An outbreak of listeriosis occurred in the Swindon area of the UK in autumn 2003. Five cases were detected in pregnant women. Four of these women were thought to have eaten prepacked sandwiches from a retail outlet in one particular hospital. Sampling at the supplier detected *Listeria monocytogenes*, which was indistinguishable on molecular testing from the patients' isolates. Recent changes in UK food legislation should help diminish the risk of further outbreaks/cases such as ours occurring.

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Key words: listeria, outbreak, pregnant, sandwiches

**Introduction**

*Listeria monocytogenes* is an uncommon cause of illness in the general population [1]. The annual incidence in European Union countries is 2 -10 cases per million population [2]. In some groups (the immunosuppressed, neonates, pregnant women and their unborn children), it can be an important cause of life threatening bacteremia and meningocencephalitis [1,3].

Outbreaks of listeriosis have most often been related to a food source [4-11]. Because of this risk, pregnant women in the UK are advised to avoid certain foods, such as camembert, brie, chèvre, blue cheeses and pâté [12]. We describe an outbreak in pregnant women that appeared to be linked to consumption of prepacked sandwiches.

**Epidemiology investigation and control measures**

A cluster of five cases of listeriosis in pregnant women and/or neonates was identified over a two month period in the autumn of 2003. These occurred in Swindon (situated in southern England) and the nearby town of Gloucester (approximately 45 km away). One of the patients gave birth in Blackpool, a town in the northwest England, but usually lived in Swindon. None of the cases was fatal. Details are given in the table below.

**Epidemiological information of cases of Listeriosis**

When the two index cases were reported, interviews were carried out by Environmental Health Officers (EHOs) using a standard food and travel history questionnaire. The isolates of *Listeria monocytogenes* were sent for typing to the Health Protection Agency's Food Safety Microbiology laboratory (HPA FSML) in Colindale, London, and were found to have indistinguishable profiles (serotype, phagetype, and genotype).

Two further cases were then detected in the Swindon area, and so investigations to find a common source continued. A second questionnaire was used, asking in more detail about the types of food eaten within the three months before onset of illness. These revealed that, apart from shopping at major supermarket chains, the only other similarity was that three of the patients had eaten prepacked sandwiches from a single retail outlet within the Great Western Hospital, Swindon which they had attended for antenatal appointments, and a fourth patient had probably eaten them on previous antenatal appointments. This fourth case thought she had eaten them but could not be 100% certain due to the long time period asked in the questionnaire and difficulty remembering.

The EHOs visited the outlet and found sandwiches sold during that period had come from two national suppliers and one local supplier. Daily temperature records for all the refrigerators and between pack of sandwiches measurements had been kept, and the refrigeration records were unremarkable. However, the outlet's contract with the local supplier had just been terminated and these sandwiches were no longer available for purchase in the hospital.

An outbreak meeting was held and the following actions were taken: active surveillance was initiated by alerting local Consultants in Communicable Disease Control (CsCDC) and microbiology departments, the outbreak was reported in the national communicable disease epidemiological bulletin (*CDR Weekly*), [13] and the HPA FSML at Colindale was contacted to find out whether any isolates with a similar profile had recently been identified. Case 5 was notified by the local microbiologist and, at the same time, information was supplied by FSML that this was a similar isolate (by typing). Healthcare workers working with pregnant women and neonates in the Swindon area were alerted to the outbreak and the local population was informed via the media (newspaper, radio and television coverage).

The EHOs visited the premises of the local sandwich supplier, and samples of food and environmental swabs were taken for microbiological testing for *Listeria*. A sample from a brie and cranberry sandwich grew *Listeria monocytogenes*, as did environmental samples from the premises (chopping boards, sink plug holes and cleaning sponge). On further serotyping and molecular testing, these were shown to be indistinguishable from blood culture isolates from all the patients at the HPA FSML. They were all typed as serotype 1/2, phage type Y, Amplified Fragment Length Polymorphism (AFLP) type III and were indistinguishable by pulsed field gel electrophoresis (PFGE) using AscI, a rare profile in the UK.

This sandwich supplier voluntarily closed down in order to clean the premises thoroughly. The EHOs also visited the supplier that provided meat and cheese for this sandwich maker. Samples were taken but none yielded listeria.

The hospital retail outlet was given advice about the future purchase of sandwiches (see discussion).
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Discussion

Listeriosis is not a notifiable disease in the UK, and so it can be difficult to recognise outbreaks early. This outbreak was detected because most of the patients (four out of five) presented to the Great Western Hospital in Swindon or had a link with it. A recent survey of European countries showed that surveillance systems are in operation in 16 of the 17 countries surveyed and that in 10 of these countries the infection is statutorily notifiable [2]. If cases of listeriosis were made notifiable in the UK, all known cases would be reported, which would help to detect outbreaks where cases are scattered throughout the UK.

The incubation period for listeriosis can be long (between 3-70 days) [14] and the food questionnaires used in our outbreak investigation had to cover a period of several weeks. The patients may therefore have had difficulty remembering exactly what they had eaten during this period. A link was, however, established for three of the cases (and possibly a fourth) - these patients all remembered eating prepacked sandwiches bought from a retail outlet in the hospital. No link was found for the fifth case. Two previous outbreak reports have found an association with sandwiches supplied by external contractors within hospitals [15,16]. In Cardiff [15], two cases of listeria septicemia occurred in immunosuppressed patients who were day cases in the hospital on the same day, and the only food link found was that both had eaten commercially prepared sandwiches supplied by the hospital. These sandwiches were sampled and grew L. monocytogenes with serogroup, AFLP type and phage type all indistinguishable from the patients’ isolates. Similarly, four cases of listeriosis occurred in and around the city of Newcastle in a two month period [16]. This outbreak was traced back to a caterer who provided sandwiches for the hospital shop. In our outbreak and the outbreaks in Cardiff and Newcastle [15,16], patients who were at risk (that is, immunocompromised or pregnant) visited the hospital and obtained food that was contaminated with Listeria. We consider that providers of food to places with higher than average concentrations of people with lowered immunity, such as hospital retail outlets, providers of food to places with higher than average concentrations of people with lowered immunity, such as hospital retail outlets, should be made aware of the need for the highest possible standards of food hygiene. In January 2006 new food hygiene legislation came into force in the UK enacting EC Regulations. The new guidelines [17] recommend that food businesses manufacturing ready-to-eat foods, which could pose a risk to public health through the presence or growth of L. monocytogenes, should monitor processing areas and equipment for the presence of this organism as part of their sampling plans. In our outbreak and in others [10,11], the environment was shown to be contaminated and may have led to product contamination. The guidelines also recommend that if the food is to be stored before consumption (that is, if it has a shelf life) then L. monocytogenes should not exceed 100 cfu/g during this period. If this level cannot be guaranteed, then it should be absent from 25 g when it leaves the food business operator. We hope that these new guidelines will prevent outbreaks such as the one described here.

In conclusion, we report an outbreak of listeriosis that occurred in pregnant women and was associated with the consumption of prepacked sandwiches (ready-to-eat food) from a hospital outlet. However, recent changes in the UK food legislation, if enforced, should diminish the risk and help prevent further cases/outbreaks occurring in similar circumstances.

Acknowledgements

Thanks to Jim McLauchlin and Kathy Grant of the HPA FSML for providing typing and information, and to Christina Rattigan (Maternity Unit, GWH) and Linda Wearn (Swindon PCT) for assistance with sending out information to healthcare workers.

References


Table

L. monocytogenes, Swindon, United Kingdom, 2003

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<td>+34 days</td>
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<td>Mother: blood culture</td>
<td>Twins born at 29 weeks + 2 days</td>
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<tr>
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<td>+33 days</td>
<td>Fever</td>
<td>Mother: blood culture Baby: blood culture</td>
<td>26 wks</td>
<td>Swindon</td>
</tr>
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<td>5</td>
<td>-20 days</td>
<td>NIL in mother (Breathing difficulty in baby)</td>
<td>Mother: vaginal swab Baby: blood culture</td>
<td>37.5 wks</td>
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During an eight week period in spring 2005, 10 cases of listeriosis were reported in a small area of northwest Switzerland (150,000 inhabitants). Eight cases were in older immunocompromised patients who became ill with bacteraemia (three deaths), and two cases were in pregnant women who had septic abortion. All cases were due to a serotype 1/2a isolate with one of two pulsotypes found by PFGE. Patient interviews quickly revealed that a locally made and distributed soft cheese (known as ‘tomme’) was the food source responsible for the outbreak. Samples of this cheese, and of butter made in the same factory, revealed *Listeria monocytogenes* sv 1/2a of the same pulsovar in amounts of 1000-10000 and 10-100 cfu/g, respectively. The prompt suspension of production, the market recall of the product, and a public alert terminated the outbreak. However, two cases of febrile gastroenteritis due to the same strains were reported within 10 days of product recall. The restricted distribution area of the contaminated cheese and the same strains were reported within 10 days of product recall. The restricted distribution area of the contaminated cheese and the same strains were reported within 10 days of product recall. The restricted distribution area of the contaminated cheese and the same strains were reported within 10 days of product recall. The restricted distribution area of the contaminated cheese and the same strains were reported within 10 days of product recall. This small outbreak of listeriosis reinforces the need for a laboratory-based surveillance system with rapid typing, as well as collaboration between physicians and microbiologists.

**Introduction**

Human listeriosis is endemic in Europe, with an annual incidence varying between 0.3 and 0.7 cases per 100,000 inhabitants [1]. It has only been 25 years since the recognition that human listeriosis is almost exclusively a foodborne disease, and in this time, many outbreaks of varying extent have been reported, mostly in Europe and North America. The food items most often implicated in outbreaks have been dairy products (milk, soft cheese), meat (pâté, rillettes, sausage, and various delicatessen), fish (smoked trout), and vegetables (coleslaw, sweetcorn salad) [2].

Between 1983 and 1987, Switzerland experienced a long-lasting outbreak of listeriosis due to the contamination of a locally produced soft cheese, causing at least 122 cases, of which 31 were fatal [3]. As a consequence of this outbreak, the federal health authorities (Swiss Federal Office of Public Health, SFOPH) designated a National Reference Centre for Listeriosis (CNRL), one of the tasks of which is to collect and characterise *L. monocytogenes* isolates, primarily from humans, but also from animal, food and environmental samples taken in Switzerland. The CNRL operates in close cooperation with the clinical microbiology laboratories and the cantonal (regional) laboratories responsible for environmental surveillance and food safety. The report of culture-confirmed human cases of listeriosis to the SFOPH and the sending of isolates to the CNRL have been mandatory for laboratories in Switzerland since 1988.

Between 1990 and 2005, the annual number of culture confirmed cases of human listeriosis has varied between 14 (in 1990) and 70 (in 2005), corresponding to 0.14 and 0.9/100,000 inhabitants per year [4]. During this time period, the proportions of bacteraemia (40%), central nervous system (CNS) infections (40%), and maternal-fetal infections (20%) remained relatively constant.

**Methods**

The laboratory surveillance consists of confirming the identification of the isolates to the species level and typing the *L. monocytogenes* isolates. Serotyping is carried out as a first step screening method using a commercial agglutination test (Denka Seiken, Tokyo, Japan) based on antibodies specifically reacting with somatic (O) and flagellar (H) antigens. This step is completed with pulsed field gel electrophoresis (PFGE) if a cluster of isolates is observed, based on geographic consideration, multiple cases on a short period of time, or cluster of isolates with identical serotype. PFGE was done following the PulseNet protocol (PFGE after DNA digestion with the enzymes Apa I and Asc I) (http://www.pulsenet-europe.org).

Interviews with patients and analysis of milk products were conducted by the local food authorities, the regional chemistry laboratory (Service de la consommation, Neuchâtel). Patient interviews were carried out face to face or by phone by a specialist microbiologist from the regional laboratory.