Vaccines in dermatology

By Caroline A. Nelson, MD

LIVE	INACTIVATED/KILLED	TOXOID	SUBUNIT/ CONJUGATE
Adenovirus Cholera (oral) **Influenza (intranasal)** **Measles, mumps, rubella** Polio (oral) Rotavirus **Smallpox** **Tuberculosis** Typhoid (oral) **Varicella zoster virus** Yellow fever **Zoster (Zostavax)**	Hepatitis A virus **Influenza (injection)** Japanese encephalitis Polio (injection) Rabies	**Diphtheria, tetanus, and pertussis**	Anthrax Haemophilus influenzae **Hepatitis B virus** **Human papillomavirus** **Influenza (injection)** **Meningococcus** **Pneumococcus** Typhoid (injection) **Zoster (Shingrix)**

VACCINE	ROUTINE INDICATIONS	SKIN REACTIONS/ COMPLICATIONS*	NOTES†
		Viral Infections	
Hepatitis B virus (HBV)	Infants at 0-, 2-, and 6-months of age and at-risk adults	Anetoderma, **granuloma annulare, lichen planus**, lichen nitidus, lichen striatus, **papular acrodermatitis of childhood (Gianotti-Crosti syndrome), polyarteritis nodosa**, and pseudolymphoma	**Patients without evidence of disease or immunity on serologic testing and with risk factors should be offered vaccination prior to immunosuppression**
Human papillomavirus (HPV)	**Gardasil and Gardasil-9: Patients 9-26 years of age** with a second dose after 6-12 months (patients 15-26 years of age should receive a second dose after 1-2 months and a third dose after 6 months) Cervarix is no longer available in the United States (US)	Localized lipoatrophy	Vaccines contain **L1 capsid protein** of specific HPV types: Cervarix has 16 and 18; **Gardasil has 6, 11, 16, and 18**; and Gardasil-9 has 6, 11, 16, 18, 31, 33, 45, 52, and 58 Can be administered regardless of history of abnormal PAP smear
Influenza	Patients ≥ 6-months of age each flu season (children 6 months-8 years of age may need two doses) **The intranasal vaccine is contraindicated in immunosuppressed patients**	**Lichen planus, linear IgA**, papular acrodermatitis of childhood, **serum sickness like reaction, and Sweet syndrome**	
Measles, mumps, rubella (MMR)	Children at 12-15 months and 4-6 years of age The vaccine is contraindicated in immunosuppressed patients	Faint morbilliform exanthem, morphea, papular acrodermatitis of childhood, and transient localized hypertrichosis **Most common cause of type I hypersensitivity** **Modified measles:** reduced severity disease after exposure to natural measles with less confluent exanthem, inconsistent presence of Koplik spots, and shorter course	Patients without evidence of disease or immunity on serologic testing should be vaccinated prior to immunosuppression
Smallpox (Vaccinia)	Patients at high risk of exposure **(not contraindicated in children)** The vaccine is contraindicated in immunosuppressed patients	**Auto-inoculation, contact transmission, eczema vaccinatum, erythema multiforme/Stevens Johnson syndrome, generalized vaccinia**, hypersensitivity reactions (exanthematous > urticarial > erythema multiforme-like), papular acrodermatitis of childhood, post-vaccination follicular eruption, **"robust take"** (plaque of erythema and induration > 10 cm at the injection site), superinfection, and vaccinia necrosum/ gangrenosum also known as **"progressive vaccinia"**	"High risk" includes military personnel and health care workers **Formation of a vesiculo-ulcer with 4 cm of erythema at the injection site is required to ensure adequate immunity** Bandage the injection site to prevent auto-inoculation and contact transmission Eczema vaccinatum can also occur in Darier's disease, Netherton syndrome, and other disorders of cornification Ocular implants, generalized vaccinia in the immunodeficient patient, eczema vaccinatum, and progressive vaccinia are indications for vaccinia immune globulin Vaccine also decreases severity of **Monkeypox**
Varicella zoster virus (VZV)	Children at 12-15 months and 4-6 years of age The vaccine is contraindicated in immunosuppressed patients	Zoster, pseudolymphoma, and **varicella-like eruption** **Modified varicella-like syndrome:** reduced severity disease after exposure to natural varicella with more macules and papules than vesicles, shorter course, and fewer lesions	Even **protects individuals who have never had seroconversion or whose antibody levels were undetectable from severe VZV disease** Patients without evidence of disease or immunity on serologic testing should be offered vaccination prior to immunosuppression Varicella-like eruption in leukemic children on chemotherapy may require acyclovir
Zoster	**Shingrix: Adults ≥ 50 years of age** with a second dose after 2-6 months Zostavax was recommended for adults ≥ 60 years of age (contraindicated in immunosuppressed patients); however, Shingrix is now recommended including for those who previously received Zostavax		**Shingrix is a subunit vaccine (HZ/su) containing recombinant VZV glycoprotein E and the $AS01_B$ adjuvant system that decreases risk of disease and post-herpetic neuralgia by >90%** 24 hours before until 14 days after you administer Zotstavax, antivirals should be stopped.

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Vaccines in dermatology *(continued)*

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VACCINE	ROUTINE INDICATIONS	SKIN REACTIONS/ COMPLICATIONS*	NOTES†
		Bacterial Infections	
Diphtheria, tetanus, and pertussis	DTaP: Children at 2-, 4-, 6-, 15–18 months and 4-6 years of age Tdap: Patients 11-64 years of age (once) Td: Patients every 10 years and after a severe and dirty burn or wound **(cat bite, dog bite, human bite, frostbite, myiasis, centipede bite, or brown recluse spider bite)**	Localized lipoatrophy, morphea, panniculitis, and papular acrodermatitis of childhood	Vaccination against diphtheria does not necessarily prevent cutaneous disease Td vaccination should be offered prior to immunosuppression
Meningococcus	Monovalent (MenB): Patients ≥ 10 years of age at increased risk of exposure and patients at 16-23 years of age to provide short-term protection with a second dose ≥ 1 month after Quadrivalent (MenACWY and MPSV4): Children at 11-12 and 16 years of age and patients at increased risk of exposure		"Increased risk" includes **asplenia, persistent complement component deficiency, and eculizumab therapy**, and, for the quadrivalent vaccine, **college freshmen living in dormitories and military recruits**
Pneumococcus	PCV13 ("Prevnar"): Children 2-, 4-, 6-, and 12-15 months of age, patients 2-64 years of age with certain health conditions, and adults ≥ 65 years of age PPSV23 ("Pneumovax"): Patients 2-64 years of age with certain health conditions, adults 19-64 years of age who smoke cigarettes or have asthma, and adults ≥ 65 years of age		**Patients should be vaccinated with PPSV23 prior to immunosuppression** **Immunosuppressed patients should be vaccinated with PCV13 followed by PPSV23 if not given previously**
Tuberculosis (Bacillus of Calmette and Guérin [BCG] strain of *Mycobacterium bovis*)	BCG is not routinely administered in the US but is recommended for infants and children at high risk of exposure and exposed health care workers in high-risk settings The vaccine is contraindicated in immunosuppressed patients	**"BCGitis"** (enlarging granulomatous plaque at the injection site), dermatomyositis, **disseminated disease, granuloma annulare**, lichen striatus, **lupus vulgaris**, pityriasis rosea-like eruption, **regional lymphadenitis, scrofuloderma**, Sweet syndrome, transient localized hypertrichosis, and the tuberculids: **erythema induratum, lichen scrofulosorum, and papular and papulonecrotic tuberculid**	**May result in false positive tuberculin skin test (TST)** **Chronic granulomatous disease patients are at particularly high risk of disseminated disease** BCG can also be used as **post-exposure prophylaxis for household contacts of leprosy patients** <12 years of age
		Melanoma	
Traditional tumor-associated antigen-based vaccines (e.g. **gp100 peptide**) and personalized neoantigen-based vaccines	Clinical trials	Trial data showing improved survival of melanoma patients	Vaccines stimulate the antitumor response, which consists of a **priming phase** (tumor antigens released by dying tumor cells captured by dendritic cells and presented to T lymphocytes) followed by an **effector phase** (immune response)

*All vaccines may cause injection site reactions and type I hypersensitivity (urticaria, angioedema, and anaphylaxis). **Nicolau syndrome may occur after intramuscular vaccinations. Aluminum-containing vaccines may cause nodules and foreign body reactions. Thimerosal-containing vaccines (a mercury-based preservative) may cause allergic contact dermatitis or eosinophilic cellulitis (Wells syndrome).**

†**Live vaccines are contraindicated in immunosuppressed patients** including those on high dose prednisone (equivalent to ≥20 mg/day of prednisone or ≥2 mg/kg/day in children weighing <10 kg), biologic agents such as tumor necrosis factor (TNF) inhibitors, interleukin (IL)-12, -23 inhibitors, IL-17 inhibitors, dupilumab, IL-1 inhibitors, rituximab, omalizumab, and Janus kinase (JAK) inhibitors.

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