Rapid communications

EUROPEAN NETWORK COOPERATION TO IDENTIFY HOTEL AS SOURCE FOR PNEUMONIA CAUSED BY *LEGIONELLA PNEUMOPHILA* SEROGROUP 2

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Here we describe a case of hotel-associated legionellosis in an immuno-competent man caused by *Legionella pneumophila* serogroup 2, sequence type (ST) 39 that was identified through European cooperation.

Legionellae are widespread in aquatic habitats where they live in close association with free living amoebae and ciliated protozoa [1]. The frequency of infection is often underestimated as recently shown in a German-wide study on community-acquired pneumonia [2]. To date, 15 serogroups of *L. pneumophila* have been defined. Serogroup 1 causes 80 to 90% of infections. In contrast, serogroup 2 is rarely isolated from clinical or environmental sources [3]. In fact, only two pneumonia cases caused by this serogroup have been detected in Germany since 1990. It represents less than 0.2% of all isolates from water. Currently, the web-based sequence-based typing schema (SBT) is the method of choice for epidemiological subtyping of [4,5].

Case description

In January 2008, a previously healthy Dutch tourist in his 40s became ill four days after returning home from a visit to Germany and was hospitalised six days after onset of symptoms with acute, chest X-ray confirmed pneumonia. The patient was admitted to the intensive care unit.

The legionella urine antigen test (Binax Now) and serology test (Serion ELISA *Legionella pneumophila* serogroup 1-7) were negative. *L. pneumophila* serogroup 2 was cultured from a sputum sample and later typed as ST 39. No primary illness or immuno-suppressive therapy was known in our patient.

The case was reported through the European Surveillance Scheme for Travel Associated Legionnaires' Disease (EWGLINET; <http://www.ewgli.org/ewglinet.htm>).

Environmental investigation

The German local health authorities were informed by the Dutch authorities that this infection might be related to the patient's visit to Germany. Subsequently, the warm water system of the German hotel where the patient had stayed for several days was inspected

by the local health officers and water samples were taken. They detected *L. pneumophila*, serotyped as non-serogroup 1 (serogroup 2-15 by using a polyvalent reagent) in concentrations of over 10,000 cfu/100ml, which is much higher than the threshold recommended by the European Guideline [6]. In addition, the patient had visited a recreational centre with a whirlpool spa (unrelated to the hotel) which was also shown to harbour *L. pneumophila* in concentrations over 10,000/100ml.

L. pneumophila strains from the hotel as well as from the whirlpool spa were forwarded to the German reference laboratory for Legionella in Dresden. Strains from the hotel were identified as serogroup 2 whereas those from the whirlpool spa were of different serotypes (1 and 6). The whirlpool spa in the recreational centre could therefore be excluded as the source of this infection. Subsequently the serogroup 2 strains from the patient and from the hotel were sequence typed as ST 39 and the results were exchanged with the Dutch authorities via the internet.

Interestingly, five of 13 unrelated serogroup 2 strains in the European SBT database belonged to the disease-causing ST 39. This ST has been isolated previously in a case of travel-associated pneumonia in Germany [9]. Furthermore, the type strain of this serogroup as well as two environmental isolates from Germany and Scotland had ST 39. All other serogroup 2 strains had unique STs that were detected only once each. One may speculate that ST 39 has a greater virulence than other serogroup 2 strains. Thus, we may be looking at the same phenomenon that has been described for serogroup 1, i. e. that some of the STs are more prevalent among clinical isolates and probably represent virulent, disease-causing strains, whereas other STs may be less dangerous [7,9,10]. However, our data are preliminary and need to be further confirmed.

SBT has previously been evaluated for *L. pneumophila* serogroup 1. However it is also useful for genetic subtyping of other serogroups including serogroup 2 as shown in this case report [4,8].

The hotel where the patient stayed is a small building with only seven rooms. Although it is known that large buildings provide a more hospitable environment for legionellae than small buildings,

our case is evidence that even smaller houses may be a source for infections with legionella [11]. As a preventive measure, all water outlets in the hotel were equipped with end stage filters. A complete reconstruction of the water supply system is anticipated.

Conclusions

Surveillance for travel-associated diseases is inherently difficult, because cases or clusters may go undetected for weeks or months [11]. The key role of the microbiological diagnosis is obvious. In our case the commonly used urinary antigen assay was not useful. The diagnosis has to rely on culture or PCR [1].

The source of the described cases of travel-associated legionellosis was the drinking water supply in the hotel and not the whirlpool spa in the recreational centre, although both were heavily contaminated with legionellae. Again this underlines the difficulties in assessing the risk for legionellosis solely based on the number of cultivated legionellae or even on the absence or presence of serogroup 1 which is the most common serogroup associated with human infections.

As many questions on risk assessment are still unsolved, it remains difficult to make scientific recommendations for every possible occasion. However, we found the European recommendations very useful as a pragmatic approach to risk assessment and detection of the source of the infection [6].

This case demonstrated the usefulness of sequence-based typing for *L. pneumophila* serogroup 2. Thus, the source of the infection was clearly established. Furthermore our study underlines the importance of international cooperation between public health authorities and microbiological laboratories in European countries.

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