

QUESTION
A 60-year-old male with a long history of hypertension and hyperlipidemia presents with a 2-week history of progressive weakness and fatigue. He reports that he has lost about 10 pounds (4.5 kg) and has noticed some swelling in his lower legs. He has no chest pain, shortness of breath, or changes in bowel habits. His medical history is significant for type 2 diabetes mellitus, chronic kidney disease (stage 3), and a recent diagnosis of atrial fibrillation. He is currently on lisinopril, atorvastatin, metformin, and warfarin. His last laboratory workup 3 months ago showed a hemoglobin of 14 g/dL, hematocrit of 42%, and a normal renal panel. He is a retired construction worker and has no known allergies.

ANSWER
Anemia

- 1. Hemoglobin: 10 g/dL
- 2. Hematocrit: 30%
- 3. Mean corpuscular volume (MCV): 80 fL
- 4. Reticulocyte count: 0.5%
- 5. Serum ferritin: 100 ng/mL
- 6. Serum iron: 100 µg/dL
- 7. Total iron-binding capacity (TIBC): 300 µg/dL
- 8. Transferrin saturation: 33%
- 9. Serum creatinine: 1.5 mg/dL
- 10. Estimated glomerular filtration rate (eGFR): 30 mL/min/1.73 m²
- 11. Serum albumin: 3.5 g/dL
- 12. Serum electrolytes: Sodium 138 mEq/L, Potassium 4.0 mEq/L, Calcium 9.0 mg/dL, Phosphorus 3.5 mg/dL, Magnesium 1.8 mg/dL
- 13. Complete blood count (CBC): Hemoglobin 10 g/dL, Hematocrit 30%, Hemoglobin A1c 7.5%
- 14. Urinalysis: Negative for hematuria, proteinuria, or casts
- 15. Electrocardiogram (ECG): Sinus rhythm, normal intervals
- 16. Chest X-ray: Clear lung fields, no pulmonary congestion
- 17. Abdominal ultrasound: No splenomegaly or hepatomegaly
- 18. Bone marrow biopsy: Hyperplastic, normochromic, normocytic erythroid precursors
- 19. Peripheral smear: Normochromic, normocytic red blood cells with some spherocytes
- 20. Direct Coombs test: Negative
- 21. Iron studies: Serum ferritin 100 ng/mL, Serum iron 100 µg/dL, TIBC 300 µg/dL, Transferrin saturation 33%
- 22. Renal panel: Serum creatinine 1.5 mg/dL, BUN 20 mg/dL, eGFR 30 mL/min/1.73 m²
- 23. Vitamin B12 and folate levels: Normal
- 24. Erythropoietin (EPO) level: Low
- 25. Renal biopsy: No significant glomerular pathology
- 26. Bone marrow iron stain: Positive
- 27. Renal ultrasound: No hydronephrosis or renal stones
- 28. Renal biopsy: No significant glomerular pathology
- 29. Bone marrow iron stain: Positive
- 30. Renal biopsy: No significant glomerular pathology

DISCUSSION
The patient's presentation is consistent with anemia, which is a common complication of chronic kidney disease (CKD). The anemia is characterized by a low hemoglobin level (10 g/dL) and a low hematocrit (30%). The mean corpuscular volume (MCV) is 80 fL, indicating a normochromic, normocytic anemia. The reticulocyte count is low (0.5%), suggesting a decreased bone marrow response to the anemia. The patient's renal function is significantly impaired, with a serum creatinine of 1.5 mg/dL and an eGFR of 30 mL/min/1.73 m². The anemia is likely due to the decreased production of erythropoietin (EPO) by the kidneys, which is a common finding in CKD. The patient's iron studies show a low serum ferritin level (100 ng/mL) and a low transferrin saturation (33%), indicating iron deficiency. The patient's renal biopsy shows no significant glomerular pathology, suggesting that the anemia is primarily due to the decreased production of EPO by the kidneys. The patient's anemia is likely due to the decreased production of EPO by the kidneys, which is a common finding in CKD.

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