

5 Vaccines in development

Vaccine research and development is lengthy and risky. From discovery to license requires 10 to 15 years. Approximately one out of 10 vaccines that enter clinical development will reach the market. Which vaccines will be successfully developed is impossible to predict.

In 2011, the global leaders in vaccine research and development reported the vaccines shown in **Table 35** to be under clinical development.

Over 100 vaccines are currently under development. A few of these may reach the market in the next decade.

Manufacturer	Phase I	Phase II	Phase III
Merck		Pneumococcal conjugate	9-valent Human Papillomavirus
			inactivated Herpes Zoster
			6-valent pediatric combination (diphtheria, tetanus, pertussis, polio, hepatitis B, and <i>Haemophilus influenzae</i> type b)
			cell-cultured influenza vaccine; pediatric influenza vaccine
Novartis	cytomegalovirus	<i>Pseudomonas aeruginosa</i>	
	group B <i>Streptococcus</i>	meningococcal B	
	HIV	cell-cultured influenza	
	pneumococcal	conjugate meningococcal A, B, C, Y, W135	
Pfizer	3 and 4-valent <i>Staphylococcus aureus</i>	Alzheimer's disease	
		adolescent and infant meningococcal B	
Sanofi Pasteur	rotavirus	6-valent pediatric combination (diphtheria, tetanus, pertussis, polio, hepatitis B, and <i>Haemophilus influenzae</i> type b)	4-valent pediatric combination (diphtheria, tetanus, pertussis, polio)
	pneumococcal	<i>Clostridium difficile</i>	6-valent pediatric combination (diphtheria, tetanus, pertussis, polio, hepatitis B, and <i>Haemophilus influenzae</i> type b)
	<i>Pseudomonas aeruginosa</i>	rabies post-exposure prophylaxis	4-valent inactivated influenza
	tuberculosis	rabies	4-valent dengue
		4-valent meningococcal a, C, Y, W135 conjugate	
GlaxoSmithKline	cell-cultured influenza	7-valent pediatric combination (diphtheria, tetanus, pertussis, polio, hepatitis B, <i>Haemophilus influenzae</i> type b, and meningococcal C conjugate)	4-valent inactivated influenza
	HIV	measles, mumps, rubella	Herpes Zoster
		pneumococcal conjugate	
		HIV	
		tuberculosis	

TABLE 35. VACCINES UNDER DEVELOPMENT BY GLOBAL VACCINE LEADERS, BY CLINICAL PHASE OF DEVELOPMENT^{174,175,176,177,178}

¹⁷⁴Merck. Merck pipeline. July 29, 2011. <http://www.merck.com/research/pipeline/home.html>

¹⁷⁵sanofi pasteur. sanofi pasteur R&D portfolio. Feb 9, 2011.

http://www.sanofipasteur.com/sanofi-pasteur2/front/index.jsp?siteCode=SP_CORP&codePage=PAG_22_1288245984593&lang=EN&codeRubrique=22

¹⁷⁶Pfizer. Pfizer pipeline – our medicines in development. Aug 11, 2011. http://www.pfizer.com/research/product_pipeline/product_pipeline.jsp

¹⁷⁷Novartis. Welcome to Novartis vaccines. Pipeline. 2011. <http://www.novartisvaccines.com/products-diseases/pipeline.shtml>

¹⁷⁸GlaxoSmithKline. Product development pipeline. Feb 2011. http://www.gsk.com/investors/product_pipeline/docs/gsk-pipeline-2011.pdf

In addition, in its report of 2006, the WHO noted vaccine research and development in specific disease areas (See **Table 36**). Some of these trials have now been completed. Others have been discontinued. Some have progressed to a further stage of development.



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Disease Area	Vaccine
Diarrheal diseases	Cholera
	<i>Escherichia coli</i>
	Rotavirus
	Shigella
	Typhoid fever
Respiratory diseases	Influenza
	Parainfluenza virus type 3
	Respiratory syncytial virus
	Severe Acute Respiratory Syndrome (SARS)
	Pneumococcal
	Tuberculosis
	Anthrax
Bacterial diseases	Meningococcal A, C, Y, W135
	Meningococcal B
	Plague
	Group A <i>Streptococcus</i>
	Group B <i>Streptococcus</i>
	<i>Chlamydia trachomatis</i>
Sexually transmitted diseases	Herpes simplex type 2
	HIV
Vector-borne diseases	Dengue fever
	Japanese encephalitis
	West Nile virus
Parasitic diseases	Hookworm
	Leishmania
	Malaria
	Schistosomiasis
Hepatitis and cancers	<i>Helicobacter pylori</i>
	Hepatitis B
	Hepatitis C
	Hepatitis E
	Human Papillomavirus
	Epstein-Barr virus
Enterovirus	Polio

TABLE 36. VACCINE RESEARCH AND DEVELOPMENT BY DISEASE AREA¹⁷⁹

¹⁷⁹World Health Organization. Immunizations and Vaccine Research. New vaccines against infectious diseases: research and development status. Updated Feb 2006. http://www.who.int/vaccine_research/documents/en/Status_Table.pdf



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