NSW GOVERNMENT Health
Hunter New England
Local Health District

Chronic Complications of Diabetes

GNS Diabetes Service- Gillian Dan

Learning outcomes !

- Identify the major groups of diabetes complications
- Identify risk factors for developing complications
- Discuss the pathophysiology of macrovascular disease
- Discuss the pathophysiology of microvascular disease
- Plan client centred strategies for the prevention and minimisation of complications
- List summary of tests/assessments involved in complication screening

Prevent or delay long term complications?

Name the complications that can arise from uncontrolled DM?

Major groups of Diabetes complications

- Diabetes can have a serious effect on all parts of the body that require a blood supply.
- This is because high blood glucose levels over time can affect the large and small blood vessels and nerves throughout the body.

Macrovascular

Heart

Brain

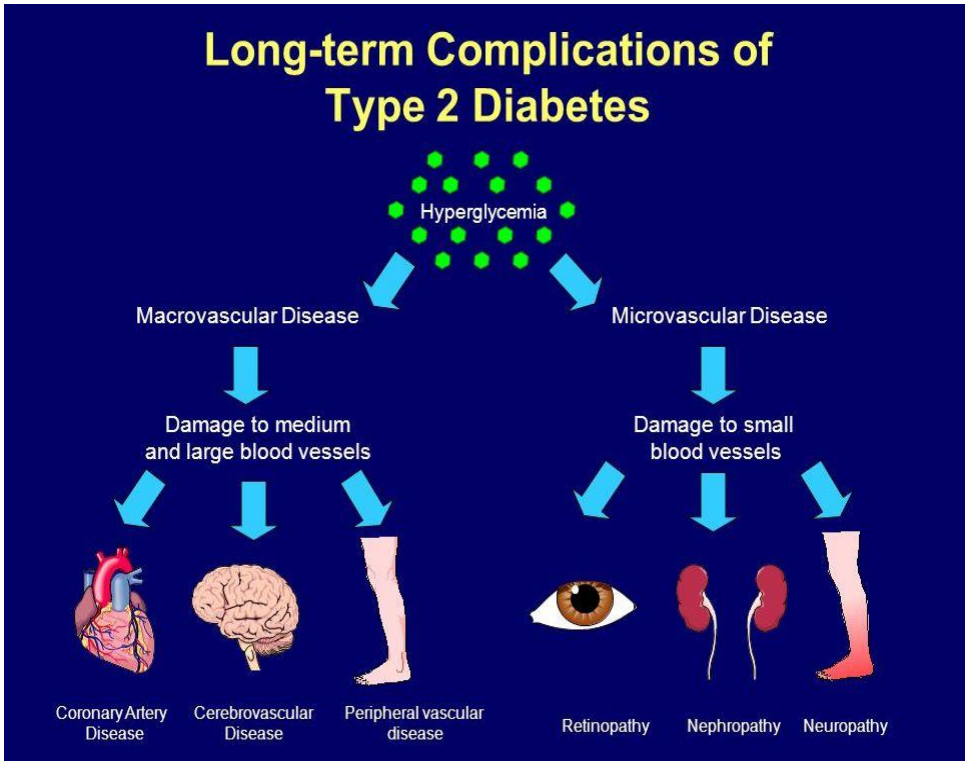
Leg Circulation

Microvascular

Eyes - Retinopathy

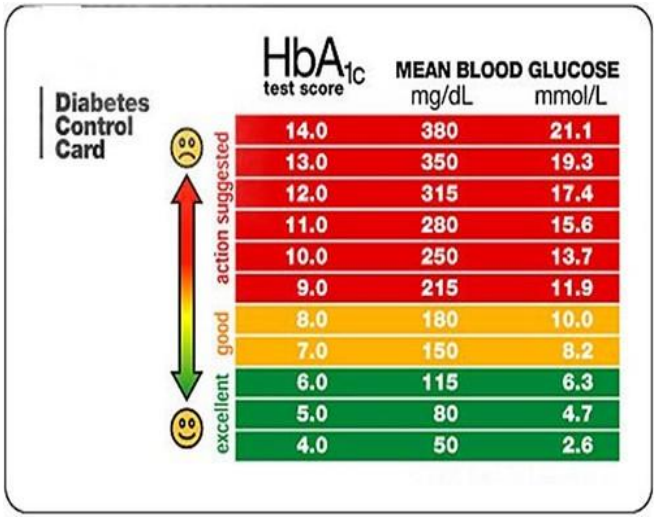
Kidneys - Nephropathy

Nerves - Diabetic Neuropathy



Reduce Complication Risk

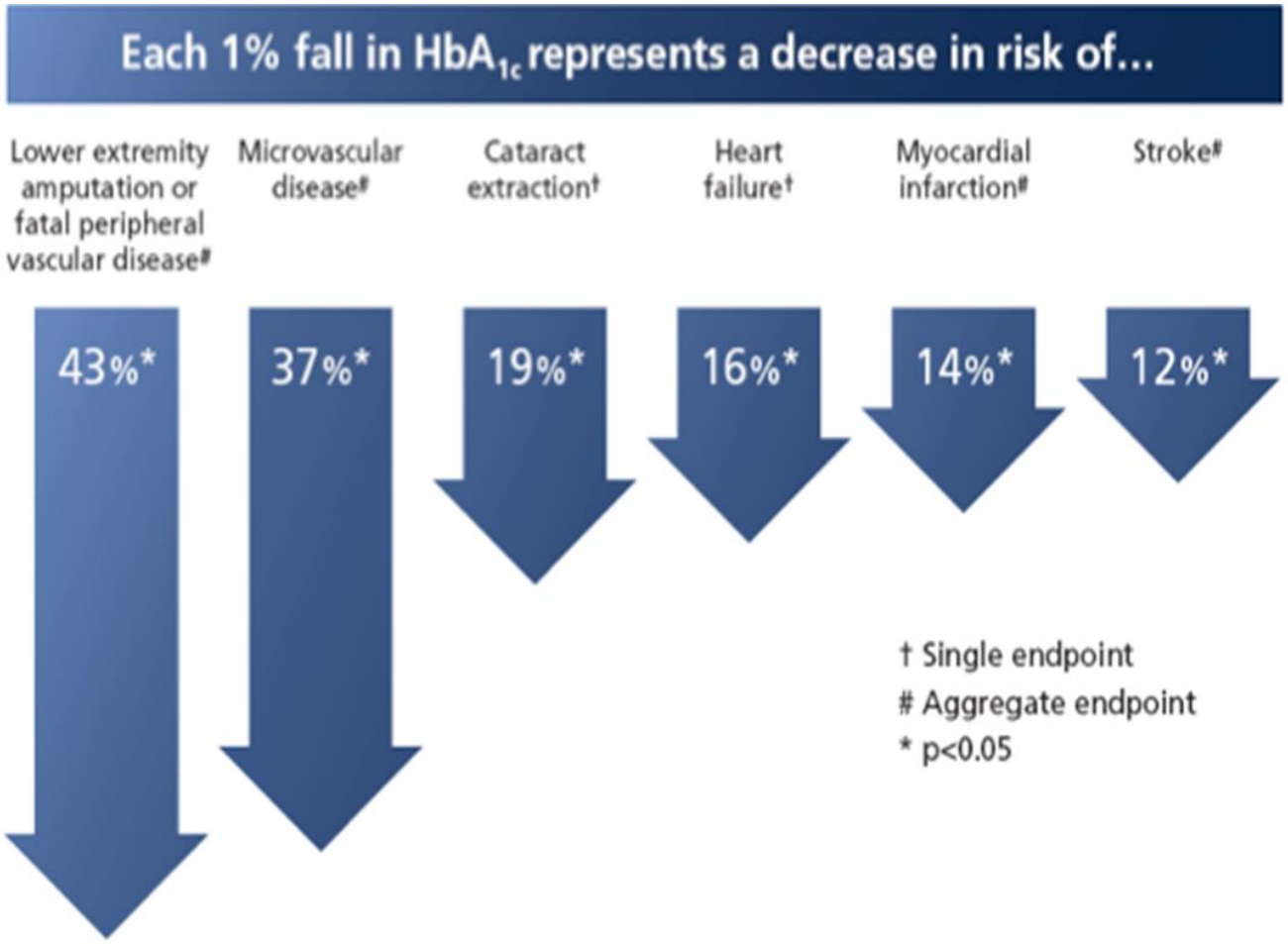
A



B

C

How important is Hba1c ?



Development of Macrovascular disease

- Cardiovascular disease is the leading cause of death in those with T2DM and those with T2DM are twice as likely to suffer a CV event than those without T2DM.
- Recommend that we focus not only on reducing hyperglycaemia but also on overall cardiovascular risk reduction.
- Dyslipidaemia: low levels of HDL cholesterol and high levels of small dense LDL cholesterol and triglycerides
- Hypertension: leading to hardening of arteries and reduction in arterial flow
- Hyper coagulation: leading to clot formation and occlusions
- Atherosclerosis: thickening of the walls of blood vessels with deposits of plaque

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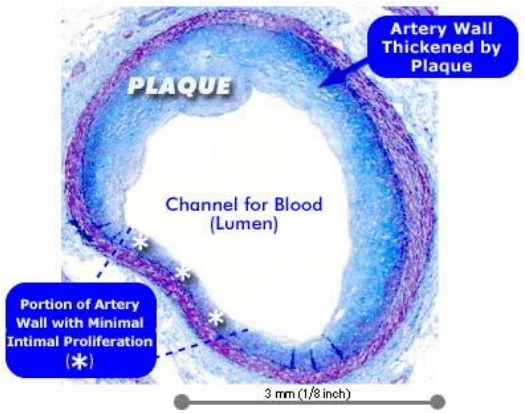

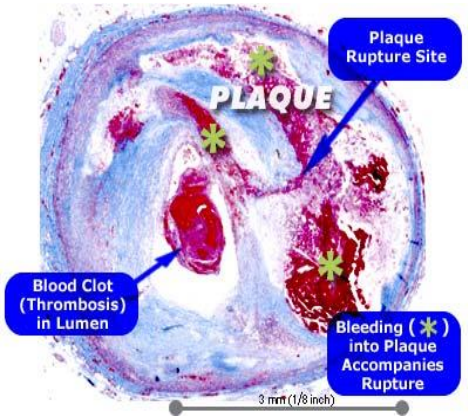

Complications-managing CVD risk

Managing CVD risk
Adults at high absolute risk of CVD should be simultaneously treated with lipid and blood pressure–lowering pharmacotherapy in addition to lifestyle advice, unless contraindicated or clinically inappropriate
Sodium glucose co-transporter 2 (SGLT2) inhibitors are recommended in patients with type 2 diabetes in the setting of CVD and insufficient glycaemic control despite metformin, to decrease the risk of cardiovascular events and decrease the risk of hospitalisation for heart failure

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Managing CVD risk

Antihypertensive medication
Antihypertensive therapy is strongly recommended in patients with diabetes and systolic blood pressure ≥140 mmHg
In patients with diabetes and hypertension, any of the first-line antihypertensive drugs that effectively lower blood pressure are recommended
In patients with diabetes and hypertension, a blood pressure target of <140/90 mmHg is recommended
A systolic blood pressure target of <120 mmHg may be considered for patients with diabetes in whom prevention of stroke is prioritised
In patients with diabetes where treatment is being targeted to <120 mmHg systolic, close follow-up is recommended to identify treatment-related adverse effects including hypotension, syncope, electrolyte abnormalities and acute kidney injury

Lipid-lowering medications
Use statins as first-line for lipid-lowering therapy
All adults with type 2 diabetes and known prior CVD (except haemorrhagic stroke) should receive the maximum tolerated dose of a statin, irrespective of their lipid levels Note: The maximum tolerated dose should not exceed the maximum available dose (eg 80 mg atorvastatin, 40 mg rosuvastatin)
In people with type 2 diabetes and known prior CVD, fibrates should be commenced in addition to a statin or on their own (for those intolerant to statin) when fasting triglycerides are greater than or equal to 2.3 mmol/L, or high-density lipoprotein cholesterol (HDL-C) is low† Note: When used in combination with statins, fenofibrate presents a lower risk of adverse events than other fibrates combined with statins
For adults with type 2 diabetes and known prior CVD already on maximally tolerated statin dose or intolerant of statin therapy, if fasting low-density lipoprotein cholesterol (LDL-C) levels remain ≥1.8 mmol/L, consider commencing one of: • ezetimibe • bile acid binding resins, or • nicotinic acid

MANAGING CARDIOVASCULAR RISK

- Patients with pre-existing cardiovascular disease (CVD) are at high risk
- All adults with type 2 diabetes and known prior CVD (except haemorrhagic stroke) should receive the maximum tolerated dose of a statin, irrespective of their lipid levels
- High risk of CVD:

  Diabetes and aged >45 years,

  Overweight or Obese (BMI >25),

  Diabetes with microalbuminuria,

  Moderate or severe chronic kidney disease,

  Diagnosis of familial hypercholesterolaemia,

  Systolic blood pressure ≥180 mmHg or diastolic blood pressure ≥110 mmHg,

  Serum total cholesterol >7.5 mmol/L

MICROVASCULAR DISEASE

Microvascular disease refers to disease of the small blood vessels associated with thickening of the basement membranes.

- Consequences are:

  kidney damage – nephropathy

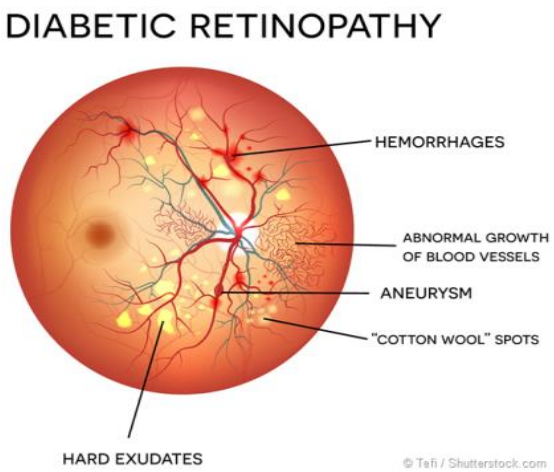
  eye disease – retinopathy

  nerve damage – neuropathy

- People who are diagnosed with Type 1 early have an increased risk of developing some microvascular end-organ complications in their lifetime.
- People with type 2 diabetes may have their condition go undiagnosed for many years.
- Consequently it is not uncommon for people with type 2 diabetes to have some evidence of microvascular complications at diagnosis

RISK FACTORS for DEVELOPMENT and PROGRESSION of RETINOPATHY

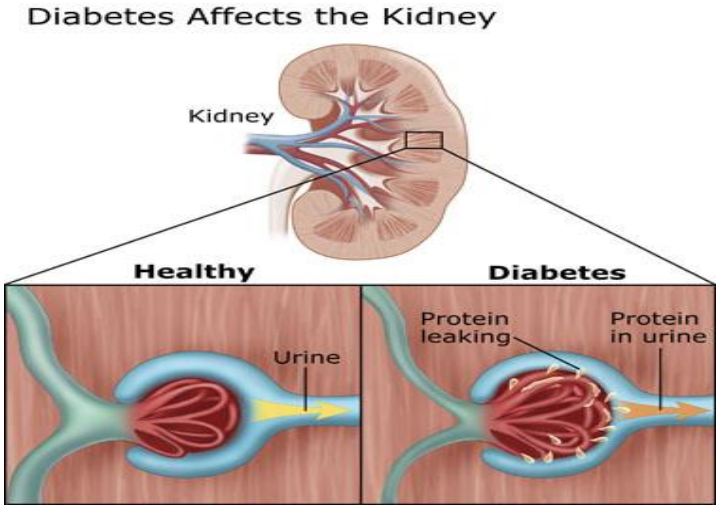
- Existing retinopathy
- Poor glycaemic control
- Raised blood pressure
- Duration of diabetes>10 years
- Microalbuminuria
- Dyslipidaemia
- Anaemia
- Pregnancy



- Retinopathy occurs as a result of microvascular disease of the retina.
- The microvascular disease results in vascular leakage, retinal oedema, and accumulation of lipids that can be seen as hard exudates in the retina and retinal ischemia.

Diabetic Nephropathy

- Chronic kidney disease (CKD) occurs when there is kidney damage and/or reduced kidney function lasting more than 3 months.
- Diabetic nephropathy is one of the main causes of CKD (32% of all new patients).
- Amongst Aboriginal and Torres Strait Islander (ATSI) population, 80% of new patients presenting for dialysis have diabetes.



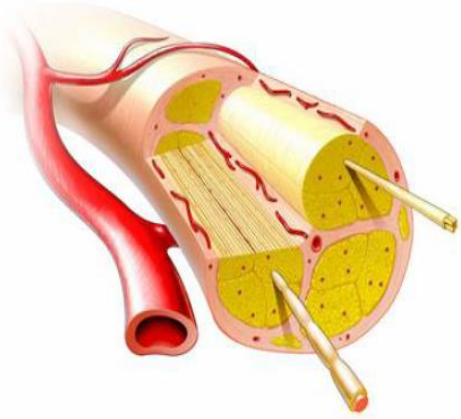
Neuropathy

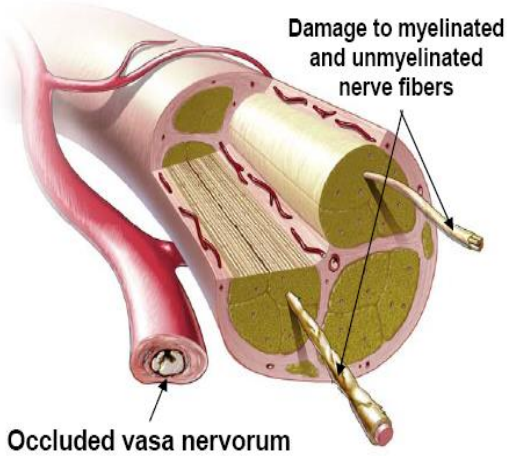
Diabetes causes impaired auto-regulation of blood flow to tissues of the nervous system and this may cause Peripheral Neuropathy – damage to nerves that connect with outlaying parts of the body and their receptors with the CNS.

Damage associated with

- Legs/feet
- Hands
- Parathesia /pain
- Trauma / neuropathic ulcer
- Charcot's joint

Healthy nerve





Nerve damage

Autonomic Neuropathy

Manifested by dysfunction of one or more organ systems which can lead to :

- Digestive problems such as feeling full, nausea
- Vomiting, diarrhea, or constipation
- Problems with how well the bladder works
- Problems having sex
- Dizziness or faintness
- Loss of the typical warning signs of a heart attack
- Loss of warning signs of low blood glucose
- Increased or decreased sweating
- Changes in how your eyes react to light and dark

Dental and Periodontal problems

More common in people who have diabetes

- Regular dental review and good oral hygiene is important so that the risk can be minimised.
- Red, sore and swollen gums that bleed are first signs of gum disease – gingivitis.
- Smoking ↑ risk of gum disease - especially if ≥ 45 and has diabetes.
- Strong correlation between dental decay and gingivitis and significant cardiac disease.
- Above target blood glucose helps bacteria grow → tooth and gum problems more prevalent in people with diabetes – 6 monthly checks.

Clinical Management goals FRACPGP

Clinical management goals	
Treatment targets for people with type 2 diabetes include the following. For a comprehensive list of assessments and screening intervals, refer to the section 'Assessment of the patient with type 2 diabetes'.	
HbA1c	Target needs individualisation according to patient circumstances Generally ≤7% (53 mmol/mol)
Lipids	Initiation of pharmacotherapy is dependent on the assessment of absolute CVD risk (refer to the Australian absolute cardiovascular disease risk calculator). This uses multiple risk factors, which is considered more accurate than the use of individual parameters Once therapy is initiated, the specified targets apply; however, these targets should be used as a guide to treatment and not as a mandatory target
Total cholesterol	<4.0 mmol/L
HDL-C	≥1.0 mmol/L
LDL-C	<2.0 mmol/L; <1.8 mmol/L if established CVD is present
Non–HDL-C	<2.5 mmol/L
Triglycerides	<2.0 mmol/L
Blood pressure	≤140/90 mmHg Lower blood pressure targets may be considered for younger people and for secondary prevention in those at high risk of stroke The target for people with diabetes and albuminuria/proteinuria remains <130/80 mmHg. As always, treatment targets should be individualised and monitored for side effects from medications used to lower blood pressure
Urine albumin excretion	UACR: • women: <3.5 mg/mmol • men: <2.5 mg/mmol Timed overnight collection: <20 µg/min; spot collection: <20 mg/L
Vaccination	Recommended immunisations: influenza, pneumococcus, diphtheria-tetanus-acellular pertussis (dTpa). Consider: hepatitis B (if travelling), herpes zoster

Individual Goals

Individual goals	
Encourage all people with type 2 diabetes to approach/reach these goals.	
Diet	Advise eating according to the *Australian dietary guidelines*, with attention to quantity and type of food Advise individual dietary review for people with difficulty managing weight, difficulty maintaining glucose levels in target range, CVD risk, or if otherwise concerned
BMI	Advise a goal of 5–10% weight loss for people who are overweight or obese with type 2 diabetes For people with BMI >35 kg/m² and comorbidities, or BMI >40 kg/m², consider facilitating greater weight-loss measures
Physical activity	Children and adolescents: at least 60 min/day of moderate-to-vigorous physical activity, plus muscle- and bone-strengthening activities at least three days/week Adults: 150 minutes of aerobic activity, **plus** 2–3 sessions of resistance exercise (to a total ≥60 minutes) per week
Cigarette consumption	Zero per day
Alcohol consumption	Advise ≤2 standard drinks (20 g of alcohol) per day for men and women
Blood glucose monitoring	Advise 4–7 mmol/L fasting and 5–10 mmol/L postprandial SMBG is recommended for patients with type 2 diabetes who are using insulin. Education should be provided regarding frequency and timing of insulin dose For people not on insulin, the need for and frequency of SMBG should be individualised, depending on type of glucose-lowering medications, level of glycaemic control and risk of hypoglycaemia, as an aid to self-management SMBG is recommended in pregnancy complicated by diabetes or gestational diabetes SMBG is also recommended for people with hyperglycaemia arising from intercurrent illness. It may be helpful in haemoglobinopathies or other conditions where HbA1c measurements may be unreliable

CORNERSTONES of MANAGEMENT

Nutrition - for normal growth, development, activity, lifestyle and culture.

Exercise - active lifestyle for all, incidental as well as planned, and weight loss for obese.

Manage co-morbid risks- Optimal BP, cholesterol/lipid levels

Oral Medication - if BGLs cannot be controlled by following a food plan and activity alone, 3 month trial often appropriate.

Insulin Therapy - for all people with type 1 diabetes and in type 2 when diabetes no longer controlled by oral glucose lowering agents.

Psycho-social support

CORNERSTONES of MANAGEMENT

Monitoring - either via 3–6 monthly HbA1c and/or self monitoring if appropriate.

Education - for all people with diabetes and their carers to allow them to make informed decisions about their diabetes care. Encourage involvement in decision-making process regarding their care.

Optimal Medical Management - involvement of the multidisciplinary diabetes team where appropriate, including regular assessment and complications screening.

QUESTIONS