

First Report of *Streptococcus pneumoniae* Serotype 6D in South America[▽]

Streptococcus pneumoniae includes the two serotypes 6A and 6B as well as two recently discovered serotypes, 6C and 6D, in which the *wciN_α* gene is replaced by *wciN_β* within the *cps* locus. Serotype 6D occurrence in Asia (2, 4), the Fiji islands (5) and Europe (7, 9) has recently been reported. To our knowledge, we describe here the first description of serotype 6D isolates identified within the Americas.

Using the CDC serogroup 6 serotyping scheme (8), we identified 155 serogroup 6 isolates within a larger collection ($n = 693$) taken from nasopharyngeal carriage in children <2 years old in Peru (2007 to 2009; 541 strains) (unpublished data) and invasive pneumococcal disease (IPD) surveillance in children in Lima hospitals (2006 to 2009; 152 strains) (reference 10 and unpublished data). Among the 155 serogroup 6 isolates, 26, 105, and 22 isolates were identified as serotypes, 6A, 6B, and 6C, respectively (Table 1). We tentatively identified two 6D isolates on the basis of positive reactions with factor sera for serotype 6B (factor 6c) and serotype 6C (factor 6d) and a negative reaction with factor serum for serotype 6A (factor 6b). We verified the serologic results for all 155 serogroup 6 isolates using a recently developed PCR scheme that efficiently resolves all four serogroup 6 serotypes (6). This scheme discriminates between serotypes 6A/6C and 6B/6D using *wciP* allele-specific reactions. The presence or absence of *wciN_β* determined by a second reaction subsequently allowed resolution into all four serotypes (Table 1).

The two 6D isolates, both from carriage, shared the new multilocus sequence typing (MLST) profile ST6148 (ST6148, 8-8-263-12-6-104-14) and were both fully susceptible to a variety of antimicrobial agents by broth microdilution. ST6148 is unrelated to previously described 6D genotypes on the MLST website (<http://spneumoniae.mlst.net/>, last accessed on 5 January 2011). It is, however, highly related to serotype 6A and 6B isolates both from carriage and invasive disease that were characterized from this same study, differing only at the *recP* allele. These data, together with data published elsewhere, show identical or related

multilocus sequence types shared between serotype 6C or 6D strains containing *wciN_β* and 6A or 6B strains that contain *wciN_α* (3, 4, 7). This suggests that the two different *wciN* genes are frequently horizontally transferred between different serogroup 6 strains in nature to effect intraserogroup 6 capsular switch events. On the basis of these genotype observations it also circumstantially appears likely that in some cases *wciP* is cotransferred with *wciN*, which could effect, for example, a serotype 6A to serotype 6D capsular switch.

In summary, we believe that this is the first reported detection of serotype 6D among pneumococcal isolates recovered in South America or elsewhere in the western hemisphere, despite the fact that our U.S.-based surveillance has been vigilant for its appearance using serologic and PCR-based approaches for 6D detection (3, 8). The work presented here validates serotype 6D as the 92nd serotype identifiable by using CDC pneumococcal typing sera (Table 1). Serotype 6C was not effectively targeted by the pneumococcal 7-valent conjugate vaccine according to recent IPD surveillance data (3); however, there are no existing comparable data for serotype 6D. It is hoped that the recently implemented 13-valent conjugate vaccine (1) will effectively target all serogroup 6 pneumococcal diseases.

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TABLE 1. Quellung and PCR results for 155 serogroup 6 isolates

Serotype	No. of isolates	Reaction with factor serum ^a			Reaction with serotype-specific PCR ^b		
		6b	6c	6d	<i>wciP</i> _{584g} (6A/6C)	<i>wciP</i> _{584S} (6B/6D)	<i>wciN_β</i> (6C/6D)
6A	26	+	–	–	+	–	–
6B	105	–	+	–	–	+	–
6C	22	–	–	+	+	–	+
6D	2	–	+	+	–	+	+

^a Factor sera described by Melnick et al. (8).

^b Method of Jin et al. (6).

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