OUTBREAK SITUATION INVOLVING *LISTERIA MONOCYTOGENES* IN PLATELETS

In October 2004, the American Red Cross (ARC) of Southern California reported platelet products testing positive for *Listeria monocytogenes*. The donor was an asymptomatic 58-year-old Hispanic male who had a long history of platelet donation. The contaminated platelets were destroyed and not released for transfusion. This was the first time ARC of Southern California had identified *L. monocytogenes* in a blood product.

Widely distributed, but rarely commensal among humans, *L. monocytogenes* is a cold-loving bacillus that can cause serious sporadic and epidemic foodborne disease, particularly among people with lowered immune systems, such as the elderly, immunocompromised, pregnant women, and neonates. Common signs and symptoms of listeriosis include fever, muscle aches, nausea, diarrhea, headache, stiff neck, confusion, loss of balance, convulsions, premature birth, and stillbirth. Reports of listeriosis usually describe hospitalization with sepsis or meningitis. Risk foods include raw milk, raw-milk products like soft cheese, raw fruits and vegetables, raw or undercooked meats and seafood, and ready-to-eat foods like bagged salads, hot dogs, and deli meats. Because the incubation period of *L. monocytogenes* ranges from 3 to 70 days with a median of 3 weeks, identifying the source of infection is often very difficult.

METHODS

Through the Health Alert Network, ACDC alerted all infection control practitioners in LAC of the platelet findings and requested immediate reports of listeriosis cases not yet reported.

ACDC had a *L. monocytogenes* isolate from the platelets sent to the LAC Public Health Laboratory (PHL) for routine pulsed-field gel electrophoresis (PFGE) analysis using *Asc*I and *Apa*I enzymes. PFGE results are typically submitted to PulseNet, a national database, which the CDC oversee to detect possible outbreaks within 120-day periods.

Aside from collecting routine case data (e.g., clinical presentation, predisposing factors, and food and travel history), for all related cases ACDC developed a hypothesis-generating questionnaire to investigate history of blood transfusion, dental work, excavation around the home, travel, and food history specifics (e.g., purchase location, dates, frequency of consumption, food product brands and names).

RESULTS

In mid-November 2004 CDC informed the PHL of two subsequent cases, one in LAC and one in Colorado, with the same PFGE pattern. Including these three incidents, the pattern appeared only eight times (0.19%) in the national database of 4167 isolates analyzed by *Asc*I and *Apa*I enzymes. LAC had two other isolates with this pattern, one occurring in 2003 and one in 1999.

Case investigation focused on the two 2004 LAC cases. The platelet donor had no risk factors for listeriosis and reported eating only a few risk foods (e.g., hard and soft cheeses). Since 2001, he donated platelets only. The later 2004 LAC case was a 58-year-old Hispanic female who developed symptoms two days after the platelets were collected and died eight days later. Although her surviving relatives recalled her getting a blood transfusion for anemia two months before her illness onset, hospital and hospice records documented only the anemia and not the transfusion. This case had multiple risk factors and ate several risk foods. The only common food between the two cases was mozzarella cheese. The distance between the case residences, different brands of mozzarella, and lack of further cases with history of mozzarella consumption made the cheese an unlikely common source. Including information from the 2003 LAC case and the Colorado case, no epidemiological connections could be made between these four cases other than the PFGE pattern.

DISCUSSION

The most unusual factor revealed in this investigation was that the platelet donor was asymptomatic with no history of recent illness. Estimates of asymptomatic fecal carriage of *L. monocytogenes* among people are as high as 10% [1]. However, listeriosis cases with sepsis normally have fever or at least some other symptom. In a review of 1,036 listeriosis cases in LAC, only one other non-pregnant adult case had sepsis and was asymptomatic. Accordingly, the best explanation regarding the platelet donor is transient bacteremia. Bacterial contamination of blood products has been ascribed to transient bacteremia in the past [2–4]. Because CDC found two other cases with the same PFGE pattern around the same time frame and the PHL confirmed *L. monocytogenes*, environmental contamination, false-positive laboratory results, and skin contamination are unlikely explanations. Furthermore, the platelet donor's lack of predisposing medical conditions probably contributed to his lack of symptoms as the 2003 LAC case and the other 2004 LAC case had risk factors for listeriosis.

Listeriosis caused by transfusion has not yet been reported—at least in the literature. Reasons for not seeing *L. monocytogenes* as a blood contaminant clinically are the same as those for suspecting rates of transfusion-transmitted bacteremia to be higher. Observational bias and under-reporting can easily occur as the majority of listeriosis cases involve patients who are immunosuppressed, leukopenic, and chronically ill. Another reason may be that *L. monocytogenes* has a relatively longer incubation period. In addition, it is rare to see healthy people with asymptomatic bacteremia donating blood.

The critical event for this case report was ARC notifying the health department. Reporting by blood banks and health care facilities are necessary to determine the risks and boundaries of possible outbreaks, particularly if contaminated products are released for transfusion. While the contaminated products were not released in this case, the donation history of the platelet donor became important to determine if he donated RBC units that might have caused the subsequent 2004 cases. Because ARC had a question of the appropriateness of reporting the *L. monocytogenes*-positive platelets, health departments at all levels of government should ensure reporting requirements are clear for various reporting sources—especially now as some blood banks like those of the American Association of Blood Banks (AABB) have started to test all platelet component for bacterial contamination [3].

This investigation revealed that in conducting surveillance for listeriosis, blood-related issues need more scrutiny. While iron-overload has been established as a risk factor for listeriosis [5,6], measurement of this suffers from diagnostic bias because testing really only occurs for patients with repeated transfusions for severe or chronic anemias such as thalassemia major, myelodysplasia (including sideroblastic anemia), moderate aplastic anemia, and Diamond-Blackfan anemia [7]. Given published evidence of iron increasing the growth and lethality of *L. monocytogenes* [8–10], researchers should measure recent history of anemia, blood transfusions, and iron supplements as risk factors for listeriosis.

Conclusion: Although progress in improving blood product safety continues, the possibility of transfusion-transmitted infectious disease and the importance of reporting notifiable diseases to the health department should not be overlooked.

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