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**Case Presentation:**

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A 58 year-old female of Italian descent, Angela Francisco, appears in your ER complaining of a fever and a productive cough that has lasted nearly two months. During your questioning she indicates that 'she just doesn't seem to have any energy anymore and attributes it to 'getting old' and 'tired'. She also complains of 'low back pain'

**Physical Examination:**

- Thin, pale female
- Alert and oriented. Not in acute distress
- BP: 120/90
- Pulse: 108 min and regular
- Temperature: 102.8 °F (39.3 °C)
- Respiratory rate 26/min.
- Alert ♀, oriented
- Bilateral rales

*What are rales? What does their presence indicate?*

The rest of the physical exam was unremarkable.

You order a routine chest X-ray, CBC, a chemistry profile and a sputum culture.

**Radiologic Studies:**

The radiologist reports a bilateral infiltrates on the chest X-ray.

*What might be the significance of bilateral chest infiltrates?*

**Lab Studies:**

**Complete Blood Count:**

	Patient	Normal
<b>WBC</b>	12.0 X 10 <sup>3</sup> /uL	(3.3-11.0)
Neut	76 %	(44-88)
<b>Bands</b>	12 %	(0-10)
Lymphocytes	8%	(12-43)
Mono	2%	(2-11)
Eosinophil	1%	(0-5)
Basophils	1%	(0-2)
<b>Nucleated RBC</b>	5%	(0)
<b>RBC</b>	3.1 X 10 <sup>6</sup> /μL	(3.9-5.0)
Reticulocytes	1.1%	(0.5-1.5)
<b>Hgb</b>	8.5 g/dL	(11.6-15.6)
<b>HCT</b>	25.6 %	(37.2-50.4)
MCV	82.6 fL	(79-99.0)
MCH	27.5 pg	(26.0-32.6)
MCHC	32.2 g/dL	(31.0-36.0)
Plts	188 thousands/μL	(130-400)

*Given the bilateral infiltrate, what is the significance of the increased numbers of bands?*

*This patient is anemic. What kind of anemia could it be?*

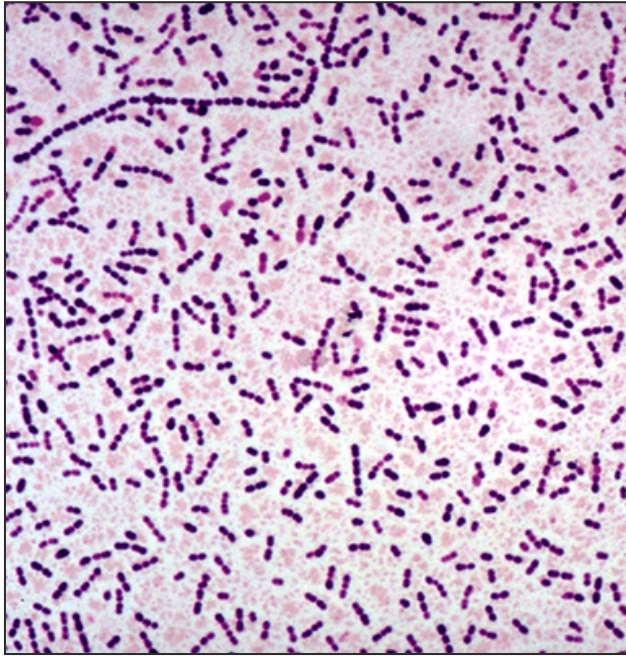
**Chemistry Profile:**

Test	Patient	Normal
Glucose	97 mg/dL	(65-110)
<b>Creatinine</b>	1.5 mg/dL	(0.7-1.4)
<b>BUN</b>	28 mg/dL	(7-24)
Uric Acid	7 mg/dL	(3.0-8.5)
Cholesterol	200 mg/dL	(150-240)
<b>Calcium</b>	11.4 mg/dL	(8.5-10.5)
<b>Protein</b>	9.8 g/dL	(6-8)
<b>Albumin</b>	3.2 g/dL	(3.7-5.0)
<b>LDH</b>	265	(100-225)
<b>Alk. Phos.</b>	190 U/L	(30-120)
AST	30 U/L	(0-55)
GGTP	40 U/L	(0-50)
Bilirubin/Bil. Direct	0.4 mg/dL/(.13 mg/dL)	(0.0-1.5)/(0.02-18)

*Creatinine and BUN are both elevated. What is the significance of both of them being elevated by roughly the same amount?  
Can you explain the other abnormalities?*

Her electrolytes are within normal.

Sputum culture reveals Gram positive cocci in pairs and chains.



The patient was treated with a 10 day course of antibiotics and asked to return for follow-up. A month later your patient returns. She feels better, but is still complaining of fatigue and low back pain and indicates that the pain in the back is now compounded by pain along her rib cage.

You order a repeat CBC, a chemistry profile and a urinalysis.

**Complete Blood Count: Two Months later**

	Patient	Normal
WBC	3.4 X 10 <sup>3</sup> /uL	(3.3-11.0)
Neut	9 %	(44-88)
Lymph	27%	(12-43)
Mono	4%	(2-11)
Eos	0%	(0-5)
Baso	0%	(0-2)
RBC	3.2 X 10 <sup>6</sup> /uL	(3.9-5.0)
Hgb	8.6 g/dL	(11.6-15.6)
HCT	26.1 %	(37.2-50.4)
MCV	81.5 fL	(79-99.0)
MCH	26.8 pg	(26.0-32.6)
MCHC	32.9 g/dL	(31.0-36.0)
Plts	110 thousands/uL	(130-400)

**Chemistry Profile: Two Months Later**

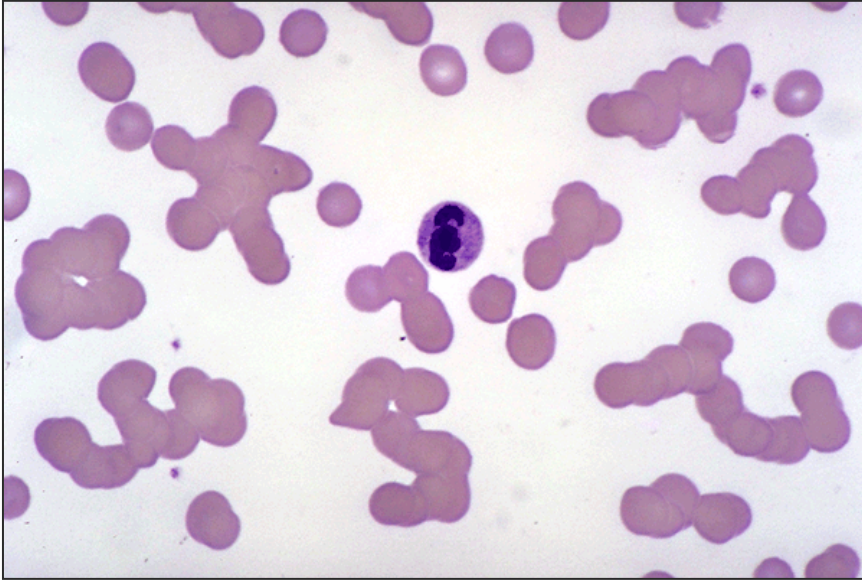
Test	Patient	Normal
Glucose	90 mg/dL	(65-110)
Creatinine	1.9 mg/dL	(0.7-1.4)
BUN	29 mg/dL	(7-24)
Uric Acid	9 mg/dL	(3.0-8.5)
Cholesterol	199 mg/dL	(150-240)
Calcium	12 mg/dL	(8.5-10.5)
Protein	10.9 g/dL	(6-8)
Albumin	3.7 g/dL	(3.7-5.0)
LDH	270 U/L	(100-225)
Alk. Phos.	210 U/L	(30-120)
AST	50 U/L	(0-55)
GGTP	35 U/L	(0-50)
Bilirubin/Bil. Direct	0.7 mg/dL/(.11 mg/dL)	(0.0-1.5)/(.02-18)

Because both BUN and Creatinine are elevated, you are beginning to wonder whether renal function is intact. To answer that question you order a urinalysis.

What does the urinalysis tell you? What is the significance of 3+ protein and hyaline casts in the urine?

Test	Patient	Normal
pH	6	(5.0-7.5)
Protein	3+	(Neg)
Glucose	Neg	(Neg)
Ketone	Neg	(Neg)
Occult blood	Neg	(Neg)
Color	Yellow	(Yellow)
Clarity	Clear	(Clear)
Sp. Grav.	1.050	(1.010-1.055)
WBC	3/HPF	(0-5)
RBC	1/HPF	(0-2)
Cast	Hyaline	(Neg)

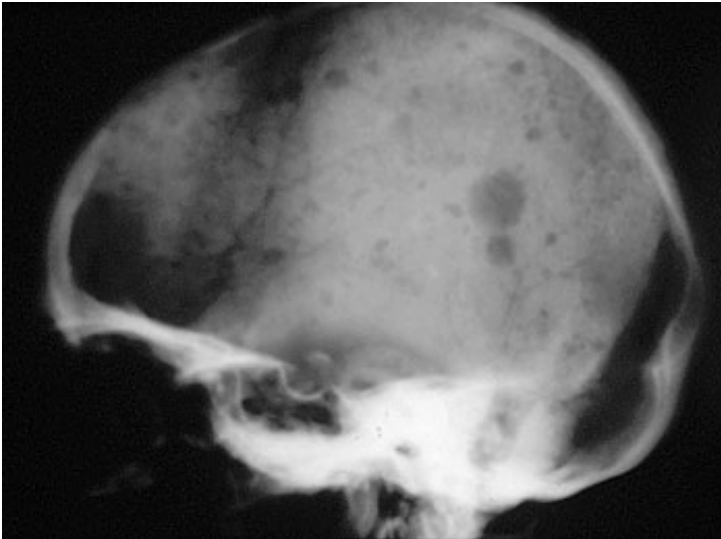
A peripheral blood smear indicates that in addition to a normochromic, normocytic anemia, rouleaux formation is occurring.



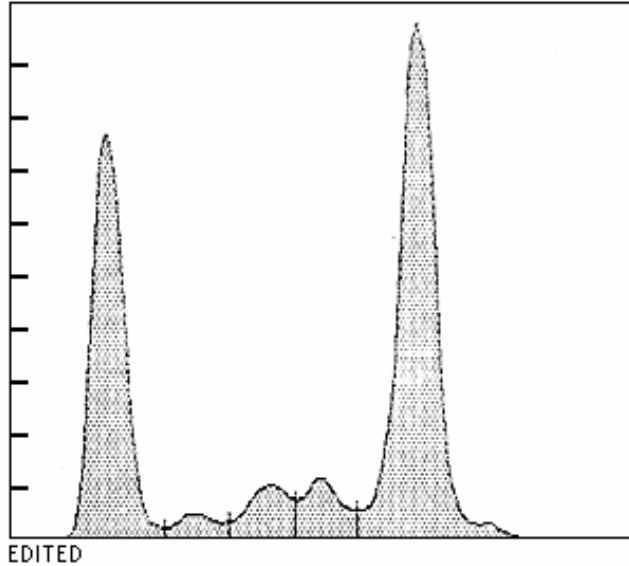
What might cause rouleaux formation?

In response to this information you order two more tests that clinch your tentative diagnosis.

One is a skull X-ray which demonstrates multiple, "punched out" lesions of the calvaria.



The other is a serum protein electrophoresis which the laboratory reports demonstrates the presence of IgG and Kappa light chains. A copy of the electrophoretic pattern is shown below.



Fraction	%	MG/DL	MG/DL	Range
ALBUMIN	33.8	3.7	3.6	5.4
ALPHA-1	3.0	0.3	0.1	0.3
ALPHA-2	6.1	0.7	0.4	0.9
BETA	6.2	0.7	0.5	1.1
GAMMA	50.9	<b>5.5 hi</b>	0.6	1.6
Total PROT		<b>10.9 hi</b>	6.0	8.2