Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD/Fatty Liver)

Understanding fatty liver disease and how to manage it

WHAT IS MASLD?

Metabolic dysfunction-associated steatotic liver disease (MASLD) is the term used to describe fat accumulation in the liver in people who have one or more metabolic risk factors, such as excess body weight, type 2 diabetes, high blood pressure, or abnormal cholesterol or triglyceride levels. MASLD is not caused by alcohol.[1,2]

MASLD was previously known as non-alcoholic fatty liver disease (NAFLD). The name was updated in 2023 to better reflect the underlying causes and to reduce stigma. It is now the most common liver disease in Australia and worldwide, affecting an estimated 1 in 4 adults globally.[2,5]

WHAT ARE THE STAGES OF MASLD?

MASLD exists on a spectrum ranging from simple fat accumulation to serious liver disease:[1,4]

- **Steatosis (simple fatty liver)**: fat accumulates in liver cells (hepatocytes) but there is no significant inflammation or damage. This is the most common and mildest stage. For many people, it causes no harm and can be reversed with lifestyle changes.
- **Metabolic dysfunction-associated steatohepatitis (MASH)**: fat is present along with liver cell inflammation and damage. Previously called non-alcoholic steatohepatitis (NASH). This is a more serious stage that can progress to scarring.
- **Fibrosis**: as inflammation persists, the liver begins to develop scar tissue. Fibrosis is graded from F0 (no fibrosis) to F4 (cirrhosis).
- **Cirrhosis**: advanced scarring that impairs liver function. See the Cirrhosis fact sheet for more information.
- **Liver cancer (hepatocellular carcinoma)**: can develop in people with MASLD-related cirrhosis, though it can occasionally occur without cirrhosis in MASLD.

The majority of people with MASLD have simple steatosis and will never develop serious liver disease. Around 20-30% of people with MASH will progress to cirrhosis over 10-20 years. The rate of progression varies greatly between individuals.

WHAT CAUSES MASLD?

MASLD develops when excess fat accumulates in the liver, usually driven by a combination of:[1,4]

- Excess body weight, particularly fat around the abdomen (central obesity)
- Insulin resistance and type 2 diabetes
- High blood triglycerides or low HDL cholesterol
- High blood pressure (hypertension)
- Metabolic syndrome (a cluster of the above conditions)

Genetic factors also play a role. Some people develop MASLD even without obesity, particularly those with a genetic predisposition. Ethnicity may also influence risk, with higher rates seen in Hispanic and Asian populations.

WHAT ARE THE SYMPTOMS?

Most people with MASLD, including those with MASH and even early fibrosis, have no symptoms. This is one reason the condition is often discovered incidentally on a blood test or ultrasound performed for another reason.[1,5]

When symptoms do occur, they may include:

- Fatigue and weakness
- Discomfort or a dull ache in the upper right abdomen
- Enlarged liver on physical examination

Symptoms of advanced liver disease (cirrhosis) include jaundice, swelling of the abdomen (ascites), confusion, and easy bruising. If you develop any of these, seek medical attention promptly.

DIAGNOSIS

MASLD is diagnosed through a combination of blood tests, imaging, and assessment of metabolic risk factors. There is no single definitive test.[1,2]

- **Blood tests**: liver enzymes (ALT, AST, GGT) may be elevated, but are often normal even in significant liver disease. Blood tests also assess metabolic risk factors including glucose, insulin, lipids, and full blood count.
- **Liver function tests (LFTs)**: assess overall liver function including protein production and bilirubin levels.
- **Abdominal ultrasound**: the most commonly used initial test. Ultrasound can detect fat in the liver (appearing bright or echogenic on the scan). However, it cannot reliably detect fibrosis.
- **FibroScan (transient elastography)**: a specialised ultrasound device that measures liver stiffness (an indicator of fibrosis) and the controlled attenuation parameter (CAP), which measures the degree of fat in the liver. It is quick, painless, and radiation-free.
- **FIB-4 score**: a simple calculation using age, ALT, AST, and platelet count to estimate the likelihood of significant fibrosis. A useful and widely used tool for risk stratification.
- **MRI-based tests**: MRI-PDFF (proton density fat fraction) quantifies the amount of liver fat more accurately than ultrasound. MR elastography can also measure fibrosis. Used in specialist settings and clinical trials.
- **Liver biopsy**: a small tissue sample is taken from the liver under ultrasound guidance. It remains the most accurate way to grade inflammation (MASH) and stage fibrosis, but is invasive and carries a small risk of bleeding. It is used selectively when non-invasive tests give uncertain results.

MANAGEMENT

Currently, the most effective treatment for MASLD is lifestyle modification. The goals of management are to reduce liver fat, prevent or slow fibrosis progression, manage metabolic risk factors, and reduce cardiovascular risk.[1,6]

Weight loss

Weight loss is the most effective intervention for MASLD. Even modest weight loss produces meaningful benefits:[6]

- 3-5% body weight loss: reduces liver fat significantly
- 7-10% body weight loss: reduces liver inflammation (MASH) and may improve fibrosis
- Greater than 10% weight loss: associated with fibrosis regression in many people

Gradual, sustained weight loss through diet and exercise is recommended. Rapid weight loss or crash dieting can temporarily worsen liver inflammation.

Diet

No single diet is prescribed for MASLD, but the following dietary approaches have the strongest evidence:[1,6]

- Reduce total calorie intake to achieve a gradual calorie deficit
- Follow a Mediterranean-style diet: rich in vegetables, legumes, whole grains, fish, olive oil, and nuts; low in red and processed meat and refined carbohydrates
- Reduce sugar and refined carbohydrates, particularly sugar-sweetened drinks, fruit juice, and foods containing added fructose
- Avoid alcohol or minimise it significantly; alcohol directly worsens liver inflammation and fibrosis in MASLD
- Avoid ultra-processed foods

A consultation with an Accredited Practising Dietitian is strongly recommended for personalised dietary advice.

Physical activity

Regular exercise improves liver health independently of weight loss, by reducing liver fat and improving insulin sensitivity. Recommendations include:[1,6]

- At least 150-300 minutes of moderate-intensity aerobic exercise per week (e.g. brisk walking, cycling, swimming)
- Resistance (strength) training at least 2 days per week
- Reducing total sedentary time

An Accredited Exercise Physiologist can design a safe and effective program, particularly if you have other medical conditions.

Managing metabolic conditions

Treating associated metabolic conditions is a critical part of MASLD management:[1,4]

- Type 2 diabetes: optimal blood glucose control reduces liver fat and fibrosis progression
- Hypertension: blood pressure management protects both the liver and cardiovascular system
- Dyslipidaemia: managing high triglycerides and LDL cholesterol reduces cardiovascular risk and may benefit the liver
- Obstructive sleep apnoea: treatment with CPAP has been shown to improve liver histology in MASLD

Medications and emerging therapies

At the time of writing, no medication has been specifically approved in Australia for the treatment of MASLD or MASH. However, several drug classes that are already available show benefit, and new therapies are rapidly emerging:[1,7,8,11]

DRUG / THERAPY	HOW IT HELPS MASLD	AVAILABILITY IN AUSTRALIA
GLP-1 receptor agonists (e.g. semaglutide, liraglutide, dulaglutide)	Reduce liver fat, promote weight loss, improve insulin resistance, and reduce liver inflammation. Strong clinical trial evidence for MASH benefit.	PBS listed for type 2 diabetes and obesity in eligible patients. Used off-label for MASLD in specialist practice.
SGLT-2 inhibitors (e.g. empagliflozin,	Reduce liver fat, body weight, and metabolic risk factors. Benefit demonstrated in clinical	PBS listed for type 2 diabetes and heart failure. Used in MASLD

DRUG / THERAPY	HOW IT HELPS MASLD	AVAILABILITY IN AUSTRALIA
dapagliflozin)	studies.	management when indicated for metabolic conditions.
Vitamin E (alpha-tocopherol)	Anti-oxidant that reduces liver inflammation in MASH. Modest benefit shown in clinical trials.	Available over the counter. Used in non-diabetic adults with biopsy-proven MASH. Discuss dose with your doctor before taking.
Resmetirom (thyroid hormone receptor beta agonist)	The first drug specifically approved for MASH with fibrosis; shown to reduce liver fat, inflammation, and fibrosis in Phase 3 trials.	Not yet PBS listed in Australia as of 2024; recently approved by the FDA. Likely to become available in Australia in coming years.

Bariatric (weight loss) surgery

In people with obesity who have not achieved sufficient weight loss through lifestyle measures, bariatric surgery (such as sleeve gastrectomy or gastric bypass) is highly effective for improving or resolving MASLD and MASH, and may even reverse fibrosis. Discuss eligibility with your specialist.[1]

CARDIOVASCULAR RISK

People with MASLD have a significantly increased risk of cardiovascular disease (heart attack and stroke), which is the leading cause of death in this group, ahead of liver-related death. Managing cardiovascular risk factors (blood pressure, cholesterol, blood glucose, weight, and smoking) is therefore just as important as managing the liver condition itself.[1,10]

LIVER CANCER SURVEILLANCE

People with MASLD-related cirrhosis are at increased risk of liver cancer (hepatocellular carcinoma) and should have a 6-monthly abdominal ultrasound and serum AFP (alpha-fetoprotein) blood test to detect any changes early. In some cases, liver cancer can also develop in people with MASLD and significant fibrosis who do not yet have cirrhosis.[1,9]

FOLLOW-UP

The frequency of follow-up depends on the severity of liver disease:

- Simple steatosis with no significant fibrosis: reassessment every 2-3 years, or earlier if metabolic conditions worsen
- Significant fibrosis (F2 or above): regular specialist follow-up, typically every 6-12 months
- Cirrhosis: 6-monthly liver cancer surveillance, regular gastroscopy to assess for varices, and close monitoring of liver function

RESOURCES AND SUPPORT

- **Australian Liver Association:** www.australianliver.com.au - Information on fatty liver disease and specialist referral across Australia
- **Liver Foundation Australia:** www.liver.org.au - Patient information and support for liver disease including MASLD
- **Diabetes Australia:** 1800 637 700 | www.diabetesaustralia.com.au - Resources on type 2 diabetes management, which is closely linked to MASLD
- **Heart Foundation Australia:** 13 11 12 | www.heartfoundation.org.au - Heart-healthy eating and cardiovascular risk resources

- **Dietitians Australia:** www.dietitiansaustralia.org.au - Find an Accredited Practising Dietitian for dietary management of MASLD
- **Exercise and Sports Science Australia (ESSA):** www.essa.org.au - Find an accredited exercise physiologist for a supervised exercise program

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