muscles. On 14 August her serum creatinine concentration was 88 μmol/L. On 25 August, Puumala virus–specific antibodies (IgG titer, 1:1,024) were detected in the patient's serum by indirect immunofluorescence (IPH [Institut Pasteur humain] 90-13 strain; Institut Pasteur, Paris) while the first serum specimen was rerun in parallel and confirmed to be negative for Puumala virus. An extensive search for other infectious illnesses associated with Guillain-Barré syndrome was negative.

We conclude that our patient presented with Guillain-Barré syndrome that was probably associated with Puumala virus–related nephropathia epidemica. Guillain-Barré syndrome associated with hantavirus infection might not be as rare as is currently believed. Thus, in areas where nephropathia epidemica is endemic, serologic tests for specific antibodies to hantaviruses should be performed for patients with Guillain-Barré syndrome.

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Disseminated Abscesses Caused by *Rhodococcus equi* in a Patient with Chronic Lymphocytic Leukemia

SIR—*Rhodococcus equi* is a gram-positive, aerobic, non-spore-forming bacillus usually found in soil and in the feces of herbivores. It is a well-known pathogen in animals, especially in foals, but it only rarely causes infection (predominantly pneumonia and lung abscesses) in humans. We describe the case of a patient with chronic lymphocytic leukemia in whom two subcutaneous abscesses of the head and neck and one intraabdominal abscess near the right adrenal gland developed; the only bacterium isolated from purulent material was *R. equi*.

A 60-year-old man with chronic lymphocytic leukemia had been treated with chlorambucil for 5 years before he developed autoimmune hemolytic anemia with progressive lymphadenopathy and lymphocytosis (117,000 cells/mm^3) in April 1993. He continued to receive therapy with chlorambucil. After treatment with prednisone (40 mg/d), the hemoglobin levels returned to normal; transfusions were not necessary. Therapy with prednisone was continued until a subcutaneous swelling appeared 4 months later on the right side of the patient's forehead; a similar process was found on the left side of his neck, and both measured 10 × 10 cm. His absolute leukocyte count was 55,000/mm^3, with 80% lymphocytes, 14% granulocytes, 2% monocytes, and 4% large unstained cells. Gamma globulin levels were reduced to 450 mg/dL.

A radiograph of the skull demonstrated osteolytic lesions adjoining an apparent tumor. Purulent material was obtained from the lesions, and gram staining of the material revealed abundant polymorphonuclear leukocytes together with intracellular and extracellular gram-positive coccobacilli. There were no histologic signs of leukemic infiltrates, and culture of the material yielded pure growth of aerobic, red-pigmented, gram-positive coccobacilli, which were identified as *R. equi* both by conventional biochemical tests and by API Coryne identification system (no. 3110004; bioMérieux, Marcy l'Etoile, France). Disk diffusion on Mueller-Hinton agar (National Committee for Clinical Laboratory Standards) showed that the organism was susceptible to amoxicillin, imipenem, erythromycin, vancomycin, and rifampin. The patient had no clinical signs of pulmonary infection, and although a chest roentgenogram and an ultrasonogram of the abdomen showed generalized lymphadenopathy, no abscesses were evident.

The patient was treated with oral amoxicillin (750 mg t.i.d.) for 10 days, and therapy with prednisone was tapered off. Debridement of the lesions was again necessary 6 weeks later; cultures of specimens from the lesions still yielded *R. equi*. Treatment with erythromycin (500 mg q.i.d.) and rifampin (600 mg q.d.) was started. Six weeks later (November 1993) both lesions had resolved, and therapy was stopped.

A month later the patient complained of abdominal pain, and he had intermittent fever. Ultrasonograms of the abdomen now showed an abscess near the right adrenal gland, and this abscess was surgically drained. The pus yielded *R. equi* in pure culture, and it had the same susceptibility pattern as the previous isolates. Therefore, treatment with erythromycin and rifampin was started again. The patient's fever subsequently abated, and he was transferred to a hospital close to his home. He left the other hospital against medical advice; shortly thereafter he died at home. An autopsy was not performed.

R. equi was first reported as a cause of human disease in 1967 [1]. Our patient owned two ponies; therefore, he had a history of contact with farm animals, which is a risk factor for *R. equi* infection. About 60 cases of *R. equi* infection have been reported in patients with impaired cell-mediated immunity, mainly in those who are infected with the human immunodeficiency virus [2–4]. Although *R. equi* isolated from our patient appeared to be susceptible to amoxicillin in vitro, treatment with this agent clearly failed. Moreover, the use of monotherapy to treat infections due to *R. equi* has generally not been effective. Combination therapy with a macrolide and rifampin, agents that concentrate in macrophages, is necessary for cure in most cases of *R. equi* infection [3].

To our knowledge, this is the first reported case of a patient without AIDS who had a disseminated *R. equi* infection that did not involve the lungs or intestines. Chronic lymphocytic leuke-

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Clinical Infectious Diseases 1995;20:478–9

1058–4838/95/2002–0049$02.00

mia, which is associated with deficient humoral immunity, is not known to be a specific risk factor for *R. equi* infection. Long-term corticosteroid use was the major predisposing factor in our patient's case. The source of the infection was probably his ponies.

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Fungal Infections Found During Autopsies: A Report from Spain

SIR—Fungi are emerging as important nosocomial pathogens, particularly in patients with cancer, in transplant recipients, in patients infected with the human immunodeficiency virus (HIV), and in those admitted to intensive care units [1]. However, the exact incidence of nosocomial mycoses has been difficult to assess because of the low sensitivity of mycological laboratory methods and the difficulty in obtaining tissue from seriously ill patients for histopathologic examination. To assess the prevalence and type of fungal infections at our institution, we did a retrospective survey of autopsy findings for patients who died in our hospital during the last 8 years.

We reviewed the records of all autopsies performed in our institution between January 1986 and December 1993. Our hospital is a tertiary care teaching institution with an average of 48,000 admissions per year. The following information was obtained from each record: age and sex of the deceased, underlying disease, presence of fungal infection, and type of fungal infection and organs involved. Tissue sections were stained with hematoxylin and eosin and with special methods such as periodic acid–Schiff reaction and/or Grocott-Gomori methenamine–silver nitrate staining.

A diagnosis of candidiasis was made if blastoconidia and/or pseudohyphae were seen in tissue samples; a diagnosis of aspergillosis was made if tissue invasion by dichotomously branching hyaline septate hyphae was seen; and a diagnosis of zygomycosis was made if tissue invasion by predominantly aseptate hyphae with nonparallel borders was seen. Mycoses were defined as superficial, deep mucosal, invasive, or disseminated. Superficial mycoses involved skin and the mucosa of the body orifices (i.e., mouth and vagina). Deep mucosal mycoses involved the mucosa of the digestive tract, the urinary tract, trachea, and bronchi. Invasive mycoses involved the parenchyma of the internal organs. Disseminated mycoses involved at least two noncontiguous organs.

Patients were categorized according to level of risk for developing fungal infections. High-risk patients were those infected with HIV, those who had undergone organ transplantation, and those with leukemia or lymphoma. Low-risk patients were those with other underlying diseases as well as those with solid tumors or connective tissue diseases. We determined the autopsy rate for various patient groups during the study period: ~6% of autopsies were performed on patients from the general hospital population, 10% on patients with leukemia or lymphoma, 20% on solid organ transplant recipients, and <1% on patients with HIV infection.

A high prevalence of mycoses were found during autopsies of patients with HIV infection, during autopsies of patients who had undergone organ transplantation, and during autopsies of patients with leukemia or lymphoma (table 1). Mycoses were found in such patients >20 times more often than in patients with other underlying conditions. However, we can not exclude the possibility of bias in this number because the autopsy rates were not the same for all patient groups. Recent studies have identified fungal infections during ~25% and 35% of autopsies performed on patients who have died of cancer or who have died after bone marrow transplantation, respectively [2, 3]. In our study, half of the mycoses were invasive and the other half were deep (involving the mucosa of the digestive tract) *Candida* species was the causative agent in most of the cases, followed by *Aspergillus* species; the zygomycetes were rarely causative agents (table 2). We found a correlation between *Candida* species and HIV infection and between *Aspergillus* species and organ transplantation. The lung and the esophagus were the two organs most frequently involved (table 3).

Autopsy-based studies of fungal infections may provide important complementary information for estimating the prevalence of mycoses in hospitalized patients, for assessing trends,

Table 1. Prevalence of mycoses found during autopsies performed from 1986 to 1994 at a tertiary care teaching hospital in Spain.

Patient group	Autopsies (*n*)	No. with mycoses (%)
High-risk patients	69	16 (23.18)*
HIV infection	20	7 (35)
Organ transplant recipients	32	6 (18.75)
Leukemia/lymphoma	17	3 (17.64)
Low-risk patients	563	6 (1.06)*
Total for all groups	632	22 (3.5)

* Difference: 22.1%; 95% confidence interval: 17.5%–26.7%; $P < .001$.

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