

## Multiple Myeloma Signs and Symptoms

Multiple myelomas are proliferations of neoplastic plasma cells that secrete a monoclonal immunoglobulin (Ig) or fragment as opposed to polyclonal Igs seen in an immune response. A monoclonal Ig identified in blood is referred to as an M component that can be detected via serum protein electrophoresis. Polyclonal Igs appears as a broad band as opposed to a sharp protein bar in monoclonal Ig. The most common monoclonal Ig is IgG in 55% of patients followed by IgA in 25% of cases. Often, the high level of M proteins causes red cells on peripheral blood smears to stack on one another in linear arrays like poker chips, a finding referred to as rouleaux formation. Unlike normal plasma cells where the production of light chains and heavy chains are tightly balanced, neoplastic plasma cells often synthesize an excess of either light or heavy chains. Free light chains are small enough to be excreted in the urine, where they can be detected and are called Bence Jones proteins. Clinical features of multiple myeloma due to bone resorption include pathologic fractures and chronic pain. Increased bone resorption also leads to hypercalcemia. Decreased production of normal immunoglobulins leads to increased susceptibility to bacterial infections. 50% of patients also suffer from renal failure due to multiple etiologies including Bence Jones proteinuria and amyloidosis, which can exacerbate renal dysfunction.



PLAY PICMONIC

### Signs and Symptoms

#### Increased Susceptibility to Infection

##### [Up-arrow Infectious Virus and Bacteria](#)

Decreased production of normal immunoglobulins leads to increased susceptibility to bacterial infections. The most common infections include pneumonias and pyelonephritis.

#### Back/Bone Pain

##### [Back and Bone Pain-bolt](#)

Bone pain, especially back pain, is a common symptom of multiple myeloma as the spine loses calcium.

#### Punched Out Lytic Bone Lesions

##### [Punch Through a Light-bulb Bone](#)

Bone disease in multiple myeloma is due to the overexpression of RANKL in bone marrow stroma which activates osteoclasts causing bone resorption. This can result in lytic bone lesions that appear as punched out radiolucencies on plain radiographs.

#### Hypercalcemia

##### [Hiker-calcified-cow](#)

Bone disease in multiple myeloma is due to the overexpression of RANKL in bone marrow stroma which activates osteoclasts causing bone resorption. This can result in lytic bone lesions that appear as punched out lesions in plain radiographs. Excess bone resorption also leads to release of calcium into blood causing hypercalcemia.

#### Primary Amyloidosis

##### [Armadillo](#)

A common complication of multiple myeloma is immunoglobulin light chain (AL) amyloidosis, also known as primary amyloidosis. This occurs when plasma cells produce light chains (fragments of immunoglobulins) that accumulate and deposit in various tissues e.g. heart, kidneys, and the gastrointestinal tract.

## Renal Insufficiency

### Kidney punching bag

The cause of renal insufficiency in multiple myeloma is multifactorial. Etiologies include light chain deposition, hypercalcemia, amyloidosis, analgesic nephropathy from chronic NSAID use for bone pain, and myeloma cast nephropathy, which may cause the presence of light chains in the urine known as Bence Jones proteinuria.

## Anemia

### Anemone

Multiple myeloma normally causes a normocytic normochromic anemia due to replacement of normal bone marrow by infiltrating tumor cells. Inhibition of normal red blood cell production by cytokines also contributes.