recommendations, were prospectively enrolled through 45 general pediatric practice facilities in 30 municipalities in Greece. A single oropharyngeal sample was obtained from each subject in a standardized manner (questionnaire, procedure). Based on the time interval since the fourth dose of PCV13, the children sampled were divided into six age groups: 26 days to 71 months after the completion of PCV13 vaccination, and that the non-PCV13 serotypes predominated throughout this period. The carriage rate of PCV13 serotypes 3 and 19A increased significantly as the time interval from the fourth dose of PCV13 increases.

Results: A total of 162 (16.3%) SP specimens were positive for SP via enhanced culture and an additional 163 (16.3%) were positive via fya+ RT–PCR molecular technology. Prevalence of SP carriage was equivalent in children aged 0–2 years and 2–5 years, but greater in children with respiratory tract infections (RTI) compared with children without RTI (26.5% vs. 9.6% among culture+ specimens only; and 43.2% vs. 25.8% among combined culture+ and molecular+ specimens). Using enhanced culture only, vaccine serotypes (VST) were identified in 4 (1%) of 450 children <2 years and 14 (2.6%) of 545 children ≥2 years; adding molecular positive specimens increased the frequency of VST to 2.9% in children <2 years and 4.6% in children ≥2 years (table).

Conclusion: Combining molecular technology with enhanced culture reveals an increased prevalence of vaccine serotype colonization in young children. The ability of sensitive molecular methods to detect vaccine serotypes in culture-negative specimens suggests that low-density vaccine serotype carriage persists in a highly immunized pediatric population. The importance of culture negative but RT-PCR positive carriage for the transmission of importance culture negative but RT-PCR positive carriage for the transmission of vaccine serotypes is not significant. Serotypes 3 and 19A were the two most commonly identified VST.

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2704. Molecular Technology to Detect Pneumococcal Colonization in Young Children Reveals Increased Prevalence of Vaccine Serotypes as Compared with Enhanced Culture Methods

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Background: Human challenge studies demonstrate enhanced sensitivity of molecular technology for identification of vaccine serotype pneumococcal (SP) carriage in PCV13 immunized adults. We hypothesized that PCV13 immunized children would similarly harbor vaccine serotypes in their nasopharynx (NP) that could only be identified by molecular technology.

Methods: We compared use of enhanced microbiologic culture vs. molecular technology to characterize SP colonization among NP swabs collected from 995 healthy or sick children <5 years old at Boston Medical Center from November 2015 to May 2017. NP specimens were broth enriched for 4 hours and cultured on selective blood agar. Specimens were evaluated for presence of SP using both routine microbiologic methods and RT-PCR. RT-PCR assays targeted the fya and piaA (SP membrane permease) genes, and 26 SP serotypes: all serotypes included in 13-valent pneumococcal conjugate vaccine and 13 prevalent non-vaccine serotypes.

Results: A total of 126 (16.3%) NP specimens were positive for SP via enhanced culture, and an additional 163 (16.3%) were positive via fya+ RT–PCR molecular technology. Prevalence of SP carriage was equivalent in children aged 0–2 years and 2–5 years, but greater in children with respiratory tract infections (RTI) compared with children without RTI (26.5% vs. 9.6% among culture+ specimens only; and 43.2% vs. 25.8% among combined culture+ and molecular+ specimens). Using enhanced culture only, vaccine serotypes (VST) were identified in 4 (1%) of 450 children <2 years and 14 (2.6%) of 545 children ≥2 years; adding molecular positive specimens increased the frequency of VST to 2.9% in children <2 years and 4.6% in children ≥2 years (table).

Conclusion: Combining molecular technology with enhanced culture reveals an increased prevalence of vaccine serotype colonization in young children. The ability of sensitive molecular methods to detect vaccine serotypes in culture-negative specimens suggests that low-density vaccine serotype carriage persists in a highly immunized pediatric population. The importance of culture negative but RT-PCR positive carriage for the transmission of vaccine serotypes is not significant. Serotypes 3 and 19A were the two most commonly identified VST.

Disclosures. All authors: No reported disclosures.

2705. Serotype Replacement Following Childhood Pneumococcal Conjugate Vaccination Programs in British Columbia, Canada

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Background: Pneumococcal conjugate vaccines have substantially reduced the incidence of invasive pneumococcal disease (IPD); however, the impact of the vaccine on non-vaccine serotypes (NVT) remains unclear. We evaluated the effect of PCV13 use in British Columbia, Canada.

Methods: The annual incidence following implementation of PCV7 (September 2004), and PCV13 (September 2010) was calculated using provincial laboratory surveillance data. We also compared incidence rate ratios (IRR) against pre-PCV13 (2004–10) and pre-PCV7 (2002–03) baselines using Poisson regression for non-conjugate vaccine type IPD. Results: A total of 4,490 cases were reported over the 14 year period. The overall annual incidence increased from 5.73 cases per 100,000 population in 2002 to 7.90 cases per 100,000 population in 2015. Compared with baseline, PCV7 reduced VT-IPD (IRR: 0.49; 95% CI: 0.42–0.56), but the additional 6 serotypes in the PCV13 vaccine caused 214% increase in IPD (IRR: 2.65; 95% CI: 2.12–3.39). The majority of this increase is related to an increase in NVT disease (IRR: 3.17; 95% CI: 2.62–3.87) such as 23B, 23A, 9N, 20, 33F, 15C, 17F and 6C. IPD from PCV13 vaccine serotypes 19A and 7F which emerged after PCV7 continue to be high.

Conclusion: The introduction of PCV13 has a modest impact on IPD rates, due to inadequate control of serotypes 19A and 7F, and of, and, concern, IPD rates continue to escalate due to serotype replacement by non-vaccine serotypes.

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2706. Indirect Effects of Infant 13-valent Conjugate Pneumococcal Vaccination Program on Invasive Pneumococcal Disease in Adults in British Columbia, Canada

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Background: The introduction of PCV13 has a modest impact on IPD rates, due to inadequate control of serotypes 19A and 7F, and concern, IPD rates continue to escalate due to serotype replacement by non-vaccine serotypes.

Disclosures. All authors: No reported disclosures.
Background: Many jurisdictions report a significant reduction in invasive pneumococcal disease (IPD) in adults following implementation of the pneumococcal conjugate vaccines, 7-valent (PCV7) and 13-valent (PCV13) in childhood immunization programs. This study evaluates the indirect effect of conjugate vaccines on IPD in British Columbia, Canada over a 14 year period (2002–2016).

Methods: Using provincial IPD laboratory surveillance data, we calculated the annual incidence following implementation of PCV7 (September 2004), and PCV13 (September 2010) in adults 18 years of age and older. We also compared incidence rate ratios (IRR) against pre-PCV13 (2004–2010) and pre-PCV7 (2002–2003) baselines for overall and age-specific IPD rates using Poisson regression.

Results: A total of 3793 cases were reported over the 14 year period. The overall annual incidence increased from 4.32 cases per 100,000 population in 2002 to 8.61 cases per 100,000 population in 2015. Overall, IPD has increased by 80% (IRR: 1.80; 95% CI: 1.59–2.04) compared with baseline, especially in adults ≥ 85 years of age (PCV13 vs baseline: IRR: 1.90; 95% CI: 1.25–3.03). This increase was the highest after introduction of PCV7 (IRR: 1.87; 95% CI: 1.65–2.11); the incremental change after introduction of PCV13 was non-significant (IRR 0.96; 95% CI: 0.90–1.03). While PCV7 type IPD plummeted by 76% (IRR 0.24; 95% CI: 0.18–0.31) since introduction of PCV7 compared with baseline, a modest decline in PCV13 type IPD of 20% was seen (IRR 0.80; 95% CI: 0.71–0.89) since introduction of PCV13.

Conclusion: Although PCV7-type IPD has decreased substantially, only a modest reduction in IPD due to 6 serotypes in the PCV13 vaccine was observed.

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2707. Non 13-Valent Pneumococcal Conjugate Vaccine Serotypes Predominate as Causes of Pneumococcal Otitis Media in Children

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Background: Pneumococcal acute otitis media (AOM) in children due to vaccine-related serotypes (ST) has declined after the introduction of the 13-valent pneumococcal conjugate vaccine (PCV13), although some serotypes, such as 3, 19A and 19F have persisted. Among non-vaccine serotypes, 35B has been shown to contribute substantially to both OM and invasive infections. This study describes the current epidemiology of pneumococcal OM isolates obtained from the U S Pediatric Multicenter Pneumococcal Surveillance Group (USPMPSG).

Methods: From the USPMPSG database, we collected data from patients <18 years of age with pneumococcal OM isolates from 2014 to 2018. Analysis included demographic, immunization status, antimicrobial susceptibility data and serotype. Statistical comparisons included Fisher’s exact and Wilcoxon rank-sum tests.

Results: A total of 494 patients with isolates were identified within the time period from January 1, 2014 to December 31, 2018. The median age was 1.7 years (range 0-17.6) and 299 (60.1%) were male; 176 (35.7%) had an underlying condition. Thirty-two patients had received no dose of either PCV7 or PCV13. Thirty-five serotypes were identified (3 isolates were untypeable), of which 6 serotypes [35B (16.8%), 3 (9.5%), 15A (7.9%), 15B (7.9%), 23B (7.9%) and 23F (4.6%)]. The isolates belonged to 38 sequence types (STs), including 4 newly discovered STs. Of the 4 clonal complexes (CCs), 3 clonal complexes were antibiotic-resistant international clones. CC166 (11.9%) were associated with non-vaccine serotype (NTVs); 11A, 15B/C, 23A and 13. Serotypes of CC320 (10.9%) comprised of serotype 19A and 19F. The main serotypes responsible for CC281 (10.9%) were serogroup 15. New serotype-ST combinations were observed, especially in serotype 13 and serogroup 15. Also, a possibility of capsular switch event was noted between serogroup 6 and serogroup 15A.

Conclusion: The introduction of extended-valency pneumococcal conjugate vaccines (PCVs) has resulted in the change of pneumococcal otitis media isolates in children. This study demonstrates that selective pressure from PCV10/13 caused predominant serotypes to be NVTs and genetic changes such as capsular switch events.

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2709. Immune Response After Diphtheria and Tetanus Toxoid Booster in Patients with Adult-Onset Immunodeficiency with Anti-interferon-γ Autoantibody

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Background: Immunization were the key of prevention in tetanus and diphtheria disease. Nevertheless, in previous observational study, low seroprotection rate of both diphtheria and tetanus were observed in Thai healthy population. Reduced-dose diphtheria and tetanus toxoid vaccine (DT) was recommended to all adult patients regardless of immunologic status. However, data on vaccine efficacy in interferon gamma (IFN-γ) autoantibody were limited. We therefore conducted clinical study to evaluate efficacy and safety of one dose of DT in IFN-γ autoantibody patient compared with healthy individuals at 4 weeks after vaccination.

Methods: Study was conducted from February to April 2019. Total 18 patients with confirmed IFN-γ autoantibody were enrolled. Baseline diphtheria and diphtheria serology study and 4 weeks after vaccination were examined. Antibody levels were measured with a solid-phase IgG-specific ELISAs (EUROIMMUN, Germany). Geometric mean titers (GMTs) were calculated using the log transformation of serological titers and from taking the antilog mean of the transformed values.

Results: Seroprevalence of tetanus was 94.5% in healthy population compared with 60.1% in IFN-γ autoantibody patients. While, seroprevalence of diphtheria was 72.8% and 77.8%, respectively. After vaccination, all healthy adults had reached seroprotection level in both diphtheria and tetanus. For patients with IFN-γ autoantibody, 88.9% and 94.4% had anti-tetanus toxin IgG and anti-diphtheria toxin IgG level above 0.1 IU/mL, respectively. These results indicated seroconversion rate of 71% for tetanus and 75% for diphtheria after DT vaccination. (Table 2). In the subgroup analysis, unboosted IFN-γ autoantibody patient had lower tetanus seroconversion rate compared with previously boosted patient (50% vs 100%). Active infection was also associated with lower immune response after tetanus vaccination. There was no severe adverse event in both group.

Conclusion: This is the first study on immune response after DT vaccination in IFN-γ autoantibody patient. Seroconversion rate of DT vaccine in IFN-γ autoantibody patient were slightly lower than healthy adults. Active infection and previously unboosted patient provided lower immune response of tetanus.