

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 Consider measles and varicella vaccination.	The effectiveness of any vaccine is uncertain if it depends only on the humoral response (e.g., PPSV or MPSV4). 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 Yellow fever Other live vaccines appear to be safe.	Pneumococcal	All vaccines likely effective. Immune response might be attenuated.
T-lymphocyte (cell-mediated and humoral)	Complete defects (e.g., severe combined immunodeficiency [SCID] disease, complete DiGeorge syndrome)	All live vaccines ^{3,4,5}	Pneumococcal	Vaccines may be ineffective.
	Partial defects (e.g., most patients with DiGeorge syndrome, Wiskott-Aldrich syndrome, ataxia-telangiectasia)	All live vaccines ^{3,4,5}	Pneumococcal Meningococcal Hib (if not administered in infancy)	Effectiveness of any vaccine depends on degree of immune suppression.
Complement	Persistent complement, properdin, or factor B deficiency	None	Pneumococcal Meningococcal	All routine vaccines likely effective.
Phagocytic function	Chronic granulomatous disease, leukocyte adhesion defect, and myeloperoxidase deficiency.	Live bacterial vaccines ³	Pneumococcal ⁶	All inactivated vaccines safe and likely effective. Live viral vaccines likely safe and effective.

¹ Other vaccines that are universally or routinely recommended should be given if not contraindicated.

² OPV is no longer available in the United States.

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

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

⁵ Regarding T-lymphocyte immunodeficiency as a contraindication for rotavirus vaccine, data exist only for severe combined immunodeficiency.

⁶ Pneumococcal vaccine is not indicated for children with chronic granulomatous disease beyond age-based universal recommendations for PCV. Children with chronic granulomatous disease are not at increased risk for pneumococcal disease..

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SECONDARY			
Specific Immunodeficiency	Contraindicated Vaccines ¹	Risk-Specific Recommended Vaccines ¹	Effectiveness & Comments
HIV/AIDS	OPV ² Smallpox BCG LAIV Withhold MMR and varicella in severely immunocompromised persons. Yellow fever vaccine might have a contraindication or a precaution depending on clinical parameters of immune function. ³	Pneumococcal Consider Hib (if not administered in infancy) and Meningococcal vaccination.	MMR, varicella, rotavirus, and all inactivated vaccines, including inactivated influenza, might be effective. ⁴
Malignant neoplasm, transplantation, immunosuppressive or radiation therapy	Live viral and bacterial, depending on immune status. ^{5,6}	Pneumococcal	Effectiveness of any vaccine depends on degree of immune suppression.
Asplenia	None	Pneumococcal Meningococcal Hib (if not administered in infancy)	All routine vaccines likely effective.
Chronic renal disease	LAIV	Pneumococcal Hepatitis B ⁷	All routine vaccines likely effective.

¹ Other vaccines that are universally or routinely recommended should be given if not contraindicated.

² OPV is no longer available in the United States.

³ Symptomatic HIV infection or CD4+ T-lymphocyte count of <200/mm³ or <15% of total lymphocytes for children <6 years of age is a contraindication to yellow fever vaccine administration. Asymptomatic HIV infection with CD4+ T-lymphocyte count of 200 to 499/ mm³ for persons ≥6 years of age or 15% to 24% of total lymphocytes for children <6 years of age is a precaution for yellow fever vaccine administration. Details of yellow fever vaccine recommendations are available from CDC. (CDC. Yellow Fever Vaccine: Recommendations of the ACIP. *MMWR* 2010;59 [No. RR-7].)

⁴ HIV-infected children should receive IG after exposure to measles, and may receive varicella, measles, and yellow fever vaccine if CD4+ T-lymphocyte count is ≥15%.

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

⁶ Live viral vaccines: MMR, MMRV, OPV, LAIV, yellow fever, varicella, zoster, rotavirus, and vaccinia (smallpox). Smallpox vaccine is not recommended for children or the general public.

⁷ Indicated based on the risk from dialysis-based bloodborne transmission.