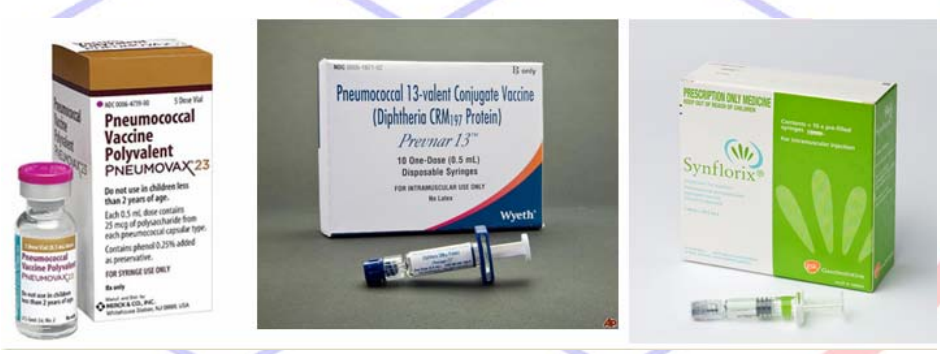
Streptococcus Pneumoniae Vaccines: ELISA Kits, Carbohydrates and Antibodies

Streptococcus pneumoniae, or pneumococcus, is a Gram-positive, alpha-hemolytic, aerotolerant anaerobic member of the genus Streptococcus. The organism causes many types of pneumococcal infections other than pneumonia. These invasive pneumococcal diseases include acute sinusitis, otitis media, meningitis, bacteremia, sepsis, osteomyelitis, septic arthritis, endocarditis, peritonitis, pericarditis, cellulitis, and brain abscess. S. pneumoniae is one of the most common causes of bacterial meningitis in adults and young adults, along with Neisseria meningitidis, and is the leading cause of bacterial meningitis in adults in the world. S. pneumoniae have a polysaccharide capsule that acts as a virulence factor for the organism; more than 90 different serotypes are known, and these types differ in virulence, prevalence, and extent of drug resistance. The genome of S. pneumoniae is a closed, circular DNA structure that contains a core set of 1553 genes, plus 154 genes in its virulome, which contribute to virulence, and 176 genes that maintain a noninvasive phenotype. Genetic information can vary up to 10% between strains. Diagnosis is generally made based on clinical suspicion along with a positive culture from the samples. S. pneumoniae is, in general, optochin sensitive, although optochin resistance has been observed. Worldwide, Streptococcus pneumoniae (pneumococcus) is a significant cause of morbidity and mortality, especially in infants and elderly people. Serotype specific antibodies against the capsular polysaccharides provide protection against the corresponding serotypes. Serotypes specific polysaccharides (free or conjugated to CRM197) are the active ingredients of various vaccines.

A pneumococcal vaccine is a vaccine against Streptococcus pneumoniae. Types include **Pneumococcal polysaccharide vaccine** & **Pneumococcal conjugate** vaccine. The polysaccharide vaccine most commonly used today consists of purified polysaccharides from 23 serotypes (1, 2, 3, 4, 5, 6b, 7F, 8,9N, 9V, 10A, 11A, 12F, 14, 15B, 17F, 18C, 19F, 19A, 20, 22F, 23F and 33F). **Pneumovax-23 by Merck** contains purified polysaccharides from 23 serotypes and it is not conjugated. Pneumococcal conjugate vaccine (PCV) contains polysaccharides conjugated to diphtheria toxin CRM197. There are currently three PCV vaccines available on the global market: Prevnar (called Prevenar in some countries), **Synflorix** and Prevnar 13. **Prevnar-7 or PCV-7** (Wyeth) is a heptavalent vaccine (4,6B,9V,14,18C,19F, and 23F), **Synflorix** (GlaxoSmithKline) is a decavalent vaccine (**PCV-10**), meaning that it contains ten serotypes of pneumococcus (1, 4, 5, 6B, 7F, 9V, 14, 18C, 19F, and 23F). **Prevnar 13/PCV-13** (Pfizer) is a triskaivalent vaccine, meaning that it contains thirteen serotypes of pneumococcus (1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F) which are conjugated to a carrier protein.



Non conjugated vaccine (**Pneumovax**) immunity is induced primarily through stimulation of B-cells which release IgM without the assistance of T cells. Pneumovax) gives at least 85% protection in those under 55 years of age for five years or longer. Immunization is suggested for those at highest risk of infection, including those 65 years or older; generally the vaccine should be a single lifetime dose, as there is a high risk of side effects if repeated. The standard 23-valent vaccines are ineffective for children under two years old. **Conjugated vaccine** (Prevnar, Synoflorix) consists of capsular polysaccharides covalently bound to the diphtheria toxoid CRM197, which is highly immunogenic but non-toxic. This combination provokes a significantly more robust immune response by recruiting CRM197-specific type 2 helper T cells, which allow for immunoglobulin type switching (to produce non-IgM immunoglobulin) and production of memory B cells. Among other things, this results in mucosal immunity and eventual establishment of lifelong immunity after several exposures. This immune response is less robust than the response provoked by conjugated vaccines, which has several consequences. The vaccine is ineffective in children less than two years old, presumably due to their less mature immune systems. Non-responders are also common amongst older adults. Immunization is not lifelong, so individuals must be re-vaccinated every 5–6 years. Since no mucosal immunity is provoked, the vaccine does not affect carrier rates, promote herd immunity, or protect from upper or lower respiratory tract infections.

ADI has now developed antibody ELISA kits to determine the efficacy of pneumococcal vaccines in animal and humans. Antibody tests kits are available for non-conjugated vaccine **Pneumovax (23-serotypes); Conjugated (CRM197) vaccines Prevnar-7 (pCV-7), Prevant-10 (PCV-10/Synflorix) and Prevnar-13 (PCV-13).** The kits are designed to detect IgG and IgM antibody titers to the carbohydrates to the given serotypes present in the vaccines. Separate kits are available to detect antibodies to CRM197 as well. ADI can also provide any serotype antibody kit (single or a combination of serotypes such as 6A upon order). These kits are the first commercial kits for pneumococcal vaccine and should be highly useful to research and test the efficacy of the existing or the new vaccines.

Streptococcus Pneumoniae Vaccines Related ELISA kits

Items Description	Species	Antibody Type IgG Cat#	Antibody Type IgM Cat#
Anti-S. Pneumococcal vaccine (Prevnar-7/PCV-7) ELISA kits (**7 serotypes**: 4,6B,9V,14,18C,19F, and 23F	Mouse	560-100-07G	560-105-07M
	Human	560-110-07G	560-115-07M
Anti-S. Pneumococcal vaccine (Synflorix/PCV-10) ELISA kits (**10 serotypes**: 1, 4, 5, 6B, 7F, 9V, 14, 18C, 19F, and 23F)	Mouse	560-130-10G	560-135-10M
	Human	560-140-10G	560-145-10M
Anti-S. Pneumococcal vaccine (PCV-13) ELISA kits (**13 serotypes** 1, 3, 4, 5, 6A, 6B, 7F, 9V, 14, 18C, 19A, 19F, 23F)	Mouse	560-160-13G	560-165-13M
	Human	560-170-13G	560-175-13M
Anti-S. Pneumococcal vaccine (Pneumovax) ELISA kits (**23 serotypes**: 1, 2, 3, 4, 5, 6b, 7F, 8,9N, 9V, 10A, 11A, 12F, 14, 15B, 17F, 18C, 19F, 19A, 20, 22F, 23F and 33F)	Mouse	560-180-23G	560-185-23M
	Human	560-190-23G	560-195-23M
Anti-**CRM197** (Diphtheria Toxin mutant) ELISA kits	Mouse	940-220-DMG	940-225-DMM
	Human	940-200-DHG	940-210-DHM

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