Serogroup W135 meningococcal disease in Hajj pilgrims

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An outbreak of W135 meningococcal disease occurred in the spring of 2000 among pilgrims returning from Saudi Arabia and their contacts. Clinical isolates from England and France were examined and compared with reference strains from other countries. Characterisation of isolates by a range of typing methods showed them to be of clonal origin (ET-37) and closely related to other meningococci with an established propensity to cause disease clusters. A reappraisal of vaccination strategies for travellers is required.

The annual Hajj pilgrimage to Mecca attracts more than a million Muslim pilgrims from around the world. In 1987, a meningococcal serogroup A, subgroup III epidemic occurred during the pilgrimage, and returning carriers dispersed these bacteria to most countries of the globe. The major epidemics of recent years throughout sub-Saharan Africa have been caused by descendants of these bacteria (unpublished data). Saudi authorities now demand evidence of immunisation with serogroup A meningococcal vaccine from those attending the pilgrimage.

In mid-March, 2000, the national meningococcal reference laboratories in England and France each identified greater than expected numbers of patients with disease caused by serogroup W135 meningococci. A history of recent return from the Hajj or of household contact with travellers was established in a high proportion of these cases. Between March 20 and May 10, 33 cases (including five deaths) of W135 infection were identified in UK residents, of whom 11 had recently returned from the Hajj; the others had had close contact with pilgrims. In France, 19 cases (four pilgrims, 15 contacts), of whom four died, were identified. Reports of Hajj-associated W135 infections have come from the Netherlands, Oman, Kuwait, Singapore, Indonesia, and the USA, while Saudi Arabia has identified more than 200 cases. W135 isolates from England and France were characterised by serotyping, multilocus DNA fingerprinting with pilA, pilD, and cng restriction-fragment-length polymorphism typing, multicolline sequence typing, and pulsed-field gel electrophoresis of meningococcal DNA. Their ancestry and likely source were investigated by comparison with reference isolates to facilitate future recognition of these bacteria and therefore to guide appropriate targeting of vaccination.

The serotype and subtype of the Hajj-associated W135 strains is 2a:P1.2,15. Fifteen English and 19 French W135 isolates were indistinguishable by multilocus DNA fingerprinting, and were closely related to other strains of the ET-37 complex organisms that have caused hyperendemic disease activity, outbreaks, and small epidemics in diverse countries. The first ten clinical isolates obtained (seven British and three French) were all sequence type 11 by multilocus sequence typing, which is the most common sequence type of the ET-37 complex. Isolates of sequence type 11 have typically been serogroup C, but occasional serogroup B, W135, and NT strains have been described. This sequence type is distinct from those found in sporadic W135 infections unassociated with this outbreak. Patterns of DNA digested with SphI and NheI from the first 15 English and French isolates identified were indistinguishable, indicating that the outbreak was clonal. Furthermore, these patterns were closely related to W135, ST11 strains isolated in The Gambia, Mali, and Ghana throughout the 1990s and in the UK during 1999.

Most meningococci that cause outbreaks are from one of several well-defined clonal groupings that are globally dispersed. Recent W135 cases in diverse countries were concurrent and epidemiologically linked to pilgrims returning from Mecca. The molecular results indicate that a W135 clone, which has caused sporadic cases and small clusters in diverse countries during the past decade, was widely transmitted during the Hajj pilgrimage in 2000, infecting those who travelled to Saudi Arabia and contacts in the pilgrims’ countries of residence. The European Union has instituted a rapid reporting surveillance system for serogroup W135, and cases of infection caused by this strain have continued to be identified in the UK, Netherlands, and France—the last occurring more than 8 months after its initial introduction. This contrasts with serogroup A infections which seem much less prone to transmission within industrialised countries; only eight cases in France and four in the UK over the past 5 years have occurred in contacts of Hajj pilgrims or in residents returning from Africa.

The evolving epidemiology of this W135 outbreak is currently being studied, so increased efforts to monitor worldwide disease activity caused by this serogroup are warranted. The results available to date highlight the importance of maintaining strain collections at reference centres and using powerful, reproducible, and portable molecular techniques for the rapid and reliable assignment of unusual disease clusters within a global context.

France, the UK, the Netherlands, Switzerland, Spain, and many African countries have used a bivalent A&C meningococcal polysaccharide vaccine for outbreak control and travel immunisation, whereas others (USA, Canada, Italy, Portugal, Denmark, and Saudi Arabia) routinely use the quadrivalent (A, C, Y, and W135) in the UK and France, a quadrivalent vaccine is used only for prophylaxis among contacts of proven serogroup Y or W135 disease cases. The W135 clusters identified in 2000 and the widespread existence of closely related bacteria in diverse countries indicate that countries currently advocating the use of A&C vaccine should consider recommending quadrivalent vaccines for travellers. Vaccines containing a W135 component might also be required in the event of epidemic disease outbreaks in Africa, where the logistics of vaccine production and distribution need to be considered. Personal and public-health needs will be best served by rapid development and deployment of effective multivalent conjugate meningococcal vaccines.


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