

Complication prevention

for patients with diabetes

A noncommunicable disease education manual for primary health care professionals and patients





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The Noncommunicable Disease Education Manual for Primary Health Care Professionals and Patients results from the contributions and hard work of many people. Its development was led by Dr Hai-Rim Shin, Coordinator, and Dr Warrick Junsuk Kim, Medical Officer, of the Noncommunicable Diseases and Health Promotion unit at the WHO Regional Office for the Western Pacific (WHO/WPRO/NCD) in Manila, Philippines.

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Noncommunicable disease education manual for primary health care professionals and patients

Part 1 Prevention and management of hypertension

- Module 1 Diagnosis and management
- Module 2 Healthy lifestyles
- Module 3 Healthy eating habits
- Module 4 Low-salt diet
- Module 5 Physical activity
- Module 6 Medication and management of associated diseases
- Module 7 Complication prevention

Part 2 Prevention and management of diabetes

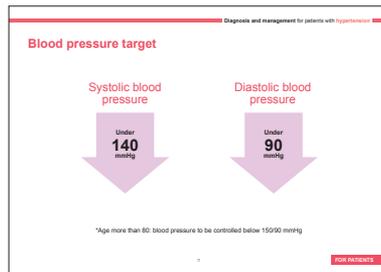
- Module 1 Diagnosis and management
- Module 2 Healthy lifestyles
- Module 3 Healthy eating habits 1
- Module 4 Healthy eating habits 2
- Module 5 Physical activity
- Module 6 Taking care of yourself in daily life
- Module 7 Complication prevention** ◀ YOU ARE HERE

Part 3 Quit smoking

How to use this manual

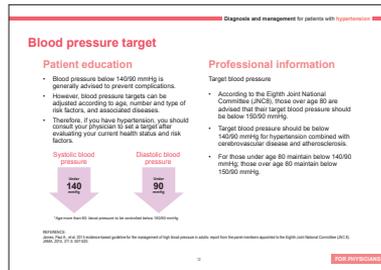
This book is one of fifteen modules of the “Noncommunicable disease education manual for primary health care professionals and patients”. This manual is intended to provide health information on the prevention and control of hypertension and diabetes.

This will be used in the form of a flip chart for health professionals to educate their patients with either hypertension or diabetes.



FOR PATIENTS

On one side of the flip chart is the ‘**For patients**’ page. This side has simple images and key messages that are easy to understand. However, health professionals may need to provide education for patients to fully understand the content.



FOR PHYSICIANS

On the other side of the flip chart is the ‘**For physicians**’ page. This side includes information that the health professional can read out to the patient during counselling. Professional information is also provided for further understanding. A small image of the ‘For patients’ side is included so that the health professional is aware of what the patient is looking at.

This publication is intended to serve as a template to be adapted to national context. Images and graphs that have been watermarked should be replaced with images or graphs that represent the national situation. If assistance is required, or if you have any questions related to the publication, please contact the Noncommunicable Diseases and Health Promotion unit at WHO Regional Office for the Western Pacific (wproncd@who.int).

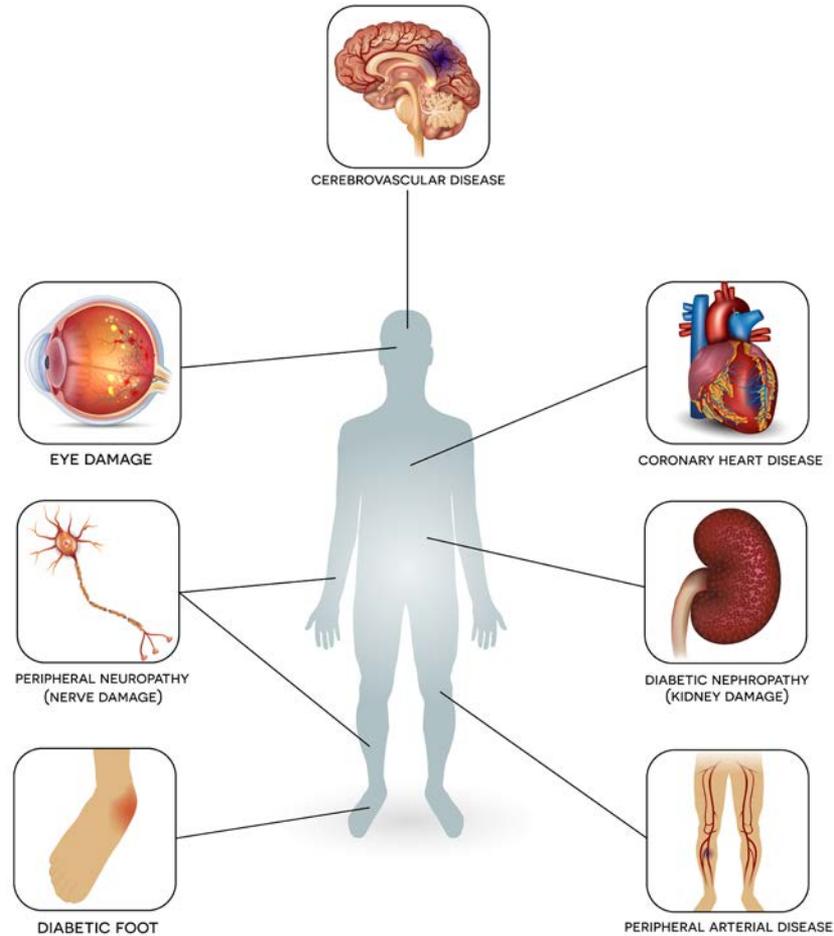
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Importance of diabetes management: preventing complications



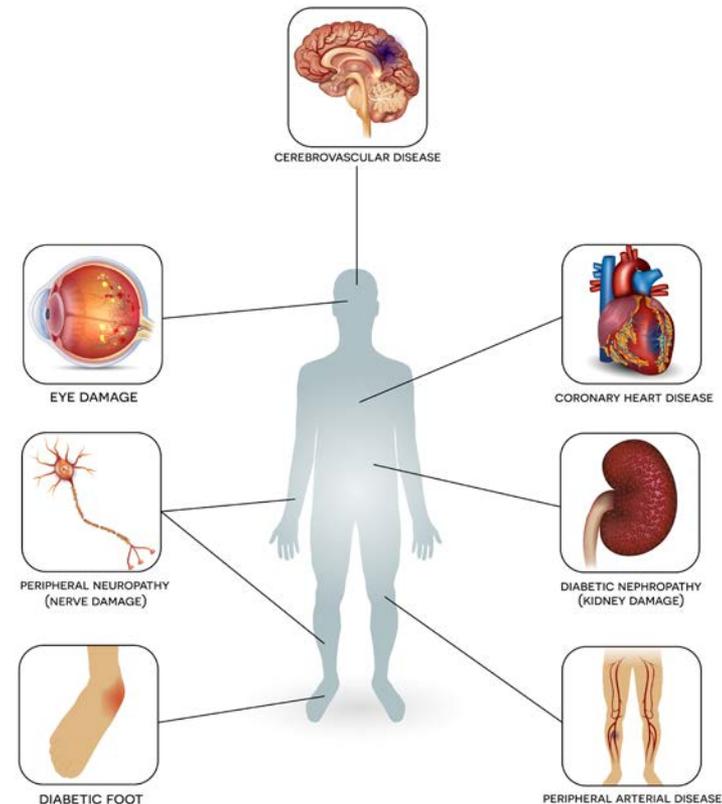
Importance of diabetes management: preventing complications

Patient education

- If you find out that your blood sugar level is high, visit a doctor for treatment as soon as possible.
- Even if you do not have any symptoms, damage to organs is already progressing, which can eventually increase mortality.

Professional information

- **Brain:** stroke
- **Heart:** myocardial infarction, angina
- **Blood vessels:** atherosclerosis, dyslipidemia,
- **Kidneys:** chronic kidney disease, renal failure requiring dialysis
- **Eye:** retinopathy, blindness
- **Nerves:** neuropathy (loss of sensation, pain, tingling sensation)
- **Foot:** nerve damage increases the chance for foot ulcers, infection and eventual need for limb amputation
- **Sexual function:** erectile dysfunction

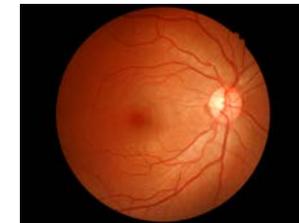
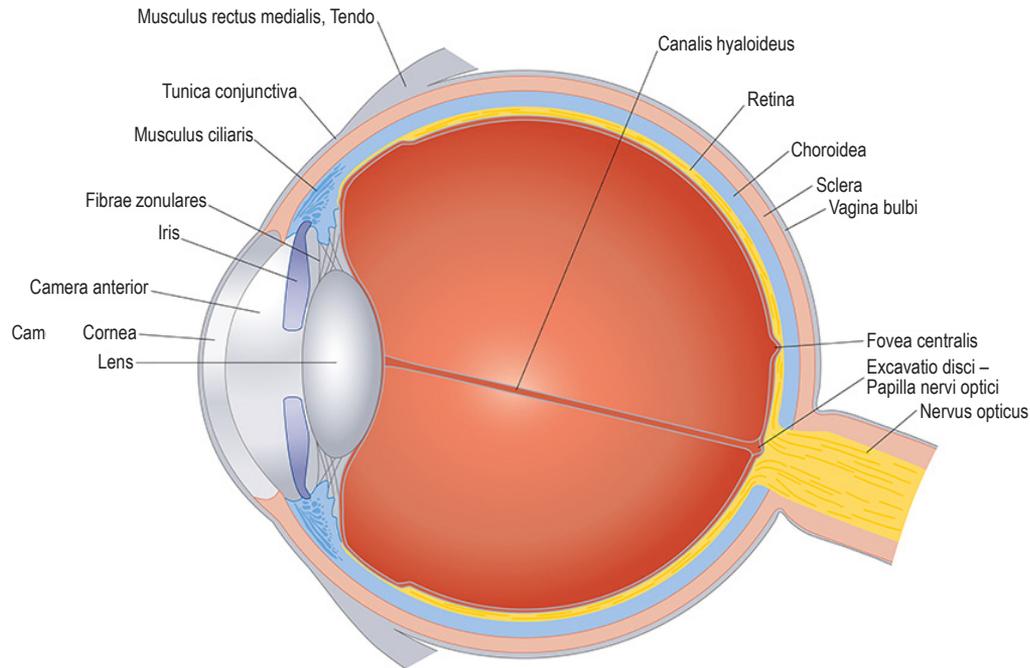


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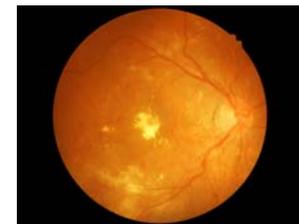
Ainsworth, Barbara E., et al. Compendium of physical activities: a second update of codes and MET values. *Medicine and Science in Sports and Exercise*, 2011, 43.8: 1575-1581.

Eye: diabetic retinopathy

Retinal damage and change in vision due to diabetic retinopathy



Chronic hyperglycaemia

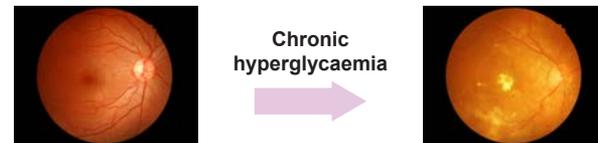
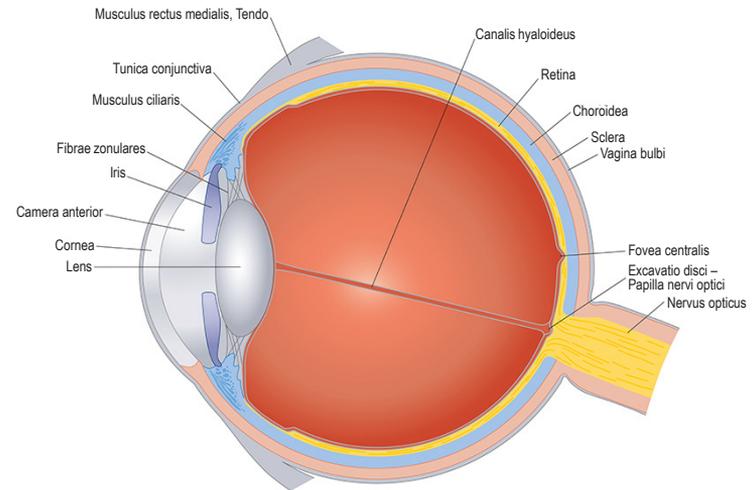


Eye: diabetic retinopathy

Patient education

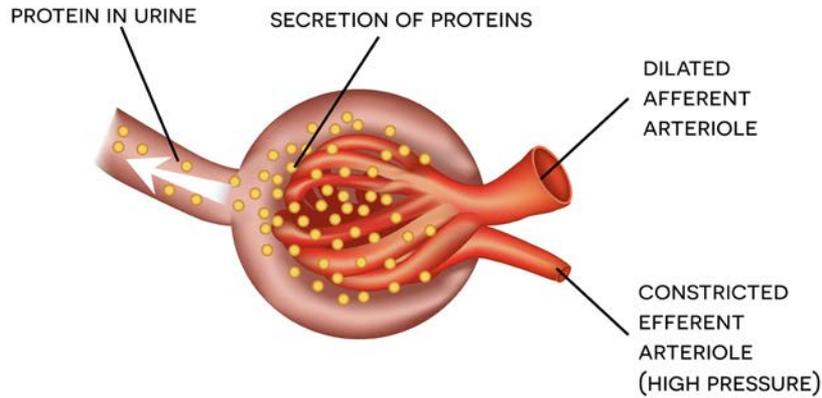
- First, eye complications. The retina is a light-sensitive layer at the back of the eye that controls how images are viewed.
- When hyperglycaemia persists for a long time, it affects retinal microvascular circulation, causing bleeding and oedema.
- This leads to vision damage and eventually blindness, as you can see in the image.
- Diabetic retinopathy is the leading cause of adult blindness.
- Like chronic kidney disease and neuropathy, retinopathy is also a microvascular complication.
- If you do not get treatment at the right time, it can cause blindness which is irreversible.
- Non-proliferative retinopathy is when microvascular damage affects the retina.
- In proliferative retinopathy, new vessels grow to other parts of the eye.
- Therefore, it is important for all patients with diabetes to have an eye health check-up at least once a year.

Retinal damage and change in vision due to diabetic retinopathy



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 International Diabetes Federation. Global guideline for type 2 diabetes. Brussels: IDF Clinical Guidelines Task Force, 2012.

Kidney: diabetic nephropathy



Proteinuria (microalbuminuria)

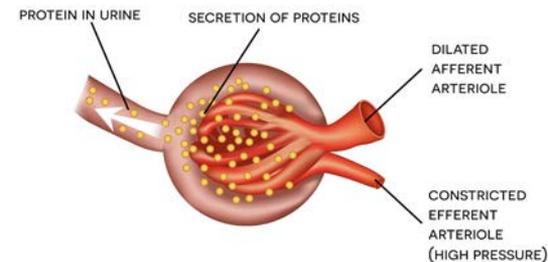
Regular health check-ups



Kidney: diabetic nephropathy

Patient education

- The second complication concerns the kidney. When hyperglycaemia persists for a long time, proteins are detected in your urine due to kidney function damage.
 - Progression of kidney damage leads to chronic kidney disease, and when your kidney function worsens, you may need dialysis or kidney transplantation.
 - Diabetic kidney damage starts about 15 years after diagnosis.
 - Kidney damage can progress in the absence of urinary tract infections, other kidney diseases, heart failure, or ketosis.
 - When kidney damage progresses you may experience a general swelling of the body.
 - Body waste is not effectively excreted and this will eventually lead to chronic kidney disease, uraemia, and finally, dialysis and kidney transplantation might be required.
 - For patients with diabetic nephropathy, eating healthy is extremely important.
- Spicy or salty food, heavy drinking and overeating must be avoided and you should eat adequate amounts of protein.
 - Risk factors for diabetic nephropathy are family history, decreased kidney function, uncontrolled hyperglycaemia, microalbuminuria, nocturnal hypertension and smoking.



Proteinuria (microalbuminuria)



REFERENCES:

American Diabetes Association. Standards of medical care in diabetes—2015. Diabetes Care, 2015.
International Diabetes Federation. Global guideline for type 2 diabetes. Brussels: IDF Clinical Guidelines Task Force, 2012.

Nervous system: diabetic neuropathy

Polyneuropathy:

Tingling sensation in hands and feet

Autonomic neuropathy:

Indigestion, heart problem, sexual dysfunction



Nervous system: diabetic neuropathy

Patient education

- Some common symptoms of neuropathy are a tingling sensation, numbness, and sharp pains.
- The autonomic nervous system controls your internal organs and autonomic nerve damage can cause digestive dysfunction, constipation and sexual dysfunction.
- Peripheral nerves are the nerves of the hands and feet.
- Peripheral neuropathy is also a common complication of diabetes.
- If a diabetic patient feels tingling, numbness, or sharp pains, and does not have any other signs of infection, tumour, or intoxication, then the patient likely has peripheral neuropathy.
- Chronic hyperglycaemia is the leading cause of peripheral neuropathy, therefore, it is important to strictly control your blood glucose levels.



Polyneuropathy:

Tingling sensation in hands and feet

Autonomic neuropathy:

Indigestion, heart problem, sexual dysfunction

REFERENCES:

American Diabetes Association. Standards of medical care in diabetes—2015. Diabetes Care, 2015.
International Diabetes Federation. Global guideline for type 2 diabetes. Brussels: IDF Clinical Guidelines Task Force, 2012.

Diabetic foot



Nerve damage



Ulcer



Gangrene

Diabetic foot

Patient education

- Diabetic nerve damage and reduced blood supply to the foot causes slow recovery from injuries and if not treated, it can lead to serious complications such as amputation.
- Diabetic neuropathy most commonly occurs in high-pressure areas of the foot.
- Ischaemic ulcers most frequently occur at the toes, front part of the foot and heel.
- Feeling the pulse of the foot is important.
- If you do not feel a pulse, there may be an obstructive lesion.



Nerve damage



Ulcer



Gangrene

REFERENCES:

American Diabetes Association. Standards of medical care in diabetes—2015. Diabetes Care, 2015.
International Diabetes Federation. Global guideline for type 2 diabetes. Brussels: IDF Clinical Guidelines Task Force, 2012.

Diabetic foot care

- Examine your feet and toes every day.
- Get an annual foot examination.
- Visit your doctor within a day if you notice foot infections, ingrown nails, corns, cracks, etc.
- Wear comfortable cushion-soled shoes and change socks daily.



Diabetic foot care

Patient education

- Many patients with diabetes might not notice a foot injury due to nerve damage or neuropathy.
- If an injury is not treated, ulcers may form, and in the most severe cases, amputation may be required.

- Examine your feet and toes every day.
- Get an annual foot examination.
- Visit your doctor within a day if you notice foot infections, ingrown nails, corns, cracks, etc.
- Wear comfortable cushion-soled shoes and change socks daily.



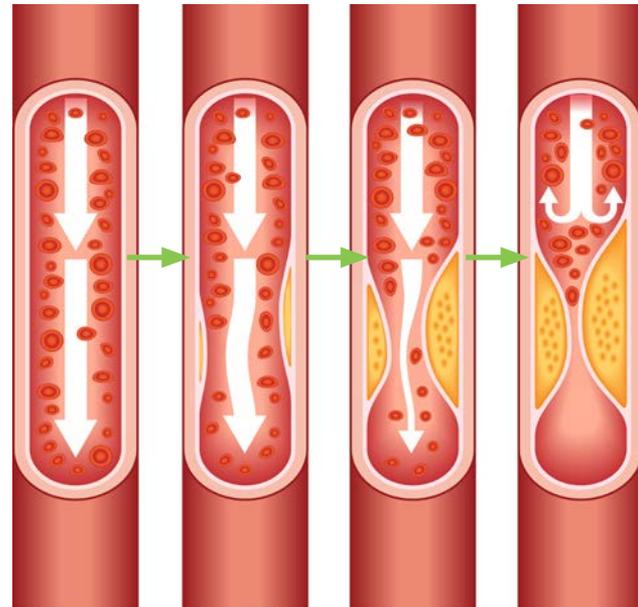
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International Diabetes Federation. Global guideline for type 2 diabetes. Brussels: IDF Clinical Guidelines Task Force, 2012.
Scottish Intercollegiate Guidelines Network. Management of Diabetes. Edinburgh. 2011.

Complications of diabetes (1)

Atherosclerosis

- Cholesterol, cells and debris form plaques that cause hardening and narrowing of the arteries.
- Atherosclerosis increases risk of stroke, brain haemorrhage, vascular dementia, angina and myocardial infarction.



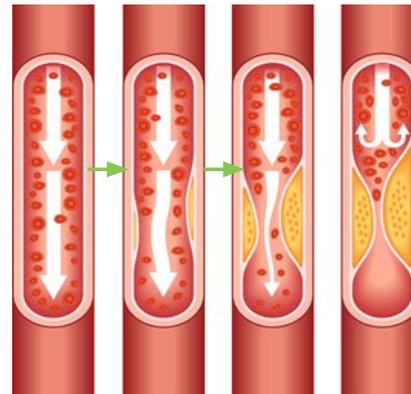
Complications of diabetes (1)

Patient education

- Atherosclerosis is a complication of diabetes that gradually blocks blood vessels.
- Prolonged exposure to high blood sugar causes damage to the vessel wall, which leads to wall thickening and fat accumulation in the vascular wall.
- This leads to angina, myocardial infarction, heart failure and kidney failure by decreasing the blood flow to the heart, brain, kidney and extremities.

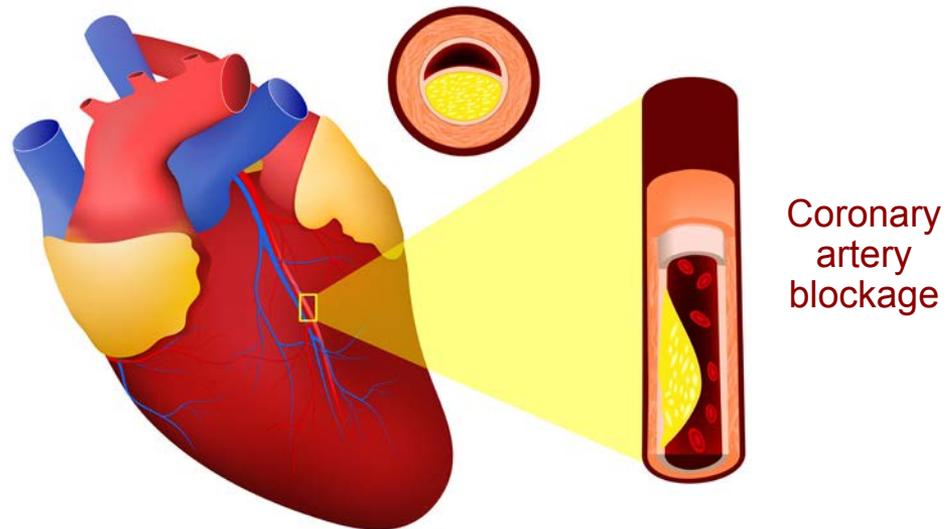
Atherosclerosis

- Cholesterol, cells and debris form plaques that cause hardening and narrowing of the arteries.
- Atherosclerosis increases risk of stroke, brain haemorrhage, vascular dementia, angina and myocardial infarction.



Complications of diabetes (2)

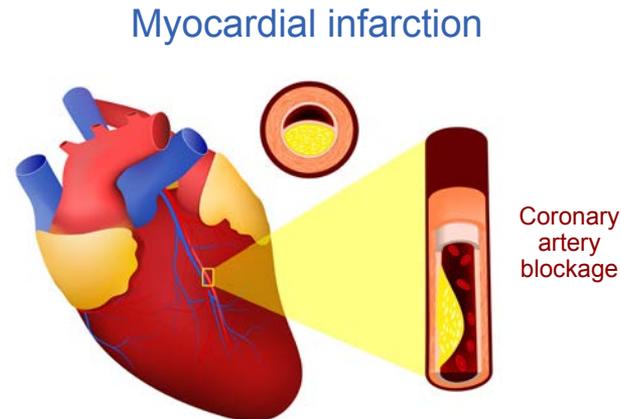
Myocardial infarction



Complications of diabetes (2)

Patient education

- Angina and myocardial infarction can be caused by obstruction of blood vessels in the heart.
- Acute chest pain is the main symptom and in severe cases, it can cause death before the patient arrives at the hospital.



REFERENCES:

Diabetes basic theory course. Centers for Disease Control and Prevention, Republic of Korea. 2016. (http://www.kncd.org/down/sub09/01/9_1_2_1.pdf, accessed 28 September 2016).

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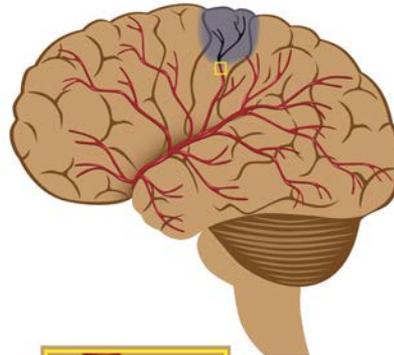
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Complications of diabetes (3)

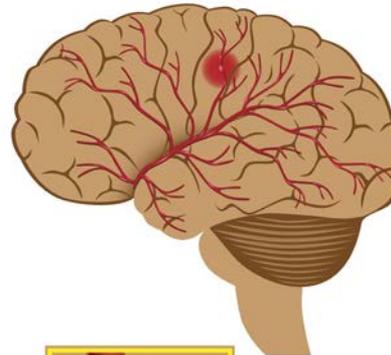
Stroke (brain infarction, brain haemorrhage)

Ischaemic stroke



Blockage of blood vessels;
lack of blood flow to affected area

Haemorrhagic stroke



Rupture of blood vessels;
leakage of blood

Complications of diabetes (3)

Patient education

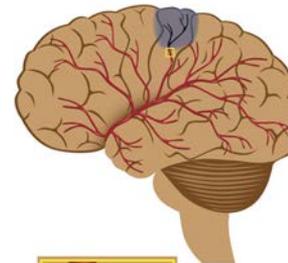
- Stroke is caused by obstruction of blood vessels in the brain.
- You can experience paralysis of the arms or legs.
- Early treatment within three hours of symptoms is extremely important for both brain infarction and brain haemorrhage.

If you experience the following symptoms, call 911 (or your local emergency number) or go to the hospital immediately:

- sudden weakening or numbness of face, arms, or legs;
- sudden slurring of speech, unable to speak, or hard to understand;
- sudden blurring of vision in one or both eyes;
- dizziness, or experiencing problems with balance and coordination while walking; and
- sudden severe headache.

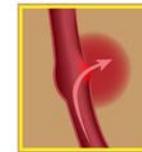
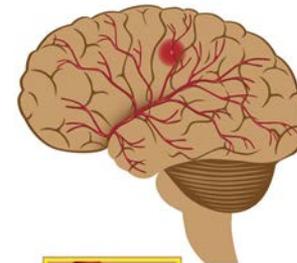
Stroke (brain infarction, brain haemorrhage)

Ischaemic stroke



Blockage of blood vessels;
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Haemorrhagic stroke

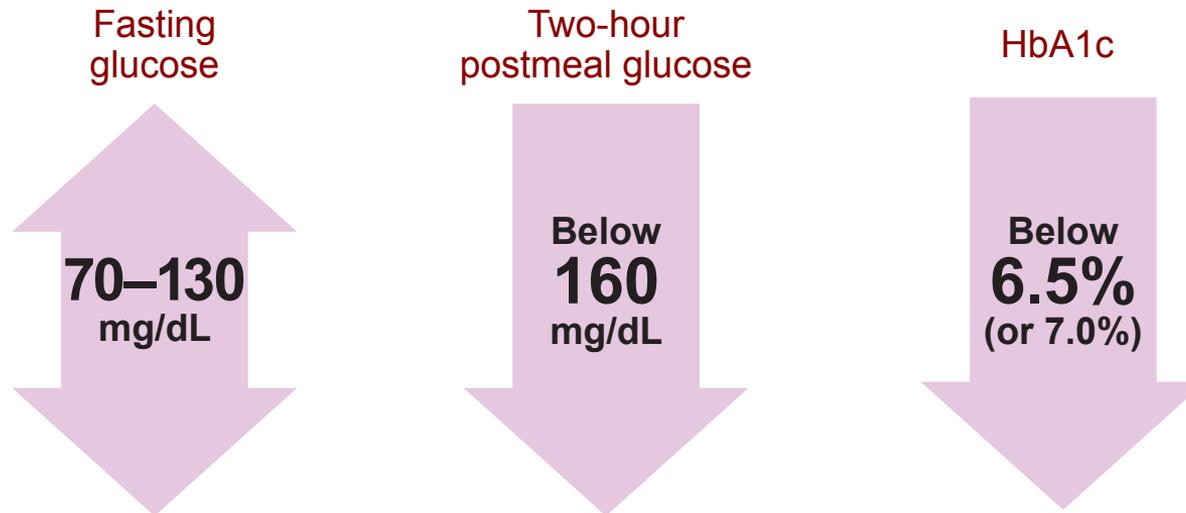


Rupture of blood vessels;
leakage of blood

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Hypertension basic theory course. Centers for Disease Control and Prevention, Republic of Korea. 2016. (http://www.kncd.org/down/sub09/01/9_1_1_1.pdf, accessed 28 September 2016).
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Treatment goals for patients with diabetes



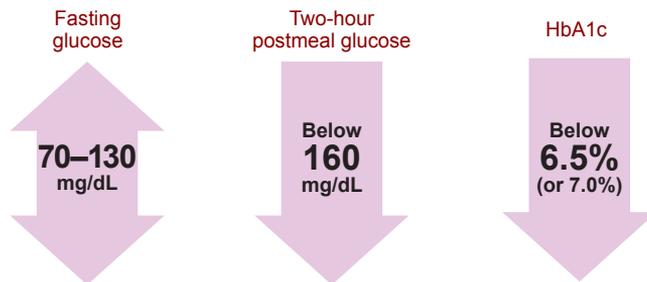
What is HbA1c?

HbA1c represents the average plasma glucose concentration over the past 2–3 months.

Treatment goals for patients with diabetes

Patient education

- The treatment goal for diabetes is a fasting blood sugar level around 110 mg/dL and a postprandial blood sugar level of less than 160 mg/dL.
- HbA1c, which shows the average glucose concentration in the past 2–3 months, should be lower than 6.5%.
- However, these target values may vary, depending on the patient’s age, medication type and general condition.



What is HbA1c?

HbA1c represents the average plasma glucose concentration over the past 2–3 months.

Professional information

	HbA1c (%)	Fasting blood glucose	2 hour postprandial blood glucose
American Diabetes Association	< 7.0	70–130	< 180
American Association of Clinical Endocrinologists	≤ 6.5	≤ 110	≤ 140
International Diabetes Federation	≤ 7.0	< 115	≤ 160
Korean Diabetes Association	≤ 6.5	80–120	< 180

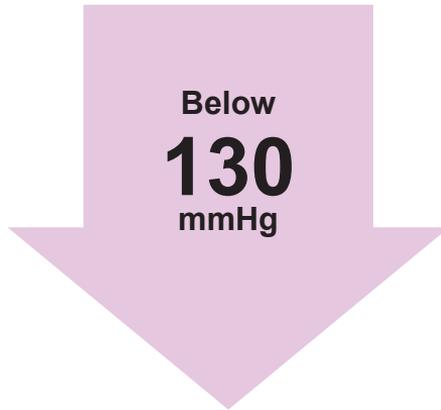
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 International Diabetes Federation. Global guideline for type 2 diabetes. Brussels: IDF Clinical Guidelines Task Force, 2012.

Blood pressure goals to prevent complications

In patients with diabetes

Systolic blood pressure



Diastolic blood pressure

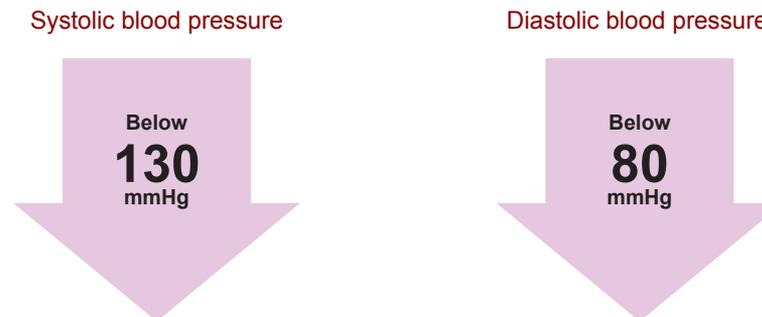


Blood pressure goals to prevent complications

Patient education

- Controlling your blood pressure is also important to prevent complications.
- The usual blood pressure target is to keep it under 140/90 mmHg.
- However, for patients with diabetes, active management maintaining blood pressure below 130/80 mmHg is important.
- The blood pressure goal may be set higher or lower depending on the patient's age, severity of complications, medical history and hypoglycaemia.

In patients with diabetes



REFERENCE:

2011 Clinical practice guidelines for type 2 diabetes in Korea. Edinburgh: Scottish Intercollegiate Guidelines Network. Diabetes and Metabolism Journal. 2011, 35: 431-6.

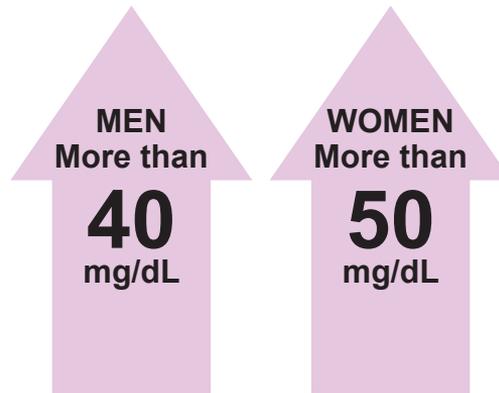
Lipid goals to prevent complications

Dyslipidaemia

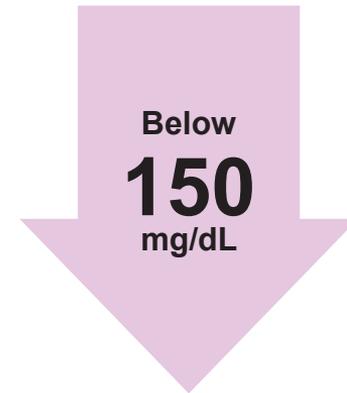
Low-density
cholesterol (LDL)



High-density
cholesterol (HDL)



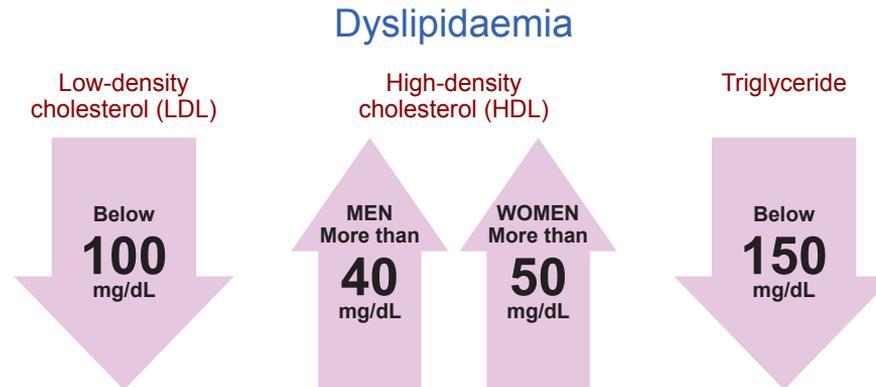
Triglyceride



Lipid goals to prevent complications

Patient education

- Controlling your blood cholesterol levels is also important to prevent complications.
- LDL, or “bad cholesterol”, should be maintained under 100 mg/dL.
- However, these goals may be set higher or lower depending on the patient’s age, severity of complications, medical history and hypoglycaemia.



REFERENCE:
American Diabetes Association. Standards of medical care in diabetes—2015. Diabetes Care, 2015.

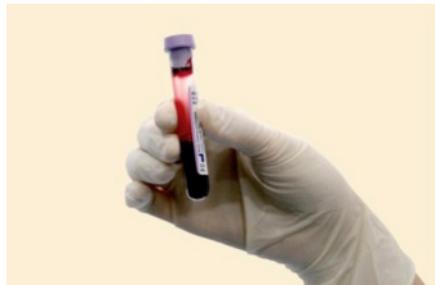
Regular check-ups to prevent complications



- Funduscopy examination



- Blood pressure measurement



- Cholesterol blood test

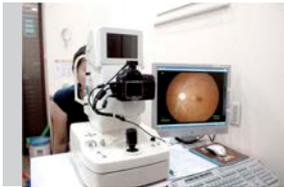


- Renal function test
Proteinuria
(microalbuminuria) test

Regular check-ups to prevent complications

Patient education

- In addition to medical treatment and blood sugar control, early detection of complications requires a funduscopic examination, microalbuminuria tests, blood pressure measurements and dyslipidaemia tests every 1–2 years.



• Funduscopic examination



• Blood pressure measurement



• Cholesterol blood test



• Renal function test
Proteinuria
(microalbuminuria) test

Professional information

- All diabetic patients must be made aware of diabetic complications.
- Even when a patient does not have any symptoms, regular check-ups are necessary to prevent or, if necessary, treat complications.
- To check for retinopathy, yearly eye health examinations are required.
- Blood and urine tests are needed to check kidney function for damage.
- Blood tests are also needed to check for hyperlipidaemia.
- To check for neuropathies and foot complications, regular visits to the doctor are necessary.

REFERENCES:

American Diabetes Association. Standards of medical care in diabetes—2015. *Diabetes Care*, 2015.
International Diabetes Federation. Global guideline for type 2 diabetes. Brussels: IDF Clinical Guidelines Task Force, 2012.
Scottish Intercollegiate Guidelines Network. Management of Diabetes. Edinburgh, 2011.

Take-home message

Complication prevention

- Control your blood glucose level through medical treatment, regular physical activity and eating healthy.
- If you have hypertension or dyslipidaemia, control these as well.
- Although you may not have any complications yet, remember to get regular check-ups (fundoscopic exams, microalbuminuria tests, blood pressure, cholesterol) at least once every 1–2 years.



