

# A Review of the Clinical Development of MenACWY-TT, a Quadrivalent Meningococcal Vaccine Conjugated to Tetanus Toxoid, in Adolescents

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• This review summarizes 8 multinational phase 2 or 3 studies in adolescents comparing MenACWY-TT to other MenACWY vaccines.<sup>11-18</sup>

# METHODS

- The percentages of subjects with serum bactericidal assay (SBA) titers ≥1:8 using human (hSBA) or rabbit (rSBA) complement are described for primary, booster, and persistence studies when available.
- Geometric mean titers (GMTs) are also described.
- MenACWY-TT safety and reactogenicity data are summarized.

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### **Study Characteristics**

• The 8 studies (3 primary, 5 extension; **Table 1**) included 2 in adolescents and young adults aged 10-25 years<sup>11,12</sup> and 6 in adolescents aged 11-17 years.<sup>13-18</sup> – A total of 3860 participants were enrolled across all clinical studies.

le 1. Clinical Studies Supporting MenACWY-TT (Nimenrix®) Licensure in Adolescents						
	Туре		Subjects			
e	(Identifier)	Design	Age, y	nª	Location	
	Primary (NCT00454909) <sup>11</sup>	MenACWY-TT vs MenACWY-DT	10–25	872	United States	
	Extension (NCT00715910) <sup>12</sup>	Antibody persistence ≤5 y postprimary		312 <sup>b</sup>	United States	
	Primary (NCT00356369) <sup>13</sup>	MenACWY-TT vs MenACWY-PS	11–17°	301	Saudi Arabia, Philippines	
	Extension (NCT00356369) <sup>14</sup>	Antibody persistence ≤5 y postprimary		284	Saudi Arabia, Philippines	
	Extension (NCT01934140) <sup>15</sup>	Antibody persistence ≤10 y postprimary; MenACWY-TT booster		182 <sup>d,e</sup>	Philippines	
	Primary (NCT00464815) <sup>16</sup>	MenACWY-TT vs MenACWY-PS	11–17	1025	India, Philippines, Taiwan	
	Extension (NCT00974363) <sup>17</sup>	Antibody persistence 5 y postprimary		478	India, Philippines	
	Extension (NCT03189745) <sup>18</sup>	Antibody persistence ≤10 y postprimary; MenACWY-TT booster		229	Philippines	

- vaccination (48.9%–97.5%; Figure 3A).
- (Figures 2–4).







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-quadrivalent meningococcal vaccine conjugated to diphtheria toxin; MenACWY-PS=quadrivalent meningococcal olysaccharide vaccine; MenACWY-TT=quadrivalent meningococcal vaccine conjugated to tetanus toxoid. <sup>a</sup>The number of subjects who received vaccination unless otherwise specified.

<sup>b</sup>The number of subjects with the longest follow-up period. <sup>c</sup>Study included subjects aged 11–55 y; however, only data for those aged 11–17 y are presented.

<sup>d</sup>Values at Year 10 are shown.

e177 subjects had immunogenicity assessments for 1 mo postbooster.

### Immunogenicity

 Across studies, MenACWY-TT antibody responses against all vaccine serogroups were comparable with those of other MenACWY vaccines at 1 month postprimary vaccination (Figure 2).



conjugated to diphtheria toxin; MenACWY-PS=quadrivalent meningococcal polysaccharide vaccine; MenACWY-TT=quadrivalent meningococcal vaccine conjugated to tetanus toxoid; rSBA=rabbit serum bactericidal assay.

### RESULTS

• Antibody responses to MenACWY-TT persisted at 5 years postprimary

Similar antibody responses to MenACWY-TT were also observed 10 years postprimary dosing (69.3%–91.2%; **Figure 3B**).

• A MenACWY-TT booster given 10 years after primary vaccination elicited robust antibody responses at 1 month postbooster (Figure 4).

• Similar results were observed for rSBA and hSBA GMTs across all time points

7.9	394.8	131.6	643.8	296.0
(4.8, 13.2)	(316.2, 493.0)	(81.9, 211.4)	(530. <i>7</i> , 781.0)	(202.4, 432.9)
30.6	111.3	90.5	248.6	366.5
(17.3, 54.4)	(84.9, 145.9)	(49.7, 164.8)	(194.2, 318.2)	(224.1, 599.4)
70.4	230.1	10.7	436.9	19.7
37.2, 133.1)	(159.1, 332.9)	(6.9, 16.6)	(324.4, 588.4)	(11.8, 32.9)
129.3	231.6	25.2	1000.2	124.9
77.4, 215.9)	(168.6, 318.2)	(15.0, 42.5)	(824.1, 1214.0)	(71.2, 219.3)

GMT=geometric mean titer; hSBA=human serum bactericidal assay; MenACWY-DT=quadrivalent meningococcal vaccine conjugated to diphtheria toxin; MenACWY-PS=quadrivalent meningococcal polysaccharide vaccine; MenACWY-TT=quadrivalent meningococcal vaccine conjugated to tetanus toxoid; rSBA=rabbit serum bactericidal assay.

# Vaccination<sup>15,1</sup>



#### Safety

- other MenACWY vaccines.

Table 2. MenACWY-TT Safety Profile From Clinical Studies in Subjects Aged 10–25 Years				
Adverse Reaction	Frequency, %			
Primary				
Local reaction				
Pain	26.2–54.9			
Redness	12.3–15.4			
Swelling	9.3–11.4			
General reaction				
Fatigue	29.7°			
Gastrointestinal	18.8ª			
Headache	17.5–33.0			
Fever	7.3ª			
Booster				
Local reaction				
Pain	27.0–58.8			
Redness	5.7–22.9			
Swelling	3.8–15.9			
General reaction				
Fatigue	14.5–34.1			
Gastrointestinal	4.4–16.5			
Headache	15.7–35.9			
Fever	2.4–6.9			
<sup>a</sup> Numerical values were not reported for Borja-Tabora et al. 2013 o	or Bermal et al. 2011.			



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# CONCLUSIONS

- The MenACWY-TT clinical study program demonstrated immunogenicity and safety in adolescents.
- Immune responses persisted through 10 years postprimary vaccination.
- A MenACWY-TT booster dose, given 10 years after primary vaccination, elicited robust immune responses.
- These data support licensure and recommendations for use of MenACWY-TT to prevent serogroups A, C, W, and Y meningococcal disease in adolescents.

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### DISCLOSURES

All authors are employees of Pfizer Inc and may hold stock or stock options.