

Vaccination of Persons with Primary and Secondary Immune Deficiencies

PRIMARY				
Category	Specific Immunodeficiency	Contraindicated Vaccines ¹	Risk-Specific Recommended Vaccines ¹	Effectiveness & Comments
B-lymphocyte (humoral)	Severe antibody deficiencies (e.g., X-linked agammaglobulinemia and common variable immunodeficiency)	OPV ² Smallpox LAIV BCG Ty21a (live oral typhoid) Yellow Fever	Pneumococcal Influenza (TIV) Consider measles and varicella vaccination.	The effectiveness of any vaccine will be uncertain if it depends only on the humoral response; IGIV interferes with the immune response to measles vaccine and possibly varicella vaccine.
	Less severe antibody deficiencies (e.g., selective IgA deficiency and IgG subclass deficiency)	OPV ² BCG Ty21a (live oral typhoid) Other live vaccines appear to be safe.	Pneumococcal Influenza (TIV)	All vaccines probably effective. Immune response may be attenuated.
T-lymphocyte (cell-mediated and humoral)	Complete defects (e.g., severe combined immunodeficiency [SCID] disease, complete DiGeorge syndrome)	All live vaccines ^{3,4}	Pneumococcal Influenza (TIV)	Vaccines may be ineffective.
	Partial defects (e.g., most patients with DiGeorge syndrome, Wiskott-Aldrich syndrome, ataxia-telangiectasia)	All live vaccines ^{3,4}	Pneumococcal Meningococcal Hib (if not administered in infancy) Influenza (TIV)	Effectiveness of any vaccine depends on degree of immune suppression.
Complement	Deficiency of early components (C1-C4), late components (C5-C9), properdin, factor B.	None	Pneumococcal Meningococcal Influenza (TIV)	All routine vaccines probably effective.
Phagocytic function	Chronic granulomatous disease, leukocyte adhesion defects, and myeloperoxidase deficiency.	Live bacterial vaccines ³	Pneumococcal ⁵ Influenza (TIV) (to decrease secondary bacterial infection).	All inactivated vaccines safe and probably effective. Live viral vaccines probably safe and effective.

¹ Other vaccines that are not specifically contraindicated may be used if otherwise indicated.

² OPV is no longer licensed in the United States, and therefore is not recommended for routine use.

³ Live bacterial vaccines: BCG, and Ty21a *Salmonella typhi* vaccine.

⁴ Live viral vaccines: MMR, OPV, LAIV, yellow fever, varicella (including MMRV and zoster vaccine), and vaccinia (smallpox). Smallpox vaccine is not recommended for children or the general public.

⁵ Pneumococcal vaccine is not indicated for children with chronic granulomatous disease.

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SECONDARY			
Specific Immunodeficiency	Contraindicated Vaccines ¹	Recommended Vaccines ¹	Effectiveness & Comments
HIV/AIDS	OPV ² Smallpox BCG LAIV Withhold MMR and varicella in severely immunocompromised persons.	Influenza (TIV) Pneumococcal Consider Hib (if not administered in infancy) and Meningococcal vaccination.	MMR, varicella, and all inactivated vaccines, including inactivated influenza, might be effective. ³
Malignant neoplasm, transplantation, immunosuppressive or radiation therapy	Live viral and bacterial, depending on immune status. ^{4,5}	Influenza (TIV) Pneumococcal	Effectiveness of any vaccine depends on degree of immune suppression.
Asplenia	None	Pneumococcal Meningococcal Hib (if not administered in infancy)	All routine vaccines probably effective.
Chronic renal disease	LAIV	Pneumococcal Influenza (TIV) Hepatitis B	All routine vaccines probably effective.

¹ Other vaccines that are not specifically contraindicated may be used if otherwise indicated.

² OPV is no longer licensed in the United States, and therefore is not recommended for routine use.

³ HIV-infected children should receive IG after exposure to measles, and may receive varicella and measles vaccine if CD4+ lymphocyte count is $\geq 15\%$.

⁴ Live viral vaccines: MMR, OPV, LAIV, yellow fever, varicella (including MMRV and zoster vaccine), and vaccinia (smallpox). Smallpox vaccine is not recommended for children or the general public.

⁵ Live bacterial vaccines: BCG, and Ty21a *Salmonella typhi* vaccine.

AIDS: Acquired Immunodeficiency Syndrome

BCG: Bacilli Calmette-Guerin vaccine

Hib: *Haemophilus influenzae* type b vaccine

HIV: Human Immunodeficiency Virus

IGIV: Immune Globulin Intravenous

IG: Immunoglobulin

LAIV: Live, Attenuated Influenza Vaccine

MMR: Measles, Mumps, Rubella vaccine

OPV: Oral Poliovirus Vaccine (live)

TIV: Trivalent (inactivated) Influenza Vaccine

Modified from American Academy of Pediatrics. Passive Immunization. In: Pickering LK, Baker C, Long S, McMillen J, ed. *Red Book: 2006 Report of the Committee on Infectious Diseases*. 27th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2006: [71-72] and CDC. General Recommendations on Immunization: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 2006; 55 (No. RR-15).