

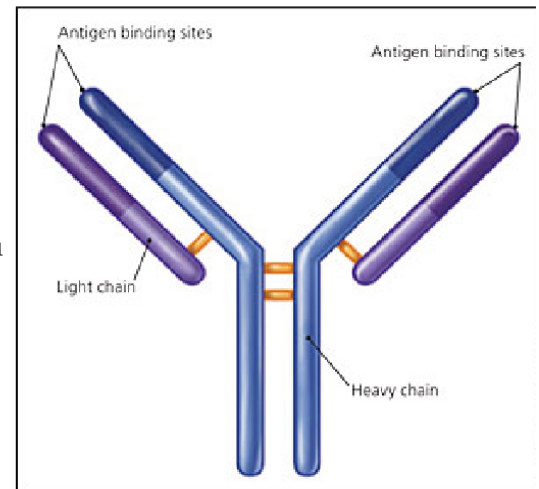
From Under the Microscope

Free kappa and free lambda light chains

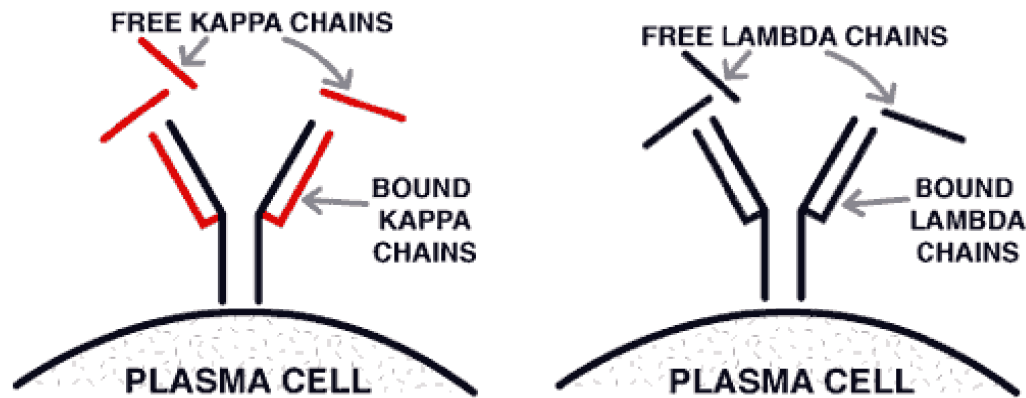
Serum free light chain (SFLC) testing is used to help detect, diagnose, and monitor plasma cell disorders (dyscrasias), including multiple myeloma and primary amyloidosis, and to monitor the effectiveness of treatment. Light chains are proteins produced by plasma cells. They are used to assemble immunoglobulins (Ig), antibodies that target and neutralize specific threats to the body such as bacteria and viruses. With plasma cell disorders or monoclonal gammopathies, a plasma cell becomes malignant, divides uncontrollably, and produces large amounts of an abnormal monoclonal immunoglobulin (M-protein). This protein may take the form of an intact immunoglobulin or of one of its component parts, a kappa or lambda light chain, or rarely, a heavy chain. Traditionally, plasma cell disorders have been diagnosed using serum and urine protein electrophoresis tests (SPEP/UPEP), followed by immunofixation electrophoresis or immunotyping (IT) tests to determine which immunoglobulin is present in excess. Blood tests may also be ordered to measure levels of intact immunoglobulins (IgG, IgM, IgA). Serum free light chain testing provides complementary information. It can detect the low levels of free light chains that are sometimes all that is produced by a plasma cell disorder and can detect changes in the ratio of kappa and lambda production, which indicate an excess of one clone of plasma cells. Serum free light chain testing may be ordered along with serum protein electrophoresis and serum immunotyping to detect abnormal monoclonal protein (M-protein) production and to calculate a kappa/lambda free light chain ratio. If a plasma disorder is detected, then the free light chain test may be ordered periodically to monitor the condition and to evaluate the effectiveness of treatment.

When is it ordered?

Serum free light chain testing and a kappa/lambda ratio is ordered along with a protein electrophoresis test when someone has signs and symptoms that a healthcare practitioner suspects are related to a plasma cell disorder. These symptoms will vary from person to person and tend to worsen over time. They involve various parts of the body and may include: bone (bone pain, soft spots, and fractures due to proliferation of plasma cells in the bone marrow), blood (anemia and frequent infections due to low levels of red and white blood cells; plasma cells crowd out the other types of cells in the bone marrow, leading to a decrease of RBCs and WBCs), kidney (production of abnormal amounts of light chains can lead to increased light chains in the urine (Bence-Jones protein); these proteins can lodge or deposit in the kidneys, causing damage). A healthcare practitioner may also order this test when someone has signs and symptoms associated with primary amyloidosis. Amyloidosis develops when abnormal proteins build up in organs or tissue, particularly the heart, liver, kidneys, spleen, gastrointestinal tract, and nervous system. In primary amyloidosis, the proteins are free light chains. Depending on the organs affected, the person may have a variety of symptoms such as the following: swelling of ankles and legs, weakness, fatigue, numbness, weakness or tingling of the arms and legs, shortness of breath, difficulty breathing, an irregular heartbeat, easy bruising, purple patches around the eyes (so-called raccoon's eyes), tongue swelling. When a light chain disorder is diagnosed, the test may be ordered periodically to monitor the condition and to evaluate the effectiveness of treatment.



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What does the test result mean?

Results of a serum free light chain test will often be evaluated in conjunction with the results of a protein electrophoresis test. Free light chains will normally be present in the blood at low levels, with a kappa/lambda ratio of approximately 0.26 to 1.65. Increased kappa free light chains and an increased kappa/lambda ratio may be seen with plasma cell disorders that produce excess monoclonal kappa light chains. Increased lambda free light chains and a decreased kappa/lambda ratio may be seen with plasma cell disorders that produce excess monoclonal lambda light chains. In general, significantly increased free light chain production and an abnormal kappa/lambda ratio indicate a poorer prognosis and an increased risk of disease progression. When the test is used to monitor a known plasma cell disorder, a decrease in the quantity of excess light chain and a more normal kappa/lambda ratio indicates a response to treatment. Increased free light chains with a normal serum free kappa/lambda ratio may be seen with people who have some degree of kidney dysfunction that is unrelated to a plasma cell disorder. Decreased free light chains with a normal kappa/lambda ratio may be seen with a disorder that suppresses bone marrow cell production. With suspected primary amyloidosis, an increase in serum free light chains with an abnormal kappa/lambda ratio may suggest that amyloidosis is the cause of symptoms. However, a biopsy of affected tissue is the primary means of establishing the diagnosis.

Is there anything else I should know?

Monoclonal gammopathy of undetermined significance (MGUS) is the most common plasma cell disorder and it usually does not cause symptoms. A percentage of people with MGUS will later develop multiple myeloma. This risk is increased in those with increased free light chain production and an abnormal kappa/lambda ratio. Serum free light chains can also be increased, usually with a normal kappa/lambda ratio, with some connective tissue disorders, inflammatory conditions, neurological conditions, and some cancers but are not typically monitored in people with these conditions. Serum free light chain analysis accelerates the detection of treatment response because the free light chains have a much shorter half-life (3-5 hours) than intact immunoglobulins (about 21 days). Although it is traditionally used for light chain-only plasma cell disorders, the test has increasingly been used for treatment monitoring of myelomas that produce intact immunoglobulins (e.g., IgG, IgA) as well.



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