# Varicella vaccine

# Introduction

- Varicella vaccine is a live attenuated preparation
- The product contains gelatin and trace amounts of neomycin.
- licensed in 1995 by the FDA for use in healthy people 12 months or older who have not had varicella illness.
- Quadrivalent measles-mumps-rubella varicella (MMRV) vaccine was licensed in 2005 by the FDA for use in healthy children 12 months through 12 years of age.

# Recommendations for Immunization 12 Months -12 Years

- Both monovalent varicella vaccine and MMRV have been licensed for use for healthy children 12 months through 12 years of age.
- two 0.5-mL doses of monovalent varicella vaccine or MMRV administered, separated by at least 3 months.
- All healthy children should receive the first dose of varicella-containing vaccine at 12 through 15 months of age.
- The second dose of vaccine is recommended routinely when children are 4 through 6 years of age but can be administered at an earlier age.

# Recommendations for Immunization
# Children 12 Months Through 12 Years of Age

- If the first dose of varicella-containing vaccine is administered 5 or more days before the first birthday, the dose does not count toward the 2 doses needed for evidence of immunity to varicella.
- In such a circumstance, the varicella dose should be repeated at 12 through 15 months, as long as at least 28 days have elapsed from the invalid dose.

# Recommendations for Immunization ≥13 Years

- Immunocompetent individuals 13 years or older without evidence of immunity should receive two 0.5-mL doses of monovalent varicella vaccine, separated by at least 28 days.
- For people who previously received only 1 dose of varicella vaccine, a second dose is necessary.
- Only monovalent varicella vaccine is licensed for use in this age group.

# Dose and Administration.

- The recommended dose of monovalent or quadrivalent varicella-containing vaccines is 0.5 mL.
- Administered subcutaneously or intramuscularly

# Immunogenicity

- Approximately 76% to 85% of immunized healthy children older than 12 months develop a humoral immune response to VZV at levels considered associated with protection after a single dose of varicella vaccine.
- Seroresponse rates and cell-mediated immune responses approach 100% after 2 doses.

# Effectiveness

- The effectiveness of 1 dose of varicella vaccine is about 82% against any clinical varicella and 98% against severe disease.
- Two doses of vaccine demonstrated 92% to 95% effectiveness against any clinical varicella.

# Simultaneous Administration With Other Vaccines or Antiviral Agents

- Varicella-containing vaccines may be administered simultaneously with other childhood immunizations recommended
- If not administered at the same visit ,the interval between administration of a varicella-containing vaccine and MMR vaccine should be at least 28 days.
- Because of susceptibility of vaccine virus to acyclovir, valacyclovir, or famciclovir, these antiviral agents usually should be avoided from 1 day before to 21 days after receipt of a varicella-containing vaccine.

# Adverse Events

- Varicella vaccine is safe; reactions generally are mild and overall frequency of approximately 5% to 35%
- Approximately 20% to 25% of immunized people will experience minor injection site reactions (eg, pain, redness, swelling).
- In approximately 1% to 3% of immunized children, a localized rash develops, and in an additional 3% to 5%, a generalized varicella-like rash develops.
- These rashes typically consist of 2 to 5 lesions and may be maculopapular rather than vesicular; lesions usually appear 5 to 26 days after immunization.

# Herpes Zoster After Immunization

- Vaccine-strain VZV can cause herpes zoster in immunocompetent and immunocompromised people.
- However, data indicate that the age-specific risk of herpes zoster is lower among immunocompetent children immunized with varicella vaccine than among children who have had natural varicella infection.

# Transmission of Vaccine-Strain VZV

- Vaccine-strain VZV transmission to contacts is rare
- In all cases, the immunized person had a rash following vaccine.

# Contraindications and Precautions

- **Intercurrent Illness. As with other vaccines, varicella vaccine should not be administered to people who have moderate or severe illnesses, with or without fever.**
- **Varicella vaccine should not be administered to people who have had an anaphylactic-type reaction to any component of the vaccine, including gelatin and neomycin.**
- **Most people with allergy to neomycin have resulting contact dermatitis, a reaction that is not a contraindication to immunization.**

# Immunization of Immunocompromised Patients

## GENERAL RECOMMENDATIONS

- Varicella vaccine should be administered ≥4 weeks before initiating immunosuppressive therapy.
- Certain categories of patients (eg, patients with HIV infection without severe immunosuppression or with a primary immune deficiency disorder without defective T-cell–mediated immunity, such as primary complement component deficiency disorder or CGD should receive varicella vaccine.
- Children with impaired humoral immunity alone may be immunized.

# HIV INFECTION

- monovalent varicella vaccine can be administered to asymptomatic HIV-infected children without severe immunosuppression (children 1 through 13 years of age with a CD4+ ≥15% and to adolescents ≥14 years with a CD4+ ≥200 lymphocytes/mm3).

# MALIGNANCY

- The interval until immune reconstruction varies with the intensity and type of immunosuppressive therapy, radiation therapy, underlying disease, and other factors, complicating the ability to make a definitive recommendation for an interval after cessation of immunosuppressive therapy.
- Current recommendations are for patients to be vaccinated with varicella vaccine when in remission and at least three months after cancer chemotherapy, with evidence of restored immunocompetence.
- In regimens that included anti–B-cell antibodies, vaccinations should be delayed at least 6 months.

# CHILDREN RECEIVING CORTICOSTEROIDS

- Varicella vaccine should not be administered to people who are receiving high doses of systemic corticosteroids (2 mg/kg per day or more of prednisone or its equivalent or 20 mg/day of prednisone or its equivalent) for 14 days or more.
- The recommended interval between discontinuation of high dose corticosteroid therapy and immunization with varicella vaccine is at least 1 month.
- Varicella vaccine may be administered to individuals receiving only inhaled, nasal, or topical steroids.

# CHILDREN WITH NEPHROTIC SYNDROME

- The results of one small study indicate that 2 doses of varicella vaccine in 29 children between 12 months and 18 years of age generally were well tolerated and immunogenic, including in children receiving low-dose, alternate- day prednisone.

# POTENTIAL CONTACT WITH IMMUNOCOMPROMISED PEOPLE

- Household contacts of immunocompromised people should be immunized if they have no evidence of immunity
- Nonimmune family members, close contacts, and health care workers associated with the patient should be immunized before that time.
- No precautions are needed following immunization of healthy people who do not develop a rash.
- Immunized people in whom a postimmunization rash develops should avoid direct contact with an immunocompromised host who lacks evidence of immunity for the duration of the rash.

# Pregnancy and Lactation

- Varicella vaccine should not be administered to pregnant women, because the possible effects on fetal development are unknown, although no cases of congenital varicella syndrome or patterns of malformation have been identified.
- Pregnancy should be avoided for at least 1 month after immunization.
- A pregnant mother or other household member is not a contraindication for immunization of a child in the household.
- Varicella vaccine should be administered to nursing mothers who lack evidence of immunity.
- no evidence of excretion of vaccine strain in human milk or of transmission to infants.

# Immune Globulin

- Whether (IG) can interfere with varicella vaccine induced immunity is unknown, although IG can interfere with immunity induction by measles vaccine.
- Pending additional data, varicella vaccine should be withheld for the same intervals after receipt of any form of IG or other blood product as measles vaccine
- Conversely, IG should be withheld for at least 2 weeks after receipt of varicella vaccine.

| Product | Minimum interval(months) |
|---|---|
| HIG | 3 |
| IVIG | 8 |
| Packed RBC | 5 |
| Whole blood | 6 |
| Platelet and FFP | 7 |

# Salicylates

- No cases of Reye syndrome have been reported following varicella vaccination with >140 million doses distributed in the United States.
- However, because use of salicylates during varicella infection is associated with Reye syndrome, salicylates are recommended be avoided for 6 weeks after administration of varicella vaccine.
- Physicians need to weigh the theoretical risks associated with varicella vaccine against the known risks of wild-type virus in children receiving long-term salicylate therapy.

| Country | Vaccine | Strain | Dose | 1st and 2nd dose introduction (yr) | Schedule (1st, 2nd dose) | Coverage (%) |
|---|---|---|---|---|---|---|
| Bahrain | Varicella | | 2 | 2015 | 12 mo, 3 yr | - |
| Kuwait | Varicella, MMRV | | 2 | 2017 | 12 mo, 24 mo | - |
| Oman | Varicella | | 1 | 2010 | 12 mo | - |
| Qatar | Varicella | Oka | 2 | 2007 | 12 mo, 4–6 yr | 92% |
| Saudi Arabia | Varicella | | 2 | 2008 | 18 mo, 4–6 yr | - |
| United Arab Emirates | Varicella | | 2 | 2012 | 12 mo, 5–6 yr | 94% |

Eastern Mediterranean
6 out of 21 member countries adopted (29%)

| Country | Vaccine | Strain | Dose | 1st and 2nd dose introduction (yr) | Schedule (1st, 2nd dose) | Coverage (%) |
|---|---|---|---|---|---|---|
| Australia | Varicella, MMRV | Oka | 1 | 2005 | 18 mo | 90% |
| Hong Kong | Varicella, MMRV | Oka, MAV | 2 | 2014 | 12 mo, 6 yr | 73% |
| Japan | Varicella | Oka | 2 | 2014 | 12–15 mo, 18–23 mo | 40% |
| New Zealand | Varicella | Oka | 1 | 2017 | 15 mo | - |
| Niue | Varicella | - | 1 | 2017 | 15 mo | - |
| South Korea | Varicella | Oka, MAV | 1 | 2005 | 12–15 mo | 96.3% |
| Taiwan | Varicella | Oka | 1 | 2004 | 12–18 mo | 98.6% |

Western Pacific 7 out of 27 member countries adopted (26%)

| Country | Vaccine | Strain | Dose | 1st and 2nd dose introduction (yr) | Schedule (1st, 2nd dose) | Coverage (%) |
|---|---|---|---|---|---|---|
| Andorra | Varicella | Oka | 2 | No data | 15 mo, 3 yr | - |
| Austria | Varicella | Oka | 2 | 2010 | 12–23 mo (4–wk interval) | - |
| Cyprus | Varicella | Oka | 2 | 2010 | 13–18 mo, 4–6 yr | - |
| Finland | Varicella, MMRV | Oka | 2 | 2017 | 18 mo, 6 yr | - |
| Germany | Varicella, MMRV | Oka | 2 | 2004, 2009 | 11–14 mo, 15–23 mo | 1 dose 89.6% , 2 dose 75.3% |
| Greece | Varicella | Oka | 2 | 2006, 2009 | 12–15 mo, 2–3 yr | 1 dose 90% 2 dose 75% |
| Hungary | Varicella | Oka | 2 | 2019 | 13 mo, 16 mo | - |

Europe 14 out of 53 member countries adopted (26%)

| Country | Vaccine | Strain | Dose | 1st and 2nd dose introduction (yr) | Schedule (1st, 2nd dose) | Coverage (%) |
|---|---|---|---|---|---|---|
| Iceland | Varicella | Oka | 2 | 2020 | 12 mo, 18 mo | - |
| Israel | Varicella, MMRV | Oka | 2 | 2008 | 12 mo, 6–7 yr | - |
| Italy | Varicella, MMRV | Oka | 2 | 2017 | 13–15 mo, 6 yr | 84%–95% |
| Latvia | Varicella | Oka | 2 | 2008, 2019 | 12–15 mo, 7 yr | - |
| Luxembourg | MMRV | Oka | 2 | 2009 | 12 mo, 15–23 mo | 1 dose 94.5% , 2 dose |
| Spain | Varicella | Oka | 2 | 2016 | (National) 15 mo; 2–4 yr | 4 regions |
| Turkey | Varicella | Oka | 1 | 2013 | 12 mo | 60.1% |

Europe
14 out of 53 member countries adopted (26%)

| Country | Vaccine | Strain | Dose | 1st and 2nd dose introduction (yr) | Schedule (1st, 2nd dose) | Coverage (%) |
|---|---|---|---|---|---|---|
| Antigua | Varicella | Oka, MAV | 1 | 2014 | 24 mo | - |
| Argentina | Varicella | Oka, MAV | 1 | 2015 | 15 mo | 74% |
| Bahamas | Varicella | Oka, MAV | 2 | 2012 | 12 mo, 4–5 yr | - |
| Barbados | Varicella | Oka, MAV | 1 | 2012 | 12 mo | - |
| Bermuda | Varicella | Oka, MAV | 1 | 2012 | 24 mo | - |
| Brazil | MMRV, Varicella | Oka, MAV | 2 | 2013, 2018 | 15 mo, 4 yr | ≥80% |
| Canada | Varicella, MMRV | Oka | 2 | 2000–2007 (1 dose), 2011 (2 doses) | 12-15 mo, 18 mo | 93% |

Americas 17 out of 35 member countries adopted (49%)

| Country | Vaccine | Strain | Dose | 1st and 2nd dose introduction (yr) | Schedule (1st, 2nd dose) | Coverage (%) |
|---|---|---|---|---|---|---|
| Cayman Islands | Varicella | Oka, MAV | 2 | 2000, 2009 | 12 mo, 3–6 yr | - |
| Colombia | Varicella | Oka, MAV | 2 | 2015, 2019 | 12 mo, 5 yr | - |
| Costa Rica | Varicella | Oka, MAV | 1 | 2007 | 15 mo | 95% |
| Ecuador | Varicella | Oka, MAV | 1 | 2010 | 15 mo | - |
| Panama | Varicella | Oka, MAV | 2 | 2014, 2018 | 15 mo, 4 yr | - |
| Paraguay | Varicella | Oka, MAV | 1 | 2013 | 15 mo | - |
| Peru | Varicella | Oka, MAV | 1 | 2018 | 12 mo | - |

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| Country | Vaccine | Strain | Dose | 1st and 2nd dose introduction (yr) | Schedule (1st, 2nd dose) | Coverage (%) |
|---|---|---|---|---|---|---|
| Puerto Rico | Varicella | Oka, MAV | 2 | 1996, 2007 | 12 mo, 4–6 yr | - |
| United States of America | Varicella, MMRV | Oka | 2 | 1995, 2006 | 12–15 mo, 4–6 yr | 90% |
| Uruguay | Varicella | Oka, MAV | 2 | 1999, 2014 | 12 mo, 5 yr | 96% |
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