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Multiple Myeloma with Dual Expression of Kappa and Lambda Light Chains

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Introduction

- Multiple myeloma (MM) is a malignancy of plasma cells that accounts for approximately 1 to 2 percent of all cancers and about 17% of all hematologic malignancies.
- Plasma cells normally produce antibodies and provide a defense mechanism for the body to fight infections.
- Antibodies typically consist of two heavy chains (IgG, IgA, IgM, IgD and IgE) and two light chains (kappa and lambda).
- Most cases of MM have malignant plasma cells producing monoclonal (M) proteins, most common being IgG about 52% of the time (1).
- Only about 2% of these myeloma cases were also found to secrete more than one paraprotein and classified as biclonal/biphenotypic plasma cell myeloma (2).
- Here we report a case of a woman who presented with lower back pain that was found to have biphenotypic multiple myeloma with a coexpression of kappa and lambda light chains.

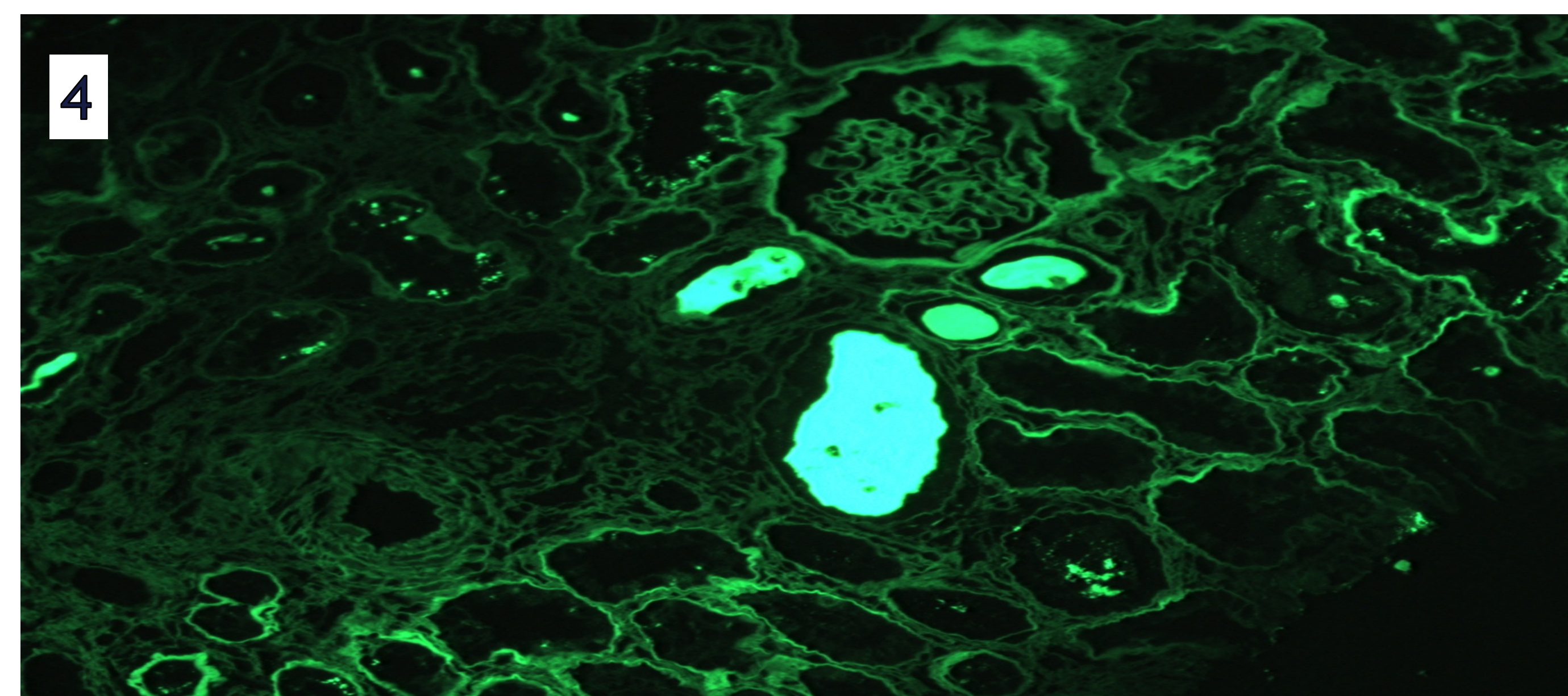
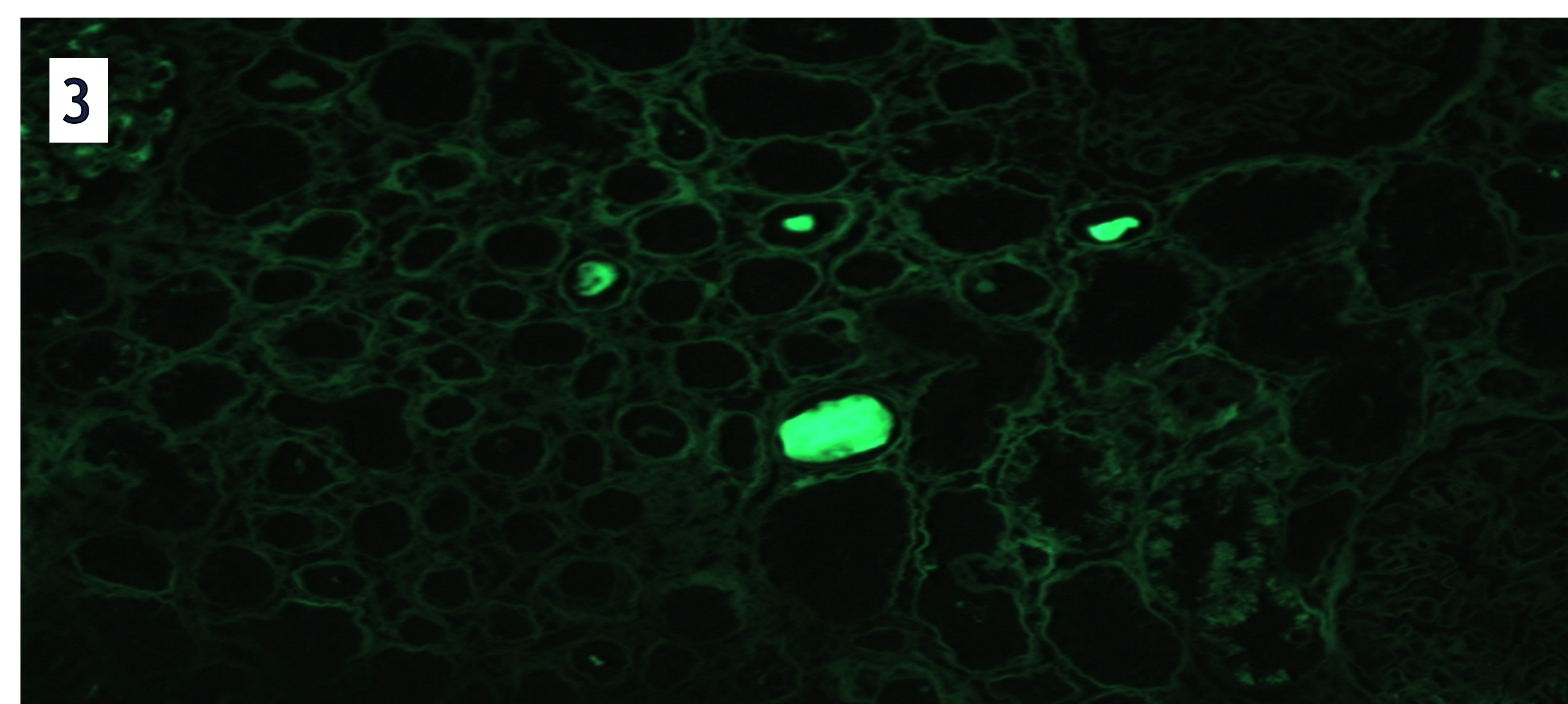
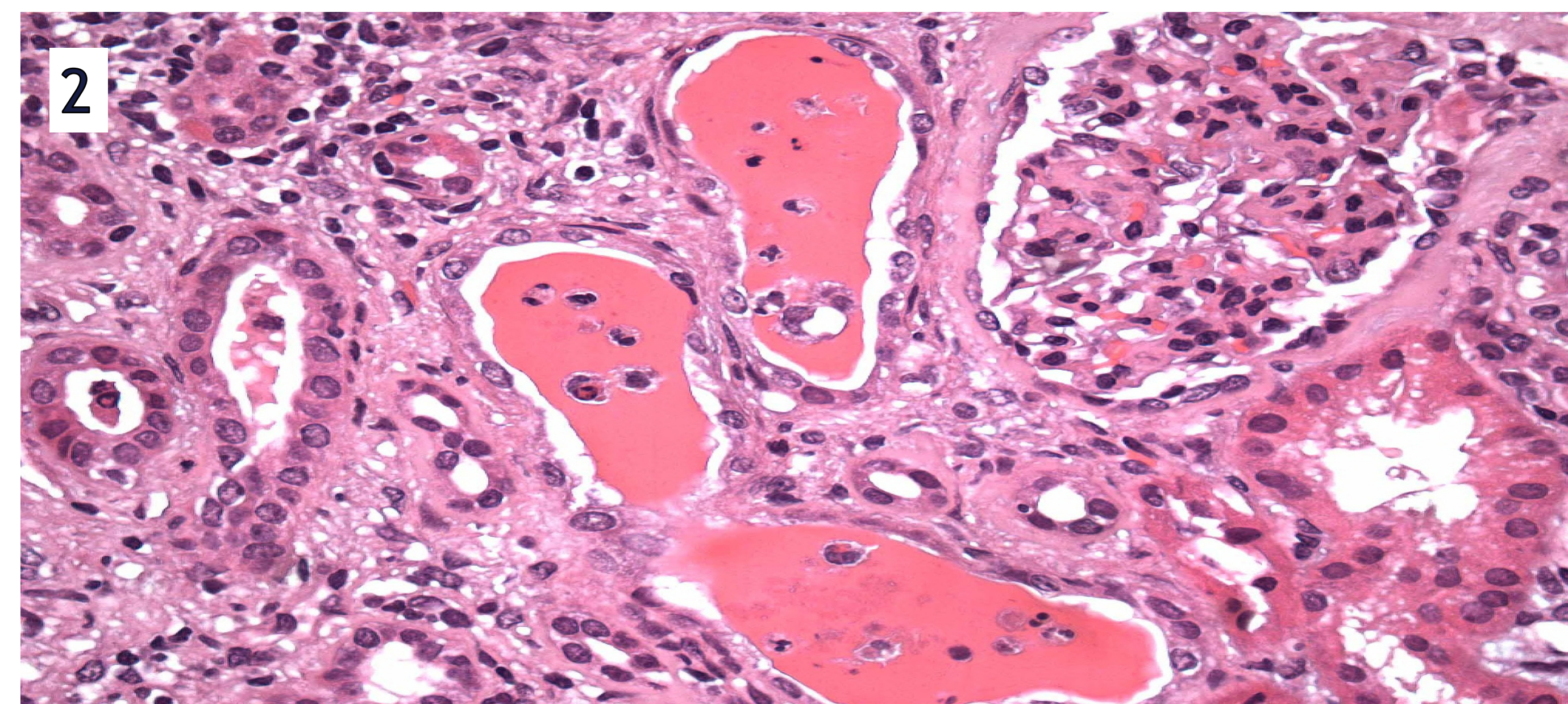
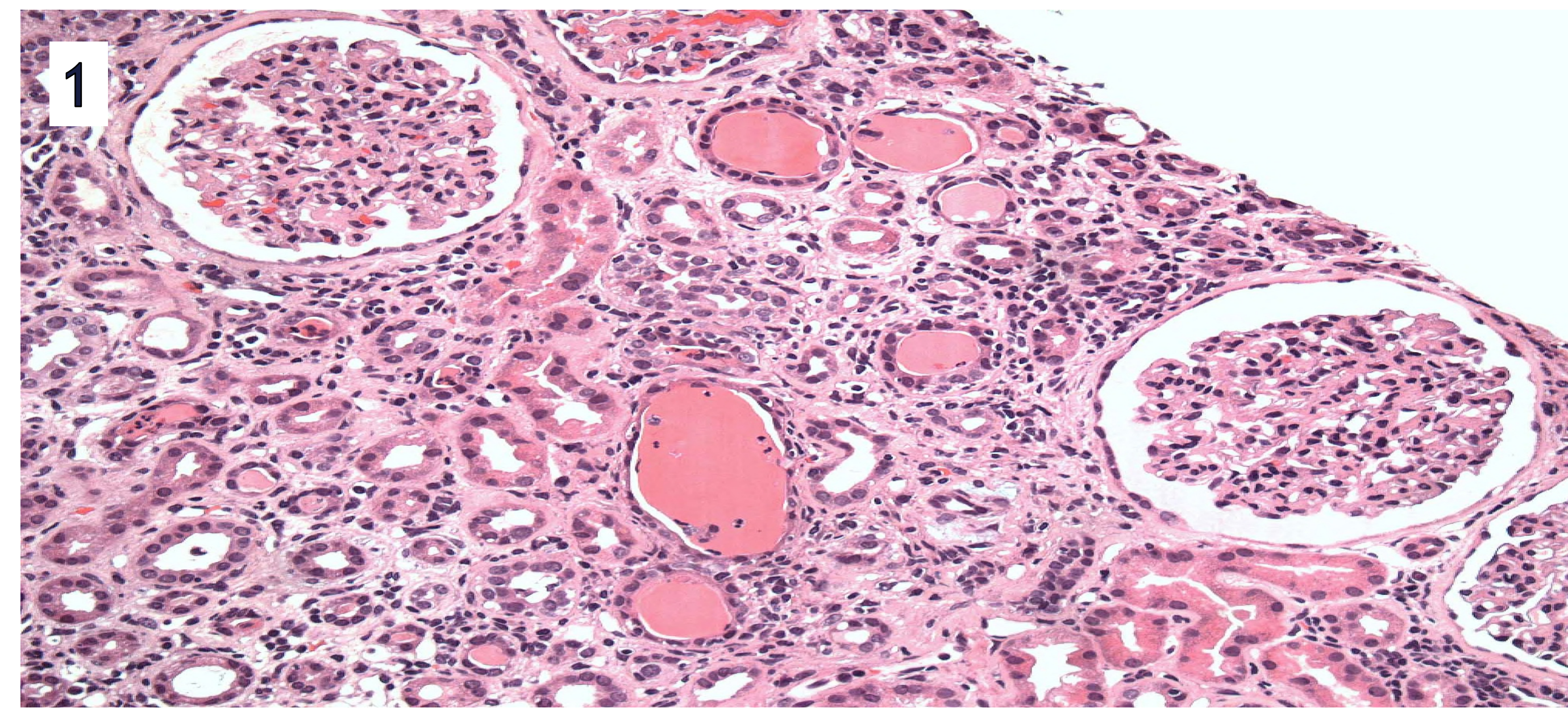
Case Presentation

- 52-year-old African American female was admitted with a chief complaint of lower back pain for a 3-4 months duration.
- PMH: hypertension, peptic ulcer disease and gastroesophageal reflux disease
- Labs were significant for elevated **serum creatinine of 6.13** and serum **calcium of 12.5, hemoglobin of 8.4.**
- Renal ultrasound showed no hydronephrosis or renal calculi, **increased bilateral cortical echogenicity**, indicative of some degree of underlying chronic kidney disease.
- SPEP showed **positive free lambda (23993), positive free kappa light chain (43.2)** normal IgG and IgA ratio, low IgM (25).
- Urinalysis was significant of 100+ protein and **urine protein to creatinine ratio consistent with 11.97 grams**
- Bone Survey showed heterogenous appearance of the right humerus with scattered ill-defined lytic lesions. Possible ill-defined lytic lesions are seen at the proximal left tibia. There was a **lytic lesion** at the proximal left radius.
- Treated with dexamethasone for multiple myeloma and pamidronic acid for hypercalcemia with a resolution of serum calcium level to 8.5mg/dL.
- Patient also **required hemodialysis** for her acute renal failure.

Figures

- Figure 1 and 2: Renal biopsy with tubular atrophy and interstitial fibrosis
- Figure 3: Immunofluorescence staining for Kappa
- Figure 4: Immunofluorescence staining for Lambda

Pathology



Discussion

- In older patients presenting with lower back pain and acute renal failure, the diagnosis of multiple myeloma should be on the differential
- MM the leading cause of malignancy induced ESRD requiring dialysis.
- The kidneys metabolizes light chain proteins but Ig and heavy chains do not pass through the glomerular filtration barriers.
- Light chains that are filtered are reabsorbed by proximal tubular cells and catabolized by lysozymal enzymes, normally this process is very efficient.
- When the burden of light chains exceeds the absorption capacity of the tubules, light chains spill into the urine (3).
- Free light chains enter proximal tubule cells and trigger apoptosis and inflammation (4).
- Free light chains bind to Tamm-Horsfall protein to form casts which result in tubular atrophy, interstitial inflammation and fibrosis leading to renal failure

Treatment Options

- Early diagnosis and initiation of therapy is the best treatment
- MM patients requiring dialysis have a higher mortality than other causes of ESRD with a greater than 85% mortality within 2 years (5).
- Pharmacologic Therapy-Bortezomib-based therapy, especially triple drug therapy (thalidomide, dexamethasone and bortezomib) has improved survival of patients with mild to moderately reduced kidney function and those requiring dialysis.
- Plasmapheresis-removing light chains from plasma leading to less being filtered by the kidney and causing less damage. Studies have shown mixed results with no clear evidence of mortality benefit.
- Stem cell transplantation (SCT)-potentially curative for a small number of patients. Interesting renal failure may prevent patient's them from qualifying for SCT, one of the disease's most effective treatments (6).
- Kidney transplant-clear curative option for patients with MM and ESRD

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