



World Health Organization  
Collaborating Centre for  
Prevention of Blindness

Meera & L.B. Deshpande Centre for  
Sight Enhancement

Dr. P.R.K. Prasad Centre for  
Rehabilitation of  
Blind and Visually Impaired

**L V Prasad Eye Institute**  
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## Diabetes and the Eye

### World Diabetes Day

The number of people with Diabetes Mellitus in developing countries is estimated to more than double over the next 30 years — from 115 million in 2000 to 284 million in 2030. The World Health Organization has marked 14<sup>th</sup> November as World Diabetes Day, signifying a commitment to intensify its efforts to minimize the impact of Diabetes Mellitus, especially on the low and middle income communities.

Of the world's estimated 171 million people with the disease 90 percent are reported to have type II Diabetes Mellitus. The burden of disease due to Diabetes Mellitus is substantial; at least one in 20 deaths worldwide is due to the disease. In financial terms, direct costs range from 2.5% to 15% of the annual health care budgets and indirect costs, such as loss of production, may be five times this number.

Source: WHO press release on the occasion of World Diabetes Day

## Diabetic Retinopathy

### Dr. Ajit Babu

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Diabetic retinopathy is emerging as a major cause of blindness, following the control of cataract-related blindness. It is essential for ophthalmologists to recognize the importance of diagnosing this disease, and formulate appropriate treatment strategies for each stage.

The main reason that patients with diabetes lose vision due to retinopathy is because of lack of proper ophthalmic treatment. In one survey, failure to identify the proper stage of diabetic retinopathy was found to be 52% for internists, 33% for diabetologists and 9% for general ophthalmologists.

Another major reason for failure in diagnosis is the prevalence of undilated fundus examination. Dilated fundus examination, with direct or indirect ophthalmoscopy, is about 78-96% more sensitive when compared to fundus photographs. Undilated fundus examination decreases this sensitivity by 50%. This underscores the importance of a dilated fundus examination for all patients with diabetes.

Diabetes mellitus can be divided into two groups:

- Type 1 diabetes or insulin dependent diabetes mellitus (IDDM)
- Type 2 diabetes or non-insulin dependent diabetes Mellitus (NIDDM)

Though IDDM usually affects people below the age of 40 years, it cannot be assumed that all patients above 40 have NIDDM. The prevalence of diabetic retinopathy among IDDM patients is 0 % below 4-5 years of

diabetes, 25-50 % between 5-10 years and 75-95 % after 10-15 years. The prevalence of diabetic retinopathy in NIDDM is 23 % after 11-13 yrs of diabetes, 43 % after 14-16 years and 60 % after 16 or more years of diabetes.

By far, the duration of diabetes is found to be most significant indication of the occurrence of diabetic retinopathy. Other risk factors include:

- poor control of blood sugar levels,
- systemic associations like proteinuria, nephropathy, cardiomyopathy, hypertension,
- pregnancy, and
- hyperlipidemia.

It is essential to educate patients, internists and diabetologists about the timing of the first dilated fundus examination. The American Academy of Ophthalmology has recommended the following schedule for the first dilated fundus examination for patients with diabetes:

<b>Age of onset of diabetes</b>	<b>First examination performed</b>
0-30 years	by five years after onset
over 30 years	when diagnosis is made
during pregnancy	during the first trimester

**Clinical signs of diabetic retinopathy include:**

- 1) early circulatory changes including venous dilation and capillary non-perfusion
- 2) microaneurysms
- 3) retinal hemorrhages: dot and blot hemorrhages of diabetic retinopathy need to be differentiated from flame shaped hemorrhages of hypertensive retinopathy
- 4) hard exudates: due to lipid deposition in the outer plexiform layer (one needs to rule out the presence of hyperlipidemia in patients with diffuse hard exudates)
- 5) soft exudates or cottonwool spots or nerve fiber layer infarcts
- 6) venous beading or loops (the presence of venous beading is an important indicator of severe and diffuse hypoxia)
- 7) Intra-Retinal Microvascular Abnormalities (IRMAs)
- 8) neovascularisation of the disc
- 9) neovascularisation of the retina
- 10) pre-retinal or vitreous hemorrhage
- 11) traction (or) combined traction/rhegmatogenous retinal detachment

The Early Treatment Diabetic Retinopathy Study (ETDRS) modified the Airlie-house classification of diabetic retinopathy for more practical application. The classification is:

**NPDR (Non-Proliferative Diabetic Retinopathy)**

- mild to moderate NPDR
- moderate to severe NPDR
- severe NPDR
- very severe NPDR

**PDR (Proliferative Diabetic Retinopathy)**

- early proliferative diabetic retinopathy
- high risk retinopathy

This classification depends on the presence/absence or severity of the clinical features. The features of each stage are:

**Mild to moderate NPDR**

- microaneurysms
- intraretinal hemorrhages — fewer than four quadrants
- hard exudates

**Moderate to severe NPDR**

- Cottonwool spots
- Intraretinal hemorrhages — mild to moderate in all four quadrants
- Venous beading
- IRMAs

**Severe NPDR (any one of the following)**

- Severe intraretinal hemorrhages in all four quadrants
- Venous beading in two quadrants
- Moderately severe IRMA in one quadrant

**Very Severe NPDR (any two of the following)**

- Severe intraretinal hemorrhages in all four quadrants
- Venous beading in two quadrants
- Moderately severe IRMA in one quadrant

It is crucial to recognize different stages of non-proliferative diabetic retinopathy to predict the long-term evidence of progression to proliferative retinopathy. The long-term incidence of PDR at each stage of NPDR is as follows:

	1 year	5 years
Mild NPDR	1%	15%
Moderate NPDR	3%	27%
Severe NPDR	15%	56%
Very severe NPDR	45%	71%

**Note:** These are percentages of the incidence of PDR at each given time interval.

Macular edema can be associated with any stage of diabetic retinopathy. The incidence of macular edema can vary between 2-6 % in mild NPDR to 20-63 % in proliferative diabetic retinopathy. It is essential to recognize clinically significant macular edema (CSME), which is defined as:

- 1) retinal thickening at or within 500µm of the macular center;
- 2) hard exudates at or within 500µm of the macular center, if associated with thickening of the adjacent retina; and
- 3) retinal thickening at least 1 disc area in extent, any part of which is within one disc diameter of the macular center.

ETDRS recommends photocoagulation in the form of macular grid photocoagulation to CSME. One can do focal or modified grid photocoagulation to CSME to save the visual field, which may otherwise compromise the macular grid photocoagulation.

Photocoagulation in the form of full scatter (previously known as pan retinal photocoagulation) is done in two or more sittings for all forms of proliferative diabetic retinopathy. One may consider supplemental photocoagulation, two or three months after initial full scatter photocoagulation. This is indicated if there is:

- a) none or minimal response to initial photocoagulation, or
- b) progressive neovascularisation over the disc or elsewhere.

Vitrectomy is indicated in the following conditions:

- 1) persistent neovascularisation after maximal photocoagulation
- 2) non-resolving vitreous hemorrhage
- 3) combined traction/rhegmatogenous retinal detachment
- 4) traction retinal detachment threatening macula
- 5) dense premacular hemorrhage
- 6) premacular fibrosis
- 7) diffuse macular edema
- 8) vitreo-macular traction

The American Academy of Ophthalmology has recommended this follow-up schedule for diabetic retinopathy patients:

1) none to minimal retinopathy	-	annual follow-up
2) mild to moderate NPDR, no ME	-	6-12 months
3) mild to moderate NPDR, early ME	-	4-6 months
4) moderate to severe NPDR	-	3-4 months
5) during pregnancy	-	each trimester
6) very severe NPDR (or) early PDR	-	consider photocoagulation
7) high risk PDR (or) CSME	-	recommend photocoagulation

Thus diabetic retinopathy calls for a holistic approach to the patient. Management of the patient requires teamwork by the internist, diabetologist, dietician and ophthalmologist. One should take into consideration the possibility of systemic factors. Attention to blood sugar control and avoid fluctuating blood sugar levels is vital.

Early diagnosis and management of diabetic retinopathy will help patients to retain useful vision. Patients with partial or severe visual loss can benefit by using low vision devices.

## LOW VISION REHABILITATION AND DIABETIC RETINOPATHY

**Vijaya Kumari**

Head, Centre for Sight Enhancement  
L V Prasad Eye Institute, Hyderabad

A person is said to have low vision when his or her eyesight cannot be improved with regular glasses, medical or surgical treatment. Diabetic retinopathy very often results in low vision. Diabetic retinopathy is 25 times more likely to lead to blindness than other conditions.

People with low vision due to diabetic retinopathy usually experience difficulty in daily life. They may see dark spots or have restricted side vision, which prevents them from being independent. Some common problem areas are:

- seeing faces or reading bus numbers from a distance
- reading fine newsprint, mails, or bills
- writing in a straight line
- reading low contrast material
- increased intolerance to light
- inability to move about alone outdoor after dusk
- locating food in a plate
- seeing the time on a wristwatch

- differentiating between Rs 1 and Rs 2 coins
- seeing in dim illumination

**The good news is that most people with diabetic retinopathy (who have remaining useful vision) can be helped with low vision devices. Low vision devices are not regular eye glasses. These devices are of two types: optical and non-optical.**

**Optical low vision devices:** They make use of lenses to enhance vision.

#### **Optical low vision devices**

- Spectacle magnifiers consist of thick lenses; however, the reading material has to be held close to the face.
- Hand magnifier: a single large lens useful for short-term reading
- Pocket magnifier: a single lens useful for spot-reading, such as bills, medicine or price labels during shopping
- Stand magnifier: a single high-powered lens useful for short-term reading

***Hand-held telescopes are rarely found useful in these patients.***

#### **Non-optical devices**

Patients with diabetic retinopathy have impaired contrast sensitivity, which results in problems in activities of daily living (ADL). Simple contrast-enhancing measures like non-optical devices can help diabetic patients to overcome these problems.

Non-optical devices do not use lenses but improve viewing conditions through bright illumination and contrast. Some devices under this category are:

- Reading stands — these are better for the posture as most optical devices have to be held at a short reading distance.
- Reading lamps: using these improves the contrast and provides focussed illumination
- Felt-tip pens have dark writing that improves the contrast.
- Letter writers enable a person to write in a straight line.
- Signature guides enable a person to sign properly.
- A notex enables a person to differentiate between currency of various denominations.
- Tinted glasses help to cut off unwanted light.

#### **Closed circuit television (CCTV):**

This provides maximum contrast and uses a camera to capture the image and project it on to a screen. The magnification can be as high as 60 times.

#### **Computer software:**

Visually impaired persons wanting to use computers can use innovative softwares such as speech (voice) output mechanism so that they do not have to depend on vision.

#### **Nonvisual devices and adaptive techniques:**

Senses other than vision are used to perform daily activities. Examples of nonvisual devices include talking books, tape recorders, talking wristwatches and calculators, folding and support canes, and tactile markings.

#### **Viewing techniques:**

Eccentric viewing or looking at the side of an object instead of directly is an adapted viewing technique. A person with diabetic maculopathy, who has had central vision loss, will find this technique useful.

#### **Orientation and mobility training:**

Many people with diabetic retinopathy find it difficult to navigate independently, especially in unfamiliar areas. This is especially true of people who have undergone pan retinal photocoagulation (PRP). They can be taught to use the cane so that they need not depend upon others.

#### **Concessional facilities:**

Depending on the extent of vision loss, a person with diabetic retinopathy is eligible for various government concessions such as travel, income tax, etc.

**To summarize, low vision rehabilitation services do not cure low vision; rather, they utilize the remaining vision to its fullest potential. Low vision does not replace the need for other concurrent treatments such as surgery or medical care.**

However, often one low vision device may not be suitable for all purposes. A comprehensive low vision evaluation is required to assess the person's current visual status, identify the goals and visual needs, and then design an individualized rehabilitation program to meet these needs.

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## **Case study**

Anji Reddy worked as a contractor to earn a living before diabetes began to interfere with his sight (name changed to maintain anonymity). He came to the Centre for Sight Enhancement (CSE) in March 2001. A known diabetic for 14 years, he had developed hypertension. He was also suffering from diabetic nephropathy and coronary artery disease.

At LVPEI retina specialists diagnosed him as having proliferative diabetic retinopathy in both eyes. He had

undergone pan retinal photocoagulation (laser treatment) in both the eyes. On his first visit, his distance visual acuity was found to be 6/48 in the right eye, and 6/24 in the left eye (on high contrast charts). This decreased to 6/180 and 6/90 respectively, in the right and left eye on the low contrast chart. The near visual acuity was N12 at 20 cm with his own bifocals (+2.50DS add).

Anji Reddy was unable to read the newspaper, mails, and other documents that the villagers brought to him to read in his capacity as a 'leader' in his community. He was having difficulty in recognising faces of persons across the road. Climbing stairs was another problem, as was differentiating coins of various denominations.

Refraction improved his distance vision by only one line, nevertheless he was happy with it. He was even happier when he could read the Telugu newspaper that he had longed to read, with a pair of separate near vision glasses (+8.00DS spectacle magnifier with base-in prisms). He found a 3x-pocket magnifier useful for spot reading tasks, such as reading labels on products, medicine labels.

The rehabilitation professionals gave Anji Reddy training in orientation and mobility for safe travelling, as he was not comfortable in going out alone and in unfamiliar places. He was informed about contrast enhancement techniques such as felt-tipped pens while writing. Myths about use of short reading distances were also dispelled.

Over the course of time, Anji Reddy lost all useful vision in his left eye due to optic atrophy. The centre has been following up on his case since his first visit. In September 2003 his vision in the right eye was 6/12. He was still using all the devices and was comfortable with them.

Today he is able to read documents for the villagers and is able to advise them on various issues. It was only simple glasses (such as bifocals) and low vision devices that helped him to live as normal a life as possible.

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## Foot Care

### WHY IS IT IMPORTANT IN DIABETICS?

*Treat your feet with care. It'll pay off big in the long run.*

**(Doctors can use this article when advising their patients)**

Foot ulcers and amputations are a major cause of morbidity, disability, as well as emotional and physical costs for people with diabetes. Early recognition and

management of independent risk factors for ulcers and amputations can prevent or delay the onset of such adverse outcomes.

### Risk identification

It is necessary to identify the risks for effective preventive management of foot problems in people with diabetes. The risk of ulcers or amputations is more in people who have had diabetes for over 10 years, are male, have poor glucose control or cardiovascular, retinal, or renal complications.

### Foot examination

All individuals with diabetes should undergo an annual foot examination. People with one or more high-risk foot conditions should be evaluated more frequently for additional risk factors. Neuropathy patients should ensure that their doctor examines their feet visually on every visit.

### Management of high-risk conditions

People with neuropathy may be adequately managed with well-fitting or athletic shoes. As a patient you should be aware of the problems associated with sensory loss and should consult your doctor if you have any loss of sensation. Be sensitive to this issue and don't ignore it.

You should not walk barefoot even in the house and visually inspect the feet regularly to detect any changes. If you have any symptoms of claudication (pain and weakness in the legs on walking, which is relieved with rest) get a vascular assessment done. Exercise and surgery are options for treating claudication.

People with a history of ulcers should be evaluated for the cause of ulceration and treated accordingly.

### Do's

- Wash your feet daily, be sure to dry between the toes.
- Inspect your feet and toes daily.
- Wear thick, soft socks.
- Cut your toenails straight across.
- Be properly measured and fitted each time you buy a new pair of shoes.
- Exercise daily.

### Don't's

- Walk barefoot.
- Wear high heels, sandals and shoes with pointed toes.
- Wear anything that is too tight around the legs.
- Try to remove calluses, corns or warts by yourself or use a corn remover.
- Drink alcohol in excess.

Every diabetic suffers from some degree of foot problems, like pain, numbness, wounds not healing routinely, cracked feet, Burning Feet syndrome, chronic fungal infection, and insensitive feet – inability to feel pain, pressure, heat and cold.

### Recommendations

- See your doctor.
- Get treated for diabetes (control blood sugar levels) or any other systemic diseases.
- Avoid smoking.
- Exercise as advised.

(Source: Eli Lilly and Company (India) Pvt. Ltd., 8, Balaji Estate, Guru Ravi Dass Marg, Kalkaji, New Delhi – 110 019)

### News

#### Provision of low vision kits to eye care professionals

We are extremely thankful to Sight Savers International, Mumbai, for their generous donation of 50 low vision assessment kits for professionals undergoing low vision training programs at LVPEI, Hyderabad. After these eye care professionals complete their training their sponsoring organizations will be gifted with a low vision assessment kit.

#### Fellowship program

Three optometrists – Mr Ranabir Das Gupta (Kolkata), Mr Dharma P Guragain (Nepal) and Ms Eshita Chandrakanth Doshi (Mumbai) have completed the short-term fellowship program in low vision care between September – November 2003.

### World Sight Day

The Vision Rehabilitation Centres participated in an exhibition on display of low vision devices to raise public awareness on October 9, 2003, to commemorate World Sight Day.

### VIII Low Vision Awareness Program (LAP)

Twenty-eight professionals from all over the country participated in the VIII Low Vision Awareness program from September 26 – 28, 2003.

### Low Vision Awareness Program

March 26-28, 2004

September 2004 (date yet to be decided)

### Short term fellowship program in Low Vision Care

Three month program for ophthalmologists and optometrists commencing January 1, April 1, July 1 and October 1, 2004.

For more details contact to:

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You can help the Vision Rehabilitation Centres of the L.V. Prasad Eye Institute discover basic causes and treatment strategies for eye disease through research, restore vision to an indigent patient and help expand the frontiers of ophthalmology through your tax deductible contribution to the Hyderabad Eye Institute or the Hyderabad Eye Research Foundation.

(Donations above Rs. 250/- are exempted under Section 80G of Income Tax Act, 1961 for Hyderabad Eye Institute and 35(i) (ii) for Hyderabad Eye Research Foundation). For more information, please contact :

**You Can  
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