A 47-year-old woman with myasthenia gravis treated with azathioprine, prednisone, and plasmapheresis was admitted for respiratory failure following 2 weeks of fever with splenomegaly, jaundice, coagulopathy, and pancytopenia (white blood cells, $1.1 \times 10^9/L$ with 64% neutrophils; hemoglobin, 9.5 g/dL; platelets, $79 \times 10^9/L$) but no substantial schistocytosis. Triglyceride (330 mg/dL) and ferritin (7562 ng/mL) levels were elevated; fibrinogen level was decreased (52 mg/dL). Soluble CD25 level was markedly elevated (17 092 U/mL), and natural killer cell activity was absent. Plasma was positive for cytomegalovirus (CMV) DNA. Bone marrow examination revealed prominent histiocytic hyperplasia with numerous hemophagocytes (panels A-C). Rare large cells with CMV cytopathic effects (panel D) were also present (confirmed by immunohistochemical staining; panel E). A diagnosis of hemophagocytic lymphohistiocytosis (HLH) accompanied by CMV infection was rendered.

HLH is a systemic inflammatory syndrome associated with impaired cytotoxic activity. Morphologic demonstration of hemophagocytosis is 1 of 8 criteria used to diagnose HLH, but it may not always be apparent at disease onset. Familial HLH has been linked to several specific genetic abnormalities. The etiology of acquired HLH is less clear and may be associated with infection, autoimmune disease, or malignancy. Several reports describe Crohn disease patients on thiopurine immunosuppressive therapy who have developed HLH following CMV infection. This patient eventually recovered following administration of etoposide, dexamethasone, and valganciclovir.

For additional images, visit the ASH IMAGE BANK, a reference and teaching tool that is continually updated with new atlas and case study images. For more information visit http://imagebank.hematology.org.
Cytomegalovirus-associated hemophagocytic lymphohistiocytosis in a patient with myasthenia gravis treated with azathioprine

John K. Frederiksen and Charles W. Ross