



## CASE STUDY: A VEGAN THAT SMOKES AND IS SHORT OF BREATH

*Don Steinert MA, RRT, MT, CLS*

There is an order on the chart for you to assess patient "Smith" and make a recommendation regarding her pulmonary status. The physician is quite sure the patient has some type of pulmonary condition that is causing her dyspnea.

### **Patient history**

The patient was admitted two days ago with shortness of breath and is currently receiving two liters of oxygen via nasal cannula. She has smoked two packs of cigarettes per day for the past 25 years, starting in high school. For the past seven years, she has been following a vegan diet without any supplements and has been very successful at it by her own account.

You notice on the laboratory section of her chart that she is anemic with a hemoglobin level of 10.4 g/dL and hematocrit of

31.8 percent. The differential shows 39 percent hypersegmented neutrophils, and the white blood cell count is slightly decreased. Red blood cell indices show a megaloblastic red blood cell with an MCV of 120 fL. The MCH is increased as well, even though the red blood

cell count was decreased. In addition to red and white cells being decreased, you also notice the platelets are only 97,000/mm<sup>3</sup>. You also identify a mild hyperbilirubinemia and increase in LDH.

During your assessment, the patient complained of chronic weakness and you observed a strawberry red tongue, which indicates glossitis. She mentioned to you that she often has numbness and tingling in her hands and feet. When you asked her to stand, she was somewhat unstable and felt weak. For the past two months she had consulted her family physician as well as a gastroenterologist. After a few tests, she was told that she has gastric atrophy and villous atrophy of the small bowel.

### **Treatment**

So what is your recommendation to the physician regarding her pulmonary status? Is her shortness of breath a symptom related to a different problem altogether? Your suggestion is that she be maintained on the 2-L nasal cannula and that a vitamin B12 assay and anti-intrinsic factor (IF) assay, along with a Schilling test, be ordered to shed some light on the patient's condition.

Strange, you are a respiratory therapist, and you are suggesting vitamins and IF as the problem. And what about this Schilling

test? What's that? Your response is, "Look at the laboratory data." You are correct. But what tipped you off to thinking outside the box and suggesting the B12, anti-IF assays and Schilling test?

In reviewing the patient's chart, you quickly noticed the anemic blood values for hemoglobin and hematocrit, but you also noticed the red blood cell indices (MCV and MCH) suggested not the typical iron deficiency anemia (microcytosis), but a megaloblastic anemia. The hypersegmented neutrophils indicated that the neutrophils on the peripheral blood film showed six to eight segments per neutrophil rather than the typical 3-5 as most mature neutrophils would have. This you remembered was a classic sign of pernicious anemia (vitamin B12 deficiency).

Thinking about the patient's history, you remembered she was a vegan of about seven years with no additional supplements (vitamins), and she had a 25-year history of smoking, putting her around the age of 42. This is in the correct age range for the development of B12 deficiencies in general. A vegan diet is deficient in B12, and not having taken any vitamin supplements for seven years, she was an ideal candidate for depletion of the vitamin in her body.

Both of these lifestyle activities can have a deleterious effect on vitamin B12 (and folic acid for that matter). The smoking in this case also added to the shortness of breath because of the carbon monoxide that was preferentially being absorbed by the red blood cells instead of oxygen. The decreases in red blood cell count, white blood cell count and platelet count, along with the megaloblastic cells, also fit the pattern of a vitamin B12 deficiency, as did the strawberry red tongue.

You correctly noted that the increased LDH was owed to the increased intramedullary destruction of megaloblastic bone marrow cells because red blood cells have a very high lactate dehydrogenase enzyme level. In addition, the liver is responsible for removing abnormal cells along with the spleen and was "stressed," therefore raising the bilirubin level.

Finally, you remembered that vitamin B12 required IF for absorption from the gut. This patient had been previously diagnosed with gastric atrophy, which would indicate that the parietal cells in the stomach had been damaged or destroyed, thus limiting the production of IF. This shows the need for the anti-IF assay because this vitamin condition often has an underlying autoimmune cause as well.

**Use clinical  
laboratory data  
proactively**

**Only First Class...** Continued from previous page

verter if you are changing from another product brand. Most are in PDF format for easy printing. The educational materials are two-fold. There are educational materials to be used with patients, and there are educational materials for nurses.

The nursing education section includes free CEU programs, clinical evaluations and case studies, helpful hints and conferences. The "Everyday Tools" section includes helpful tools to help in day-to-day practice. There are care tips, including ideas submitted by clinical users, sales specialist contact support, informational links, product formularies and competencies. For competencies Hollister provides a service whereby they will assist your facility in developing specific care competencies.

The patient educational materials include a learning center. There is an educational theater to view teaching videos, education booklets to print, sizing information (if appropriate), pediatric specific information and an FAQ for each product. Lastly, there is a list of links to additional outside resources.

Some of the product sections contain a unique service called "Secure Start." To assist in discharge planning, Hollister will ensure the delivery of product samples and match your patients with the right supplier within 48 hours of discharge. This is a secured area of the Web site that requires a log-in. A clinician can register patients online and receive a patient status report, program coordinator information, request samples, receive feedback and more.

Education is a large focus of the materials. There are many free CE courses within the site for nursing professionals. The videos and brochures are professionally made and well-designed to educate the target audience.

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All in all, the Web site reflects the fact that this globally savvy company has not lost sight of its roots and has not lost touch with its first objective: Only First Class is good enough.

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The only thing that you have to think about now is why the patient had numbness and tingling in her hands and feet and an unsteady gait. These are also classic symptoms of megaloblastic anemias such as vitamin B12, but not folic acid deficiency. You requested the Schilling test to verify your thinking and nail down a final diagnosis: This patient has pernicious anemia.

The physician treated her with parenteral administration of B12 monthly for the rest of her life. She improved within five days and was discharged. Once at home, she was enrolled in a smoking cessation program.

I hope this scenario got you to do some critical thinking about using clinical laboratory data proactively.

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