

# Serum Free Light Chain Assay

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**This Infosheet explains what light chains are, what the Serum Free Light Chain Assay is, and why it is used in AL amyloidosis.**

In AL amyloidosis, abnormal plasma cells in the bone marrow produce proteins called light chains which are released into the bloodstream and go on to form amyloid deposits in the tissues and organs.

## What is the Serum Free Light Chain Assay?

The Serum Free Light Chain Assay (SFLCA) is a blood test that measures the levels of

light chains and can be used to determine AL amyloidosis activity and response to treatment.

## What are light chains?

Light chains are part of immunoglobulins (also called antibodies). Immunoglobulins (shortened to the letters Ig) are produced by plasma cells in the bone marrow and are a normal part of the body's immune system.

There are several different types of immunoglobulin with each playing a specialised role in fighting infection. Each immunoglobulin molecule is made up of four components: two 'heavy chains' and two 'light chains' (see Figure 1 below).

There are five different types of heavy chain and these are known as G, A, M, D and E. An immunoglobulin molecule will always have two identical heavy chains and so can be identified as IgG, IgA, IgM, IgD or IgE.

There are two different types of light chains and these are known as kappa ( $\kappa$ ) chains and lambda ( $\lambda$ ) chains. Each immunoglobulin

molecule will have two identical light chains, either kappa or lambda.

Therefore immunoglobulin molecules are named depending on their make-up. For example IgG kappa or IgG lambda and so on.

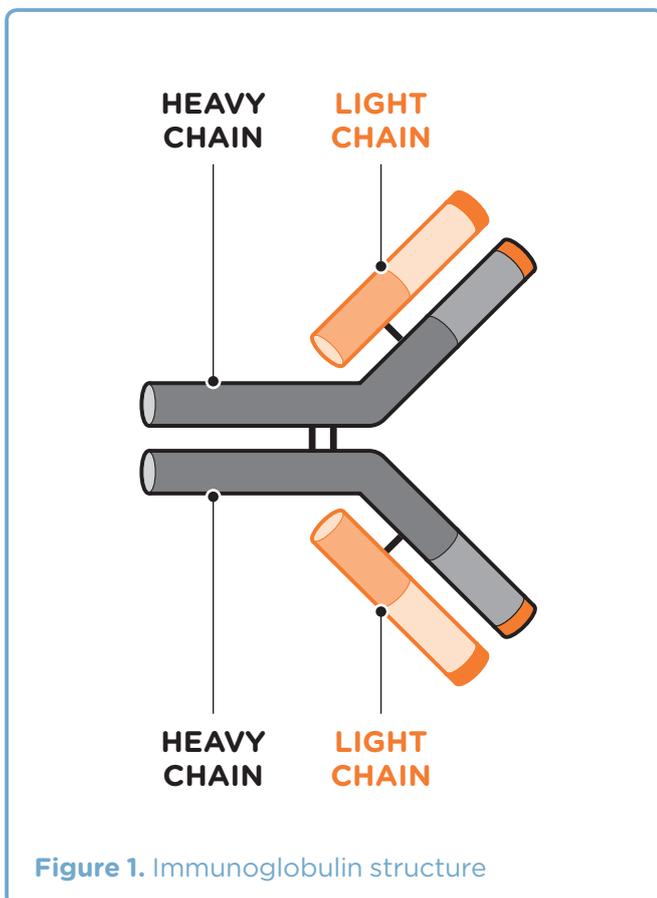
### What are free light chains?

When plasma cells produce immunoglobulin molecules, they initially produce the heavy and light chain components separately which then assemble together before being released into the bloodstream.

Once light chains are attached to heavy chains, they are referred to as 'bound light chains'. However, light chains do not always attach to heavy chains and they are referred to as 'free light chains'.

Plasma cells usually make slightly more light chains than heavy chains. This means there are usually some left over light chains that are secreted in the blood (serum) without being bound to a heavy chain. These are known as 'serum free light chains'.

Normally, there are only very low levels of free light chains in the blood. However, in AL amyloidosis the abnormal plasma cells make far too many light chains. These light chains are released into the



blood as free light chains. They also have an abnormal structure which leads to the formation of amyloid deposits in the tissues and organs.

Serum free light chains can be detected and measured in over 95% of AL amyloidosis patients.

The type of AL amyloidosis you have is denoted by the type of light chain your abnormal plasma cells produce - either kappa or lambda AL amyloidosis. Lambda AL amyloidosis is more common than kappa AL amyloidosis.

### **Why is the SFLCA used?**

The measurement of free light chains in the blood is important in both the diagnosis and monitoring of AL amyloidosis.

The SFLCA (or Freelite™ test) is a sensitive test that is able to detect even small changes in the levels of free light chains. The test helps doctors see how well a new treatment is working at an early stage, as the amount of free light chains in the blood falls quickly when treatment is working. The SFLCA will be used regularly to monitor your response to treatment, and to ensure any relapse is detected early.

### **Importance of the kappa/lambda ratio**

The SFLCA measures the separate kappa and lambda free light chain values in your blood. The ratio between these values shows the proportion of each free light chain relative to the other.

Calculating the kappa/lambda ratio is important in AL amyloidosis. When either the kappa or lambda level is high but the other is normal, the ratio will be abnormal and indicates that the AL amyloidosis is active.

A normal kappa/lambda ratio after treatment can indicate a complete response.

The ratio is also important because it can be an indicator of poor kidney function. Kappa and lambda chains are removed from the blood by the kidneys. If the kidneys are not working properly then the kappa and lambda values may both be raised but with a normal ratio between the two. Raised levels but a normal ratio generally indicates some degree of kidney damage.

## Normal kappa/lambda values

The free light levels in serum vary from person to person but the normal ranges are:

- Kappa free light chains:  
3.3 – 19.4mg per litre of serum
- Lambda free light chains:  
5.71 – 26.3mg per litre of serum
- Normal kappa/lambda ratio:  
0.26 – 1.65

## What is involved in the SFLCA?

The SFLCA involves taking a sample of your blood from a vein in your arm or hand. You can usually have this sample taken at the same time as other routine blood tests.

## In summary

The SFLCA is an important advance in the diagnosis and monitoring of AL amyloidosis. Before this test the only way to monitor response to treatment was by bone marrow and organ biopsies. Knowledge about the importance of free light chains, and of how best to measure and monitor them through tests such as the SFLCA, continues to grow.

## About this Infosheet

The information in this Infosheet is not meant to replace the advice of your medical team. They are the people to ask if you have questions about your individual situation. All Myeloma UK publications are extensively reviewed by patients and healthcare professionals prior to publication.

## Other information available from Myeloma UK

Myeloma UK provides a wide range of information covering all aspects of the treatment and management of AL amyloidosis.

For a full publication list visit [www.myeloma.org.uk/publications](http://www.myeloma.org.uk/publications)

To order your free copies contact Myeloma UK. Our information is also available to download at [www.myeloma.org.uk](http://www.myeloma.org.uk)

To talk to one of our Myeloma Information Specialists about any aspect of AL amyloidosis, call the Myeloma Infoline on **0800 980 3332** or **1800 937 773** from Ireland.

Information and support about AL amyloidosis is also available around the clock at [www.myeloma.org.uk/amyloidosis](http://www.myeloma.org.uk/amyloidosis)

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**Myeloma UK** 22 Logie Mill, Beaverbank Business Park, Edinburgh EH7 4HG  
**T: 0131 557 3332**   **E: [myelomauk@myeloma.org.uk](mailto:myelomauk@myeloma.org.uk)**   Charity No: SC 026116

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**Myeloma Infoline: 0800 980 3332** or  
**1800 937 773** from Ireland  
**[www.myeloma.org.uk](http://www.myeloma.org.uk)**

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