

# Type 2 diabetes mellitus (T2DM)

## What is type 2 diabetes mellitus?

Type 2 diabetes mellitus (T2DM), previously known as Non Insulin Dependent Diabetes Mellitus [NIDDM], is a chronic disease defined by insulin resistance (in which the body's cells do not respond properly to insulin); and lower levels of insulin secreted by the pancreas. Most often, this leads to increased blood glucose (sugar) levels, called hyperglycaemia. Insulin is a key metabolic hormone and its release is triggered by rises in blood glucose levels. In 2002, about 7.4% of the Australian population had T2DM, with half of people unaware they had this condition (1). The proportion of Australians with T2DM increases every year, and costs the economy more than \$3 billion per year.

## How is type 2 diabetes monitored?

People with T2DM usually monitor their own blood glucose three or more times a day with a small instrument (a glucometer). Measuring blood glucose levels is particularly important before, during and after exercise. Health care professionals monitor long-term disease by measuring a compound in the blood called glycated haemoglobin (HbA<sub>1c</sub>). Other markers like blood lipids and blood pressure should also be monitored.

## What are the benefits of exercise for people with type 2 diabetes?

Studies show that exercise can help prevent T2DM, as well as improve control of blood glucose, decrease the proportion of body fat, decrease the risk of heart disease, and increase heart and lung fitness in people with T2DM (2, 3). People with poor fitness have an increased risk of developing T2DM. Increasing physical activity can reduce the incidence of T2DM by almost 60% in people at risk (4). People who already have T2DM can increase their fitness levels (and improve their symptoms) by about 12% through exercise training (5). Poorly controlled blood glucose leads to earlier onset of other serious effects of T2DM, such as heart, kidney and eye diseases, and an increased risk of death. Better blood glucose control often means people can reduce their T2DM medications (6). As people with diabetes age, the benefit of maintaining muscle mass through exercise is also likely to improve physical function and independence (7).

## How much exercise is enough?

The table below shows the type, intensity, duration and frequency of exercise recommended for people with T2DM. The total amount of exercise should be a combination of aerobic and resistance training. Aerobic exercise (e.g. walking or running) increases heart and lung fitness, while resistance training (e.g. lifting weights) maintains muscle and bone strength.

Type of exercise	Intensity	Duration	Frequency
Aerobic exercise (for heart and lung fitness)	Moderate	Total of 210 minutes	On at least 3 days a week with no more than two consecutive days without exercising
	Vigorous	Total of 125 minutes	
Resistance training (for muscle and bone strength)	Moderate to vigorous	30 minutes per session (included in totals above)	2 or more times per week (2–4 sets of 8–10 repetitions)

## Who should exercise?

Although some risks are associated with physical activity for people with T2DM, the risks of inactivity mostly outweigh them. Even half the recommended levels of exercise are probably beneficial (8) if people cannot initially exercise at recommended levels. The following points should be kept in mind before starting an exercise program:

- **Hypoglycaemia** (low blood glucose). Occurs relatively rarely in people with T2DM. Monitoring blood glucose levels (avoiding blood glucose of 4.0mmol/L or less), consulting with the doctor, and correctly timing medications, meals and exercise usually prevent problems. Exercise may need to be temporarily modified if T2DM is unstable;
- **Risk of cardiac events** (e.g. heart attacks). The risk of remaining inactive usually outweighs this risk. However, people wishing to exercise vigorously, older people, and people with established cardiovascular disease should have their heart function assessed by a GP first;
- **Peripheral neuropathy**. This condition is associated with T2DM and reduces sensation in the hands and feet. Appropriate footwear, regular foot inspection and low-impact exercises are essential with peripheral neuropathy, and are also highly advised for all people with T2DM;
- **Hypertension** (high blood pressure). Although exercise reduces hypertension in people with T2DM, those with poorly controlled blood pressure should avoid vigorous exercise, particularly resistance training of vigorous intensity; and
- **Obesity**. For overweight people with T2DM, weight loss will reduce joint pain and discomfort when exercising, and encourage them to continue exercising.

### Related information and references

Diabetes Australia [www.diabetesaustralia.com.au](http://www.diabetesaustralia.com.au)

Exercise & Sports Science Australia [www.essa.org.au](http://www.essa.org.au)

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