Streptococcus pneumoniae Serotype 6D
Cross-Reacting with Serotype 6A, 6B, and 6C Factor Sera

We read the papers of Bratcher and Nahm (3) and Oftadeh et al. (8) with interest. Both papers reported that Streptococcus pneumoniae serotype 6D isolates react with factor antisem specific to serotype 6C in addition to that to 6B. Pneumococcal serotype 6C, first reported in 2007, cross-reacts serologically with serotype 6A but is differentiated by a change in the wciN gene (wciN_p) among the cps loci (9). In addition to serotype 6C, the novel serotype 6D has recently been reported in several countries (2, 4, 6, 7). In serotype 6D, it is assumed that wciN_b is inserted into serotype 6B cps loci (2). Thus, it can be speculated that serotype 6D isolates react simultaneously with the factor sera 6c and 6d, which are bound to the serotypes 6B and 6C, respectively, which was confirmed by recent papers (3, 8).

Recently, we found serotype 6D pneumococcal isolates reacting with factor serum 6b (both absorbed and unabsorbed), which is specific to serotype 6A. As a part of a multinational study on invasive pneumococcal infections, we have collected 244 S. pneumoniae serogroup 6 isolates from 11 Asian countries, South Korea, India, Japan, Hong Kong, Malaysia, the Philippines, Saudi Arabia, Sri Lanka, Taiwan, Thailand, and Vietnam, during 2008 and 2009. Serotypes were determined using a conventional Quellung method (Statens Serum Institute, Copenhagen, Denmark). In addition, the serotype-specific PCR method of Jacobs et al. (5) was used to identify serotypes 6C and 6D.

Among the 244 invasive S. pneumoniae serogroup 6 isolates, 73, 144, and 13 pneumococcal isolates were identified as serotypes 6A, 6B, and 6C, respectively (Table 1). Fourteen isolates could be identified as serotype 6D because they reacted with the factor sera 6c and 6d and produced 1.8-kb products with the 5106-3101 primer pair set in PCR. This product indicates that the wciN gene of serotype 6B was substituted by the wciN_p gene. These S. pneumoniae serotype 6D isolates (13 from South Korea and one from Taiwan) were isolated from sputum, tracheal aspirates, and blood. In addition to reacting with factor sera 6c and 6d, these isolates also reacted with factor serum 6b specific to serotype 6A (Table 1). The 14 pneumococcal isolates reacted simultaneously with factor sera 6b, 6c, and 6d.

To our knowledge, no pneumococcal isolates reactive with all the factor sera have hitherto been reported. Oftadeh et al. (8) reported that serotype 6C isolates reacted with unabsorbed factor serum 6b and did not react with absorbed serum and that serotype 6D isolates did not react with both absorbed and unabsorbed sera. However, our serotype 6D isolates reacted with both absorbed and unabsorbed factor serum 6b. It has been suggested that serotype 6D emerged by substitution of the wciN gene with the wciN_p gene from serotype 6B isolates (1, 2). However, the present result may indicate that serotype 6D did not arise simply by such a substitution. Even cps loci other than the wciN_p gene of serotype 6D may differ from those of serotype 6B, which is supported by the finding that the results of PCR using the primer set 5101-3101, targets wchA and wciO, differed between two serotypes. The structure of the cps locus in serotype 6D is now under investigation.

In addition, the finding concerning the presence of S. pneumoniae isolates cross-reactive with serotypes 6A, 6B, and 6C factor sera indicates that serotype 6D isolates may exist in pneumococcal isolates originally identified as serotype 6A. Although it is unknown if there is cross-protection for serotype 6D from serotype 6B that is in the 7-valent, 10-valent, and 13-valent vaccines (PCV7, PCV10, and PCV13, respectively) or for serotype 6D from serotype 6A that is in PCV13, an exact determination of the serotypes of clinical isolates is important with respect to vaccination.

### REFERENCES


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