she was 14. Diagnosed with Type-II diabetes, she has got used to a controlled diet and takes insulin regularly. Diabetes has not diminished her ambition.

20% or 33 million of the world's diabetics are Indians.

12% of the people living in Indian metros suffer from diabetes.

14% more are in a pre-diabetic stage and may get it later.

30% of diabetics in urban India are below the age of 40.

■ By Supriya Bezbaruah

Smart, articulate, energetic, determined, successful. Adroitly managing crores of rupees at the age of 25, investment manager Tamanna Varma enjoys living on the edge. Her bright smile and efficient manner, however, hide a poignant secret—for the past 10 years, her life has hinged on three shots of a drug called insulin, taken religiously before meals every single day. No soothing cup of tea, no impulsive ice cream for her. No chocolates, no mangoes, no unplanned meals as a teenager. When she started losing weight inexplicably at the age of 14, little did she realise that those little joys of youth would be forever forbidden. No one else did either. After an extensive range of tests for almost every possible ailment, her doctors diagnosed her with Type-II diabetes, a disease earlier seen only in pot-bellied and middle-aged men and women.

Varma typifies the unique Indian twist in a global epidemic. Diabetes, a metabolic disorder involving high blood sugar levels due to the non-functioning of a key hormone called insulin, has been on the rise across the world, affecting 150 million people. More than one-fifth, or 33 million, of them are Indian, according to the International Diabetes Federation (IDF), resulting in India being dubbed the Diabetes Capital of the World at the recent 2003 IDF conference in Paris. Indians diabetics tend to be younger and are more likely to fall prey to complications ranging from heart attacks and strokes to blindness and sexual dysfunction. Worse, almost 80 per cent of them don't even know they suffer from diabetes. The cost: an estimated $2 billion (Rs 9,200 crore) annually, according to a British Medical Journal report. "For developing countries like India, where most patients don't have optimal control, the cost of this epidemic can be crippling," says Wim Wientjens, president-elect of IDF Europe.

What makes Indians so vulnerable? From Chennai to Chandigarh, a plethora of recent studies by leading Indian doctors throws some light on the mystery. The potent combination of genetics, a rapid rise in riches, and even one's weight at birth are possible culprits. But a range of new drugs and treatment methods have made a diabetic's life easier than ever before.

"Everyone knows someone who has diabetes. It is that common in India," says Ambrish Mittal, senior consultant endocrinologist at the Indraprastha Apollo Hospital, Delhi. Recent surveys across the country buttress the fact. Diabetes is increasingly afflicting young and affluent urban people in India, reveals a survey of the disease in six metros. The survey conducted by A. Ramachandran of the Chennai-based M.V. Diabetes Research Centre (MVDRC) found that almost every eighth person living in a metro was diabetic. Worse, half of them were less than 50

years old and at the peak of their working life. In comparison, Chinese, Japanese, Americans and Britons tend to be a decade older when the disease strikes. "Diabetes is increasing as the age profile of the patients drops," says K.P. Singh, senior consultant endocrinologist at Fortis Hospital, Mohali.

Gaurav Kapur, 25, doesn't need statistics to tell him that. Three years ago, the fun-loving successful veejay went to the doctor when he lost 15 kg. They conducted a battery of tests, but not for blood sugar. "Who would have thought I had diabetes?" he asks. Finally, at the Escorts Heart Institute in Delhi, a blood test revealed the bitter truth—he was suffering from diabetes. The doctor said, "We're surprised you are not in coma." He adds, "Looking back, I am amused by my lack of awareness of the disease. I didn't realise the repercussions till much later." To Kapur, diabetes has meant giving up on beer, sugar, oily food and red meat.

Worryingly, according to the survey, another 14 per cent of metro residents—most of them below the age of 40—showed a pre-diabetic condition called impaired glucose tolerance (IGT). This implies that in the next two decades there may be a veritable explosion of the disease in India. It may have already begun. In the 1970s, urban diabetes prevalence was 2.1 per cent. Now it is 12 per cent. In Ahmedabad, the incidence has risen from 3.8 per cent of the population to 7.8 per cent in 17 years. In cash-rich Ludhiana, the number of diabetics has almost doubled in the past decade to 20 per cent. The World Health Organisation (WHO) estimates a 170 per cent increase from 84 to 228 million diabetics in developing countries by 2025. India will lead the pack, followed by China and the US.

"It is the possible complications that make diabetes a dreaded disease," says R.K. Gupta, senior endocrinologist at the Sir Ganga Ram Hospital, Delhi. People with diabetes are 25 times more likely to develop blindness, 17 times more likely to develop kidney diseases, 30-40 times more likely to undergo a major amputation, 2-4 times more likely to suffer a heart attack and twice as likely to get a stroke than a normal individual. It is because diabetes forms part of the larger Insulin Resistance Syndrome (IRS) in Indians, which includes hypertension, thinner arteries, and high cholesterol levels.

Simply put, glucose, obtained from our diet, is our body's fuel. It is crucial. Cells grab it from the blood and burn it for energy. The gate through which glucose enters cells is controlled by insulin, a pancreatic hormone, which acts as the key. Diabetes mellitus happens when the body's insulin does not work. So glucose cannot enter the cells and its level in the blood increases. The disease is of two types. In Type 1, insulin cannot be produced by the pancreas, and manifests itself in early childhood. In Type II, or adult onset diabetes, insulin is produced but cannot function as efficiently—a condition known as insulin resistance. Starving and desperate, the brain then directs the pancreas to churn out higher amounts of insulin, not realising that the cells are blind to the hormone. Worse, high insulin levels increase the transport of fatty acids, also obtained from the diet, into fat cells. It leads to fatty acids floating about in blood vessels too, causing cardiovascular horrors. The glucose, meanwhile, chokes other crucial proteins with a sugar layer, rendering them ineffective. The eyes, brain, kidneys, heart, even the healing properties of the body are adversely affected.

Where one lives and how much one earns clearly make a difference to the risk of diabetes. That is what Diabetes India, a Mumbai-based organisation, discovered after conducting a comprehensive study of the disease in villages, small towns and cities across India. Urban India was 4.57 per cent diabetic, while only 1.91 per cent of villagers were affected. Another study conducted in South India found an increase in Type-II diabetes with the rise in the urbanisation level from villages (2.4 per cent) to semi-urban areas (5.4 per cent) and metros like Chennai (11.6 per cent). Intra-city income groups also showed considerable differences for both diabetes and IGT—the incidence of diabetes was 12.4 per cent in the middle-income class and 6.5 per cent in the low-income class while that of IGT was 7.5 per cent and 2.9 per cent. "Our Chennai studies have clearly established the role of lifestyle in the probability of diabetes," says MVDRC Chairman V. Mohan.

SPREADING LIGHT: An awareness camp on diabetes. Many diabetics in India don't even know that they are suffering from the insidious disease

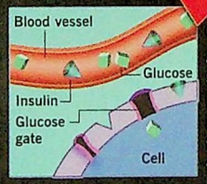
NARENDRA BISHT

Graphics by NILANJAN DAS

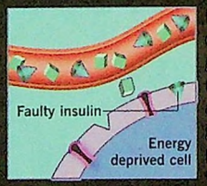
Diabetes Dossier

A combination of genes and lifestyle changes place urban Indians at a risk of diabetes

THE CAUSE



Cells need glucose. Insulin, secreted by the pancreas, is the key that opens the cell gates for glucose.



If the insulin is defective, the glucose gates remain shut and cells don't get energy. The patient feels very tired.

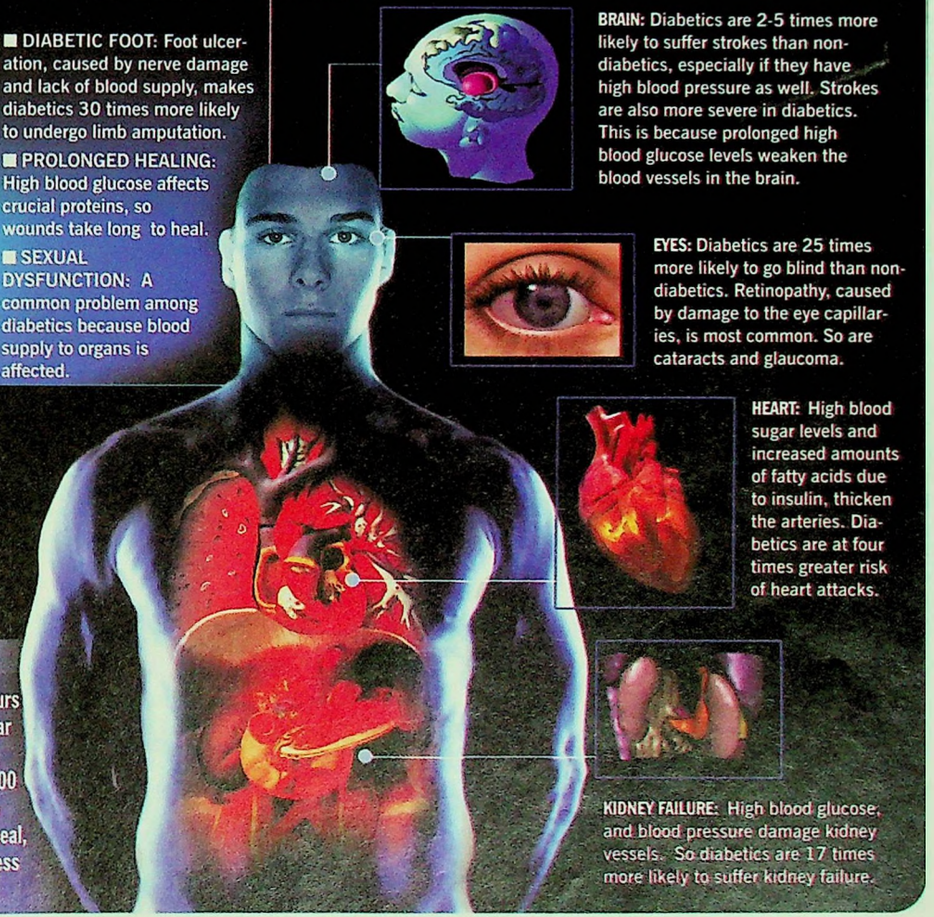
SYMPTOMS

- Frequent hunger and thirst are common signs of diabetes.
- Weight loss, irritability and lack of energy are other symptoms.
- Frequent urination is also a sign.
- A common sign is when wounds don't heal, cramps and pain in legs.

Diabetes occurs if fasting sugar level crosses 110 mg per 100 ml blood. Two hours after meal, it should be less than 140 mg.

THE WHOLE BODY IS AFFECTED

- **DIABETIC FOOT:** Foot ulceration, caused by nerve damage and lack of blood supply, makes diabetics 30 times more likely to undergo limb amputation.
- **PROLONGED HEALING:** High blood glucose affects crucial proteins, so wounds take long to heal.
- **SEXUAL DYSFUNCTION:** A common problem among diabetics because blood supply to organs is affected.



BRAIN: Diabetics are 2-5 times more likely to suffer strokes than non-diabetics, especially if they have high blood pressure as well. Strokes are also more severe in diabetics. This is because prolonged high blood glucose levels weaken the blood vessels in the brain.

EYES: Diabetics are 25 times more likely to go blind than non-diabetics. Retinopathy, caused by damage to the eye capillaries, is most common. So are cataracts and glaucoma.

HEART: High blood sugar levels and increased amounts of fatty acids due to insulin, thicken the arteries. Diabetics are at four times greater risk of heart attacks.

KIDNEY FAILURE: High blood glucose, and blood pressure damage kidney vessels. So diabetics are 17 times more likely to suffer kidney failure.

"I am amused by my lack of awareness of the disease."

Gaurav Kapur, 25

Three years ago, Kapur started losing weight. Puzzled doctors found nothing amiss before a blood sugar level test pronounced severe diabetes. Initially on a strict diet, he later decided to go in for insulin therapy. He now takes it regularly.

MYTHS AND REALITIES ABOUT DIABETES

MYTH: I AM NOT FOND OF SWEETS, SO I WILL NOT GET DIABETES.

REALITY: The onset of diabetes is not linked to intake of sweets. Diabetes is more likely to hit people who don't exercise regularly or are overweight. Once a person develops diabetes, however, sweets are best avoided.

MYTH: ONLY OVERWEIGHT PEOPLE SUFFER FROM DIABETES.

REALITY: Slim people are as much at risk of diabetes in India as are overweight people because Indians suffer from a syndrome called the Insulin Resistance Syndrome which is caused by abdominal fat and high blood pressure.

MYTH: I HAVE HIGH BLOOD SUGAR BUT I FEEL FINE. NO SYMPTOMS.

REALITY: Often, symptoms do not correlate with the blood sugar level.Going by just symptoms can be very misleading because the high level of blood sugar can seriously damage other organs like eyes, kidneys and heart.

MYTH: I WAS TOLD I CAN HAVE ALCOHOL.

REALITY: Alcohol can worsen blood sugar control, provoke severe hypoglycaemia and even react with antidiabetic drugs.

MYTH: ONCE ON INSULIN, ALWAYS ON INSULIN.

REALITY: Medical evidence says that early use of insulin can stop diabetes from worsening.

The Diabetes India study also showed significant regional differences—western and southern India showed highest prevalence while east and central India showed the lowest, with the north in between. "Western and southern India are more industrialised compared with the rest of the country. So it is likely that they get the least amount of physical exercise," explains Mumbai-based S.M. Sadikot, president, Diabetes India.

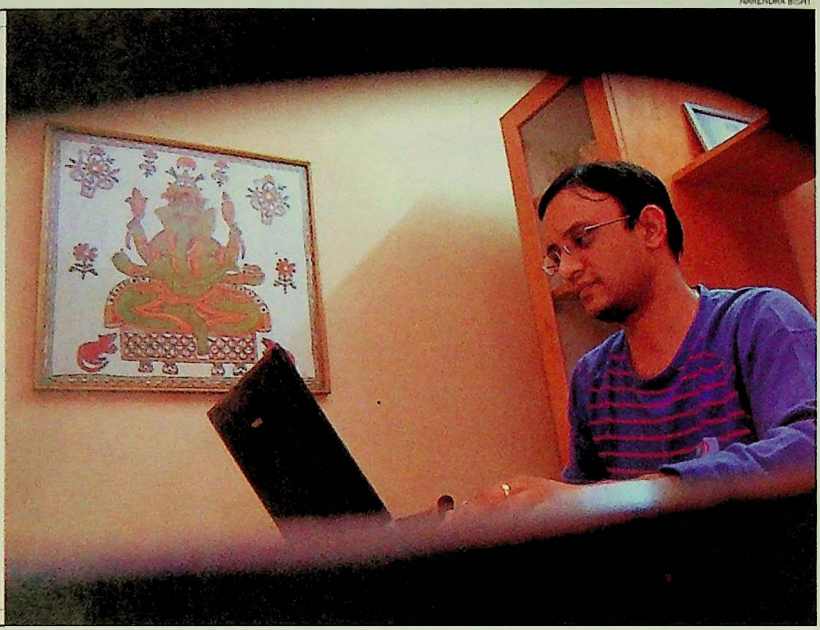
While lifestyle changes pull the trigger, one theory says it is the "thrifty genes" in Indians that put them in the cross-hairs. These are genes that over the centuries helped ensure survival during famines by storing excessive fat in the abdomen when there was plenty of food. In modern times, bombarded with rich food, the body cannot cope, leading to diabetes. This is precisely what happened to Indians migrating to western countries. Indians settled in the UK and US have far higher rates of the disease than any other ethnic groups. Mexican Pima Indians living in the US, and other US native Americans who have since moved to an urban life, also show epidemic rates of the disease. Research by Pune-based doctor Chittaranjan Yajnik showed that Indian babies are born smaller than Caucasian babies, but, surprisingly, have just as much fat, all concentrated

NARENDRA BISHT

"That I have to inject myself daily comes as a huge shock."

Sonic Purwal, 34

A busy IT professional, Purwal went for a routine preventive health check up only to find that he had diabetes. Put on insulin immediately, Purwal has been able to manage the disease by regular exercise and a more disciplined lifestyle.



around the abdomen. Indian babies are also born with much higher blood insulin levels. All are markers for diabetes in later life.

Genes may show the way, but diet spells dooms. Low birth weight followed by obesity in later life has been linked to insulin resistance syndrome. Yajnik's group had recently shown that it is not lack of food but specific lack of micronutrients—like iron and zinc—in mothers that lead to smaller babies among Indians. "Most girls in India are deficient in micronutrients from childhood. Anaemia is rampant," says Geetu Amarnani, chief nutritionist, Delhi Diabetic Forum. One study by Raheja Hospital, Mumbai, blames the refined, processed and preserved foods which are very popular but deficient in an important fatty acid called n:3 fat.

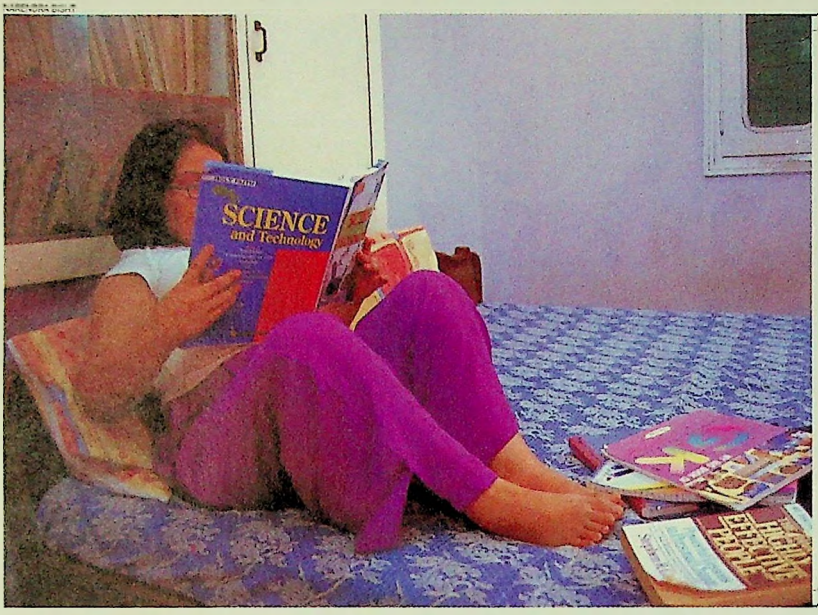
Sadikot blames a sedentary lifestyle instead. "In India, it is more to do with lack of activity rather than being overweight because 40-50 per cent of the diabetics are either underweight, normal or just mildly overweight," he explains. Interestingly, it is not confined to human beings. Evolutionary biologist Jared Diamond noted that there is a diabetes epidemic in the Los Angeles zoo too, among primates like chimpanzees, whose zoo lifestyle approximates the high-calorie, low-exercise lifestyle of many human diabetics.

Genes, pre-birth and post-birth diet, lifestyles, whatever the reason, Indians seemed to have pulled the worst cards for this disease. With a diabetic father, an American has a 20 per cent chance of getting the disease. But an Indian has a 30 per cent chance. If both parents are diabetic, Indians are at a 60 per cent risk, while Americans are safer at 25 per cent.

First generation Indian diabetics are common, the disease often creeping up without warning. It took IT professional Sonic Purwal, 34, completely by surprise. No one in his family suffered from diabetes. But two months ago, he was stunned when a routine preventive healthcare checkup showed his sugar levels were so high that he had to be put on insulin immediately. "Learning to inject myself and realising that I would have to do this every day for the rest of my life has come as a big shock," he admits. In two months, his life has changed drastically, but he looks at the brighter side. Now he is more disciplined, his meal timings regulated and regular exercise makes him more energetic. "We have realised how precious life is. Now all of us have a healthier lifestyle," his wife adds.

Several new products in the market have made managing the disease easier now. Thirty years ago, when a young Delhi-based businessman Jitender Mohan, then 35, was diagnosed with diabetes, there were no disposable needles. "I even had to learn to carefully sterilise those large needles," he says. "Now it's so much easier," he says feelingly, bringing out what looks like a pen case. Inside, what looks like an ordinary pen is a compact, injectible insulin pen, costing Rs 1,200 which he can carry anywhere, even in his shirt pocket. "And since it is insulated, I don't have to worry about finding a fridge to keep the temperature-sensitive insulin whenever I travel," he adds.

Timing and balance were once crucial features of a diabetic's life. Their vocabulary was entirely different—they talked in terms of "million dollar peaks". Those are the blood sugar peaks after a meal. "Even in the middle of an important business meeting, I had to excuse myself and take my insulin shot on time," says Mohan. Timing the insulin dose is vital. Too much, or too early, and glucose levels dip precariously. Headaches, restlessness, dizziness, blurred vision, and eventually coma could follow. Now, a new slow-releasing insulin analogue, called insulin glargine, has been launched in India. One shot is enough for 24 hours,



"I miss sweets and chocolates but I am used to it now."

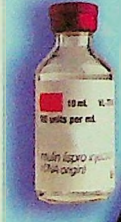
Kalpana Sharma, 10

Two years ago, Kalpana started urinating frequently. No one had imagined she would get the adult version of diabetes at such a young age. Put on a strict diet and exercise regimen, she has shed over 10 kg. With pills, her sugar level is down.

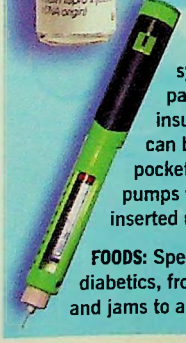
WHAT'S NEW

Managing diabetes has become easier with modern technology

HOME ALONE: Easy to use glucometers monitor blood sugar levels at home. New software sets alert if sugar levels rise.



NEW DRUGS: One shot of Lantis, a slow-acting insulin, is enough for a day. An Indian-made recombinant human insulin from Wockhardt is cheaper.



EASY INSULIN: No more syringes. Instead patients use sleek insulin pens that can be carried in the pocket. Also, insulin pumps which are inserted under the skin.

FOODS: Specially made for diabetics, from chocolates and jams to atta.

allowing for more flexible schedule.

There is another minor revolution—no more daily pokes. Diabetic patients today can also replace injections altogether with an insulin pump—a battery powered, computerised device about the size of a deck of cards. It has a needle or catheter implanted in the body and a preset dose of insulin is automatically administered. But at $3,000 (Rs 1.4 lakh), it is too costly.

Insulin itself is seen as the last option for diabetics. In India, patients are first put on a diet-and-pills course. From only a couple of types of anti-diabetes drugs a decade ago, now there are a huge range of treatment options. Prominent among them are sulphonylureas (which interferes with the liver's output of glucose), buguanides (helps more efficient utilisation of glucose in insulin resistance), sulphonylureas+ biguanides and alpha-glucosidase inhibitors (which help in the absorption of glucose).

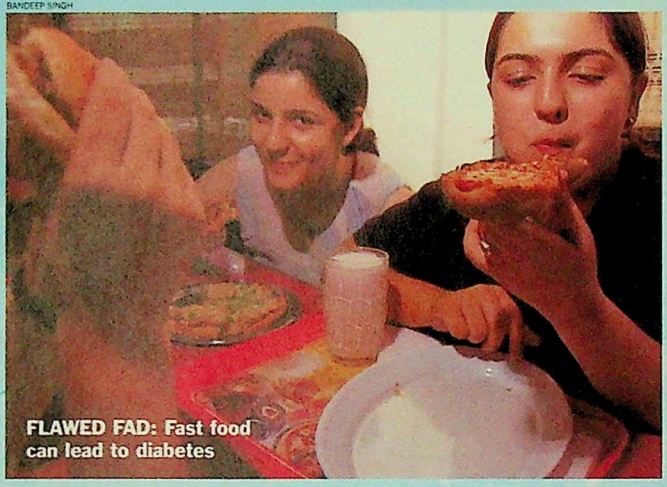
It is also far easier to monitor blood glucose levels today, with the new one-touch monitoring systems now available in India precluding the chances of falling into diabetic coma. Another device—the HbA1c—monitors glucose levels in the past three months by detecting the percentage of sugar coating blood haemoglobin. It is considered extremely accurate and takes only eight minutes. A reading of more than 7 per cent by this instrument spells danger. And new software helps IT-savvy people like Purwal to keep track of how well they are fighting their disorder.

Even the availability of insulin is easier now. Earlier, animal-based insulin had caused ethical problems. Now, modern biotechnology ensures that yeast or bacteria churn out human insulin. Eli Lilly, the world's first manufacturer of insulin, has a range of such insulin and insulin analogs in the market. Recently, Wockhardt, using a unique system, launched India's first "desi" recombinant insulin. This has brought prices down to a more affordable Rs 120 per vial. "The launch of Wosulin is part of Wockhardt's larger commitment to diabetes management in the country," says Habib Khorakiwala, chairman, Wockhardt. Following Lantis, a 24-hour insulin developed by Aventis, an inhaled form of insulin, Exubera, will soon be available, making diabetes management easier.

Indeed, to both multinational and Indian pharmaceutical companies, the Indian diabetes explosion spells an opportunity. "Not just in the near future, but in the long term too, the single largest and most important business for Eli Lilly will be diabetes," says

LIVING WITH DIABETES

BANDEEP SINGH



FLAWED FAD: Fast food can lead to diabetes

Controlling the Problem

Although Indians are genetically prone to diabetes, an affluent, high-stress, sedentary lifestyle increases the risks dramatically. But minor changes can help one cope.

YOU MUST ...

EXERCISE REGULARLY: Even if this means walking to work or taking the stairs instead of the elevator. A sedentary lifestyle is considered a major cause of the diabetes epidemic in urban India.

EAT HIGH-FIBRE DIET: Though this varies from individual to individual, food with high fibre content, like leafy vegetables, is good.

MONITOR BLOOD SUGAR LEVEL: Check blood sugar levels every three months, especially if there is a history of diabetes in the family.

AVOID STRESS: Try and control stress and lead a regular daily routine. According to some patients, yoga and even a regular massage have helped them in reducing stress.

YOU MUST NOT ...

IGNORE ANY SYMPTOM: Symptoms such as tiredness, cuts that do not heal, frequent urination, frequent hunger and thirst, should not be taken casually. Consult your doctor and get a check up done.

MISS A MEAL: Missing a meal will result in fluctuations in blood sugar level, and can even result in dangerous hypoglycaemia (low blood sugar level). Small frequent meals are advisable.

EAT FOOD RICH IN FAT: Fast, fatty, fried, refined, processed and preserved foods should be avoided at all cost.

Rajeev Gulati, managing director, Eli Lilly India. For the company, India is No. 1 in Asia, and among the most important markets globally. Ranbaxy has set up a separate dedicated division for innovative cardiac and anti-diabetic products. The total Indian diabetes market is Rs 750 crore and is growing at a rate of 15 per cent. The average pharmaceutical industry growth, in comparison, is 8 per cent. The potential can be gauged by the fact that 30 new players entered this market in the past four years. Nearly 144 new diabetic products were launched in the Indian market in 2002 alone.

But awareness remains low. "For every diagnosed Indian diabetic, at least two have the disease and do not know it," says Ashok Jhingan, chairman, Delhi Diabetic Research Centre. Even doctors are not always up to date with the latest technologies. "Here patients are less compliant on medicine and doctors are not aggressive enough, so the disease is not controlled," says Sandeep Bhattacharya, director, Commercial Operations, Aventis. As a result, it takes 15 years before a diabetic patient is put on insulin by doctors, usually as a last resort, although some studies show that early use of insulin can help control sugar levels better. Fear of injections, and the risk of hypoglycaemic coma, are some of the reasons why Indians avoid using insulin. Eli Lilly has launched many pioneering initiatives, including diabetes education camps, and a special diabetes kit for children called HumaCare. Aventis, in co-operation with doctors nationwide, is launching a major database of its Lantis users.

Even as scientists grope for a cure for diabetes, it may take several years before a breakthrough. Only a few genes which can cause diabetes have been identified so far. "Till then, only a broadbased preventive programme involving all sections of society can tackle this challenge," says the Ahmedabad-based diabetes expert O.P. Gupta. Regular physical exercise, a controlled diet and careful monitoring of sugar levels would be a good beginning for most urban Indians.

with Kanika Gahlaut, Sheela Raval, Arun Ram, Ramesh Vinayak, Stephen David and Uday Mahurkar

FOR CIRCULATION

D15-11.

Food related maladies - in relation to Lifestyle With special reference to Diabetes.

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Food is one of the three pillars of life according to Ayurveda, the ancient Indian science of life. Sleep and regimented lifestyle are the other two which contribute to a great extent the state of healthy living. The optimum state of health is a goal toward which many strive. After all, every one knows that, in great measure, primarily the physical well-being determines the quality of life. But deciding which approach to a healthy life-style will best improve or maintain personal health is no easy task. It is virtually impossible to read a newspaper, watch television, listen to the radio, or browse in a book-store without being bombarded by information from experts and so-called experts on the art of staying healthy. It is no wonder that confusion abounds.

Ahara, the food as it is known in Ayurveda, is defined as that which brings near or procure or being about to fetch all the living beings the nutrition that results in strength (physical & immunological), complexion (social) and enthusiasm (psychological) and subsequently survival. Ironically it is the same food which is also the cause for the diseases and death. Hence the food borne diseases are in the focus.

Diet as a Tool for Health

"Whenever you find yourself on the side of the majority, it's time to pause and reflect." - Mark Twain

Modern day lifestyles are busy, stressful, and seem to produce time conflicts more than ever. With time being so precious, it is no wonder that quick and easy foods are eaten over foods one needs to prepare. Not until one gets ill, does one look at food as a possible problem in one's life. This common notion should change.

The food one consumes on a daily basis affects the health more than anything else. The skin protects the body from the outside world, but what protects it when the outside world is internalized? All of the materials one requires for survival (besides oxygen and sunlight) need to be ingested and then digested. The easiest way to take control of the health is to take control of what one eats. If the physician inform that most of the health problems are not diet related, they could be wrong.

The foods of today are nothing like the foods of the past. Modern foods are laced with nitrates, preservatives, soy additives, plant byproducts, etc, and are heavily processed. Most livestock are pampered with high caloric feed, injected with hormones and antibiotics, and not allowed to graze, resulting in meat with different nutrients than those of wild game. Many of the modern foods touted as "healthy" didn't even exist in our ancestor's diet. It is important to realize that what the majority of people eat today is not optimized for the body, but optimized for convenience, taste, and preservation.

"It has become appallingly obvious that our technology has exceeded our humanity"- Albert Einstein

The knowledge and technologies have advanced at a tremendous pace, but the human body is still in the Stone Age. One still have the genetic makeup of our Paleolithic ancestors. On an evolutionary scale, our bodies have not been given the necessary time to efficiently utilize these new foods. It takes thousands upon thousands of years to adapt to the dietary changes we have incorporated in our modern day diet in a relatively short period of time. This sudden change in diet can account for many of the diseases that plague modern society.

If one has been caught up in the mainstream by following a diet low in fat or high in processed foods, or if they have developed a modern illness such as obesity, diabetes, Irritable Bowel Disease, Ulcerative Colitis, Crohn's disease, rheumatoid arthritis, and other autoimmune diseases, one need not despair. A Paleolithic diet can still be followed today. In fact, a number of diets that closely resemble that of our ancestors have been used to alleviate modern day illnesses. The following is a list of these diets, and the illness they have treated.

The Generic Low Carbohydrate Diet: Also called a high protein diet was made popular by the cardiologist, Dr. Atkins. The program restricts the amount of carbohydrates one can eat in a day. As a result, one can lose a fair amount of weight. Our ancestors did not have access to the refined sugar found

found in today's food. By restricting sugar-laden foods, we get one step closer to our optimum (our ancestors) diet. A generic low carbohydrate has been used to treat obesity, diabetes, and heart disease.

The Specific Carbohydrate Diet: This diet was developed to treat illnesses of the bowel, such as Crohn's and Ulcerative Colitis. It has also been used effectively to combat yeast infections and other illnesses, including autoimmune diseases. The diet does not limit the amount of carbohydrates eaten, just the kind of carbohydrates. The diet also stresses eating whole foods and limiting the amount of processed foods one eats.

The Paleolithic Diet: Is the strictest of the three diets shown, but also offers the greatest health benefits. It stresses whole foods with an emphasis on meats. The diet excludes all modern foods, such as dairy, alcohol, legumes, and grains.

Diet & Diseases

Diet as a means of disease prevention has-with good reason-received a lot of attention from the medical community and the popular media. An unhealthy diet has been linked in varying degrees to six of the ten leading causes of death in America today: cancer, adult diabetes, atherosclerosis, stroke, cardiac diseases, and liver cirrhosis. Of these, heart disease and cancer are responsible for the vast majority of chronic illnesses and premature deaths. Whereas enormous strides have been made in the treatment and cure of these diseases, medical science is now also investigating their prevention, with special emphasis on how dietary modifications affect probability of disease. Obesity, the most common nutrition-related health problem, is a contributing factor in a number of health problems, including hypertension, arthritis, and certain types of cancer, adult diabetes, and heart attacks.

The health is influenced not only by how much one eats, but what one eats. While many experts have been advocating a low-fat, low-cholesterol, high-complex-carbohydrate diet to combat heart disease, evidence has been mounting that virtually the same diet may also reduce the risk of other diseases.

To control weight and minimize other food-related health problems, one needs to become knowledgeable about nutrition. Although Americans are more concerned about eating healthfully today than in the past, the abundance of conflicting, misleading, or outright false information about diet can be bewildering. Indeed, sorting out reliable nutrition advice from the plethora of misinformation (i.e., popular diet books such as Fit for Life or How to Be Your Own Nutritionist) can be difficult.

Foodborne Diseases

Definition of foodborne illness: Foodborne illnesses are defined as diseases, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food. Every person is at risk of foodborne illness.

There are three main types of causative agents that bring about illnesses from food: - Pathogenic Bacteria, Viruses, and Chemical toxins in food either naturally occurring or introduced to a food.

Magnitude of foodborne illness:

Foodborne diseases are a widespread and growing public health problem, both in developed and developing countries.

- The global incidence of foodborne disease is difficult to estimate, but it has been reported that in 2000 alone 2.1 million people died from diarrhoeal diseases. A great proportion of these cases can be attributed to contamination of food and drinking water. Additionally, diarrhoea is a major cause of malnutrition in infants and young children.
- In industrialized countries, the percentage of people suffering from foodborne diseases each year has been reported to be up to 30%. In the United States of America (USA), for example, around 76 million cases of foodborne diseases, resulting in 325,000 hospitalizations and 5,000 deaths, are estimated to occur each year.
- While less well documented, developing countries bear the brunt of the problem due to the presence of a wide range of foodborne diseases, including those caused by parasites. The high prevalence of diarrhoeal diseases in many developing countries suggests major underlying food safety problems.

- While most foodborne diseases are sporadic and often not reported, foodborne disease outbreaks may take on massive proportions. For example, in 1994, an outbreak of salmonellosis due to contaminated ice cream occurred in the USA, affecting an estimated 224,000 persons. In 1988, an outbreak of hepatitis A, resulting from the consumption of contaminated clams, affected some 300,000 individuals in China.

Major Foodborne diseases from microorganisms

- Salmonellosis
- Campylobacteriosis
- Cholera
- Infections due to enterohaemorrhagic (causing intestinal bleeding) E. coli , and listeriosis

Other food safety problems: some major examples are:

- Naturally occurring toxins, such as mycotoxins, marine biotoxins, cyanogenic glycosides and toxins occurring in poisonous mushrooms periodically cause severe intoxications.
- Unconventional agents such as the agent causing bovine spongiform encephalopathy (BSE, or "mad cow disease"), is associated with variant Creutzfeldt-Jakob (vCJD) Disease in humans.
- Persistant Organic Pollutants (POPs) - Dioxins and PCBs (polychlorinated biphenyls).
- Metals: such as lead and mercury, cause neurological damage in infants and children. Exposure to cadmium can also cause kidney damage, usually seen in the elderly. These (and POPs) may contaminate food through pollution of air, water and soil.

Costs of foodborne diseases

Food contamination creates an enormous social and economic burden on communities and their health systems. In the USA, diseases caused by the major pathogens alone are estimated to cost up to US $35 billion annually (1997) in medical costs and lost productivity. The re-emergence of cholera in Peru in 1991 resulted in the loss of US $500 million in fish and fishery product exports that year.

Food safety is an increasingly important public health issue. Governments all over the world are intensifying their efforts to improve food safety in response to an increasing number of food safety problems and rising consumer concerns.

Why do foodborne diseases emerge?

New foodborne disease threats occur for a number of reasons. These include increase in international travel and trade, microbial adaptation and changes in the food production system, as well as human demographics and behavior:

- The globalization of the food supply :
- The inadvertent introduction of pathogens into new geographic areas :
- Travelers, refugees, and immigrants exposed to unfamiliar foodborne hazards while abroad :
- Changes in microorganisms :
- Change in the human population
- Changes in lifestyle: Greater numbers of people go out and eat meals prepared in restaurants, canteens, fast food outlets, and by street food vendors.

Diabetes & Lifestyle Changes

The disease is described several centuries ago in Ayurvedic literatures, which have recorded the bad lifestyle as the principal cause of this disease. It is said that sedentary lifestyle including excess sleep, food very rich in carbohydrates like fresh rice, cane sugar products, milk products especially curds, animal protein, dietary fats.

"The world is facing a growing diabetes epidemic of potentially devastating proportions. Its impact will be felt most severely in developing countries. The World Health Organization and the International Diabetes Federation are working together to support ongoing initiatives to prevent and manage diabetes and its complications, and to ensure the best quality of life possible for people with diabetes worldwide. Together we are helping to provide countries with the means to face the challenges that lie ahead. It is time for **diabetes action now***". – WHO.*

DIABETES is a life-threatening condition

- Worldwide, 3.2 million deaths are attributable to diabetes every year.
- One in 20 deaths is attributable to diabetes; 8,700 deaths every day; six deaths every minute.
- At least one in ten deaths among adults between 35 and 64 years old is attributable to diabetes.
- Three-quarters of the deaths among people with diabetes aged under 35 years are due to their condition.

A full and healthy life is possible with DIABETES

- Studies have shown that, with good management, many of the complications of diabetes can be prevented or delayed.
- Effective management includes lifestyle measures such as a healthy diet, physical activity, maintaining appropriate weight and not smoking.
- Medication often has an important role to play, particularly for the control of blood glucose, blood pressure and blood lipids.
- Through the provision of optimal health care the risk of developing diabetic complications can be reduced substantially.
- Helping people with diabetes to acquire the knowledge and skills to manage their own condition is central to their leading a full and healthy life.

In many cases, DIABETES can be prevented

- The prevention of type 1 diabetes is not yet possible and remains an objective for the future. The prevention of type 2 diabetes has been shown to be possible and requires action now.
- Trials have shown that sustained lifestyle changes in diet and physical activity can reduce the risk of developing type 2 diabetes. For example, the Finnish Diabetes Prevention Study showed that a better diet, increased physical activity and modest weight loss could substantially reduce the development of type 2 diabetes in middle-aged adults at high risk.
- In all the studies conducted so far in people at high risk, lifestyle changes have been substantially more effective than the use of drugs.
- The scale of the problem requires population-wide measures to reduce levels of overweight and obesity, and physical inactivity.
- Informed policy decisions on transport, urban design, and on food pricing and advertising can play an important part in reducing the population-wide risks of developing type 2 diabetes.

Ayurvedic literatures have advocated the treatment such as less fat in the food, and physical exercise, besides dry massage and sauna which help to reduce the body weight or obesity.

D15-11.

Issue no. 37 April-June 2004

Health Dialogue

A forum for the exchange of news and views on primary healthcare in India

Diabetes

Diabetes is no longer the disease of the rich or the aged. Known as the "Silent Killer", it is reaching epidemic proportions and according to the World Health Organization (WHO) approximately 177 million people worldwide have diabetes. India has an estimate of 32.7 million diabetic people.

To compound this problem, diabetes is no longer behaving the way it did in the past. In recent years it has been noticed, class distinctions and age have been blurred and it is now increasingly common even among migrant labourers in Indian cities.

Delhi Government has recently introduced Diabetic Awareness Camps in schools to help children fight obesity and diabetes.

Dr Paul Zimmet, Director, International Diabetes Institute, Australia predicts "Diabetes is going to be the biggest epidemic in human history."

Get set, go...

Sounds ominous? Sure, but should that scare us? The answer is No. While diabetes is a serious disease, it is well within one's power to control both high blood sugar and the complications it can cause.

If you have diabetes, take your doctor's advice seriously. If you are at risk for diabetes, that is, if you have a family history of diabetes or are obese, or think that you could have diabetes, get your blood tested and make sure of your status without further delay.

But more importantly, the key is, NOT to let your diabetes diagnosis paralyse you. The sooner you start to act, the sooner you will start feeling better and will be able to get your life back under control.

It is also important to realise that your diabetes is not the same as the next person's, so do not pop another person's pills.

Wasim Akram

And finally, remember diabetes is not the end of the world. Wasim Akram, the legendary cricketer has it but he did not let this hamper his game. This is what he has to say, "The best way to control the sugar levels is to exercise." Indeed, exercise and proper diet are the two important keys to control diabetes.

This issue focuses on the management of diabetes and lists out tips for care.

Editor

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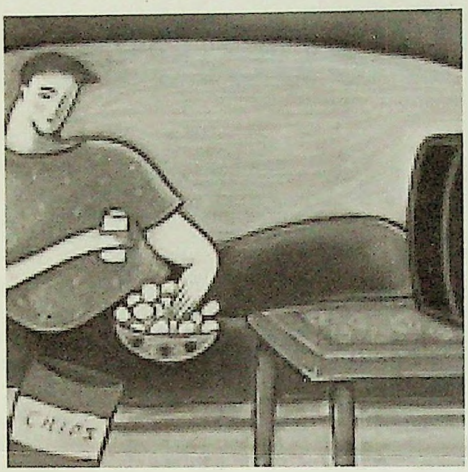
OVERVIEW

What is diabetes?

A recent survey indicated that Asians are more prone to diabetes. Change in lifestyles, food habits and stress are some of the causes for this



Diabetes Mellitus or diabetes is an illness in which the body cannot automatically control the level of sugar (glucose) in the blood.

Many people think that it comes from eating too much sugar. But that is not the case.

In a healthy body, the pancreas releases the hormone insulin, which converts blood sugar into energy. Diabetes interrupts this process. A diabetic fails to produce enough insulin — a hormone made by the pancreas needed to transport glucose to muscles and other tissues to provide energy — effectively.

Researchers have also come to realise that while it takes several forms, it is fundamentally similar but differ in many important ways.

The term 'diabetes' come from the Greek word 'siphon' based on the observation that diabetic people lose fluids in urine almost as quickly as they quench their thirst.

There are three main types of diabetes: Type 1, Type 2 and Gestational diabetes

With **Type 1** diabetes, the pancreas loses its ability to monitor and control blood sugar. This type used to account for less than ten per cent of diabetes and even though genetics does not completely predict the disease, having a family history of Type 1 diabetes may be the single most important risk factor.

This type will need an outside supply of insulin and therefore, will have to be injected with insulin. That is why Type 1 is sometimes referred to as Insulin Dependent Diabetes Mellitus (IDDM).

Although the reasons are not known, the incidence of Type 1 diabetes appears to be rising steadily.

Type 2 diabetes, known as adult-onset diabetes, is the more common form of diabetes and accounts for 90% to 95% cases of all diabetes. With Type 2 the pancreas does not completely shut off insulin production, but instead the body's use of insulin becomes impaired. Unlike Type 1, Type 2 develops slowly over time and the symptoms do not show right away.

It usually strikes people above 40, but in recent times even children have been known to have it. In Japan for example, 80% of new cases in children are Type 2, some as young as nine years.

The cause of Type 2 has much more to do with lifestyle habits and obesity could be the biggest culprit. With doughnuts, burgers and colas becoming the popular food for teenagers across the country, the caloric intake is far too unhealthy. But other important factors are genetics, physical inactivity, wrong diet and age.

Gestational diabetes — This is detected during pregnancy and is caused by the hormones produced by the placenta which hinder insulin function. Symptoms are similar to Type 2 diabetes. Women detected with Gestational diabetes should be careful with their lifestyle habits to avoid problems in later years.

How to treat it?

There is no cure for diabetes. But it can be controlled effectively with medicines, correct diet and exercise.

TERMS & DEFINITIONS

This box explains some of the technical terms used in this issue.

Amputation[3] — Surgical removal of a limb or other appendage or outgrowth from body.

Polycystic ovary[3] — Congenital disease where several cysts form in the ovary at the same time.

Glucose tolerance test[3] — Test for diabetes mellitus where a person is given a specific amount of glucose and the urine and blood are tested at regular intervals.

Insomnia[7] — Inability to sleep.

Gangrene[8] — Death and putrefaction of tissue usually due to loss of blood supply.

Dribbling[9] — To flow or fall in drops or in an unsteady stream.

TAKE-CHARGE TIPS

- Learn how to test your own blood sugar (by using test strips and blood glucose meter).
- Use the result to determine your average blood sugar levels and how they tend to fluctuate throughout the day.
- Learn from your doctor or diabetes educator about how to stabilise your blood sugar with diet and exercise.
- Schedule an eye examination for a month after your diagnosis. High blood sugar can temporarily cause blurry vision, a complete visual examination to screen for more permanent damage after a few weeks of having brought blood sugar under control.
- Read everything you can about diabetes.

Diabetic patients must also pay special attention to their eyes and feet. Since it is a multi-system disease, that is, it can affect one's heart (increase the risk of a heart attack), kidneys (long term high blood glucose can damage small blood vessels in the kidney which could result in kidney failure), eyes (damage small blood vessels in the [illegible] which can lead to vision blurring) nerve endings and circulation (this could lead to loss of sensation, which could result in foot ulceration and even amputation).

Prevention is better than cure

We are a generation that is vulnerable to this disease because our lifestyles have changed dramatically. Stress, coupled with bad eating habits and lack of exercise make us easy targets. It is therefore, important to adopt a healthy lifestyle. Be positive, change your diet, cut fats and most importantly exercise. Get regular check ups done and monitor your blood sugar.

If you are diabetic or have a family history of diabetes, a little bit care could take you a long way. Diabetes is not just physical disorder. Like any chronic condition it is also an ongoing emotional challenge. You are likely to face anger, frustration and even feelings of depression. Learning to cope therefore, is important.

Symptoms

While the signs of diabetes can be subtle at first, they are not something you can ignore for long. The longer the diabetes progresses, the more likely symptoms are to become obvious and troublesome.

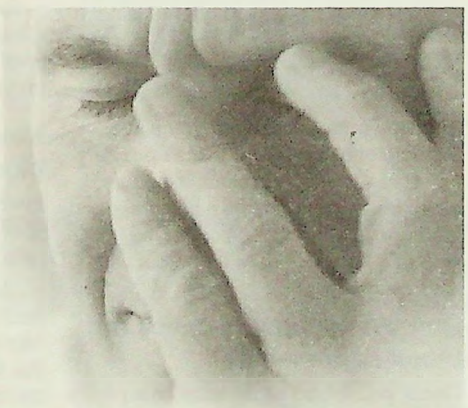
The following are some pointers:

- **Excessive thirst**
- **Increased appetite**
- **Frequent urination**
- **Fatigue**
- **Blurred vision**
- **Frequent infections**
- **Tingling in your hands and feet**
- **Sexual dysfunction**

Test for diabetes

Today testing for diabetes is simple and fairly accurate. Apart from the traditional finger prick to draw out a drop of blood, today the market is flooded with easy-to-use test strips, blood glucose meters etc. to check ones blood sugar level.

Sometimes you might be advised by your doctor or health visitor to come without eating or drinking anything before the test (fasting). See a doctor for a full evaluation.



Avoid stress

When to test for Diabetes?

Because risk increases with age, it is advised that diabetes tests should be taken routinely at three-year intervals for everyone after the age of 35 years.

In addition, it is recommended that for people with a higher risk, the tests should be more frequent.

This includes:

- Adults who are at least 20% above ideal body weight
- Persons with a parent or sibling with diabetes
- Women who have given birth to babies weighing more than nine pounds (4 kg)
- Women who have had diabetes during pregnancy
- Persons with high cholesterol
- Persons with high blood pressure
- Persons identified with abnormal glucose tolerance
- Women with polycystic ovary syndrome

For children:

Over weight children with two or more additional risk factors, should test every two years.

DOES STRESS CAUSE DIABETES?

Fact: Stress makes the body release hormones like cortisol.

Fact: Stress hormones make blood sugar go up.

Fact: High blood sugar and belly fat contribute to insulin resistance and eventually to diabetes.

Conclusion: Stress causes diabetes.

(Source: Diabetes Care)

Taking charge of your Diabetes

What is diabetes?

Diabetes occurs when a person's body doesn't make enough insulin or doesn't use insulin the right way. Insulin helps your cells use blood sugar for energy. Diabetes causes the sugar to build up in your blood.

Diabetes can generally be classified as Type 1 or Type 2. If you have type 1, your body makes little or no insulin. If you have Type 2, your body makes some insulin but can't use it properly. Most adults with diabetes have Type 2.

What health problems can diabetes cause?

Over time, high blood sugar levels can damage your eyes, blood vessels, nerves and kidneys. Damage to your nerves can lead to foot sores, problems with digestion and impotence. Damage to your blood vessels increases your risk of heart attack and stroke. Many of these problems can be delayed or prevented with treatment.

How is diabetes treated?

The goal in treating diabetes is to keep the level of sugar in your blood as close to normal as possible—not too high (called hyperglycaemia) or too low (called hypoglycaemia). You can do this by eating right, by exercising and by taking insulin or medicine if your doctor prescribes it. Regularly checking your blood sugar is a key to helping you control it. Blood sugar checks can help you see how food, exercise and insulin or medicine affects your level. Checking your blood sugar also allows you and your doctor to change your treatment plan if needed.

How do I check my blood sugar level?

To check your blood sugar level, you'll need to prick your finger to get a drop of blood for the test. Spring-loaded devices, which prick your finger when you press them against your skin, make this simple and less painful.

Call your doctor if:

- you start feeling very thirsty and are urinating more.
- you feel sick to your stomach or vomit more than once.
- you start breathing deeper and faster.
- your breath smells sweet.
- you start to tremble, feel weak and drowsy, and then feel confused or dizzy, or start seeing double.
- you feel uncoordinated.

After you prick your finger, you place the drop of blood onto a test strip. The test strip will change colour. You then either insert the strip into a blood sugar meter or compare the colour of the strip to a colour chart to figure out your blood sugar level.

How often should I check my blood sugar level?

Check your blood sugar as often as your doctor suggests. You'll also check it more often when you feel sick or stressed, when you're changing your medicine, or if you're pregnant. People taking insulin may need to check their levels more often.

Keep track of your blood sugar levels by writing them down. You can also keep track of what you've eaten and how active you've been during the day. This will help you see how eating and exercise affect your blood sugar level.

Tips on blood sugar testing

- Wash your hands and dry them well before doing the test.
- Pay attention to expiration dates for test strips.
- Let the drop of blood be big enough.
- Be sure your meter is set right.
- Keep your meter clean.
- Check the batteries of your meter.
- Follow the instructions for the test carefully.
- Show the results to your doctor.

What should my blood sugar level be?

Consult with your doctor about what range of blood sugar levels is best for you. A level of 80 to 120 before meals is often a good goal, but not everyone with diabetes can get their blood sugar levels this low.

Be sure to ask with your doctor about what to do if your blood sugar level isn't within the range that's best for you.

How does food affect my blood sugar level?

Every time you eat, you put sugar in your blood. Eating the right way can help control your blood sugar level.

As a general rule, just following a healthy diet is wise. Your doctor may help you find a dietitian who can help you learn how to make wise food choices. See the box for some tips on eating right.

Tips on eating right

- Eat at about the same time every day. This helps to keep your insulin or medicine and sugar levels steady.
- Try to eat thrice a day. Have a snack at bedtime if you're taking medicine or insulin. Avoid other snacking unless you're exercising or treating hypoglycaemia.
- If you're overweight, lose weight. Even losing just a little weight, such as 5 to 15 pounds, can lower your blood sugar levels.
- Eat plenty of green leafy vegetables, grains and fruits. Fiber helps you feel full.
- Eat fewer "empty" calories, such as foods high in sugar and fat, and alcohol.

What about smoking and alcohol?

You should stop smoking as soon as possible. It's probably okay to drink some alcohol. But it's best not to have more than about one serving a day with a meal. A serving is 4 ounces of wine, 12 ounces of beer or 1.5 ounces of hard liquor. If you drink on an empty stomach, you risk causing a drop in your blood sugar.

Will exercising help my blood sugar level?

Yes. Exercising is especially good for people who have diabetes because it can help the body better use insulin, resulting in a lower blood sugar level. Exercise is also good for your heart, your cholesterol levels, your blood pressure and your weight — all factors that can affect your risk of heart attack and stroke.

Exercise also seems to make people feel better about themselves and feel less anxious.

Talk with your doctor about starting an exercise programme. He or she can help you make a plan.

What is a glycosylated haemoglobin test?

It's a blood test your doctor may do. One common type of glycosylated haemoglobin is haemoglobin A_{1c}. The haemoglobin A_{1c} level helps to show how well your blood sugar has been controlled during the previous 1 to 3 months. It helps your doctor to see how effective your treatment is and decide if any changes are needed.

Source: www.familydoctor.org

Your Guide to Start Right...

Good diabetes care always begins at home with daily blood sugar tests that are done often enough to achieve your blood sugar goals. This monitoring is essential for providing a record from which changes in therapy can be made to reach a level of control that is best for your overall health. It is also the cornerstone for feeling at your best each day and preventing unwanted complications. The best record is a complete one: a sample log of typical food choices and quantities and blood sugar readings.

Below is a chart which describes the types of laboratory tests one should have performed and the frequency at which to perform them.

Lab Test	Type	Frequency	Purpose and Goal
HbAlc or Fructosamine	Blood Blood	4 times a year	Averages the blood glucose levels for the past 2-3 months. Goal is 7% or under when normal is 4-6% Averages the blood glucose levels for the past 2-3 weeks
Lipid Profile: Tot Cholesterol:<200 LDL:<100 HDL:>35 men >45 women Triglycerides:<200	Blood fast for 8 hours	Yearly	Measure of fats and lipids in the blood. Provides good determination for risk of heart disease.
Microalbumin	Urine	Yearly	Determines kidney disease at an early stage.
Serum Creatinine	Blood	Yearly	Determines kidney disease at a late stage
24-year Protein or 24-hour Creatinine Clearance	Urine Urine and Blood	As needed	Determines function of the kidney at an early stage

When visiting a healthcare professional, the following should be checked and discussed:

- Blood pressure
- weight
- foot exam
- Blood glucose readings record
- Review of diet, exercise and medications or insulin

Every year be sure to have the following:

- A dilated eye exam
- A detailed foot exam
- Your seasonal flue shot

Source: http//www.diabetesnet.com/diabetes_information/index.php

Managing Hypoglycaemia

Hypoglycaemia & Hyperglycaemia are two conditions that threaten diabetes if they are not careful about their sugar level. If monitoring reveals that your blood sugar has dropped below 70 mg/dl, your glucose levels are too low and you are in danger of hypoglycaemia. Do not wait for such symptoms as mental confusion, rapid heartbeat, sweating and double vision to occur before you act. They often show up when blood sugar drops dangerously low.

Follow these steps

EAT: Start by consuming 10 - 15 gm of a fast acting carbohydrate to get glucose into the blood as quickly as possible. This could be two spoonfuls of raisins, half cup of juice, half cup of any soft drink (not a diet cola) two teaspoonful of sugar, a sweet or two, half a chocolate bar or even a small portion of gur.

REST: Take it easy for at least 15 min. or while the carbohydrate goes to work

TEST: Take another blood test to check if your glucose levels have improved. Once your glucose levels have improved and if you have another hour or so left for the next meal, then eat another small snack (some salt biscuits) to help tide you over.

Important Tips

- To protect against hypoglycaemia, do not exercise if your blood sugar is below 100mg/dl.
- Blood sugar can continue to fall long after you have exercised. So be alert and watch for signs of hypoglycaemia until 24 hours after the workout.
- Always carry a snack/biscuits/ toffee.
- Staggering your food intake throughout the day helps to keep your blood sugar on an even keel.
- Avoid three big meals in a day, instead take five smaller meals.
- **Always carry an identity card with your diabetes status written clearly along with your name, address and emergency telephone nos.**

Understanding hyperglycaemia

Hyperglycaemia is arbitrarily defined as a glucose level of less than 12 mmol/1. It can result from non-compliance with treatment. Most patients forget to take their tablets/insulin from time to time. If one dose of tablets/insulin is forgotten within 1 hour of the usual time, take as usual. If longer than this, omit the dose and take the usual dose when the next one is due. DO NOT double the following dose. Accept that blood glucose levels will be temporarily raised.

Causes

- Untreated diabetes
- Too much food
- The wrong type of food
- Infections/illness
- Insufficient tablets or insulin (incorrect dose)
- Overuse of particular injection sites – leading to fatty lumps
- Poor injection technique
- Reduction of activity
- An increase in drugs affecting glycaemic control (e.g. steroid therapy)
- Stress—life changes (retirement, bereavement)
- Weight increase.

MONITORING: THE PRIMARY CARE TEAM

☑ Patients should monitor their own general health and well-being, diabetes control, eyesight, weight, dental care, care of the feet and footwear.

☑ To promote health and reduce risks of complications, you should teach them how to monitor their diabetes control (urine/blood glucose levels). This monitoring allows them to check their own control, take responsibility for their condition and as far as possible maintain independence.

☑ If you suspect that the person with diabetes has hypoglycaemia (from discussion of symptoms or reports of ('dizzy spells'), blood glucose levels should be checked and medication or insulin reduced.

☑ Hyperglycaemic episodes will need an increase in tablets or insuli

☑ You will have to decide with the patient whether any change in therapy is needed, e.g. diet alone to tablet therapy combination tablet therapy to combination tablet + insulin therapy to insulin therapy— all in association with dietary guidelines.

☑ Decisions about adding tablets or insulin should be taken in consultation with the doctor and the person with diabetes.

☑ By monitoring dietary habits, changes in weight, lifestyle and other medical problems (particularly in elderly people), you can decide when possible review and changes in treatment are necessary.

Naturopathy & Diabetes

The market is full of alternative therapies and some of them can indeed be tempting especially if you are faced with injecting insulin every day

To use these remedies (Ayurvedic, Homeopathy or Chinese herbal medicines) is a personal decision, but it is better to approach them with caution. To begin with do not assume that "herbal" means "safe". Medicinal herbs do have effects on the body. But more importantly, even if they work for you, you should never substitute it for your regular insulin or medication, but instead use it to complement your allopathic medicines. And finally it is extremely important that you monitor your blood sugar closely if you take these remedies. First to find out how effective the herb is and second to monitor your blood sugar for your own safety.

Among the herbs that show the most promise for lowering blood sugar are:

Jamun (Gymnema Sylvestre) – is a very popular black-blue fruit in the north of India, and have been used to treat diabetes for more than 2000 years. It is thought that it works by boosting the activity of the enzymes that help cells use glucose or by stimulating insulin-producing beta cells in the pancreas. The herb is not known to cause side effects.

Methi (Fenugreek) – A spice that is found in most Indian kitchens. Small studies conducted have revealed that methi seeds can lower blood glucose. Lab research shows that methi seeds contain an amino-acid shown to boost the release of insulin.

Karela (Bitter Gourd) – This common vegetable has been a local remedy for diabetes for a long time. A number of studies in small groups of people who were diagnosed with Type 2 diabetes suggest that it indeed might have some benefits. It is consumed as juice or in powder form and it is thought to help cells use glucose through such active ingredients as plant insulin. Other substances in the bitter gourd are thought to block sugar absorption in the intestine.

A word of caution –Some side effects like headaches and gastrointestinal distress have been reported. It should not be taken during pregnancy.

Ginseng – An increasing popular remedy in India. However, research about its effect to lower blood glucose is far from conclusive. Ginseng is known to cause excitability, which in turns makes people more active, and this might lead to burning up more calories.

Ginseng is expensive to cultivate, so what is marketed is often adulterated with other substances like caffeine.

Side effects could include headaches, increased blood pressure and Insomnia.

(Source: RD)

SOME MYTHS

Myth: If you have diabetes, you can never eat sugar again.

Truth: People with diabetes can eat sugar but these treats should be a part of a careful meal plan.

Myth: I just have a touch of diabetes.

Truth: Either you have diabetes or you don't. Even if your type 2 diabetes does not require insulin injections, it still demands medical attention and careful calorie management.

Myth: I feel fine, so my blood sugar is fine.

Truth: High or low blood sugar does not always produce symptoms. Regular monitoring is the only way to know where you stand.

Myth: I am, a pro at self-management, check-ups are just a waste of time.

Truth: Your treatment programme is never a done deal, Thanks to ongoing research; the best way to keep up is to keep up with regular doctor visits.

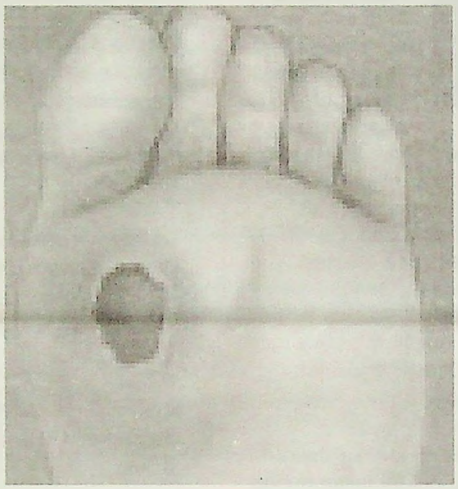
Myth: If I don't need insulin my diabetes is not serious.

Truth: Diabetes is always serious. Even if diet and exercise keep your blood sugar in check, your cells are still insulin resistant and your condition could get worse if you do not control it.

Care for your feet

If you are diabetic, then you have to be vigilant about your eyes, kidneys and feet

Thomas, a diabetic, was meticulous about his insulin shots, diet and exercise. But he slipped up when it came to his feet. It was not deliberate though. His age made bending difficult and his failing eyesight did not help either. A new shoe proved to be his undoing. A small shoe-bite was the beginning of the end. The wound refused to heal. Medication and dressing did not help. The infected area turned blue (which his eyes failed to see) and it was not till his wife complained of a foul smell did the alarm bells ring.



He immediately went to see his doctor, who without wasting time admitted him and got ready to amputate his foot. Gangrene left him with no choice.

Many diabetics end up losing their toes or foot. Taking care of your feet is important. Poor circulation from damaged blood vessels slows healing and makes feet more prone to infection, while nerve damage can dull sensation and leave you oblivious to injuries that can quickly get out of control.

And therefore, it is important to be extremely careful of one's feet. Cuts while clipping of toe nails, in-grown nails, chapped feet, broken skin, or small shoe bites should not be ignored.

Give your feet a good check once a day, both with your eyes and hands. Besides blisters, cuts or bruises check for discolouration. A paler or redder tint could indicate your footwear is not the right kind. Also check for areas of coldness (indicates poor circulation) or warmth (could indicate presence of infection) and swelling. Use a mirror to see the bottom of your foot and if your vision is poor ask a relative or friend to check for you.

Wash your feet everyday with luke warm water. Avoid soaking the feet as it will soften the skin and make you more vulnerable to infection. Dry feet by gently patting dry the water. Avoid vigorous rubbing down. Take care to dry between the toes to avoid fungal infection. Use moisturising cream or oil to prevent dryness and cracking.

Clip your toe nails with care and if need be ask for someone to help.

Wear clean and good fitting cotton socks and proper shoes.

Have your doctor check your feet when you visit him.

MUST DO'S

- Find out all you can about diabetes and check with your medical care team.
- Inform others about your diabetes: your family, friends and your colleagues.
- Go for regular checks.
- Be in control of your diabetes on a daily basis.
- Monitor your own sugar levels and change treatment as advised.
- Keep a record of your blood (or urine) tests.
- Know when to seek help and where, particularly in an emergency or if you are ill.
- Discuss your fears with your team.
- Ask questions and repeat if not answered; prepare them before your appointment.
- Follow a healthy lifestyle by choosing healthy food, controlling your weight, taking physical exercise and not smoking.
- Examine your feet regularly. If you find this difficult, try to arrange for someone to do this.
- Recognise signs of low/high blood glucose levels and how to prevent.
- Be aware of the long-term complications of diabetes, the importance of early detect and the relevance of reducing blood glucose (sugar) levels to reduce the risk of complications.
- Carry personal identification card with your diabetic status and details of who can help.
- If you are female and hoping to have a baby, get advice on your diabetes before trying to conceive.

Care for your kidneys

It takes years of blood sugar abuse for your kidneys to pack up. But between 20% to 40% of diabetic patients develop kidney problems and diabetes is among the leading causes of kidney failure. Total loss of renal function will ultimately require dialysis where the patient is hooked up on a machine for two to four hours for the blood to be cleansed. The other option is a kidney transplant.

The kidneys produce and eliminate urine through a complex system. Blood flows through at high pressure and urea, toxin and other wastes are flushed out in the form of urine.

Over time, high blood sugar destroys these small centres and the kidney fails to flush out the toxins or keep the nutrients from being expelled. Small amounts of protein or albumin can be detected in the urine and you

can notice puffiness of the eyes and swelling of hands and feet — classic symptoms of a diseased kidney.

What you can do:

- Control blood sugar – Closely controlling blood sugar is the single most effective way to keep kidney at bay.
- Check blood pressure – Monitoring of blood pressure can halt damage to the arteries in the kidney.
- Cut back on protein – If you have a kidney problem, be careful about the protein intake.
- Visit the doctor – If you have swelling, pain in the lower back.
- Protect against UTI – Urinary Tract Infections (UTIs) are common in people with diabetes. If you feel a burning sensation when you urinate, constantly having to go, pain in the lower abdomen, or notice your urine is cloudy or has traces of blood, then chances are you have urinary tract infection and are in need of treatment. Dribbling of urine is a common symptom.
- Watch the pills you pop – A wide range of drugs can be hard on the kidneys. Check with your doctor and watch for warnings on the cover/strip about taking it if you have kidney disease.

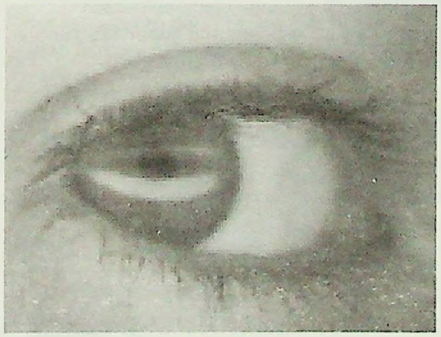
Care for your eyes

Diabetes is one of the leading causes of blindness in adults. Like the kidneys, the eyes are nourished by small blood vessels and diabetes can easily damage these blood vessels.

If this damage is not attended to promptly then it could lead to vision loss.

Most diabetes related damage of the eye takes place in the retina, where the weakened blood vessels can puff up or rupture (nonproliferative retinopathy) and make your vision blurry. If this damage is unchecked, it could develop into more serious haemorrhages and pressure build up in the eye, leading to scarred tissues or even the retina starts tearing away from the eye.

Do not take even minor changes in



your vision lightly. You may not be able to detect any serious changes in your ability to see, but your doctor will be able to do so. Most diabetic centres recommend that persons with Type 1 diabetes get their eyes examined at least once in three years. Persons with Type 2 should have an eye examination immediately after diagnosis and then get their eyes checked once every year.

Apart from this, should you experience any of the following, visit your ophthalmologist immediately:

- Double vision
- Vision is blurry
- Vision is distorted. That is, straight lines start looking wavy.
- Spots or lines seem to float in front of your eyes
- Flashes of bright light
- Pain or pressure in your eyes
- Hazy vision and narrower field of vision
- Difficulty in seeing in dim light
- Difficulty in colour identification, especially blue and yellow.

Juvenile Diabetes

According to a national survey, two in five Delhi students have diabetes and high cholesterol (Type 2) is becoming increasingly common even among young school children. About a decade ago, a ten-year-old diabetic patient would have been startlingly rare. Not any longer. Doctors are now struggling to treat even six-year old.

Treating diabetes (both Type 1 & Type 2) in children is more challenging as children often fail to take their problem seriously.

As a first step parents have to be extra alert and learn to identify hypoglycaemia and hyperglycaemia, since the child is often at a loss to express its feeling.

Expect some opposition to change in food habits and may be even open rebellion over insulin injections and blood sugar tests. But do not give in.

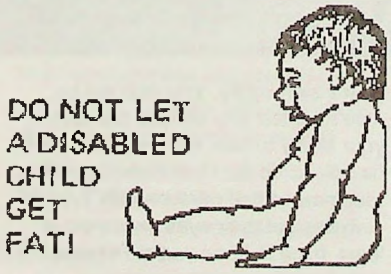
Children need more blood sugar for normal development. Consult a dietician and follow instructions.

As the child grows up he/she will be able to understand why this treatment is necessary and will also cooperate. Educate the child whenever he/she shows a curiosity or a willingness to learn.

Do not scare the child, instead be positive and encourage positivity in your child too.

Make sure he/she has a bedtime snack and that the child does not skip its meals.

If the child is nine or above, encourage him/her to inject himself/herself. Monitor and supervise the child as it grows into adulthood and you are sure he/she is capable of handling it himself/herself. Kindly make sure the child carries the identification tag at all times identifying him/her as diabetic.



RURAL MIGRANTS PRONE TO DIABETES: STUDY

Rural people who migrate to urban areas in search of better prospects and reside in slums, are at high risk of getting diabetes and hypertension compared to those who choose to remain in villages, a study has said.

"Rural population usually has a low risk of development of diabetes and hypertension but migration to metropolitan cities exposes them to several adverse lifestyle and environmental influences," Dr Anoop Mishra, a professor in the department of medicine at All India Institute of Medical Science (AIIMS) said.

"Change in lifestyle of the people living in urban slums is having a fall-out on their health in terms of increased risk of Type 2 diabetes, a disease which was earlier thought to be associated with affluence," he said.

A total of 532 people, including 362 women, in an urban slum in a south Delhi area, were studied for the disease. Pregnant women, disabled, drug users and acutely ill people were excluded, Mishra, who led the study, said.

Contrary to the widespread assumption even among the experts that obesity and diabetes are not a crucial problem in urban slums due to high prevalence of malnutrition and low socio-economic conditions, the team found that about 10 per cent of the people over 30 years had Type 2 diabetes while about 27 per cent were found to have hypertension.

"Over 11 per cent males and about 10 per cent females over 30 years were found to have the disease while the obesity was more prevalent among women," Mishra said. The team found that the onset of Type 2 diabetes was also linked with high waist-hip ratio.

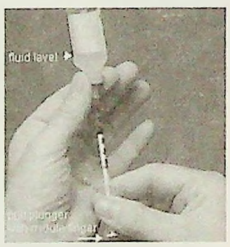
"Children who are obese are more vulnerable to Type 2 diabetes," he said.

Source: PTI

SHOTS MADE SIMPLE

If you are insulin dependent and need insulin injections regularly, do not get alarmed. It can be scary at first, but most people quickly get used to them. Learn to inject yourself by following some basic steps. First, wash your hands with soap and water and check the bottle to make sure you are using the right insulin. Get the syringe, alcohol wipes and your insulin. Relax. Tense muscles can promote tightness that can make it harder for the needle to enter.

Gently roll the bottle between your palms (shaking it can make the insulin less potent) check its appearance, except for regular insulin which should look clear, the contents should look uniformly cloudy. Do not use if its clumped or settled at the bottom or if the bottle has a frosty look.



After wiping the stopper/ cover with an alcohol wipe take the cover of the syringe and pull the plunger back until it reaches the dose you need as marked by the lines printed on the syringe side.

Stick the needle through the stopper and press the plunger down so all the air in the syringe goes through the bottle.

Turn the bottle and syringe upside down so the tip of the needle is submerged in the insulin. Now pull the plunger back once again drawing the insulin until you reach your dose mark.

If you see any air bubbles (which dilute the insulin strength) push the plunger back in and draw the insulin again. Repeat this process until you have the right dose and no bubbles.

Cleaning the injection site, (preferably outer thigh, upper arm or stomach) with an alcohol dipped cotton swab and wait for the area to dry. Pinch a fold of the skin and push the needle in at a 90 degree angle. (Insert the needle quickly, slowness and hesitation can make it hurt more) If you are thin, consider using a short needle or inserting it at a 45 degree angle to avoid injecting into muscle.

Push the plunger down; release the skin and pull the needle out. Press the cotton swipe on the needle mark as you remove the needle. Keep pressing for a few seconds but do not rub the area.

Source: Diabetes Care

DIABETES AT A GLANCE

Type 1

Characteristics: Sudden onset; pronounced thirst and hunger, frequent urination; fatigue, nausea and vomiting; weight loss.

Age at onset: Usually 20 or younger.

Physical Condition: Usually lean or normal weight.

Cause: The immune system destroys the pancreas cells that produce insulin.

Mainstay of treatment: Insulin injections.

Type 2

Characteristics: Slow, difficult-to-detect onset; pronounced thirst; frequent urination; fatigue; slow wound healing; tingling hands or feet; frequent infections; weight loss.

Age at onset: Usually 40 or older. However, in recent times younger people are getting Type 2 diabetes.

Physical Condition: Usually overweight.

Cause: Lack of exercise, poor diet and resulting obesity; genetics.

Mainstay of treatment: Lifestyle changes, possibly supported by insulin and drugs.

Gestational

Characteristics: Pronounced thirst, frequent urination, fatigue and other symptoms similar to Type 2.

Age at onset: Child-bearing years

Physical Condition: Pregnant

Cause: Hormones produced by the placenta hinder the function of insulin.

Mainstay of treatment: Lifestyle changes, possibly supported by insulin injections.

Useful Addresses

Madras Diabetes Research Foundation, 6, Conran Smith Road, Gopalpuram, Chennai 600 086.

Juvenile Diabetes Foundation, India is a international organisation dedicated to the welfare of children and young adults with diabetes within India.

Diabetes Research Centre, (WHO Collaborating Centre for Research, Education and Training in Diabetes), 4, Main Road, Royapuram, Chennai - 600 013.

Diabetic Association of India, 127, MG Road, Maneckya Wadia Bldg, 1st Floor, MG Road Fort, Bombay 400 001, Tel: 91-22/273813

Diabetic Association of India, Raheja Hospital Road, Mahim 400 016, Mumbai, India, Tel +91-22-4467569/70, E-mail info@rahejahospital.com

Diabetes Education and Treatment Center, Kantiwikha Road, Panjagutta, Hyderabad 500 082, Andhra Pradesh, India.

Nutrition Foundation of India, C-13, Qutab Institutional Area, New Delhi 110016, Ph: 26962615.

Useful Sites

Diabetes Clinic Online Consultation

www.diabetescliniconline.com — It is the online consultation for diabetic patients and provides useful information for doctors.

www.diabetesindia.com

www.familydoctor.org

http//www.diabetesnet.com/diabetes_information/index.php

Dear Reader,

We appreciate your interest in our magazine and would like to record our thanks for the same. However, with the steep increase in production costs, bringing out each edition of 'Health Dialogue' (HD) is an uphill task. The printing and paper costs alone for a single copy of HD is Rs. 14/-. We would therefore, appreciate your support to supplement these costs, by donating Rs. 100/- **for two years' supply of HD**. Please send a crossed cheque or Demand Draft payable to Christian Medical Association of India, New Delhi.

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MEDICINE

Dealing with renal disease

Cross-blood renal transplantation can go a long way in the treatment of end-stage renal disease, but even more important is the control of diabetes and hypertension.

ASHA KRISHNAKUMAR

THE number of people suffering from end-stage renal disease (ESRD), that is, a condition in which the kidneys function at less than 10 per cent of their capacity, is rapidly rising the world over and threatening to become a major public health problem.

In India, several lakh people suffer from ESRD, which requires long-term dialysis or renal transplantation. In the United States there are over 300,000 ESRD patients and in Europe more than 250,000.

The kidneys maintain the internal body environment for the optimum functioning of various organs by getting rid of various metabolic byproducts such as urea and uric acid and by maintaining the pH and electrolyte level of various body fluids. They filter 180 litres of blood every day. The kidneys also perform hormonal functions such as the activation of vitamin D and the production of erythroprotein, which is responsible for the functioning of bone-marrow.

There are two types of kidney failures. One is acute failure, when there is a reduction in the blood supply to the kidneys or when a nephrotoxin is administered. It is potentially reversible. The other failure is chronic, which is caused by urinary infection, allergic reactions, diabetes and hypertension. It is irreversible. When a chronic failure patient cannot survive without dialysis or transplant, the patient is said to be suffering from ESRD.

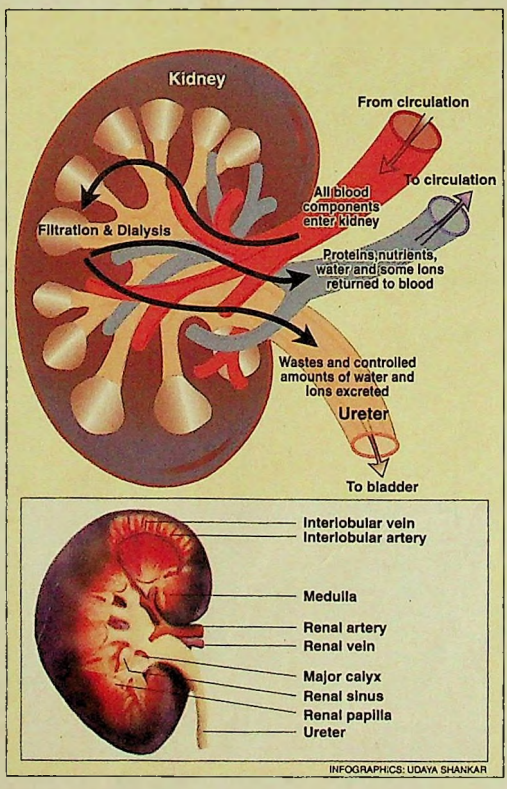
Dialysis purifies blood. There are two types of dialysis. One is haemodialysis. It is done by a sophisticated machine in hospitals. A patient is usually required to undergo haemodialysis two or three times a week, which would cost about Rs.10,000 a month. The second is continuous ambulatory peritoneal dialysis (CAPD), which can be administered by a patient on himself/herself by implanting a catheter in the peretonial (abdominal) cavity. It costs Rs.20,000 to Rs.25,000 a month and provides better-quality life.

Haemodialysis was first done over 50 years ago. Only in 1960, with the development of the indwelling arteriovenous teflon shunt, called the Quinton-Scribner shunt, was maintenance haemodialysis introduced for patients with ESRD. At about the same time, advances in immuno-suppression, such as the development of 6-mercaptopurine (Purinethol) and its derivative azathioprine sodium (Immuran), led to the procedure of kidney transplantation. Widespread use of peritoneal dialysis began in the mid-1970s and is used by over 100,000 patients the world over.

Neither haemodialysis nor peretonial dialysis offers a cure. Transplantation is a more stable form of therapy and leads to complete rehabilitation, particularly among younger ESRD patients. Transplantation, done from a live donor or from a cadaver, costs over Rs.2 lakhs and the annual cost of maintaining the patient with immuno-suppresants is about Rs.1 lakh.

According to the nephrologist Dr. R. Ravichandran, Director, Madras Institute of Nephrology, Chennai, most kidney problems remain undetected until they become ESRD. Even among those detected, most patients cannot afford the cost of dialysis or transplantation and treatment with immuno-suppresants. Added to this are the myths and half-truths associated with renal diseases. Says Ravichandran: "Most times the patient and his family are left fatigued, confused and depressed." Realising the complexity of the problem faced by ESRD patients, Ravichandran and Dr. P.B. Sivaraman, Professor in the Department of Urology at the Government General Hospital in Chennai and consultant urologist, Malar Hospitals, who have been treating ESRD patients for over two decades, set up the Balaji Medical and Educational Trust five years ago, to subsidise treatment costs, create awareness about the disease, and screen the population for diabetes and high blood pressure – the main causes of ESRD. Some organisations such as the Tanker Foundation subsidise dialysis. But that is not enough, they say.

The rising incidence of ESRD the world over has led to social problems primarily because the number of patients wanting kidneys for transplantation has increased manifold while the availability of donor and cadaver



A viewer, particularly one who accepts the theological import of the story, is thus caught in a sadomasochistic paradox, as are the disciples for whom Jesus, in a flashback that occurs towards the end, promises to lay down his life. The ordinary human response is to wish for the carnage to stop, an impulse that seems lacking in the dissolute Roman soldiers and the self-righteous Pharisees. But without their fathomless cruelty, the story would not reach its necessary end. To halt the execution would thwart divine providence and refuse the gift of redemption.

The paradox of wishing something horrible to stop even as you want it to continue has as much to do with movie going as with theology. And Gibson, either guilelessly or ingeniously, has exploited the popular appetite for terror and gore for what he and his allies see as a higher end. The means, however, are no different from those used by virtuosos of shock cinema like Quentin Tarantino and Gaspar Noi, who subjected Monica Bellucci to such grievous indignity in *Irreversible*. Gibson is temperamentally a more stolid, less formally adventurous film-maker, but he is no less a connoisseur of violence, and it will be amusing to see some of the same scolds who condemned Tarantino's "Kill Bill: Vol. 1" sing the praises of *The Passion of the Christ*.

Gibson, from the moment he began speaking publicly about this project, emphasised his desire to make his "Passion" as realistic as possible. To that end the dialogue is in Aramaic and a dialect of Latin, which takes some getting used to but which dispenses with the stilted, awkward diction that afflicts so many biblical epics. The absence of identifiable movie stars (with the exception of Bellucci, who comports herself with fitting modesty) also adds an element of verisimilitude. But the style and tone of *The Passion* are far from what is ordinarily meant by realism.

The first part, which takes place in the murk and gloom of night (shot by the superb cinematographer Caleb Deschanel), has the feel of a horror movie. As Jesus prays in the garden of Gethsemane, the camera tiptoes around him like a stalker, and John Debney's score is a high-toned creep show of menacing orchestral undertones and spine-jabbing choral effects. A slithery, effeminate Satan (played, the end credits reveal, by a woman named Rosalinda Celentano) slinks around like something in a Wes Craven nightmare, and Judas, reeling from his betrayal, is menaced by demon children with pointy teeth and milky eyes. When daylight dawns, the mood shifts from horror-movie suspense to slasher-film dread.

TIMOTHY A. CLARY/AFP

At a theatre in New York, a group called "Jews for Jesus" hands out flyers for the first showing of the film, on February 25.

Throughout, Gibson lays on Debney's canned sublimity with the heaviest possible hand, and he indulges in equally unsubtle visual and aural effects. Judas' 30 pieces of silver fly through the air in slow motion, and the first nail enters Jesus' palm with a thwack that must have taken hours of digital tweaking to articulate. The thuddingly emphatic storytelling (along with the ancient languages) makes the acting almost beside the point, though it is hard not to be impressed by Caviezel's endurance. The only psychological complexity in this tableau of goodness and villainy belongs to Pontius Pilate and his wife Claudia, played by two very capable actors, Hristo Naumov Shopov and Claudia Gerini, who I hope will become more familiar to American audiences.

IS *The Passion of the Christ* anti-Semitic? To my eyes it did not seem to traffic explicitly or egregiously in the toxic iconography of historical Jew hatred, but more sensitive viewers may disagree. The Pharisees, in their tallit and beards, are certainly shown as a sinister and inhumane group, and the mob they command is full of howling, ugly rage. But this on-screen villainy does not seem to exceed what can be found in the source material.

A few weeks ago Gibson reportedly expunged an especially provocative line of dialogue that referred to the Jews: "His blood be on us, and on our children." That line comes from the Book of Matthew, and it would take a revisionist to remove every trace of controversy and intolerance from a story that rests squarely on the theological boundary separating Christianity from Judaism. That Gibson did not attempt to transcend these divisions may be regrettable, but to condemn *The Passion of the Christ* for its supposed bigotry is to miss its point and to misstate its problems.

The troubling implications of the film do not arise primarily from its religious agenda: an extreme, traditionalist Roman Catholicism that has not prevented *The Passion* from resonating, oddly enough, with many evangelical Protestants. What makes the movie so grim and ugly is Gibson's inability to think beyond the conventional logic of movie narrative. In most movies – certainly in most movies directed by or starring Gibson – violence against the innocent demands righteous vengeance in the third act, an expectation that Gibson in this case whips up and leaves unsatisfied.

On its own, apart from whatever beliefs a viewer might bring to it, *The Passion of the Christ* never provides a clear sense of what all of this bloodshed was for, an inconclusiveness that is Gibson's most serious artistic failure.

The Gospels, at least in some interpretations, suggest that the story ends in forgiveness. But such an ending seems beyond Gibson's imaginative capacities. Perhaps he suspects that his public prefers terror, fury and gore. Maybe Homer Simpson was right after all.

New York Times Service

S THANTHONI

In a haemodialysis centre at the Tamil Nadu Kidney Research Foundation in Chennai.

organs has not. A cadaver organ is hard to come by and live related donation is not happening at the desired level, leading to a thriving trade in kidneys; the organs are sold mostly by the poor and the vulnerable.

According to Ravichandran, it is important to increase the live related donor pool, apart from strengthening the infrastructure to harvest cadaver organs. One way of increasing the live related donor pool is by accepting cross-blood donation. A new technique that was explained by Japanese nephrologists Dr. Kazunari Tanabe and Dr. Hiroshi Toma (see interview) recently in Chennai. According to Ravichandran, though relatives of ESRD patients often want to donate a kidney, they are unable to do so because of blood group mismatch. The new technique removes antibodies from the patient's blood before the transplant. It can increase the donor pool by over 20 per cent.

The technique was tried in India in 1984, in Mumbai. But because of problems with filteration techniques to remove the antibodies from the patient's blood, it was not successful. "But now," says Ravichandran, "with new developments in filteration technology, we should be able to do it without any problem."

With the introduction of cross-blood group transplantation, there is a very good case for scrapping Clause 9(3) of the Transplantation of Human Organs Act (1994), which allows for live unrelated donations on emotional grounds leading to trade in kidneys. Often, the reason cited for sourcing a kidney from an unrelated donor on "emotional grounds" is: "The blood group of the patient does not match with any eligible close relative." Now that excuse will not hold water with the introduction of cross-blood transplantation.

On the flip side, the cross-blood match will open up a number of social issues. For instance, there is the possibility of a rise in kidney sales once the constraint of "same blood group" match too is gone. But Ravichandran is confident that this will lead to at least a 20 per cent rise in live related donation.

But medically, this kind of transplantation is significant and may be useful especially as the number of ESRD patients is rising sharply. For instance, in the last decade, the prevalence of ESRD has almost doubled in most countries and on an average the rate is more than one in every 1,000 persons. The figure is much higher in developing countries. The incidence of ESRD is similar to that of AIDS (Acquired Immune Deficiency Syndrome) and 10 times greater than that of Hodgkin's lymphoma. On an average, the incidence of ESRD is increasing at 5 per cent a year.

The rising incidence of diabetes (fuelling an increase in diabetic nephropathy) and hypertension is said to be the major reason for the sharp rise in ESRD cases. Diabetes is the cause for over 40 per cent of ESRD cases. Among ESRD patients, those with Type II diabetes outnumber patients with Type I diabetes by almost three to one. Over 25 per cent of ESRD cases are related to hypertension. Glomerulonephritis accounts for over 10 per cent of new ESRD cases, and cystic, hereditary and congenital diseases together constitute another 4 per cent of cases.

With significant developments in pharmacology, the mortality rate has declined in dialysis patients in recent years and is much lower in patients who have undergone kidney transplants, particularly those having received the organ from a live related donor. Increased clearance of nitrogenous solutes through improved dialysis membrane technology has resulted in enhanced nutrition and fewer infection-related complications. Improvements in general medical care may also be contributing to the decrease in mortality. Patient survival rates after a renal transplantation has also improved dramatically in the last two decades. The five-year survival rate is more than 90 per cent. Recipients of cadaver kidneys have a one-year survival rate slightly lower than recipients of live donor kidneys.

According to Ravichandran, the best method is live related donation and it is in that context that cross-blood group transplantation would go a long way.

According to Dr. M.K. Mani of Apollo Hospitals, Chennai, the primary goal should be the prevention of ESRD. Aggressive treatment for hypertension is likely to reduce the incidence of ESRD. Screening for diabetes and hypertension may be important in reducing ESRD rates. Mani's project in Sunkuvarchathram, a suburb of Chennai, is a success story. Regular screening for hypertension and diabetes has more than halved the risk of ESRD among its population. ■

'Research on to ensure graft survival'

Interview with Dr Hiroshi Toma and Dr. Kazunari Tanabe.

Dr. Hiroshi Toma, Director of the Tokyo Women's Medical University, and **Dr. Kazunari Tanabe** Assistant Professor in the Department of Urology, Kidney Centre and Head of the section of Kidney Transplantation and Renovascular Surgery at the university, form one of the leading kidney transplant teams in Japan. Since 1971, they have performed over 2,000 transplants, more than 200 of them across blood groups. According to Tanabe, in the past decade the donor pool increased by over 20 per cent in Japan because of cross-blood group transplantation.

The two doctors were in Chennai on an invitation from the Madras Institute of Nephrology, which is celebrating its 15th anniversary, and the Balaji Medical and Educational Trust, which is celebrating five years of its existence. They spoke to nephrologists about their experiences in cross-blood group transplantation. Excerpts from an interview they gave **Asha Krishnakumar**:

► *What are the main causes of the increase in the number of patients with chronic renal failure the world over?*

Tanabe. About 20-30 years ago, chronic glomerular nephritis (an inflammatory disease of the glomerula, the filter in the kidney that removes uric toxins) was the main cause of chronic renal failure. But today, diabetes and hypertension, which are increasing rapidly throughout the world, seem to be the major reasons. I think diabetes is the single most important factor for the increased incidence of chronic renal failure.

In Japan, the number of patients needing dialysis has increased three times, from 10,000 ten years ago. Some 10 per cent of the Japanese people are diabetic and 40 per cent of them end up with chronic renal failure.

► *What is the incidence of chronic renal failure?*

Toma. Though we do not have the exact figures, I believe the incidence varies with industrialisation. For instance, in India, it seems to occur in 100 per million people every year, while in Japan, it may occur in 200 per million people. In Japan, we do 700-800 transplants a year. Our hospital does 20-25 per cent of all transplantations done in our country. Since 1971, we have done 2,000 transplantations in our hospital.

► *How does the incidence vary with industrialisation?*

Toma. With industrialisation people's lifestyles change, food habits change. People become sedentary, they do not exercise, and so on. Of course, genetics has an important role in getting diabetes, but lifestyle change is a very important reason for increase in the incidence of the disease.

► *Does the incidence of ESRD (end-stage renal disease) vary with sex, age, ethnicity and geographic location?*

Tanabe. Not with sex. But age seems to be important, as Type II diabetes, whose incidence increases with age, is the major cause of the ESRD. In Japan and the United States, the average age of a person undergoing dialysis is 63. I have not seen any study on the incidence of the disease across ethnic groups. But I do know that in the U.S., African-Americans are more prone to the disease compared to Caucasians.

► *What are the treatment options for chronic renal failure?*

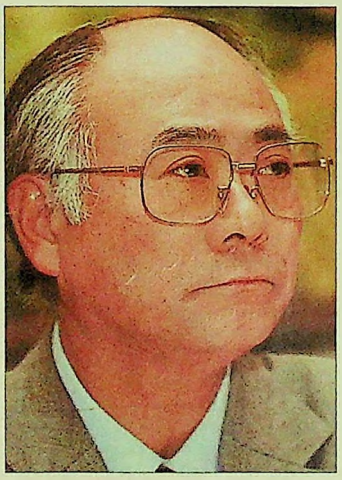
Tanabe. There are only two options – dialysis or transplantation. There are two types of dialysis – haemodialysis and CAPD (continuous ambulatory pereto-neal dialysis). But neither is sufficient to remove all the uric toxins. Normally, haemodialysis is done thrice a week, each session lasting four hours. That is 12 hours a week of haemodialysis, or less than 10 per cent of the hours in a week. In such a situation, only 7-8 per cent of uric toxins can be removed, with close to 90 per cent remaining in the body. This leads to chronic uremia, which may cause athelosclerosis (heart disease) and bone diseases that shortens the life span.

But renal transplantation completely resolves these kinds of problems. Of course, the recipient has to be on immuno-suppresant medicines, which can cause side-effects. Earlier there used to be tremendous side-effects such as steroid-induced osteoporosis, athelosclerosis and so on. But now we sometimes take patients off steroids, prescribe low dosages of steroids and cyclosporin, or put patients on Tactrotimus (IL-2 inhibitor) and so on, and thereby minimise the side-effects.

► *So, are the protocols of treatment changing?*

Tanabe. Yes, treatment protocols or drug combinations are changing to minimise the side-effects. Pharmacology has improved so much that transplant patients have practically little or no side-

M. MOORTHY



Dr. Hiroshi Toma.

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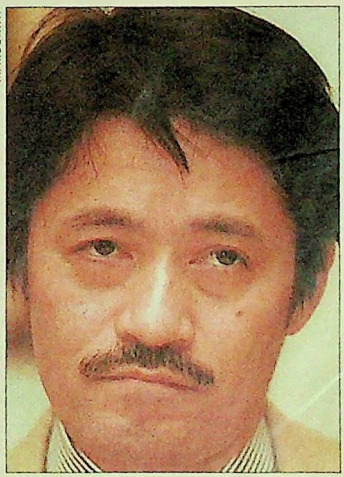

Dr. Kazunari Tanabe.

effects. Twenty years ago, one could easily identify a transplant patient, with bloated face, increased weight and so on due to the intake of steroids. But, now, it is very difficult to make them out from normal people.

► *What kind of research – pharmacological, treatment methods and diagnosis – is going on?*

Tanabe. A lot of work is going on to ensure graft survival. Short-term graft survival is not a major problem. A five-year graft survival with cyclosporin and tacrotimus is over 90 per cent. But our concern is primarily on increasing long-term graft survival rates – 10 to 20 years. In Japan, the graft survival rate 16 years after transplantation is 50 per cent. To better that and to be able to prevent non-immunological injury to the kidneys, we need more effective immuno-suppresants.

Non-immunology injury that reduces the graft survival rate depends largely on the age of the transplanted kidney (the older the kidney, the lower the survival rate). But conditions such as diabetes and hypertension that damage the kidneys, as also obesity, lower the graft survival rate. These are things a transplant patient should be very careful about. Thus, a lot of work is going on to study the effects of immunological and non-immunological kidney injury on the graft survival rate.

Also, after transfusion or the first transplantation, patients may have anti-HIV (human immunodeficiency virus) antibodies. This is very harmful to the kidneys. Over 20 per cent of the people have these antibodies and they are high-risk sensitive recipients. They pose a big problem during transplantation. A lot of work is on to improve graft survival rates, especially in the long term.

For non-immunological factors we need to use effective hypertension drugs that protect kidney functioning. Work is on in this area as well. Apart from choosing the appropriate drugs, it is important to focus on the diet to prevent hypertension and so on. A lot of work is on in the management and treatment with a view to increasing long-term graft survival rates.

We have to accept high-risk patients, we cannot refuse anybody. We accept older patients, AB incompatible patients, and those with high complications such as vascular and heart diseases owing to diabetes. A lot of clinical research work is on to improve the management and increase the long-term graft survival of such high-risk patients.

At the basic level, we are concerned about strengthening the immune systems or tolerance levels to accept the donor organs and, at the same time, keep up the defence mechanisms against bacteria, viruses and other such germs. Achieving this has been the main struggle since the beginning of the organ transplantation programme. But we have not been very successful in this till now. One of the most interesting research works in this area is doing bone marrow transplantation on the recipient from the donor so that the immunology of the donor also gets transferred to the recipient. Then the donor's kidney is transplanted onto the recipient. In such a case there is no need to use immuno-suppresant drugs and there is no immunological injury to the kidney. There would be no reason for the donor kidney to be rejected in this case as the immuno-competant cells of the recipient become compatible with that of the donor's. In this process, the recipients may have some infections. That is what we need to overcome.

"We hope cross-blood transplantation and laparoscopic harvesting of kidneys will increase the donor pool significantly. It may not be dramatic or happen overnight, but it will certainly improve gradually."

► *This is very interesting. How does one do this?*

Tanabe. There is no established technique as yet. The Harvard Medical School tried doing this, but there are still some problems. We are also trying to do this at our centre. We are now working on monkeys and mice. Monkeys are difficult as they are very similar to humans, with a very complicated immuno-system. We hope to complete this research work in the next five years.

► *Throughout the world, there is a big gap between donors and the number of people waiting for a kidney. What is the situation in Japan?*

Toma. It is very difficult to get donor organs. We also face a lot of problems as the Japanese are reluctant to donate organs as they cannot accept brain death. There are over 10,000 ESRD patients waiting for a kidney and, we get only about 100 cadaver organs in a year. Several patients die just waiting for a kidney. So, we have no choice but to expand our live kidney donation programme. Live unrelated donation is not allowed in Japan; it is illegal.

► *How do you increase your donor pool?*

Tanabe. We are focussing a lot of work to increase our donor pool. For instance, in 1989, we started the cross-blood transplantation programme. Fifteen years ago, 15-20 per cent of the recipients who had relatives to donate were found to be AB incompatible and hence could not get a transplant done. But after we started this programme, those 20 per cent of patients who have relatives willing to donate but do not have matching blood group have benefited. This has led to a big increase – at least by 20 per cent – in the number of transplantations in Japan. In our hospital, we have done over 200 transplantations across blood groups. In Japan over 10 hospitals do across-blood group transplantations against only two or three centres in the U.S.

In the U.S., the laparoscopic or keyhole surgery to remove the donor kidney for transplantation has increased the number of relatives coming forward to donate as it means no blood, less pain, and shorter hospital stay. This has enhanced the donor pool. Thus in the U.S. live donation increased from 10 per cent to 60 per cent last year.

So, we hope cross-blood transplantation and laparoscopic harvesting of kidneys will increase the donor pool significantly. It may not be dramatic or happen overnight, but it will certainly improve gradually.

► *What is the procedure for doing across blood group transplantation?*

Tanabe. The antibodies of blood groups A and B are removed from the patients before surgery by a procedure called Double Filtration Plasma Pheresis (DFPP). This is done several times till the antibodies against the blood group disappear from the patient. Then the transplantation is performed. The plasma removed from the patient is again separated into albumin and globulin and the former is returned to the patients. This minimises risk as only the antibodies are removed.

► *Does the graft survival rate vary with the same blood group and across blood group transplantations?*

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1-3-2004

Tanabe. When we started the cross-blood group transplantation in 1989, there was a difference in the graft survival rate within five years after transplantation and was the same after that. But, now, with the use of newer and better drugs, the graft survival rates are the same for both – over 95 per cent for three years – and the rejection rates are also similar. The rejection rates are higher and the graft survival rates are poorer for the anti-HIV antibody positive or hyper-sensitive patients. Thus, the immunological barrier for the highly sensitised recipients is much higher than the AB incompatible transplantations. This is because the anti-HIV antibody is much more difficult to remove and recurs easily; it destroys the kidney easily. So, we desensitise the recipients who are anti-HIV antibody positive and then perform the transplantation.

"It is very difficult to get donor organs. We also face a lot of problems as the Japanese are reluctant to donate organs as they cannot accept brain death."

▶ *Do patients undergoing cross-blood group transplantation need to use more immuno-suppresants than in the case of same-blood group transplantation?*

Toma. There is no difference in the use of immuno-suppresants. Only, the antibodies need to be removed from the donor blood before transplantation in the case of cross-blood group graft.

We also do laparoscopic springectomy (removing the spring; a two-hour procedure) on the recipients before the transplantation, as spring – the oasis in the bonemarrow – is a very important organ for immuno-response. The spring has a lot of B-cells that help in producing every kind of antibodies. That is why we remove the spring to remove the antibodies. In the early 1980s, without springectomy, cross-blood group transplantation was not successful. But now, with newer and more powerful immuno-suppresants, the Mayo Clinic in the U.S. does cross-blood group transplantations successfully, even without springectomy. But nobody knows the long-term results. Just to be on the safe side, we do springectomy before cross-blood group transplantations.

▶ *What ways do you adopt to save the kidney?*

Tanabe. When there was a tumour in the kidney, we used to remove the whole organ. This resulted in the loss of functioning of kidney tissues, leading to a rapid progression of kidney failure. But now many patients have diabetes, hypertension, glomerular nephritis and so on. If we remove the whole kidney in case of tumours in all these patients, then they will be left with only one kidney, thereby increasing the risk of ESRD. Hence we prefer to spare the kidney tissues and remove only the tumour, without disturbing normal kidney functions. But we have to pay attention to the recurrence of the tumour. So, we also remove the region around the tumour to reduce the risk of recurrence. This procedure was started in the U.S. in the 1980s.

▶ *As the kidney has a lot of blood vessels, does it require some special technique to remove the tumour?*

Tanabe. Yes. It is a difficult surgery. Small tumours are all right. It just needs to be cut and stitched up. But the real problem is with the bigger ones. We study the area carefully for the arteries and veins, cool the kidney, cut out the tumour and then close the blood vessels. But if the tumour is too big, we remove the kidney from the body, cool it, take out the tumour, close the blood vessels, and then put it back into the body. This takes a long time. This is a new technique but we now do it routinely in our hospital.

▶ *What is your view on kidney commerce?*

Toma. The International Society of Transplantation and the Japanese Society of Transplantation are strongly against the buying and selling of organs. We are for totally doing away with trade in kidney. The only long-term solution for any country is to focus on preventive measures, concentrating on diabetes, glomerular nephritis, hypertension and so on, the main causes of renal failure, and at the same time step up research work to decrease rejection and increase graft survival rates, which include the development of better immuno-suppresant drugs.

As one gets older, regular check-up is a must as early detection can make a lot of difference to managing the kidney without going in for dialysis or transplantation. To detect problems in children, it is important to educate paediatricians to detect kidney problems early. ■