



Freelite™
Serum Free
Light Chain Assay

Interpretation of Results

Diagnosis and monitoring of monoclonal disease states made easy

Freelite is a sensitive, specific marker of kappa and lambda free light chains in serum.



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Serum reference ranges¹

The most extensive serum free light chain normal range study has been conducted at The Mayo Clinic, USA, using The Binding Site **Freelite** assays for the BN™II. In this study serum samples from 287 normal subjects aged from 20 to 90 years were assayed for free kappa and free lambda. The results from this trial are shown in the table below.

Normal Adult Serum	Mean Concentration	Median Concentration	95 Percentile Range
Free Kappa	8.36 (mg/L)	7.30 (mg/L)	3.30-19.40 (mg/L)
Free Lambda	13.43 (mg/L)	12.40 (mg/L)	5.71-26.30 (mg/L)
	Mean	Median	Total range
Kappa/Lambda ratio	0.63	0.60	0.26-1.65

Confidence

- Rapid and quantifiable measurement of serum free light chains by **Freelite**.
- Free light chains have a half life of just 2-6 hours in serum and can be used confidently to detect rapid response to treatment.
- Confidently screen for all paraproteins using both **Freelite** and serum protein electrophoresis or capillary zone electrophoresis.

Peace of Mind

- Eliminates requirement for urine samples in diagnosis and monitoring of AL amyloidosis and Multiple Myeloma patients.
- Distinguish monoclonal free light chain increase from excess polyclonal light chain production by using the kappa/lambda ratio.

Kappa/Lambda ratio

The combination of individual concentrations of the free light chains and their ratio distinguishes a monoclonal increase from excess polyclonal production and renal dysfunction.

The ratio of kappa to lambda in serum is the opposite of that seen in urine, with kappa being lower than lambda. This is despite the fact that there are approximately twice as many kappa producing plasma cells as lambda producing cells.

The explanation for this is kappa molecules (25kDa), that are normally present in serum as monomers, are filtered through the kidney at approximately three times the rate of the lambda molecules (50kDa) which are present as dimers. So although the production rate of lambda in normal patients is lower than kappa, the serum concentration of lambda is actually higher, due to slower renal clearance. This also explains why, in the urine, the reverse is seen with kappa being present at approximately twice the level of lambda.

Interpretation of serum free light chain results²

Freelite results should be considered under the following categories and investigated appropriately.

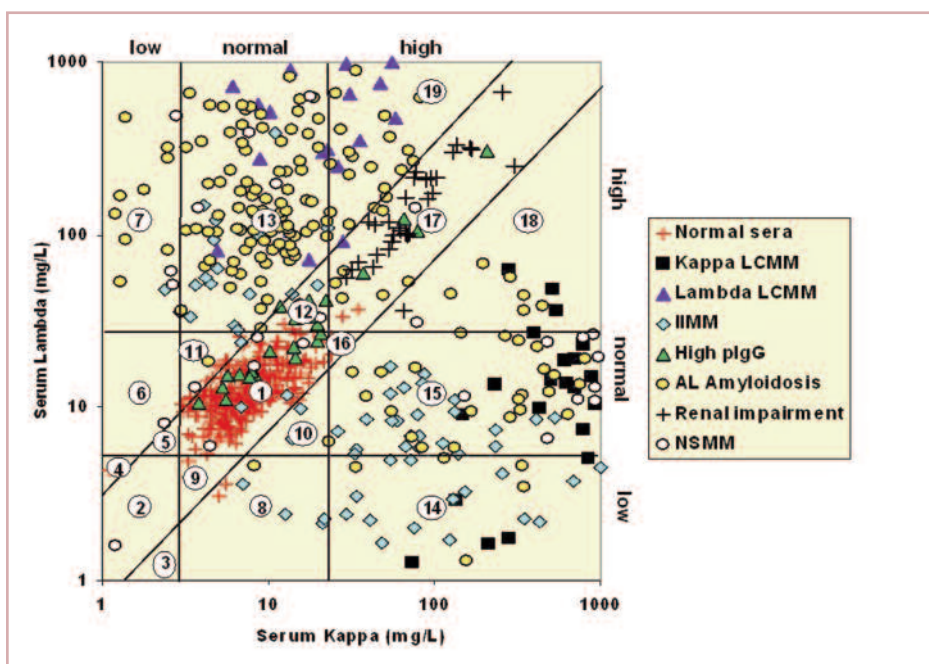
1. **Normal samples.** If electrophoresis tests for monoclonal proteins are also normal it is unlikely that the patient has a monoclonal gammopathy.
2. **κ/λ ratios** indicate a monoclonal gammopathy and should be investigated.
3. **Low concentrations** of one or both light chains indicate a degree of bone marrow suppression, either from bone marrow replacement by the tumour or from tumour therapy.
4. **High concentrations** of both light chains or the non-tumour light chain in patients with monoclonal gammopathies can be due to the following:
 - Renal impairment
 - Over production of polyclonal light chains and probably intact immunoglobulins
 - Biclonal gammopathy of different light chain types

Renal function tests and serum electrophoresis should be used to assess these different possibilities.

Sector	Kappa	Lambda	κ/λ Ratio	Interpretation	
1	Normal	Normal	Normal	Normal serum	
2	Low	Low	Normal	BM suppression without Monoclonal Gammopathy	
3			High		Monoclonal Gammopathy
4			Low		
5		Normal	Normal	Normal serum	
6			Low	Monoclonal Gammopathy	
7			High		
8			Low		
9	Normal	Low	High	Normal serum	
10			Normal		High
11		Low			
12		High	Normal	Polyclonal Ig increase or renal impairment	
13			Low	Monoclonal Gammopathy	
14			Low	High	Monoclonal Gammopathy
15		High	Normal	High	Monoclonal Gammopathy
16	Normal			Polyclonal Ig increase or renal impairment	
17	High		Normal	Monoclonal Gammopathy with renal impairment	
18			High		
19			Low		

■ With bone marrow (BM) suppression

□ Without bone marrow (BM) suppression



Serum kappa and lambda concentrations in a selection of clinical conditions. Patients are categorised according to serum free light chain concentrations and κ/λ ratios. Diagonal lines separate monoclonal from polyclonal diseases.

plgG-polyclonal hypergammaglobulinaemia.

Sector numbers refer to table above.

Freelite Analysis

Freelite assay time is less than 20 minutes, facilitating rapid clinical decisions.

All kits are FDA cleared for *in vitro* diagnostic use to aid in the diagnosis and monitoring of Multiple Myeloma, Lymphocytic neoplasms, Waldenstrom's macroglobulinaemia, AL amyloidosis, Light Chain Deposition Disease and connective tissue diseases such as Systemic Lupus Erythematosus.

Freelite is CE marked for many European countries, please contact us for the latest information.

Assays are available on a wide range of automated platforms, ensuring accuracy and reduced hands on time.

Ordering information

Analyser	Description	Pack	Code
Dade Behring BN™II	Freelite Kappa Kit	2 x 50 test	LK016.T
	Freelite Lambda Kit	2 x 50 test	LK018.T
Dade Behring BN ProSpec®	Freelite Kappa Kit	2 x 50 test	LK016.P
	Freelite Lambda Kit	2 x 50 test	LK018.P
Beckman Coulter IMMAGE®	Freelite Kappa Kit	2 x 50 test	LK016.IM
	Freelite Lambda Kit	2 x 50 test	LK018.IM
Roche Hitachi 911/912/917/P module	Freelite Kappa Kit	2 x 50 test	LK016.H
	Freelite Lambda Kit	2 x 50 test	LK018.H
Olympus AU400/640/2700/5400	Freelite Kappa Kit	2 x 50 test	LK016.AU
	Freelite Lambda Kit	2 x 50 test	LK018.AU

Protocols for other instruments are being developed so please contact us for the latest information.

References

1. Katzmann JA, Clark RJ, Abraham RS, Bryant S, Lymp JF, Bradwell AR, Kyle RA. Serum Reference Intervals and Diagnostic Ranges for Free κ and Free λ Immunoglobulin Light Chains: Relative Sensitivity for Detection of Monoclonal Light Chains. *Clinical Chemistry* 2002; **48**: 1437-1444
2. Serum Free Light Chain Analysis. A.R. Bradwell 2004

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