

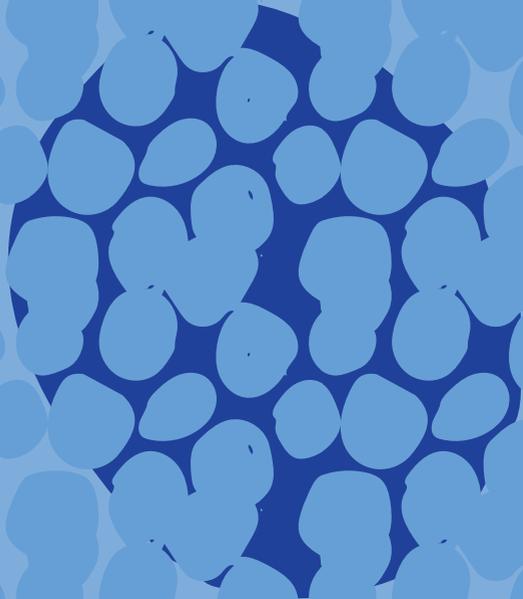


Leukaemia
Foundation

VISION TO CURE
MISSION TO CARE

AMYLOIDOSIS

A guide for patients and families



1800 620 420



leukaemia.org.au

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The Leukaemia Foundation values feedback from people affected by amyloidosis and the healthcare professionals working with them. If you would like to make suggestions, or tell us about your experience of using this booklet, please contact us at **info@leukaemia.org.au**.

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INTRODUCTION

This booklet has been written to help you and your family understand more about amyloidosis.

A diagnosis of amyloidosis may leave many of you feeling shocked, anxious, and confused. That is quite understandable as you will probably have never heard of amyloidosis before and you will find that most people you talk with have not heard of it either.

A great deal of information can be found on the internet but some of this may be confusing and difficult to understand, and much of it may not apply to your situation. It is hoped that this booklet will help you begin to understand your disease a little better.

Please remember the information in this booklet is written in very general terms. Your disease is unique to you. The treatment you will be offered will be decided only after your doctors make a definite diagnosis on the type of amyloidosis you have and fully assess your disease status. This booklet is written to supplement any information given to you by your doctors and the rest of your treatment team.

The first part of this booklet gives a very general overview of amyloidosis, including the symptoms, diagnosis and treatment. The sections following this discuss the main types of amyloidosis in more detail. Every section may not apply to you. It may be useful to look at the list of contents and read the sections you feel most useful at the time.

In some parts of the booklet we have provided additional information you may wish to read on selected topics. Some of you may require more information than is contained in this booklet, so we have included some internet addresses that you might find useful. In addition, many of you will receive written information from the doctors and nurses at your treating hospital.

It is not the intention of this booklet to recommend any particular form of treatment to you. You need to discuss your particular circumstances at all times with your treating doctor and team.

We hope you find this booklet useful in providing support and information. We would appreciate any feedback from you so we can continue to help you and your family in the future.

THE LEUKAEMIA FOUNDATION

The Leukaemia Foundation is the only national charity dedicated to helping those with leukaemia, lymphoma, myeloma, amyloidosis and related blood disorders survive and then live a better quality of life.

It exists only because of the generous and ongoing support of the Australian community.

Each year, the Leukaemia Foundation helps more than 750 families from regional and rural Australia by providing free accommodation in our capital cities so they can access life-saving treatment at major hospitals.

Our transport service helps thousands get to and from medical appointments, driving more than one million kilometres each year to ensure people get the medicines they need to beat their blood cancer.

The Leukaemia Foundation also provides counselling, comprehensive information, education and support programs and financial assistance to help the 60,000 Australians who are currently living with a blood cancer.

The Leukaemia Foundation also funds researchers who are working tirelessly to discover safer and more effective treatments that will save lives and help people lead a better quality of life.

Supporters ensure the Leukaemia Foundation can continue to give those impacted by blood cancer a strong voice, advocating for change and ensuring all Australians who need them have easy access to the very best blood cancer treatments.



Leukaemia Foundation staff are health professionals who provide people affected by amyloidosis and their families with information and support.

Support Services

The Leukaemia Foundation has a team of highly trained and caring support staff with qualifications and experience in nursing or allied health who work across the country.

We can offer individual support and care to you and your family when it is needed.

Support Services may include:

Information

The Leukaemia Foundation has a range of booklets, DVDs, fact sheets and other resources that are available free of charge. These can be ordered via the form at the back of this booklet or downloaded from **leukaemia.org.au**.

Education and support programs

The Leukaemia Foundation offers you and your family both amyloidosis-specific and general education and support programs throughout Australia. These programs are designed to empower you with information about various aspects of diagnosis and treatment and how to support your general health and wellbeing.

Emotional support

A diagnosis of amyloidosis can have a dramatic impact on a person's life. At times it can be difficult to cope with the emotional stress involved. The Leukaemia Foundation's support staff can provide you and your family with much needed support during this time.

Blood Buddies

This is a program for people newly diagnosed with amyloidosis to be introduced to a trained 'Buddy' who has been living with amyloidosis for at least two years, to share their experience, their learning, and to provide some support.

Telephone discussion forums

This service enables anyone throughout Australia who has or has been affected by amyloidosis to share their experiences, provide tips, and receive education and support in a relaxed forum. Each discussion is facilitated by a member of the Leukaemia Foundation support team who is a trained health professional.



Accommodation

Some people need to relocate for treatment and may need help with accommodation. The Leukaemia Foundation's staff can help you to find suitable accommodation close to your hospital or treatment centre. In many areas, the Leukaemia Foundation's fully furnished self-contained units and houses can provide a 'home away from home' for you and your family.

Transport

The Leukaemia Foundation also assists with transporting people to and from hospital for treatment. Courtesy cars and other services are available in many areas throughout the country.

Amyloidosis Network Group (private Facebook group)

This is a private group for people affected by amyloidosis to connect and share their personal experiences. You can join this closed group at **facebook.com/groups/AMYLFA**. This group is a great place to share experiences, information, and stay up-to-date on research news.

Practical assistance

The urgency and lengthy duration of medical treatment can affect everyday life for you and your family and there may be practical things the Leukaemia Foundation can do to help. In special circumstances, the Leukaemia Foundation provides financial support for patients who are experiencing financial difficulties or hardships as a result of their illness or its treatment. This assistance is assessed on an individual basis.

*Meeting other patients
at the Leukaemia Foundation's
support groups really helped me
to understand a little better.*



I was very grateful for the Leukaemia Foundation's support during and after my treatment.

Advocacy

The Leukaemia Foundation is a source of support for you as you navigate the health system. While we do not provide treatment recommendations, we can support you while you weigh up your options. We may also provide information on other options such as special drug access programs, and available clinical trials.

Contacting us

The Leukaemia Foundation provides free services and support across Australia. Every person's experience of living with amyloidosis is different. It's not always easy, but you don't have to do it alone.

Please call 1800 620 420 to speak to a support staff member or to find out more about the services the Leukaemia Foundation offers.

Alternatively, contact us via email by sending a message to

info@leukaemia.org.au or visit **leukaemia.org.au**.

WHAT IS AMYLOIDOSIS?

Amyloidosis is the general term given to a relatively rare group of disorders in which an abnormal protein known as amyloid is deposited in the tissues and organs of the body.

Amyloid is formed when certain proteins fold in an abnormal way to form fibrils, which have a unique chemical structure. These protein fibrils progressively deposit and accumulate in organs and tissues of the body, disrupting normal function. Without treatment this may lead to organ damage and eventually organ failure.

Amyloid (the word means 'starch-like') deposits are not readily recyclable or biodegradable and cannot be broken down easily. Therefore the body finds it difficult to remove these proteins and as a result they accumulate in tissues and organs. At this time it is not known what triggers the initial formation of the amyloid protein and why this happens in such a small proportion of the population.

Amyloidosis can be acquired (not a condition you are born with but something that develops over time) or hereditary (occurs due to a faulty gene and is passed down through the family). It can be localised (amyloid protein produced and deposited only in one small area of the body), or systemic (amyloid protein circulates in the blood and deposits in one or several organs of the body in no particular order).

Amyloidosis is not a cancer but is equally as serious. Over the past 10 years there has been a much greater understanding of these diseases. With earlier diagnosis, and great improvements in assessment and treatment regimens, many patients are now experiencing long remissions and living full lives.

Much research is being done around the world to develop new treatments for all types of amyloidosis.

What are the different types of amyloidosis?

Over 20 different types of amyloidosis have been identified at this time. Many of these are obscure and cause few problems. Each type of amyloidosis is different, requiring different treatments.

The abnormal amyloid protein occurs as a result of a number of different protein triggers. Each protein trigger (or precursor protein) has the ability to form the fibrillar structure called amyloid. Previously the amyloidoses were classified as either primary (occurring on their own) or secondary (occurring secondary to another underlying condition). Now amyloidosis is classified according to the main protein trigger that causes that particular type of amyloidosis. Each type is given an abbreviation where the first letter 'A' stands for amyloid and the subsequent initials stand for the amyloid protein.

For example, in AL amyloidosis the A stands for amyloid and L for the type of fibril protein, light chain.

This booklet details the types of amyloidosis listed below:

- » AL amyloidosis is a light chain amyloid caused by a bone marrow disorder.
- » AA amyloidosis occurs when the serum amyloid A (SAA) protein increases substantially in response to a long-term inflammatory disorder such as rheumatoid arthritis.
- » Hereditary amyloidosis occurs when a gene mutation is inherited, leading to the life-long production of an abnormal protein. The most common types of hereditary amyloidosis are ATTR (transthyretin gene mutation) and AFib (fibrinogen alpha chain gene mutation).
- » Localised amyloidosis occurs when the amyloid protein is produced and deposited in one part of the body only.
- » Wild-type transthyretin amyloidosis (previously known as senile amyloidosis) occurs when 'wild-type' transthyretin amyloid deposits in the heart and sometimes the carpal tunnel in the wrists. This is **not** an inherited disease.

Asking questions has helped me understand how amyloidosis affects me.

Organ involvement

Amyloidosis is usually a systemic disease meaning that any of the tissues and organs of the body may be affected by the amyloid protein. There is no set pattern in the way organs or tissues are affected but many patients will have more than one organ affected.

In a few cases amyloidosis may be localised, meaning the disease is confined to just one area of the body such as the airways, bladder or skin.

Major organs involved in the most common types of amyloidosis

Amyloid types	Nature of amyloid forming protein	Other names	Major organs involved
AL	Immunoglobulin light chain	Previously known as primary systemic amyloidosis; Myeloma-associated amyloidosis	Kidney Heart Nervous system Liver Gastrointestinal Soft tissues
AA	Amyloid A protein	Previously known as secondary amyloidosis	Kidney Liver
ATTRm	Mutated transthyretin	Familial amyloidotic polyneuropathy; Familial amyloidotic cardiomyopathy	Nervous system Heart
ATTRwt	'Wild-type' transthyretin	Senile amyloidosis	Heart Carpal tunnel
AFib	Mutated fibrinogen alpha chain		Kidney
ALECT2	LECT2		Kidney Liver

The way amyloid affects the organs is discussed in more detail in the section on AL amyloidosis on page 16.

WHAT ARE THE SYMPTOMS OF AMYLOIDOSIS?

Symptoms depend on which tissues and organs are affected and to what degree. Symptoms vary greatly from patient to patient and between the different types of amyloidosis.

Symptoms are often vague, mimicking other medical conditions. The most common symptoms are:

- » fatigue/tiredness
- » unexplained weight loss
- » swelling of the ankles and legs due to fluid accumulation (oedema).

Other symptoms vary depending on the organ or tissues most affected and may include:

- » shortness of breath (dyspnoea)
- » loss of appetite (anorexia)
- » enlarged tongue (macroglossia)
- » unexplained bruising around the eyes (raccoon eyes)
- » numbness or tingling in the hands and feet (peripheral neuropathy)
- » lumps in soft tissue.
- » dizziness or light-headedness
- » diarrhoea.

Due to the rarity of the disease and vagueness of symptoms, diagnosis may be difficult and delayed.

Who is at risk of developing amyloidosis?

Anyone can develop amyloidosis but certain factors increase the risk:

- » Being over 50 years of age
- » Males are at a slightly higher risk, especially for 'wild-type' transthyretin (TTR); and if they're over 50 with a history of carpal tunnel syndrome
- » About 15-20% of patients with MGUS (monoclonal gammopathy of undetermined significance) also develop AL amyloidosis
- » Patients with a long-term chronic infectious or inflammatory disease are at risk of developing AA amyloidosis
- » People who inherit a certain gene mutation may develop hereditary amyloidosis
- » Patients who require kidney dialysis for a long period of time may be at increased risk of dialysis-associated amyloidosis, although this is rare with modern dialysis techniques.

How common is amyloidosis?

The amyloidoses are a rare group of diseases, which means that accurate statistics are difficult to collect.

In Australia a diagnosis of amyloidosis is not required to be reported on a state or national register, so we have no accurate way of knowing how many people are diagnosed with the disease each year; nor do we know exactly how many people living in the community have the disease.

In the United Kingdom it has been estimated that the disorder affects one in every 1500 people.

HOW IS AMYLOIDOSIS DIAGNOSED?

Amyloidosis can be difficult to diagnose. There is no specific blood test and results of investigations vary greatly from patient to patient. The diagnosis of amyloidosis starts when a doctor becomes suspicious of the patient's symptoms. A definite diagnosis can only be made through a biopsy.

A biopsy involves taking a small piece of tissue from your body. This may be taken from the organ that is exhibiting the symptoms. Occasionally a biopsy from several organs may be required. Amyloid deposits are often present throughout the body and therefore a less invasive biopsy of abdominal fat tissue, rectum or lip may be performed.

This tissue biopsy is then sent to the laboratory for analysis where it is stained with a dye called congo red. If the amyloid protein is present, the biopsy will appear red under normal light and green (so-called apple green birefringence) under special polarised light, which confirms the diagnosis of amyloidosis.

*I had never heard of
this disease, my friends
hadn't either.*

Once a diagnosis of amyloidosis has been made, further tests are done in the laboratory to establish which type of amyloidosis you have. You may also be asked to undergo further tests to help clarify this. This is vitally important as treatment is very different for the various types of systemic amyloidosis.

Sometimes a DNA test is suggested to either diagnose or exclude one of the hereditary forms of amyloidosis.

When AL amyloidosis is suspected, a bone marrow biopsy may also be performed to establish the presence of abnormal plasma cells.

Further tests are then usually arranged to establish if and to what degree the heart, kidneys or other organs of the body have been affected by the amyloid.

These tests include blood and urine tests, electrocardiogram (ECG), echocardiogram (ECHO), and sometimes MRI, CT, and/or bone scans and nerve conduction tests. Not all of these tests will be necessary for every type of amyloidosis.

CAN AMYLOIDOSIS BE TREATED?

There is a range of treatments available for the amyloidoses with much research being carried out around the world to find new treatments.

Once a diagnosis has been made and the subtype of amyloidosis identified, the doctors caring for you will discuss their recommended treatment regimen with you.

Regardless of the type of amyloidosis you have, the goals of treatment are:

- » to stop or slow the production of the amyloid protein
- » to preserve and support affected organs and tissues
- » to improve your quality of life.



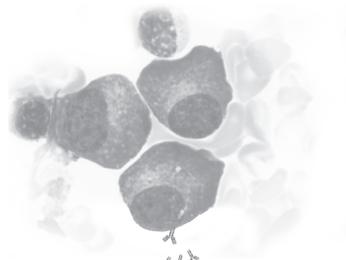
AL AMYLOIDOSIS

AL amyloidosis is the most commonly diagnosed form of amyloidosis in the Western world. It is usually seen in people over the age of 50 but can occur in younger people. It is not inherited or contagious.

AL amyloidosis is caused by an abnormal protein (the 'light chain' of the immunoglobulin or antibody protein) made by abnormal plasma cells found in the bone marrow. Plasma cells are a special type of white blood cells and are part of the body's immune system. They are responsible for making antibodies, also called immunoglobulins, which are proteins involved in the body's defence against infection. Normally once these proteins have served their purpose they are broken down and recycled in the body.

In AL amyloidosis a clone or single population of plasma cells grows and produces excess amounts of immunoglobulin light chain. These light chains build up in the bloodstream and are progressively deposited as amyloid fibres (fibrils) in the tissues and organs of the body. These amyloid fibrils cannot easily be broken down. They stop the organs functioning normally and can lead to organ failure and eventually death unless treated.

AL amyloidosis is a complex and individual disease and there is great variation in the way the amyloid protein is laid down in the individual's organs and tissues, leading to variation in the symptoms experienced. Often more than one organ is affected.



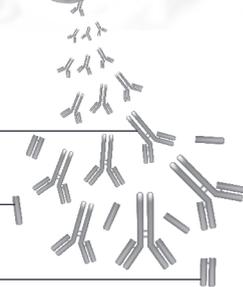
Plasma cells are a type of white blood cell that develop from mature B cells in the bone marrow.

Plasma cells in the bone marrow produce whole antibodies (immunoglobulins) and immunoglobulin free light chains (Kappa and Lambda type), which enter the blood stream and circulate around the body.

Antibody

Kappa Free Light Chain

Lambda Free Light Chain



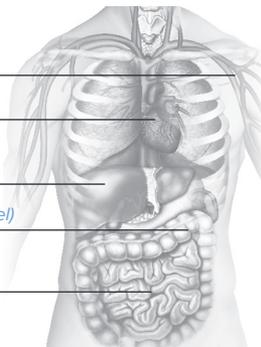
*Nerves
(throughout the body)*

Heart

Liver

Kidneys (behind bowel)

Bowel



The free light chains misfold into amyloid fibrils, which deposit and build up in the tissues and organs in the body.

Symptoms

The symptoms experienced by each individual depend on the organs affected. Non-specific symptoms can include weakness, tiredness, weight loss, lumps in soft tissue and poor appetite. Organ-specific involvement may cause swollen ankles (kidney or heart involvement), shortness of breath (heart involvement), diarrhoea (gut involvement) and tingling or numbness in the fingers and toes (nerve involvement).

What organs may be affected?

Any organ apart from the brain can be affected but the most commonly affected organs are the kidneys, heart, nerves and liver.

Kidney

The kidney is the organ most commonly involved in AL amyloidosis. It may be easier to think of the kidney as a sieve, which filters your blood. When your sieve/kidneys are working well, waste fluid can filter from your blood. This waste fluid becomes your urine. As the waste fluid passes through the

sieve/kidneys the sieve traps the normal products and keeps them in your bloodstream where they belong.

When the sieve/kidneys are affected by the amyloid protein the holes in the sieve are damaged and get bigger. As a result the normal 'good' blood proteins (the most common of which is albumin) leak through the holes. A simple urine test can show that excessive amounts of normal protein (albumin) is present in the urine. This excessive protein in the urine is called proteinuria and if severe is known as nephrotic syndrome.

There are a number of consequences of this loss of protein:

- » Protein in the blood is necessary for retaining fluid in the blood vessels. When this protein is lost, fluid leaks out of the blood vessels into tissues of the body. This fluid may build up to cause swelling (oedema). This is common in the feet and ankles.
- » If this process goes on over a long period of time the kidney function worsens and the patient may develop kidney failure and may require dialysis.
- » Blood cholesterol can rise to very high levels.

Heart

The second most commonly involved organ in AL amyloidosis is the heart. The amyloid deposits make the heart muscle stiff and unable to pump blood properly. Normally, after the heart beats and pumps blood out, it needs to relax and let more blood in. If the heart is too stiff to fill with blood appropriately in between beats, there will not be enough blood to be pumped out and fluid backtracks into the lungs, liver and legs. This may result in the loss of the heart-pumping function, causing:

- » lethargy and extreme tiredness
- » shortness of breath
- » swelling of the ankles and legs
- » chest pain, mimicking angina
- » feeling light-headed when standing due to low blood pressure.

This is different from normal heart failure where the heart muscle is weak. In the amyloid heart the heart muscle is stiff and therefore many drugs used for heart failure may not be effective for amyloidosis patients. Generally diuretics ('fluid tablets') are the most effective way of relieving symptoms.

Cardiac amyloidosis may also affect the way electrical signals move through the heart (conduction system). This can lead to arrhythmias (irregular heart beat) resulting in palpitations (a racing heart) and blackouts.

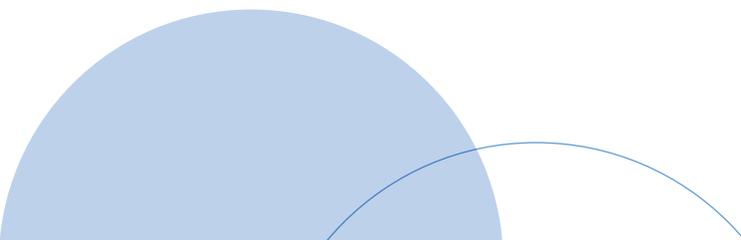
The degree of cardiac involvement will influence the type of treatment offered to the patient.

Nervous system

The nervous system includes the central nervous system and the peripheral nervous system. The brain and the spinal cord make up the central nervous system. The central nervous system can send and receive signals to and from the rest of the body via the nerves (known as the peripheral nervous system) to ensure the body works normally. AL amyloidosis affects the peripheral but not the central nervous system.

Peripheral neuropathy

Amyloid deposits can affect the nerves in the arms, hands, legs and feet. These peripheral nerves act like electrical wiring, carrying signals caused by touch, pain, heat and cold,





from the feet and hands to the brain. The nerves also convey signals to our muscles telling them when to contract and relax. When the amyloid protein affects the nerves it can cause a short circuit in this wiring, resulting in numbness, tingling, pain and loss of light touch and temperature perception. Weakness can also result. This is known as peripheral neuropathy.

In 20% of patients there is carpal tunnel syndrome, with wrist and hand pain and tingling. This is where the nerves are squashed by amyloid deposits in the wrist.

Autonomic neuropathy

Nerves that control heart rate, blood pressure, and movement of the gut that allows us to digest food may also be affected. These nerves are known as 'autonomic' nerves. 'Autonomic neuropathy' is when these nerves are affected by amyloidosis. Symptoms may include nausea, abdominal bloating or pain, diarrhoea, inability to absorb nutrients from food in the gut, weight loss, feeling full after eating only small amounts, impotence, and dizziness on standing.

Digestive system and gastrointestinal tract (gut)

Amyloid deposits may infiltrate the gastrointestinal tract (gut). The main role of the gut is to break down the food you eat into small components so that you can absorb the nutrients into your body. Amyloid infiltration can prevent the regular movement of the gut, which helps break down the food particles, and can make it very difficult for the nutrients to pass from your gut into your body. This can cause diarrhoea or constipation, weight loss, bleeding (which may appear as bright red blood or black bowel movements) and disruption to the normal working of the gut.

Amyloid proteins can also deposit in the tongue causing it to swell and become rubbery (macroglossia), resulting in problems with speech, eating, and sometimes breathing.

Liver and spleen

Amyloid deposits in the liver can result in an enlargement of the liver (hepatomegaly) and disruption of its normal functioning. This will be picked up in routine blood tests, which measure liver function. Sometimes liver involvement may be very severe, causing a yellow complexion (jaundice) and fullness in the abdomen, and lead to liver failure.

Infiltration of the spleen by amyloid can cause an enlarged spleen which can lead to discomfort and sometimes pain in the abdomen.

What tests will I need?

Once it has been fully established you have AL amyloidosis, further tests will be performed to:

- » establish which organs are affected and the severity of damage
- » detect any other medical problems that may affect treatment
- » determine a treatment plan.

Many of these tests will be repeated over time to monitor organ function and the effects of treatment. Some of these are listed in this section.

Blood tests

This involves taking blood from a vein to:

- » measure the serum (blood fluid) free light chains and serum protein electrophoresis. These tests measure the abnormal light chain protein that is causing the AL amyloidosis.
- » identify markers that indicate kidney, liver and heart function. Important heart tests include serum troponin and NT-pro BNP (brain natriuretic peptide).
- » assess levels of normal protein (albumin) in the blood

- » measure the blood's clotting function
- » measure the number of red and white blood cells and platelets:
 - A low red blood cell count indicates anaemia
 - A low white blood cell count increases the risk of infection
 - A low platelet count increases the risk of bleeding or bruising more easily.

Urine tests

Urine tests measure any free light chains in the urine (Bence Jones protein), as well as whether normal protein (albumin) is being lost into the urine. This will assess if the amyloid proteins are affecting the kidneys.

Bone marrow biopsy

A needle is inserted into a bone (usually the back of the pelvic bone) under a local anaesthetic and a sample of bone marrow is taken from the inside of the bone to establish the presence of abnormal plasma cells. A light sedative may also be given while this procedure is being done.

Bone scan

This is an x-ray where special molecules are injected into the body and highlight the parts of the bones that have increased activity, but in some types of amyloidosis it will highlight the involvement of the heart.

Echocardiogram

This is a scan using ultrasound technology to assess the structure and the function of the heart muscle and heart valves.

Electrocardiogram

This is a test used to measure the electrical activity in the heart.

CT scan

A CT scan is a computerised X-ray that looks at images of organs and tissues of the body.

MRI scan

This scan uses a powerful magnet to look at images of the organs and tissues of the body.



What are free light chains?

In AL amyloidosis the amyloid protein comes from the light chain of an antibody. An antibody is made of two 'heavy' chains and two 'light' chains (see diagram on the next page).

Antibodies are made by plasma cells in the bone marrow. Normally the body makes lots of different antibodies, which have different heavy chains and lots of different light chains. The plasma cells make light chains in excess of the amount needed to produce an antibody and those excess light chains circulate around in the blood as free light chains. There are two main types of light chains, kappa and lambda. Thus, everyone has small amounts of normal kappa and lambda free light chains in their blood.

In AL amyloidosis abnormal plasma cells proliferate and build up in the bone marrow. They make large amounts of a single type of free light chains, which have the ability to form amyloid deposits. Although more patients with AL amyloidosis appear to have lambda light chains, the type of light chains does not seem to alter prognosis.

What is the free light chain assay?

The free light chain assay (FLC) is a blood test used to detect monoclonal light chains in virtually all patients with AL amyloidosis. It recognises the kappa and lambda free light chains that cause AL amyloidosis but not the light chains that are bound to the heavy chains.

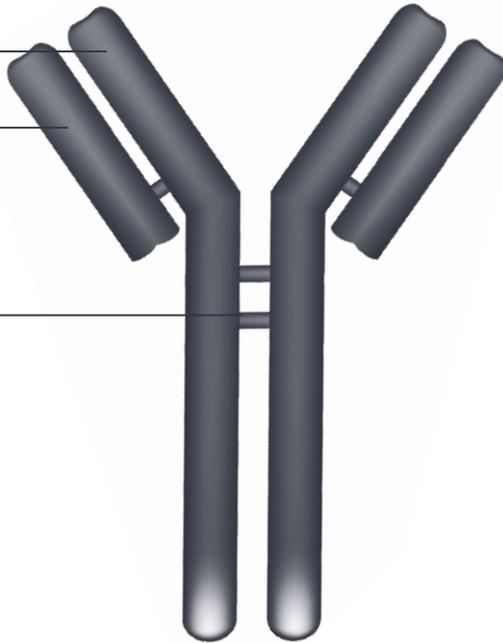
Reduction in the serum free light chains following treatment correlates with reduction in the production of amyloid throughout the body.

Free light chains

Heavy
Chains

Light
Chains

S-S Bonds



Diseases that can result from these plasma cells multiplying and becoming abnormal

Plasma cell proliferation	Does the free light chain form amyloid?	Potential resulting disease
Cancerous (malignant)	No	Myeloma
Cancerous	Yes	Myeloma + AL amyloidosis
Non-malignant	No	MGUS (monoclonal gammopathy of undetermined significance)
Non-malignant	Yes	AL amyloidosis

Why is the FLC assay so useful?

Introduction of the free light chain (FLC) test in the early 2000s was a landmark advance in the management of patients with AL amyloidosis. The assay is very useful in diagnosis as FLCs can be detected and measured in the blood in nearly all cases of AL amyloidosis. FLCs can also be used to monitor response to therapy and see if the treatment is working or not. When treatment is successful, the test shows improvement in the FLC level, allowing treatments to be changed if there is no response.

Organ improvement in AL amyloidosis can take many months to years, making it traditionally difficult to know if the treatment is working. Now, although there may not be immediate organ improvement, the drop in the FLC level can indicate the treatment is working before organ improvement is seen. Greater reductions in the FLC level predict a better chance of improvement in organs affected by amyloidosis as well as better long-term outcomes.

Every patient with amyloidosis is different. The measurement of the FLC assay at diagnosis does not always correlate with the extent of the disease and different patients need different amounts of reduction in their FLC assay result to reduce the amyloid deposit in their organs. What is important in treatment is to reduce the FLC in the individual patient.

As with all tests the FLC assay is not perfect

There may be blips in the FLC assay results from time to time and patients should not worry too much if suddenly one result is slightly higher than before. Similarly, the FLC assay result should not be used in isolation from the other more traditional tests and assessments of the affected organ function.

In spite of not being 100% accurate, the free light chain assay has certainly improved the diagnosis, assessment and treatment of patients with AL amyloidosis, and is an important part of the management of these patients.

How is AL amyloidosis treated?

Over the past 10 years an increasing range of therapies has been developed. Even though treatment for AL amyloidosis is still not thought to be curative, many patients are living long and active lives.

In deciding on the best treatment for you, your medical team will take into account a number of factors including your age, general health and the extent to which your organs have been affected by the disease. They will also consider potential complications of therapy.

Information gathered from hundreds of AL amyloid patients around the world helps to guide your doctor in recommending the best treatment for you. It must be remembered, however, that no two people are the same.

The aim of treatment is to rapidly reduce the free light chains that are causing the production of amyloid. Targeting the plasma cells within the bone marrow, which are producing the free light chains, achieves this. Once the production of the amyloid protein is slowed or stopped, the amyloid fibrils already deposited in the organs may slowly move out of the affected organs. The function of the affected organs may then slowly improve. Sometimes, however, the organs may be damaged to the point where the organ function does not improve greatly.

At this time there are no specific treatments that can directly clear amyloid deposits from organs and tissues of the body, but research is currently being carried out to find a treatment that will safely and efficiently do this.

Learn about your disease and become a partner with your medical team rather than a patient.

Treatments for AL amyloidosis:

- » Chemotherapy such as melphalan or cyclophosphamide.
- » Steroids such as dexamethasone and prednisolone.
- » Novel treatments, such as thalidomide, bortezomib (also known as Velcade), and lenalidomide (also known as Revlimid).
- » Autologous stem cell transplant in selected patients*.
- » Treatments to preserve and support the function of affected organs, which may be used in conjunction with the treatments listed above.

Some of these treatments are not funded in Australia by the Pharmaceutical Benefits Scheme (PBS). There may be some other funding sources for this medication, or you may have to fund the full price yourself. Speak to your doctor about all of your options.

These treatments have historically been borrowed from those proven to be beneficial in the treatment of the related disorder myeloma*.

**The Leukaemia Foundation has separate booklets called: 'Autologous stem cell transplants: A guide for patients and families', and 'Myeloma: A guide for patients and families'.*

Myeloma is also a disease of plasma cells, although the plasma cells in myeloma are cancerous (malignant). Treatments that kill these cancerous plasma cells in myeloma are also effective in killing the light chain producing plasma cells in AL amyloidosis.

Approximately 20% of patients with myeloma have or will develop AL amyloidosis. Less than 1% of patients with AL amyloidosis at diagnosis develop myeloma at a future time.

Other treatments may include:

- » organ transplantation
- » experimental treatments with drugs not yet available for general use through clinical trials
- » palliative care. Because of advanced organ damage some people may decide not to have any treatment through chemotherapy or novel drugs. These patients may receive palliative care where the emphasis is on reducing symptoms.

Amyloidosis is best treated by an experienced medical team, which may include a haematologist, cardiologist, gastroenterologist, neurologist, renal physician, and specialist nurses. Health professionals offering education and emotional and practical support are also important. Specialist amyloidosis clinics are available in Melbourne, Sydney and Brisbane, and travel assistance can be accessed for regional patients.

What is chemotherapy?

Chemotherapy literally means therapy with chemicals.

Although amyloidosis is not a cancer, chemotherapy drugs have been proven to work in the treatment of AL amyloidosis by destroying the light chain-producing plasma cells in the bone marrow.

Commonly used chemotherapy drugs in the treatment of AL amyloidosis include:

- » melphalan
- » cyclophosphamide.

Chemotherapy may involve the use of a single drug or combinations of drugs (combination chemotherapy) and other medications such as steroids and novel agents. These drugs are usually given in several cycles (or courses) with a rest period of a few weeks in between each cycle. This is to allow the body to recover from the side-effects of the drugs. The names of the different chemotherapy regimens are commonly derived from the first letters of each of the drugs given. Some examples of treatment combinations used to treat AL amyloidosis are listed on this page. Several of these combinations are not currently funded by the PBS, but may be funded, or partially funded by other methods. Speak to your treatment team for all of your options.

- » MDex: melphalan and dexamethasone
- » CVD: cyclophosphamide, Velcade (bortezomib) and dexamethasone
- » CTD: cyclophosphamide, thalidomide, and dexamethasone
- » RevDex: Revlimid (lenalidomide) and dexamethasone
- » VD: Velcade (bortezomib) and dexamethasone
- » MDT: melphalan, dexamethasone, and thalidomide.

Chemotherapy may be given in tablet form or by intravenous injection. Patients receiving oral treatment can usually take these drugs at home, visiting their doctor regularly for blood tests. Patients receiving chemotherapy into a vein may have their treatment administered in the haematology day-patient area or as an inpatient on a hospital ward.

Whatever the type of chemotherapy, it is important to appreciate that improvement in amyloid-related symptoms is often slow and may not be apparent for 12 to 18 months. In addition to chemotherapy, supportive measures can help to reduce symptoms, maintain general wellbeing, and assist the function of affected organs.

Chemotherapy side-effects

Although the treatment is targeted to destroy abnormal plasma cells, it will also affect other normal cells in the body that are dividing, especially in the bone marrow, lining of the mouth and gut, and hair follicles. These side-effects from treatment vary from one patient to another and vary depending on the drugs used. Most side-effects are short term and will usually settle when the treatment ceases.

Common side-effects some people may experience are:

- » infection. Patients with a low white cell count are more at risk of infection. During this time sensible precautions should be taken such as avoiding crowds and people with infections. You will be asked to report any rise in temperature to your doctor.
- » a lowered white cell count causing neutropenia, which carries a risk of increased infection
- » nausea, which is usually well controlled by medication
- » diarrhoea, which is usually controlled by medication
- » hair loss (temporary)

Infertility can be a concern. If so, you should speak with your doctor, preferably before treatment starts.

Your treatment team will talk with you about any treatment side-effects you may experience, but if you are experiencing anything out of the ordinary that has not been mentioned you should contact your local doctor or your treatment team.

It is important that you contact your doctor or the nursing team for advice immediately (at any time of the day or night) if you are feeling very unwell, or if you experience any of the following:

- » A temperature of 38C or over and/or an episode of uncontrolled shivering (also called a rigor)
- » Bleeding or bruising, for example blood in your urine or bowel motions, coughing up blood, bleeding gums or a persistent nose bleed
- » Nausea or vomiting that prevents you from eating or drinking or taking your normal medications
- » Diarrhoea, stomach cramps or severe constipation
- » Persistent coughing or shortness of breath
- » The presence of a new rash, reddening of the skin, itching
- » A persistent headache
- » A new severe pain or persistent unexplained soreness anywhere
- » If you cut or otherwise injure yourself
- » If you notice pain, swelling, redness or pus anywhere on your body.

Cortico-steroids

Cortico-steroids are hormones that are produced naturally by the body in the adrenal glands. They can also be made in the laboratory and they play an important role in treatment.

Manufactured cortico-steroids such as prednisolone, dexamethasone, and methylprednisolone are commonly used in combination with chemotherapy in the treatment of AL amyloidosis.

Side-effects experienced with cortico-steroids depend largely on how long they are used and the dose given. If they are used for a short time, you may notice that your appetite increases or you may feel more restless than usual. It is not uncommon for steroids to cause mood alterations with periods of feeling restless and hyperactive on the days you take steroids, followed by periods of fatigue, low mood, and aches and pains on the days immediately after you stop taking the steroids. Some people find it more difficult to get to sleep at night and sleeping tablets are sometimes recommended.

Cortico-steroids can cause a rise in the blood sugar. Diabetics may find they need more of their anti-diabetic medication while they are taking these drugs. Some people who are not normally diabetic may require treatment to keep their blood sugar at acceptable levels. It is important to keep a check on blood sugar and to keep a diary of the

levels and the amount of diabetic medication being taken. Diabetics will already know how to do this.

People whose blood sugar only goes up when they are on cortico-steroids will be given information on diet and taught how to measure their blood sugar and adjust their medication. Many of the side-effects of cortico-steroids are temporary and should pass once you finish taking them.

In patients with AL amyloidosis, cortico-steroid use may cause some other effects such as fluid retention (you may be asked to monitor your weight if this is an issue), worsening heart failure, and an increased susceptibility to infections. Aching joints such as the knees and hips have also been reported.

People taking steroids as part of their treatment may find that it heightens feelings of anxiety or depression. If you have ever had episodes of anxiety or depression, it is important to tell your treatment team before commencing steroid therapy and to ask your friends and family to monitor your moods.

People need to be encouraged to inform their doctor about any worrying side-effects they may be experiencing, including mood changes, so that help can be offered to minimise the impact of treatment. Keeping a diary to record when side-effects are experienced and noting the severity and patterns of symptoms can be useful.

Novel Agents

Bortezomib (also known as Velcade)

Bortezomib is a type of drug called a proteasome inhibitor. It causes the light chain-producing plasma cells in the bone marrow to die by altering their internal process, while leaving the normal healthy cell less affected.

Bortezomib is given by intravenous or subcutaneous injection. While patients do not need to be admitted for this treatment, it does require frequent visits to the hospital. The main side-effects of bortezomib are peripheral neuropathy, autonomic neuropathy, and low platelet count. It also lowers immunity to certain viruses especially herpes zoster, which increases the risk of shingles. Medications to prevent shingles are given with bortezomib.

Ixazomib

Ixazomib is also a proteasome inhibitor which works similar to bortezomib but is given in tablet form, once a week for three doses every four weeks. The main side-effects are developing a rash,

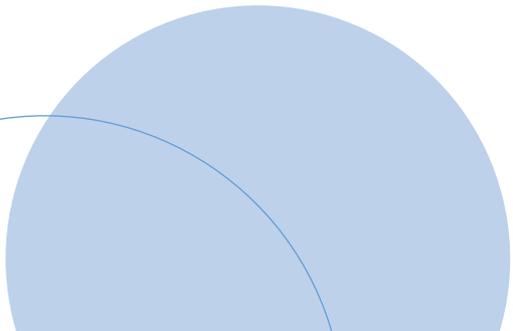
diarrhoea and a low platelet count. It also lowers immunity to certain viruses, especially herpes zoster. Medication to prevent shingles is given with ixazomib.

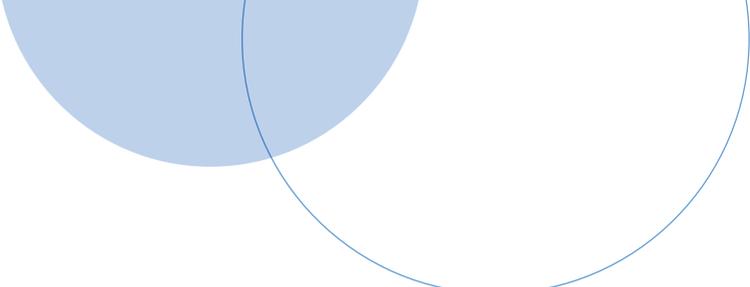
Thalidomide

Thalidomide is a drug that works in a number of ways to interfere with the growth and survival of the light chain-producing plasma cells in the bone marrow.

Thalidomide is taken daily in tablet form. It can cause side-effects including drowsiness, lack of concentration, dizziness, constipation, skin rash and in some cases, heart problems and nerve damage (peripheral neuropathy). Due to its sedative effects it is recommended that you take thalidomide in the evening. Regular laxatives and a high-fibre diet can help prevent the risk of constipation.

Nerve damage is usually felt as tingling and loss of sensation in the hands and feet. It is important you tell your doctor if you experience this as the dose of thalidomide may need to be reduced or stopped. Thalidomide can increase the risk of developing a clot in the





veins (thrombosis). Your doctor may prescribe a blood-thinning medication while you are taking this drug.

Thalidomide is harmful to babies developing in the womb and should never be taken by pregnant women. It is important to avoid becoming pregnant and to use a suitable form of contraception, if necessary, while taking thalidomide and for some time afterwards. There are special government regulations relating to the prescribing and dispensing of thalidomide by which you and your doctor have to abide. Your doctor will explain these regulations to you.

Lenalidomide (also known as Revlimid)

Lenalidomide is derived from thalidomide. It is given in tablet form for three weeks out of four and often in combination with dexamethasone and sometimes chemotherapy. Its main side-effects are the lowering of blood counts (causing neutropenia and risk of infection), an increased risk of blood clots, fatigue and diarrhoea. Therapy with a blood-thinning agent may be used to help reduce the risk.

Lenalidomide may be harmful to babies developing in the womb and should never be taken by pregnant women. It is important to avoid becoming pregnant and to use a suitable form of

contraception, if necessary, while taking lenalidomide, and for some time afterwards. There are special government regulations relating to the prescribing and dispensing of lenalidomide by which you and your doctor have to abide. Your doctor will explain this to you.

Pomalidomide (also known as Pomalyst)

Pomalidomide is also derived from thalidomide. It is given in tablet form for three weeks out of four and often in combination with dexamethasone and sometimes chemotherapy. Its main side-effect is the lowering of blood counts (causing neutropenia and risk of infection), an increased risk of blood clots and fatigue. Therapy with a blood-thinning agent may be used to help reduce the risk. Pomalidomide may be harmful to babies developing in the womb and should never be taken by pregnant women. It is important to avoid becoming pregnant and to use a suitable form of contraception, if necessary, while taking Pomalidomide, and for some time afterwards. There are special government regulations relating to the prescribing and dispensing of Pomalidomide by which you and your doctor have to abide. The doctor will explain this to you.

Autologous stem cell transplantation (ASCT)

(Also refer to the Leukaemia Foundation's booklet on Understanding Autologous Transplantation)

This treatment involves collecting stem cells from your bloodstream, storing them, and then giving them back to you after you have received high-dose chemotherapy. An ASCT enables a larger dose of chemotherapy to be administered than would normally be given during a usual cycle of treatment.

This procedure requires admission to hospital. A high dose of chemotherapy is given intravenously to destroy the bone marrow, including the light chain-producing plasma cells. This is followed by the infusion of your own previously collected stem cells to 'rescue' your bone marrow function. These stem cells will repopulate the bone marrow and restart the production

of blood cells. You will remain in hospital for approximately three to four weeks following this procedure. The benefits in reduction of amyloid protein and improvement of organ function after an autologous stem cell transplant can be slow to occur, often taking 12-18 months to become apparent.

An ASCT is an intensive procedure with a number of significant risks in patients with AL amyloidosis, so it is usually considered only for younger patients with good heart and kidney function. If your medical team feels the risk of you undertaking an ASCT may be too high at diagnosis they may still suggest that your stem cells are collected and stored in case a stem cell transplant becomes an appropriate treatment choice in the future.

*I would tell other people
diagnosed with amyloidosis to
never give up!*

Collecting/harvesting stem cells

You will receive a course of injections of a stem cell-stimulating drug (GCSF) several days before stem cell collection takes place. Most people can administer these subcutaneous injections at home.

Stem cells are collected or harvested from the blood by a process called apheresis once blood tests have shown that the patient has enough stem cells in the blood to collect. Your blood is taken from a vein in the arm or through a special catheter and passed continuously through a special apheresis machine for some hours. This machine separates and collects the stem cells and returns the remainder of the blood back to you. This procedure may take place in an outpatient or inpatient setting and sometimes in coronary care. You are monitored constantly throughout this procedure. The stem cells are frozen and can be preserved for a long period of time.

Organ transplantation

Slowing or stopping the production of amyloid may not be sufficient in itself to repair the damaged organ. When the damage is considered permanent an organ transplant may be considered. Kidney, heart and liver transplants are sometimes offered in some treatment centres. To stop the amyloid protein depositing in the new organ, chemotherapy or stem cell transplantation is essential, either before or after successful organ transplantation.

Supportive treatments

These treatments are an important part of your overall treatment plan. They are given to alleviate problems caused by the amyloid build-up in the various organs, and to improve quality of life.

For example:

- » Diuretics are often used to get rid of any build-up of fluid when the kidney or heart is affected
- » Salt may be restricted in the diet as high salt intake will encourage your body to retain excess fluid
- » Elastic stockings and elevating feet and legs when sitting may be suggested to reduce fluid build-up
- » Drugs may be given for low blood pressure, diarrhoea and nausea.

How will I know whether the treatment is working?

Your medical condition will be closely monitored throughout your treatment and after treatment has ceased. The aim of treatment is to reduce the production of the free light chains, which form the amyloid proteins. Tests will be performed to see whether there is evidence that this is being achieved. Treatment regimes may be changed or started at any time if the required results are not achieved or if you are experiencing severe side effects of the treatment. The medical team will regularly check any affected organs to see how they are coping with the treatment and whether their performance is improving.

A test called the free light chain assay, which indicates whether your light chain numbers are rising or falling, is used to help measure whether your treatment is working. See page 24 for more information on the free light chain assay.

What happens if treatment does not work?

It is very upsetting and disappointing to hear that the treatment you have been given is not achieving the hoped-for results. This may happen after a few months of treatment or after a period of remission when the AL amyloid is found to be active again.



Options at relapse - if the disease has come back

Don't despair because at this point your medical team will fully assess the situation and probably discuss a different type of treatment with you. There may be a different combination of drugs with one of the newer drugs such as Velcade (bortezomib) or Revlimid (lenalidomide). Sometimes an autologous stem cell transplant may be suggested. Clinical trials of new medications being studied may be available; ask your doctor if any would be suitable for you.

There are some patients where the disease may have progressed to a point where supportive care may be the best way of proceeding. The treatment team may introduce the palliative care team who specialises in symptom management without adversely impacting the treatment.

The thing I found the hardest was telling my partner and my friends and family.

AA AMYLOIDOSIS

AA amyloidosis, which used to be known as ‘reactive’ or ‘secondary’ amyloidosis, occurs in patients who have long-standing inflammatory disorders. These may include rheumatoid arthritis (children and adults), bronchiectasis, inflammatory bowel disease, chronic infections, and Familial Mediterranean Fever.

A small number of patients are unaware they have an underlying inflammatory disease. The number of people with AA amyloidosis seems to be declining in the Western world with better treatment and control of these inflammatory diseases.

How is the SAA (serum amyloid protein) produced?

The inflammatory disease causes changes in the blood chemistry. Healthy levels of the blood protein serum amyloid protein (SAA) can increase from normal levels to excessive levels and remain elevated as long as the inflammatory disease remains active. In a small number of patients, over time the SAA proteins begin to deposit as amyloidosis fibrils in various tissues and organs of the body. It is not known why this happens in some people and not in others.

Symptoms

The underlying disease often obscures symptoms experienced in AA amyloidosis. Symptoms and signs are non-specific but commonly include swelling of the ankles and legs and sometimes stomach problems such as nausea, vomiting and/or feeling bloated.

Organ involvement

The spleen, kidneys, and gastrointestinal tract appear to be the organs most affected by the SAA amyloid deposits. Deposits in the spleen may cause few symptoms although the spleen may be enlarged and rubbery. Damage in the kidneys from the SAA deposits may cause proteinuria and nephrotic syndrome.

Over time this can lead to kidney failure, requiring dialysis. Vascular involvement may be widespread but involvement of the heart and peripheral or autonomic nerves is rare.

For more information on how the amyloid affects the organs see page 17.

Diagnosis

AA amyloidosis can only be definitely proven through a tissue biopsy, usually of the kidney (refer to introductory section on 'diagnosing amyloidosis' on page 14).

Treatment

AA amyloidosis is managed by controlling the underlying inflammatory disease and therefore reducing the production of the amyloid protein SAA. If the SAA level can be reduced to almost normal and remains there for a long time, there is a chance that the existing amyloid will eventually regress, improving the organ function. New treatments that interfere with the process of amyloid deposition are also being studied in AA.

Prognosis

Once the underlying inflammatory disease has been controlled, the outlook for those with AA amyloidosis is often good, with patients surviving for many years. Patients may require dialysis and some require a kidney transplant to return to good health.



HEREDITARY AMYLOIDOSIS

Hereditary amyloidosis is less common than AL and AA amyloidosis. It is caused by the inheritance of an abnormal gene (mutation). This mutation or abnormal gene leads to the production of the abnormal protein. This mutated protein deposits in the organs and tissues of the body in the form of an amyloid fibril. Because the protein is not easily broken down it gradually builds up in the organs and tissues of the body, disrupting their function.

This mutant gene can be passed from one generation to another. Hereditary amyloidosis is known as an autosomal dominant disease, meaning that someone with the mutant gene may have inherited it from their father or mother and they in turn are capable of passing the gene to their children, who each have a 50% chance of inheriting it.

If you have not inherited the gene yourself you cannot pass it to your children. Even if you have inherited one of these mutations you may not develop any clinical problems. If you do develop symptoms this usually will not be until middle age.

Diagnosing hereditary amyloidosis

Amyloidosis can be diagnosed conclusively only through a tissue biopsy (refer to the section Diagnosing Amyloidosis on page 14). After a diagnosis of amyloidosis has been established further tests will be performed in the laboratory to establish the type of amyloidosis.

The genes associated with all known forms of hereditary amyloidosis can be analysed through DNA testing. This test can be performed from your blood sample in a specialised laboratory.

Healthy individuals who are at risk of having inherited a potentially amyloid-causing mutation may choose to undergo such DNA tests. However, this is not advised without discussing it with your physician. Genetic counselling is recommended before family members undergo genetic testing.

Types of hereditary amyloidosis

The two main types of hereditary amyloidosis are ATTR and AFib. The other types of hereditary systemic amyloidosis are uncommon and in these diseases nerve damage is not usually experienced. The liver and heart are sometimes affected but in general patients present with kidney disease and high blood pressure in middle age.

Possible organ damage

Organ damage in the different types of amyloidosis is summarised in the table below.

Type	Protein	Usual Clinical Features
ATTR	Transthyretin	Neuropathy, heart failure, diarrhoea
AFib	Fibrinogen	Hypertension, kidney failure
AApoAI	Apolipoprotein AI	Kidney failure
ALys	Lysozyme	Kidney failure, liver failure
AGel	Gelsolin	Corneal (eye) changes, occasionally heart and kidney disease
ACys	Cystatin C	Intra-cranial (brain) haemorrhage

Symptoms

Symptoms vary depending on the type of hereditary amyloidosis the patient has, however, many of the symptoms are similar to those experienced by patients with AL amyloidosis. It is therefore vital that the type of amyloidosis is diagnosed correctly before treatment starts.

Each family will have its own pattern of organ involvement with the various types of hereditary amyloid affecting individuals differently.

The progression of this group of diseases, which usually does not produce symptoms until middle age, is often very slow.

ATTRM

ATTRm is the most common form of hereditary amyloidosis. The ATTRm abbreviation consists of an A standing for amyloidosis and the other letters standing for the precursor protein transthyretin (TTR). The 'm' in ATTRm stands for mutation, or the inheritance of the abnormal gene, distinguishing it from amyloid due to the normal or 'wild-type' transthyretin, abbreviated to ATTRwt. ATTRm is also known as Familial Amyloidotic Polyneuropathy (FAP) and Familial Amyloid Cardiomyopathy.

ATTRm is due to mutations of the transthyretin protein, which is a protein that is made in the liver and circulates in the blood. In healthy people, normal so-called 'wild-type' transthyretin functions as a transporter of thyroid hormone and vitamin A (retinol) within the bloodstream, hence the name: 'trans-thy-retin'. People with mutations in the TTR gene produce abnormal, amyloidogenic, 'variant' TTR throughout their lives.

Organ involvement

ATTRm most commonly causes:

- » peripheral neuropathy (loss of feeling, pain or weakness in the limbs)
- » autonomic neuropathy (disturbances of bowel and bladder, impotence and dizziness on standing)
- » heart failure
- » amyloid deposits in the eyes, kidneys, adrenal glands and blood vessels.

Symptoms may appear as early as age 20, or as late as age 80. There is often little correlation between the underlying mutation and the symptoms. However, within families, the pattern is usually fairly consistent for age of onset, rate of disease progression and involvement of different body organs. In some families all affected members have just neuropathy, while in other families all affected members have both neuropathy and cardiac disease.

Treatment

As with AL and AA amyloidosis the main goals of your treatments will be to:

- » stop or slow the production of the abnormal amyloid-forming protein
- » support and preserve organ function
- » improve quality of life.

Liver transplantation may be considered to remove the source of the amyloid-forming TTR variant. However, transplantation can be limited by the presence of amyloid in the heart, especially in older patients. New drugs are being trialled at this time to stop or interfere with the abnormal protein folding that leads to formation of the amyloid protein.

Medications such as pregabalin, amitriptyline and duloxetine may be used to control pain associated with peripheral neuropathy. Elastic stockings and/or the medication midodrine may be suggested for dizziness on standing. Avoiding dehydration is important and medications to control the bowels may be needed.

Other forms of hereditary amyloidosis

AFib amyloidosis (Fibrinogen A alpha chain amyloidosis)

A number of mutations of a gene called the fibrinogen A alpha chain are known to cause amyloid. Patients usually present with kidney disease at age 50-60.

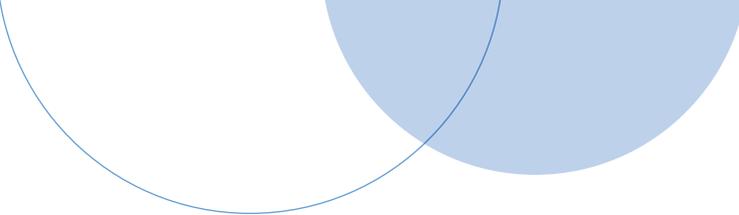
As the abnormal fibrinogen is produced solely in the liver, a liver transplant can prevent further amyloid deposition. A kidney transplant can also be used to replace the failed organ.

ApoA1 amyloidosis (Apolipoprotein A1)

Several mutations in the gene for apolipoprotein A1 cause amyloidosis. Half of the abnormal protein is produced in the liver. The kidneys are the main organs affected but the heart, liver, and other organs can be affected. Transplant to replace any of these organs may improve the situation.

ALys amyloidosis (Lysozyme amyloidosis)

This type of hereditary amyloidosis is very rare. There is no specific treatment except for liver and kidney transplants to replace the failing organs. Progression of this disease is usually extremely slow.



LOCALISED AL AMYLOIDOSIS

Amyloidosis is most often systemic, that is where the production of the amyloid-forming protein is distant to the amyloid deposits (for example, monoclonal light chain production in the bone marrow depositing as amyloid in the heart; or variant fibrinogen produced in the liver depositing as amyloid in the kidney). In localised amyloidosis, the amyloid-forming protein is both produced and deposited in one isolated part of the body.

Localised light chain amyloid deposits most commonly occur in the:

- » upper airways and lungs
- » eye, especially the conjunctiva
- » bladder
- » gastrointestinal tract
- » skin.

Occasionally localised amyloid can be seen in the skin comprised of insulin. These are around injection sites of insulin-dependent diabetics or of keratin in areas of scratching or trauma.

These deposits often appear like small tumours and may be cured through surgical excision. There is a risk of the amyloid recurring at the same site in the future, in which case local surgical measures or laser treatment is needed to treat the amyloid deposits.

Sometimes no treatment is required. Chemotherapy is not indicated in localised amyloidosis. This type of amyloidosis rarely becomes systemic but it is suggested that this disease is followed up by a clinical team from time to time.

WILD-TYPE TRANSTHYRETIN AMYLOIDOSIS (ATTRWT)

(also known as senile systemic amyloidosis)

This type of amyloidosis typically causes heart disease in older men, although about half of patients will have experienced carpal tunnel syndrome (tingling, numbness or pain in the fingers and hands) several years before the diagnosis. It is due to amyloid deposits made from the protein transthyretin, and is thus also called ATTR. In this case the protein is normal or 'wild-type' transthyretin, as opposed to a variant or mutated protein seen in the inherited form of ATTR (see page 40). Because this type of amyloid usually affects the heart in older men it is also called senile systemic amyloidosis or senile cardiac amyloidosis. The term 'senile' amyloidosis, often used in the past, refers to age and not to any loss of intellectual capacity.

ATTRwt is NOT a hereditary disease. It is not known how common this type of amyloidosis really is but it is almost certainly underdiagnosed at present.

This diagnosis may become more common in future as the population ages and diagnostic methods continue to improve.

Symptoms

Symptoms of ATTRwt amyloidosis result from amyloid deposits in the heart, making the heart wall stiff (constrictive cardiomyopathy). This leads to heart failure and heart rhythm problems. Typically, these changes happen slowly. Symptoms may include:

- » shortness of breath on exertion
- » leg swelling
- » fatigue
- » palpitations
- » dizziness or blackouts, which may occur with exercise or after eating
- » chest pain (angina).

Almost 50% of patients with ATTRwt amyloidosis experience carpal tunnel syndrome—which can feel like tingling and pain in the wrists, and pins and needles in the hands. Carpal tunnel syndrome often appears three to five years before the symptoms of heart disease.

Occasionally, amyloid deposits can be found incidentally in biopsies of other tissues of the body before any particular symptoms have developed.

In general, heart symptoms progress more slowly in patients with senile systemic amyloidosis and they have a better prognosis than patients with other types of cardiac amyloidosis.

Diagnosis

When doctors suspect ATTR amyloidosis, the following tests may be required:

- » tissue biopsy, usually of the heart
- » genetic testing to exclude the hereditary variants of ATTR
- » electrocardiography
- » echocardiography
- » MRI of the heart
- » bone scan (DPD or PYP scan): this is where special molecules (DPD or PYP) are injected into the body and highlight parts of the bones that have increased activity. These molecules get trapped in a heart full of transthyretin amyloidosis (TTR) so can help identify and diagnose TTR amyloid in the heart.

Treatment

The main goals of your treatment will be:

- » to stop or slow the production of the abnormal amyloid-forming protein
- » to support and preserve organ function
- » to improve quality of life.

There is some evidence that an anti-inflammatory called Diflunisal may help to slow the progress of disease. This medication is not without side-effects and your doctor will advise if this is suitable for you. Whilst taking diflunisal it is important to protect the lining of the stomach, to reduce the risk of stomach ulcers.

At this time there is no treatment to stop the production of the amyloid-forming transthyretin protein affecting the heart but research is underway. Medications to reduce the production of ATTR by the liver appear promising. New drugs are being trialled to stop or interfere with the abnormal transthyretin folding that leads to formation of the amyloid protein, or to disrupt the amyloid that is already deposited. Research is being conducted around the world to develop

drugs that will draw the amyloid protein out of the organs. These treatments are not yet available.

The mainstay of treatment is medication to control symptoms of heart failure and heart rhythm problems. Once a full diagnosis is made you will predominantly be cared for by a cardiologist who will do all they can to offer treatment to help your heart function as well as possible. You will be followed up regularly. There are certain medications used in general heart failure that are not applicable in patients with heart failure due to ATTRwt amyloidosis. Your cardiologist will talk with you about this and work closely with your general practitioner.

Some general points to note:

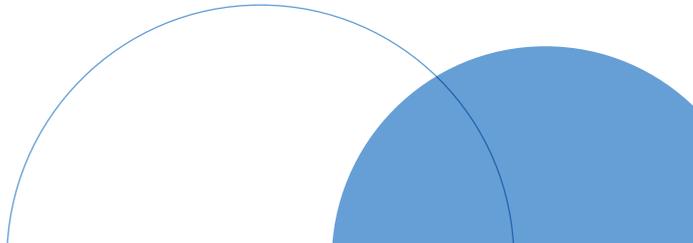
- » Avoid excess fluids. Your daily fluid intake will need to be kept steady and may need to be restricted as discussed with your cardiologist. Salt intake should be limited and keeping a diary of regular measurements of your weight (daily or weekly) helps pick up early fluid accumulation. Your doctor will often prescribe diuretics to

increase urine production and rid your body of excess fluid and salt. All these measures can help with breathlessness and swelling (oedema).

- » Certain blood pressure-lowering medications should be avoided if there is amyloid affecting the heart. The medications that are most commonly used in heart failure due to other causes may actually lead to a worsening of heart failure due to amyloidosis.

Under certain circumstances some other treatments may be helpful:

- » Medications such as midodrine may help to maintain blood pressure and allow higher diuretic doses
- » In some cases anticoagulation (thinning of the blood) may be recommended
- » Pacemakers may be recommended if there is a slow heart rate
- » Heart transplantation is rarely used as most patients are too elderly to undergo this procedure. It may, however, be considered in highly selected younger patients.



WHAT IS A CLINICAL TRIAL?

Clinical trials are research studies in which patients and researchers help find ways to improve health care. Each clinical trial sets out to answer specific questions about new therapies or new ways of using known treatments. Carefully conducted clinical trials are the fastest and safest way to find treatments that work.

A clinical trial is one of the final stages of long and careful research processes which usually begin with scientists first developing and testing new ideas in the laboratory. Before the clinical research stage is reached there has to be evidence of benefit to patients.

Clinical trials contribute to the knowledge and progress of treating disease. If a new treatment is proven effective in a trial it may become a new standard treatment for many patients.

What is a protocol?

All clinical trials are based on a set of rules called a protocol. A protocol sets out:

- » what types of people may participate in the trial
- » the schedule of tests, procedures, medications, dosages, and how the participant should be monitored
- » the length of the study.

This protocol will be fully discussed with the participating patient by their doctors.

While in a clinical trial, participants are seen regularly by the research staff to monitor their health and to determine the safety and effectiveness of their treatment.

Clinical trials proceed through four phases:

- » **Phase 1** trials determine the proper amount of a drug to be given to a patient (dosing) and major side-effects.
- » **Phase 2** trials gather data on a treatment's safety and benefits.
- » **Phase 3** trials test the treatment's effectiveness, monitor side-effects and compare the new product to an existing treatment to determine which is better.
- » **Phase 4** trials are conducted after a treatment has been approved by the Therapeutic Goods Administration in Australia. During this phase, researchers study the long-term risks, benefits and optimal use of the therapy.

Why participate in a trial?

Clinical trials ensure high levels of quality control within a clinical treatment unit as results are independently monitored and verified. Participating patients are more closely monitored and may need to visit hospital more frequently than a person undergoing standard treatment. However, it must be emphasised that a clinical trial may not always result in improved outcomes and may occasionally result in an unexpected less favourable outcome. Participation in clinical trials is the main way doctors learn how to better treat illness.

You can choose to leave a clinical trial at any time for any reason. You are not obliged to stay on a trial should you change your mind.

*Loving life and all it has to offer,
quirks and all, is what kept me going
and continues to keep me going.*

TAKING CARE OF YOURSELF

Coping with a diagnosis of amyloidosis can be very demanding physically and psychologically.

Many patients and carers experience feelings of depression, fear, anxiety, and sadness mixed with periods of optimism. These feelings and emotions are nothing to be ashamed of but it is important to tell your doctor if your depressive or anxious feelings last any length of time or are interfering with your life. There is help available and your doctor may refer you for counselling or offer some medication.

Anxiety, fear and exhaustion can change all relationships. Sexual relationships may seem unimportant as you try to cope with the disease and the treatment. Treatments themselves can reduce sexual desire and AL amyloidosis can cause impotence. It is usually helpful to discuss the way you feel with your partner and look for a level of closeness that suits you both.

Talking about your illness with family and friends can help you reduce anxiety.

It may also be helpful to talk with others who are undergoing treatment for amyloidosis. There are amyloidosis support groups in Australia or you may wish to join a chat line on the internet. The Leukaemia Foundation also facilitates support groups and information seminars. Learning about your disease is important so that the relationship with your multidisciplinary care team can be one of collaboration. There may be more than one option for treatment and being able to ask questions and discuss these options will help you to feel more in control of your life.

Looking after yourself is important. You may need to accept help and let friends and family take over some of your duties for a while.

It is important to eat well, continue with some exercise, and get the rest you need. Your care team is there to help you and you can ask to speak with a dietician, exercise therapist or physiotherapist. Talking with other patients about how they have coped with problems such as a lack of appetite and inability to sleep may help.

*It's very important
to stay strong and
positive mentally.*

HOW CAN I UNDERSTAND MY ILLNESS AND TREATMENT A LITTLE BETTER?

Coping with the shock of the diagnosis of a life-threatening disease such as amyloidosis can leave you and your family feeling numb, out of control, and unable to think properly. However good the doctors may be at talking about the disease and treatment, many patients say they have difficulty retaining any information they have been given, except perhaps how serious amyloidosis is.

If you or your family wishes to make informed decisions about treatment, you need to have the facts. Much of what is written about amyloidosis is written by doctors, for doctors, and can be difficult to understand. Many patients turn to the internet where much of the information will not apply to you. Some people will join chat lines or attend

support meetings. This may give a good general overview about amyloidosis, however everyone's disease is slightly different and after full assessment your doctor will suggest treatment designed specifically for you. People vary in how much they want to know and what they can understand. Some people want to know as much as possible about their disease from the beginning and will ask many questions. Other people would rather not know very much at first or are overwhelmed when they meet their doctor and are unable to ask questions.

In the course of the diagnosis and assessment of your disease you may see a number of specialists. They will try to be sensitive to your needs and give the information they perceive you want. It is often a good idea to take your partner or a friend to your appointments.

Some people like to tape the consultation. It is wise to ask the doctor whether he/she is happy with this. Always carry a pen and paper to make notes. Think about and write down your

questions before your doctor's appointment. The mind tends to go blank when we enter the doctor's consulting room. A diagnosis of amyloidosis means you will be quickly learning a new vocabulary.

Asking the questions that are relevant to you can help you understand these new terms and build a better understanding between you and your doctor.

In their publication 'AL amyloidosis—your essential guide', Myeloma UK suggests questions to help you understand your disease and treatment. We have included many of these questions below and added a few of our own. Obviously you may not want to ask all these questions at one time, and the relevant questions will change as you move through your treatment.

Example questions to ask your doctor and treatment team:

The disease

- » What is amyloidosis?
- » What type of amyloidosis do I have?
- » How serious is this disease?
- » How can I learn more about my disease, do you have any written material I can read?

- » Are there many other people you know with this disease?
- » Are there any support groups or people I could talk with?

Treatment program

To gain a complete idea about your treatment some or all of the following questions may be useful:

- » What exactly is the treatment?
- » What are the objectives of treatment?
- » Over what time period would it be given?
- » How will the treatment be given?
- » How often would I have to visit hospital?
- » Will I have to stay in hospital?
- » Will I be able to work or look after my children during treatment?
- » How do people usually feel during treatment?
- » How long would the treatment last?
- » How long would I take to get over it?
- » What will happen after the treatment is finished?
- » Why have you chosen this treatment for me?

- » Are there any costs attached to the drugs recommended for my treatment?
- » What happens if this treatment does not work?

Past experience

- » How many patients have you treated with this treatment regimen?
- » How much experience is there with this treatment in Australia and around the world?
- » What is the likelihood of achieving a complete or partial remission?
- » How long have other people remained in remission?
- » In the event of the disease coming back, would there be other treatments I could have?
- » What factors influence outcomes?
- » If I should develop any pain, nausea or other problems through the treatment would there be medicines to help me?
- » How will you know whether the treatment is working?

Side-effects

- » What side-effects do people usually get on the treatment you have suggested?
- » When would I begin to experience any side-effects?
- » Could any side-effects be life-threatening or cause pain and permanent damage?
- » Will I be offered treatment for any side-effects?

Alternatives

- » What are the alternatives to the treatment you are recommending?
- » What would be the good and bad things about the alternative treatment?
- » How affective might the alternative treatment be for me?



WHAT WILL WE TELL THE CHILDREN AND GRANDCHILDREN?

It would be normal for families facing a diagnosis of amyloidosis to be very upset. When there are young children or teens in the family there is the added concern of how the children will react and what they should be told.

Obviously the way this is handled will depend on the age of the child, the family relationships and the circumstances. However, adults often underestimate the way children can cope with the truth if it is given in a loving way in language they can understand.

Parents, who are often in shock themselves, may have concerns with their children seeing them upset, or burdening them with worries and fears. But the children themselves usually sense that something is wrong.

Often how they react to a worrying diagnosis will depend on how their parents and close adults handle the crisis. If they are not told anything they may fear that things are worse than they are, or that they are not wanted. Small children may even think they have caused the parent to be sick because they have misbehaved.

Children and many teenagers depend on adults for their nurturing and safety. They need to know that they are still very much part of the family and understand why their routine may change for a while. A few tears and hugs and some explanation given in a reassuring way can help them feel included without overly worrying them at first. This also means that the parents do not have to use energy hiding everything from their children. Every family will handle the way they deal with their children differently. Deciding how to handle this dilemma is far from easy for many families. Some may seek advice from their general practitioner or other health professionals, or one of the numerous websites available. Others will use family members for help.

USEFUL INFORMATION SOURCES

The Leukaemia Foundation

The Leukaemia Foundation produces a number of other booklets including:

- » Understanding myeloma
- » Understanding autologous transplants
- » Living with leukaemias, lymphomas, myeloma and other related disorders (such as AL amyloidosis)
- » Eating well.

In addition, regular newsletters provide information about amyloidosis for patients, carers, and medical practitioners. They also contain information about the services offered by the Leukaemia Foundation.

Copies of these publications can be downloaded from leukaemia.org.au or you can phone 1800 620 420.

Australian Amyloidosis Network

Three amyloidosis services in Australia have collaborated to form the Australian Amyloidosis Network which is dedicated to the diagnosis, treatment, education and care of people with all forms of amyloidosis. To visit one of these amyloidosis centres you need a referral letter from your GP or specialist.

Victorian and Tasmanian Amyloidosis Service, Melbourne

simon.gibbs@monash.edu
Box Hill Hospital, 1300 342 255

Westmead Amyloidosis Clinic, Sydney

linda.mekhael@health.nsw.gov.au
02 9845 8738

Princess Alexandra Hospital Amyloidosis Centre, Brisbane

amyloidosis@health.qld.gov.au
07 3176 5772

Myeloma UK

myeloma.org.uk/amyloidosis

Myeloma UK has a number of booklets or articles available, including:

- » Living with AL amyloidosis—your essential guide
- » AL amyloidosis—an introduction
- » AL amyloidosis—your essential guide
- » High dose chemotherapy and stem cell transplantation
- » Mel/dex
- » Revlimid
- » CTD
- » Understanding Myeloma
- » Understanding Revlimid
- » Understanding Thalidomide Therapy
- » Understanding Dexamethazone and other steroids.

Links to other Australian and overseas amyloidosis organisations

The Amyloidosis Foundation (USA)

amyloidosisresearchfoundation.org

Boston University Amyloidosis Centre (USA)

bu.edu/amyloid/

Myeloma Foundation of Australia Inc

myeloma.org.au

Mayo Clinic Amyloidosis Centre (US)

mayoclinic.org/amyloidosis

National Amyloidosis Centre (London)

ucl.ac.uk/amyloidosis/nac

Other helpful organisations

Amyloidosis Australia

amyloidosis.com.au

Australian Centre for Grief and Bereavement

grief.org.au

Amyloidosis Support Groups (US)

amyloidosissupport.com

Beyondblue

beyondblue.org.au

Cancer Council Australia

cancer.org.au

Centrelink

centrelink.gov.au

Kidney Health Australia

kidney.org.au

Look Good Feel Better

lgfb.org.au

Palliative Care Australia

pallcare.org.au

The Heart Foundation

heartfoundation.org.au

GLOSSARY OF TERMS

Adrenal glands

A pair of small glands, which sit on top of the kidneys. These glands produce hormones that help control the heart rate and blood pressure; the way the body uses food; and other vital functions. They also secrete steroid (cortisone-related) hormones and mineralocorticoids that regulate the levels of minerals such as sodium and potassium in the blood.

Albumin

A simple water-soluble protein found in many animal tissues and liquids. Albumin helps to keep fluid in the bloodstream. People with low albumin often have fluid build-up in the tissues, especially in the hands and feet.

Allogeneic transplant

A procedure in which stem cells are collected from a compatible donor, often a sibling, stored and given to the patient following high-dose chemotherapy. The risks associated with this procedure increase with age and so it may not be suitable for older patients and is usually not used in amyloidosis patients.

Amyloid

An abnormal, insoluble protein, which deposits in organs and tissues of the body.

Amyloidosis

A general term for a group of diseases in which an abnormal protein called amyloid is produced and distributed in organs and tissues of the body.

Antibodies

Proteins found in the blood and produced by specialised white blood cells (plasma cells) to fight infection and disease.

Apheresis

A procedure in which a machine separates and collects stem cells from the patient's blood, returning the remainder of the blood components to the patient.

Apolipoprotein A1

APOA-I is instrumental in promoting the transfer of cholesterol into the liver where it is metabolised and then excreted via the intestine.

Arrhythmias

A disturbance of rhythm in the heartbeat.

Autologous transplant

A procedure whereby stem cells are collected from the patient, stored, and returned to the patient following high-dose chemotherapy. As these stem cells do not create any problems with tissue matching, this procedure can be successfully used in older patients. Age will be a consideration in AL amyloidosis patients.

Autonomic neuropathy

Symptoms that occur when there is damage to nerves that regulate body organs.

Autosomal

Pertaining to a chromosome that is not a sex chromosome. People normally have 22 pairs of autosomes (44 autosomes) in each cell together with two sex chromosomes (XY in the male and XX in the female).

Bence Jones Protein

Free light chains filtered from the blood by the kidney and found in the urine.

Biodegradable

A substance or object able to be broken down by a biological agent.

Biopsy

The removal of a sample of tissue from a living body for diagnostic purposes.

Birefringence

The splitting of a light ray, generally by a crystal, into two components that travel at different velocities and are polarised at right angles to each other.

Blood count (also called a complete blood count or CBC)

This is one of the most commonly ordered clinical laboratory tests. It is a basic evaluation of the cells (red blood cells, white blood cells, and platelets) suspended in the liquid part of the blood (plasma). It involves determining the numbers, concentrations, and conditions of the different types of blood cells.

Blood pressure

Blood pressure is the pressure of the blood within the arteries determined by the contraction of the heart muscle and the properties of the arteries. Two numbers record the measurement. The first (systolic pressure) is highest and is measured after the heart contracts. The second (diastolic pressure) is lowest, measured when the heart relaxes. Blood pressure varies between individuals and during many normal (exercise) and abnormal (disease of the arteries) situations.

Blood proteins

Also called serum proteins, they are proteins found in the blood plasma.

Bone marrow

The red area inside your bones where the platelets and red and white blood cells are produced.

Bone marrow biopsy

A needle is inserted into a bone (usually the back of the pelvic bone) under a local anaesthetic and a sample of bone marrow is taken from the inside of the bone to establish the presence of abnormal plasma cells. A light sedative may also be given to the patient while this procedure is being done.

Bronchiectasis

A disease that causes localised, irreversible dilation of part of the bronchial tree (branches of the windpipe in the lungs).

Cancer

A disease characterised by uncontrolled growth, division, accumulation and invasion of genetically damaged cells into other tissues. It causes problems in the body because its cells acquire abnormal functions or lose the ability to perform normal functions.

Cardiologist

A doctor who specialises in treating heart disorders.

Cell

The smallest unit of life, which makes up the tissues and organs of our bodies. Cells can be seen with a microscope and can be grown in culture in a laboratory.

Chemotherapy

Treatment with drugs intended to kill dividing cells, particularly cancer and cancer-like cells.

Cholesterol

A fatty substance that occurs naturally in the body and which is necessary for hormone production, cell metabolism, and other vital processes.

Complementary therapies

A wide range of therapeutic disciplines used alongside conventional medicine.

Complete remission (CR)

The disappearance of all detectable signs of amyloidosis.

Congo red dye

Congo red dye shows a fluorescent activity when bound to amyloid fibrils. It is used as a sensitive diagnosis tool for amyloidosis. Amyloid is stained a light orange-red with Congo red and exhibits apple green birefringence under polarised light.

Contagious

Can be spread from one person to another.

Creatinine

A chemical waste molecule that is generated from muscle metabolism. The kidneys filter out most of the creatinine and dispose of it in the urine. A high level of creatinine in the blood may indicate poor kidney function.

CT Scan (computerised tomography)

A scan that shows three-dimensional images of organs and the structures of the body.

Diabetic

A condition in which a person has a high blood sugar (glucose) level as a result of the body either not producing enough insulin, or because their cells do not properly respond to the insulin that is produced.

Diarrhoea

The frequent passing of watery faeces.

Diuretics

A substance or drug designed to increase the production of urine by increasing the loss of salt and water from the body. Diuretics may be used during chemotherapy to assist the excretion of chemotherapy drugs.

DNA testing

A simple blood test where the genes are analysed to determine if a mutation is present.

Echocardiogram

A scan using ultrasound technology to assess the structure and the function of the heart muscle and heart valves. It can also measure the fraction of blood pumped out of your heart with each heartbeat.

Ejection fraction

The fraction of blood inside the heart (given in %) pumped out each time the heart beats.

Enzyme

A protein that speeds up chemical reactions in the body.

Fatigue

A feeling of extreme tiredness, lethargy and exhaustion, which may be caused by the disease and or the treatments. It can be made worse by poor nutrition, anaemia, pain, stress and some treatments. Fatigue is common in amyloidosis.

Fibril

A fibril is the abnormal protein fibres which form amyloid deposits.

Free light chain

Part of an antibody (immunoglobulin) that circulates freely in the bloodstream.

Gastroenterologist

A doctor who specialises in diseases of the gastrointestinal tract (gut).

Gastrointestinal tract

The digestive tract, which includes the oesophagus, stomach, small and large intestines and rectum.

Gene

Genes are collections of DNA on a chromosome, which direct the activities of cells. They are responsible for the inherited characteristics that distinguish one individual from another.

Gene mutation

A change in the DNA of a gene which may be caused by exposure to a hazardous substance or a mistake during cell division. Mutations can affect normal cell functions leading to disease development. This happens through loss of a function or the development of abnormal functions in the cell.

Haematologist

A doctor who specialises in the diagnosis, treatment, and prevention of diseases of the blood and bone marrow.

Hickman's catheter

A type of central venous catheter used for the long-term administration of substances into the veins. It may also be used to draw blood for blood tests.

Hormone

The secretion of a gland that is transported by the blood to target cells. The hormone will stimulate the target to perform a specific action.

Immune system

Cells responsible for defending an organism against infections.

Immunoglobulins

Also known as antibodies. They are proteins found in the blood, which are produced by plasma cells (specialised white cells) to fight infections.

Immunomodulatory drugs

Drugs that suppress the immune system.

Intravenous injection

An injection into a vein.

Light chains

There are two main types of light chains: Kappa and Lambda. Light chains help form antibodies.

Lysozyme

An enzyme present in saliva, tears, egg white, and many animal fluids, functioning as an antibacterial agent.

MRI Scan (magnetic resonance imaging)

A scan which uses a powerful magnet to image the organs and tissues of the body.

Myeloma

A cancer of the bone marrow where plasma cells become malignant. Healthy plasma cells produce antibodies, which help to protect us from infections.

Nephrotic syndrome

Damage to the kidney resulting in the loss of a normal blood protein known as albumin into the urine. This causes water to leak out of the blood vessels into the tissues causing swelling (oedema). This occurs particularly in the hands and feet.

Nerve conduction test

An electrical test used to detect nerve conditions.

Neurologist

A doctor who specialises in the diagnosis and treatment of disorders of the nervous system.

Neutropenia

An abnormally low number of white blood cells (neutrophils). It may be caused by high-dose chemotherapy and carries risk of increased infection.

Oedema

Swelling in the tissues due to fluid retention.

Oncologist

A doctor who specialises in the diagnosis and treatment of cancer and the use of chemotherapy and other drugs to treat cancer.

Palliative care

Care that concentrates on disease symptoms with the goal of preventing and relieving suffering and improving quality of life. Palliative care aims to complement any ongoing treatment for disease.

Paraprotein

Abnormal accumulation of antibody protein (immunoglobulin produced by mature B cells, usually plasma cells).

Peripheral neuropathy

Damage in the peripheral nerves, particularly in the hands and feet, causing pain, tingling, and loss of sensation. Peripheral neuropathy may also be caused by some of the treatments used in amyloidosis.

PICC line

Peripherally inserted tube used for infusion of medicine, usually chemotherapy.

Plasma cells

Specialised white blood cells that produce antibodies (immunoglobulins) to fight infection. Derives from B-cells.

Platelets

Small blood cell fragments that are involved in blood clotting.

Precursor

A substance from which another substance is formed.

Prognosis

The likely course of the disease.

Proteasome inhibitor

A drug that interferes with the normal functioning of the part of the cell called the proteasome, causing abnormal cells to die while leaving normal cells less affected.

Proteins

A molecule made up of amino acids that are needed for the body to function properly. Proteins are the basis of body structures such as skin and hair and of substances such as enzymes and antibodies.

Proteinuria

The presence of excessive protein in the urine.

Red blood cells

Blood cells that contain the red pigment and transport oxygen around the body. This oxygen is required to make the body's energy.

Relapse

A term used when amyloidosis has responded to previous treatment but there are signs that the disease is active again.

Renal dialysis

The process of filtering the blood, the way kidneys normally do, using a machine.

Renal failure

A term used when the kidneys are losing the ability to cleanse blood.

SAP scan

This scan is available only at the National Amyloidosis Centre in London. Serum amyloid P component (SAP) is a normal protein found in the blood that binds to amyloid deposits in proportion to the amount of amyloid present. A small amount of SAP is tagged with a radioactive iodine tracer and is injected intravenously. The tagged SAP then binds to amyloid deposited within the organs of the body. A gamma camera scan is then performed 6 to 24 hours later to image these deposits and show the amount and distribution of amyloid within the body. The scanner is an open device on which patients lie fully clothed for about 40 minutes. It is not necessary to avoid food, drinks or medications before the scan. Unfortunately, hollow or moving organs such as the gastrointestinal tract and heart cannot be assessed reliably by the SAP scan.

Stem cells

The most primitive cells in the bone marrow from which all blood cells develop.

Stem cell transplant

Stem cell transplant or bone marrow transplant is a procedure in which high-dose chemotherapy is used to destroy bone marrow cells. Stem cells previously collected from the patient or donor are infused to restore healthy bone marrow.

Systemic

Meaning any of the tissues and organs of the body, except the brain, may be affected by the amyloid protein.

Transthyretin

A protein component of blood serum that functions especially in the transport of thyroxine. Also called prealbumin.

Uraemia

Accumulation in the blood of nitrogenous waste products (urea) that are usually excreted in the urine.

Virus

A minute infective particle smaller than a bacteria, which cannot grow or reproduce outside a living cell. Sometimes they behave like a 'wild gene' and become part of the genes in our cells.

White blood cells

Blood cells (leucocytes) formed in the bone marrow and involved in the body's immune system. They consist of several different cell types.



MAKING A DONATION

The Leukaemia Foundation is the only national charity dedicated to helping those with leukaemia, lymphoma, myeloma and related blood disorders survive and then live a better quality of life. It exists only because of the generous and ongoing support of the Australian community.

How can I give?



ONLINE leukaemia.org.au



PHONE 1800 620 420



POST (complete this form or enclose cheque/money order and return)
The Leukaemia Foundation, Reply Paid 9954 in your capital city

Name

Address

Postcode

Phone

Mobile

Email

I enclose my gift of (please tick box)

\$30 \$50 \$75 \$100 \$250 Other \$

My cheque/money order made payable to the Leukaemia Foundation is enclosed.

I wish to pay with my credit card and my details are included below:

Visa MasterCard Diners Amex

Card Number

Expiry Date

MM

YY

Cardholder's Name

Signature

Your privacy is important to us. That is why we treat your personal information with confidence. To learn more about how and why we collect and use any personal or sensitive information about you, please view our Notification Statement at www.leukaemia.org.au/privacy



PLEASE SEND ME A COPY OF THE FOLLOWING BOOKLETS:

- Leukaemia, Lymphoma, Myeloma, MDS, MPN and related blood disorders
- Acute Lymphoblastic Leukaemia in Adults (ALL)
- Acute Lymphoblastic Leukaemia in Children (ALL)
- Acute Myeloid Leukaemia (AML)
- Amyloidosis
- Chronic Lymphocytic Leukaemia (CLL)
- Chronic Myeloid Leukaemia (CML)
- Hodgkin Lymphoma
- Non-Hodgkin Lymphoma (NHL)
- Myelodysplastic Syndrome (MDS)
- Myeloma
- Myeloproliferative Neoplasms (MPN)
- Eating Well
- Living with Leukaemia, Lymphoma, Myeloma, MDS, MPN and related blood disorders
- Allogeneic Stem Cell Transplants (also called Bone Marrow Transplants)

- Autologous Stem Cell Transplants
- Young Adults with a Blood Cancer
- My Haematology Diary

Books for children:

- Tom has Lymphoma
- Joe has Leukaemia
- Ben's Stem Cell Transplant
- Jess' Stem Cell Donation

Or information about:

- The Leukaemia Foundation's Support Services
- Giving at work
- Monthly giving program
- National fundraising campaigns
- Volunteering
- Receiving our newsletters
- Leaving a gift in my will

Name

Address

Postcode

Phone Mobile

Email

- POST TO** The Leukaemia Foundation, Reply Paid 9954 in your capital city
- PHONE** 1800 620 420 **EMAIL** info@leukaemia.org.au
- FURTHER INFORMATION ONLINE** leukaemia.org.au

This information booklet is produced by the Leukaemia Foundation and is one in a series on leukaemia, lymphoma, myeloma, MDS, MPN and related blood disorders.

Copies of this booklet can be obtained from the Leukaemia Foundation by contacting us.

The Leukaemia Foundation is a not-for-profit organisation that depends on donations and support from the community. Please support the Leukaemia Foundation today.

July 2017

CONTACT US



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leukaemia.org.au



**Leukaemia
Foundation**

VISION TO CURE
MISSION TO CARE