disseminated candidiasis and/or fungal colonization of the bowel. The normal appearance of the liver and spleen on ultrasonographic examination and, in the second patient, on CT scan (the most sensitive, noninvasive procedure available for screening for this disease) and, to a lesser degree, the absence of *Candida* in stool cultures from both patients made this diagnosis improbable. The laparotomy revealed a gangrenous cholecystitis with normal liver and spleen.

The fact that *Candida* was recovered from pure bile cultures after disseminated candidiasis in patients without previous biliary symptoms and the histological finding of yeast organisms in the mucosa of the gallbladder wall strongly suggest a pathogenic role of these fungi as causative agents of the two cases of cholecystitis presented and not just as bile colonizers.

In summary, we report two cases of gangrenous cholecystitis that were probably due to *Candida* spp. (*C. parapsilosis* and *C. albicans*), findings not previously described in patients with disseminated candidiasis.

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Bottled Lemon Juice—A Cryptic Source of Invasive *Candida* Infections in the Immunocompromised Host

Colleagues—We followed with interest the recent discussion in the *Journal* of disseminated candidiasis in heroin abusers [1–3]. Lemon juice was found to be the likely vehicle of *Candida* infections in these patients [2–6]; *Candida* spp. grow well and even selectively in lemon juice [2–5].

So far, candidal infections transmitted through lemon juice are described only in heroin abusers. We recently observed a nosocomial outbreak of *Candida krusei* infections in our hospital [7]. Over a four-month period, five immunocompromised patients with hematologic or oncological diseases experienced infection with this rare opportunistic yeast. One patient had a disseminated infection, one had a fungemia, two had pulmonary diseases, and one had a tonsillary infection. Seven more patients were colonized. Infection was defined as the presence of the clinical signs and symptoms of infection and either more than one culture of blood that was positive for *C. krusei* or identification of the yeast in tissue obtained by biopsy or at autopsy. The growth of *C. krusei* in surveillance cultures done for asymptomatic patients was considered to be colonization. Three of the 12 patients died of pulmonary or disseminated *C. krusei* infection. Before that time we had never observed a systemic infection due to this yeast in our hospital.

Epidemiological investigations included examination of nose and throat swabs taken from 120 patients' contacts, of samples from the hospital water system and the air-conditioning system, and of 100 alimentary samples. All but one culture for yeast were negative for *C. krusei*. The single positive culture was from the kitchen of the hospital. *C. krusei* was grown from lemon juice kept in a single refill bottle used for preparing salad dressing and desserts. All samples of lemon juice from seven original packages were sterile. Retrospectively, it was not possible to determine whether culture-positive patients were more likely to have received *C. krusei*-containing foods from the kitchen. Molecular epidemiological studies could not be done. Contaminated lemon juice as the source of infection therefore remains hypothetical.

After destroying the contaminated bottle of lemon juice, we detected *C. krusei* in only three additional patients (one with pneumonia, two were colonized) over the following 15 mo. This rate of detection corresponds to a 10-fold decrease in the prevalence of this yeast compared with the findings during the epidemic period (4% vs. 0.4% of all yeast isolated).

For economical and practical reasons, refill bottles are widely distributed in community kitchens. Various products bought cheaply in large-volume packages are kept for use in small, handy bottles. Such refill bottles may be in use for months without being washed or exchanged. They may be the unexpected source of many more nosocomial infections.

On the basis of our experience, there is a strong suspicion that contaminated lemon juice can cause not only parenteral but also food-borne infections with *Candida* spp., at least in immunocompromised patients. Contamination of lemons with *Candida albi-*

cans may occur through their handling by asymptomatic persons who are colonized with this yeast [4]. This route of transmission was probably the same as the one we observed. It had also been demonstrated that commercially prepared frozen fruit juices, such as apple, grape, orange, and limeade, can be contaminated with several *Candida* spp. [8]. These juices could well be an unsuspected source of yeast infections in the immunocompromised host.

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Hair Clipping: Another Hazard for Granulocytopenic Patients?

COLLEAGUES – Infections caused by *Pseudomonas aeruginosa* and other aerobic gram-negative bacilli remain a common cause of morbidity and mortality among patients with acute leukemia who become severely neutropenic [1]. This fact has prompted many investigators throughout the years to develop several strategies for preventing these infections. Some of the most commonly known strategies include the use of antibiotic prophylaxis; the continuous bacteriologic surveillance of skin, throat, and stool; diet changes, especially in regard to salads and juices; the avoidance of fresh flowers and carpets; better teeth-brushing methods and care of the mouth and anus; and the avoidance of water-related activities [2, 3].

A common practice among cancer patients receiving chemotherapy is to shave their heads for aesthetic and emotional reasons, because some of the chemotherapeutic agents cause substantial, but not total, hair loss. Excluding general hygienic principles, we have been unable to provide specific guidelines advising these patients when to have their hair clipped. Furthermore, even though some reports have shown that infections from contaminated mascara can occur, no reports of infection from commonly used beauty preparations such as shampoos, lotions, and creams were found [4, 5]. We report here, however, that two patients with acute leukemia and profound neutropenia developed scalp infections due to *P. aeruginosa*, which had been acquired from contact with contaminated, diluted shampoo.

Case reports. Patient 1. After partial hair loss due to chemotherapy (vincristine and cytarabine), a 59-y-old woman with acute myelogenous leukemia had her hair clipped at our institution's beauty salon. Her total white blood cell count that day was 900 cells/mm^3, with only 40% neutrophils. Five days later she noticed fever, itching of the scalp, and a maculopapular rash that was diagnosed as folliculitis. Cultures yielded *P. aeruginosa* serotype 0:11. Despite immediate antibiotic therapy, the rash persisted for 10 d, but the infection eventually cleared.

Patient 2. A 70-y-old woman received induction therapy with vincristine and doxorubicin. She later received several antibiotics to treat a fever. The fever subsided, and she began receiving prophylactic trimethoprim-sulfamethoxazole on an outpatient basis. She had her hair clipped at the same beauty salon (15 d after patient 1 had visited it). Her white blood cell count that day was 1400 cells/mm^3, with fewer than 100 neutrophils. Two days after her visit, she developed cellulitis of the scalp; the scalp was sore and secreted yellow fluid. She started receiving cephalexin orally and applying bacitracin ointment locally, but the next day she was lethargic and febrile. The culture taken the day before had yielded *P. aeruginosa*. She was admitted to the hospital in septic shock and had swelling of the entire right side of the face and head, including the eye and ear. Results of a chest radiograph and a computerized tomographic scan were normal. Despite administration of appropriate antibiotics, the lesions progressed and became necrotic and ecchymotic during the next two days. She developed disseminated intravascular coagulation and a clinical picture compatible with cavernous sinus thrombosis, and she died the next day. The autopsy showed *P. aeruginosa* invasion of almost every organ, including the brain. The original organism cultured from the scalp was shown to be serotype 0:11.

Investigation. The relative rarity of *Pseudomonas* scalp infections, the occurrence of two such infections within a few days of each other, and the fact that both patients had had recent haircuts in the hospital beauty salon alerted the staff that the infections had probably been acquired in the beauty salon.

A review of salon procedures was instituted. Thorough cleaning and disinfection of all equipment and reusable items was appropriate and was carefully monitored. We found several shampoos and hair conditioners in concentrated form that had to be

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