

# Pancytopenia Associated With Hypothermia

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**Abstract:** This is the first report of pancytopenia associated with moderate hypothermia occurring in an elderly patient, where no other etiologic or associated factors could account for the hematologic abnormalities found. Reversible pancytopenia should be added to the list of hematologic abnormalities that can be seen in patients with hypothermia. (J Am Board Fam Pract 1991; 4:123-4.)

Among hematologic abnormalities in patients with hypothermia, there are reports of thrombocytopenia, polycythemia, erythroid hypoplasia, anemia, sideroblastic anemia, and granulocytopenia.<sup>1</sup> Only one report has been published that described two patients having pancytopenia with concurrent hypothermia and sepsis.<sup>2</sup> Granulocytopenia was found in these two patients, perhaps secondary to concurrent sepsis. Our report describes a case of pancytopenia associated with hypothermia. There was no other etiologic factor (e.g., sepsis) that could account for the pancytopenia.

## Case Report

A 69-year-old woman was brought to the emergency department because of a 2-day history of increasing lethargy and anorexia. She lived alone in a home that was heated primarily by a kitchen stove, and her admission coincided with an early spring cold spell in Baltimore, MD. She had fallen 5 days before admission, apparently without injury. Her medical history noted moderately severe Alzheimer disease for 5 years.

At admission, her temperature measured by a core rectal thermometer was 88°F (31.1°C). Examination showed a thin obtunded black woman with shallow respirations. Her blood pressure was 78/56 mmHg; heart rate, 54 per minute; respirations, 14 per minute. Her pupils were sluggishly reactive to light. Her neck was stiff, and there was no palpable goiter. Heart and lung examinations were normal apart from the bradycardia and some shallow respirations. Her abdomen was soft, and bowel sounds were dimin-

ished. She moved all four extremities in response to painful stimuli. Muscle tone was generally increased, but tendon reflexes were symmetrical and slightly delayed. Plantar response was downgoing bilaterally.

## Laboratory Studies

The results of her laboratory tests are shown in Table 1. There was no infiltrate on her chest radiograph and cranial computed tomography showed moderate cerebral atrophy. Her ECG showed a sinus bradycardia, left ventricular hypertrophy, and a prolonged QT interval.

## Hospital Course

The patient was admitted and treated with active external rewarming (AER). We prescribed empiric broad spectrum antibiotics and administered intravenous fluids because of presumed sepsis and dehydration. Rewarming took place at a rate of 0.7°F/hour. Within 24 hours, her temperature was normal. Her mental status continued to be abnormal, but no focal neurological findings were observed.

A lumbar puncture revealed no red or white cells in the cerebrospinal fluid, and Gram stain was negative. An EEG showed diffuse electrical slowing without focal activity. Abdominal sonography showed a normal liver and gallbladder.

Following admission, a number of hematologic abnormalities occurred. After 3 days, the hemoglobin level decreased to a nadir of 90 g/L (9.9 g/dL). That same day her white cell count was  $2.3 \times 10^9/L$  (2300/mm<sup>3</sup>), and her platelet count  $72 \times 10^9/L$  (72,000/mm<sup>3</sup>). The peripheral blood smear showed occasional burr cells, helmet cells, one plasma cell, and one nucleated red cell. Thyroid tests were normal apart from a very mildly elevated thyroid-stimulating hormone (TSH) level 5.7  $\mu U/mL$  (normal values for

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**Table 1. Laboratory Results.**

Component	SI Unit	Present Unit
Hemoglobin	152 g/L	15.2 g/dL
Hematocrit	0.58	58.8%
White cell count	$2.5 \times 10^9/L$	2500/mm <sup>3</sup>
Segmented neutrophils	0.58	58%
Band forms	0.06	6%
Lymphocytes	0.27	27%
Monocytes	0.07	7%
Thrombocytes (platelets)	$102 \times 10^9/L$	102,000/mm <sup>3</sup>
Sodium	142 mmol/L	142 mEq/L
Potassium	4.5 mmol/L	4.5 mEq/L
BUN	7.9 mmol/L	22 mg/dL
Creatinine	70 $\mu$ mol/L	0.8 mg/dL
Glucose	4.06 mmol/L	73 mg/dL
Osmolality	284 mmol/kg	284 mOsm/kg
ASAT (SGOT)	70 U/L	70 U/L
ALAT (SGPT)	72 U/L	72 U/L
Albumin	26 g/L	2.6 g/dL
Ammonia	20 $\mu$ mol/L	20 $\mu$ g/dL
Partial thromboplastin time	33.4 sec (control 24.3 sec)	

laboratory 0.68–5.4  $\mu$ U/mL). Blood, urine, and cerebrospinal fluid cultures were sterile.

Seventy-two hours after admission, the patient's mental status returned to her baseline state of moderate cognitive impairment. Antibiotics were discontinued because there was no clinical, laboratory, or radiographic evidence of infection.

A bone marrow aspirate and biopsy showed a reduction of precursors of all cell lines. Serum folic acid level and Vitamin B<sub>12</sub> were normal. The serum ferritin level was elevated to 424  $\mu$ g/L (424 ng/mL) (normal values 16–330  $\mu$ g/L).

Gradually the patient's hematologic measures returned to more normal values. Laboratory studies drawn 4 weeks prior to admission showed a hemoglobin of 130 g/L (13 g/dL), hematocrit 0.39 (39.3 percent), and white count  $4.1 \times 10^9/L$  (4100/mm<sup>3</sup>). Upon discharge, 1 week after admission, the patient's white cell count was  $4.5 \times 10^9/L$  (4500/mm<sup>3</sup>), hemoglobin was 109 g/L (10.9 g/dL), and the platelet count was  $177 \times 10^9/L$  (177,000/mm<sup>3</sup>). Other laboratory values on discharge were ASAT (SGOT) 38 U/L, ALAT (SGPT) 35 U/L, partial thromboplastin time 35 seconds. The patient was discharged home to her daughter's care having returned to her baseline functional status, which was ambulatory and self-feeding.

## Summary

This patient presents the unusual clinical picture of moderate (defined as core body temperature of 30–32°C [86–89°F]) hypothermia together with pancytopenia. The two previous cases of pancytopenia associated with hypothermia were in middle-aged patients, each of whom died of sepsis.<sup>2</sup> Our patient manifested many of the other well-described clinical signs and symptoms of hypothermia, such as bradycardia, prolonged QT interval, elevated levels in liver function tests, prolongation of the partial thromboplastin time, mild prerenal insufficiency, and hypotension.<sup>3</sup> All of these abnormalities also showed marked improvement upon rewarming with near or low normal levels for each component at the time of discharge a week after admission.

The pathophysiology for hematologic abnormalities in hypothermia is not fully understood. Postulated reasons for these abnormalities are sequestration of platelets in the spleen, concomitant nutritional deficiencies, and blood loss because of hemorrhagic pancreatitis.<sup>3,4</sup>

Hematologic abnormalities have been described rarely in patients with hypothermia. In the previous report of pancytopenia associated with hypothermia, the author believed the association was unlikely to be coincidental.<sup>2</sup> Both patients died of concomitant sepsis, which may have been a confounding factor in the etiology of the pancytopenia. Our case supports that conclusion, because the normalization of her hematologic abnormalities after rewarming makes it highly likely that pancytopenia can occur in hypothermic patients even in the absence of sepsis.

## References

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