

Immunization

Bacille Calmette-Guérin (BCG)

It is a live strain of *Mycobacterium bovis* developed by Calmette and Guérin for use as an attenuated vaccine to prevent tuberculosis and other mycobacterial infections. The vaccine was first administered to humans in 1921 and remains the only vaccine against tuberculosis.

BCG is the most widely administered vaccine in the world; it has been given to over 3 billion individuals, principally in the setting of routine newborn immunization (as dictated by guidelines of the World Health Organization).

EFFICACY — BCG vaccine efficacy appears to depend on three factors: the underlying immune status of the recipient, the extent of background exposure to mycobacteria prior to vaccination, and perhaps the potency of the BCG strain used in the vaccine

Active disease — A widely cited meta-analysis suggests that BCG vaccination reduces the risk of active TB by about 50 percent, Vaccination of newborns and infants appears to confer protection in about 80 percent of cases,

The greatest benefit of BCG appears to be diminished risk of tuberculous meningitis and disseminated disease in children (75 to 86 percent efficacy)

Dose — The standard dose of BCG vaccine is 0.1 mg in 1 mL. Other childhood vaccines can be administered simultaneously with BCG. BCG can be administered intradermally

Durability of protection — The duration of BCG induced protection against tuberculosis is generally believed to be approximately 10 to 15 years

GROUPS TO CONSIDER FOR VACCINATION — The approach to BCG vaccination policy depends on the regional prevalence of TB and is variable around the world. In countries where the prevalence of TB is moderate to high, neonatal vaccination is recommended by the World Health Organization (WHO) and is administered routinely

The WHO does not recommend use of BCG vaccine in the countries meeting the following criteria;

1. Average annual rate of smear-positive pulmonary TB below 5 per 100,000
2. Average annual rate of tuberculous meningitis in children under five years below 1 per 10 million population
3. Average annual risk of TB infection below 0.1 percent

SIDE EFFECTS

- Local
 - Skin ulceration, regional lymphadenitis
 - Subcutaneous abscess
- Generalized
 - Anaphylaxis, generalized BCG infection
 - Osteitis (rare)
 - Potential factors affecting the rate of adverse reactions include the BCG dose, vaccine strain, and method of vaccine administration.

PRECAUTIONS & CONTRAINDICATIONS (CI):

- CI Positive tuberculin skin test
- CI in persons with immunodeficiencies
- CI during pregnancy

Hepatitis B Virus Vaccine

Vaccination with hepatitis B virus (HBV) vaccine prevents HBV infection and its complications, which include hepatocellular cancer. Thus hepatitis B vaccine was the 1st anticancer vaccine

The initial strategy of targeting hepatitis B vaccination toward high-risk persons failed to significantly reduce the incidence of HBV infection

STORAGE: The vaccine should arrive at the office with a refrigerant but unfrozen. It should be refrigerated on arrival and stored at 2° to 8° C. The vaccine should not be frozen. The shelf life is up to 3 years

ADMINISTRATION:

0.5 - 1 ML, anterolateral thigh or deltoid

IM injection

A 3-dose (0.5 mL) schedule is recommended for active immunization. For routine infant immunization, the initial dose should be given to the newborn before hospital discharge. The minimal intervals between doses are:

- Between the 1st and 2nd doses—4 weeks
- Between the 2nd and 3rd doses—8 weeks
- Between the 1st and 3rd doses—16 weeks

The 3rd dose should be administered no earlier than 24 weeks of age. For infants, children, and adolescents through 19 years of age, the dose is 0.5 mL.

Adverse effect

The most common adverse event after receiving the hepatitis B vaccine is

1. Pain at the injection site.
2. Mild systemic complaints, including fatigue, headache, and irritability, occur in fewer than 20% of children. Low-grade fever occurs in up to 6% of children.
3. Serious systemic adverse events and allergic reactions are rare.

CONTRAINDICATIONS AND PRECAUTIONS

Administration of hepatitis B vaccine is contraindicated for individuals who had a serious (anaphylactic) allergic reaction to a prior dose of hepatitis B vaccine or a vaccine component

Infants born to women who are HBsAg positive

All infants born to women who are HBsAg positive should receive hepatitis B vaccine and HBIG (at a different injection site) within 12 hours of birth, regardless of gestational age or birth weight.

For infants weighing less than 2000 g, this birth dose should not be counted as part of the series; that is, 3 additional doses of hepatitis B vaccine should be given, the first of which should be at 1 month of age

Infants born to women who were not tested for HBsAg should receive an initial dose of hepatitis B vaccine within 12 hours of birth. The mother should be tested immediately, and if she tests positive, then the infant should receive HBIG within 7day.

NB/ LOW-BIRTH-WEIGHT INFANTS: Hepatitis B vaccination should be postponed if an infant is born to an HBsAg-negative woman and weighs less than 2000 g. Low-birth-weight infants whose mother's surface antigen status is positive or unknown should receive immediate vaccination and HBIG, as previously described days

After the hepatitis B immunization series is complete (preferably at 6 months of age), all infants of HBsAg-positive mothers should be tested for the presence of anti-HBs and HBsAg at 9 to 15 months of age.

DTP

Tetanus and Diphtheria component is toxoid. The pertussis component is whole cellular.

PREPARATIONS

- < 7 years : DTP, DT, DTaP (acellular pertussis vaccine)
- > 7 years : Td, TdaP

STORAGE

DTaP, DTP, or DTP-Hib vaccines should arrive at the office unfrozen and should be refrigerated on arrival at a temperature of 2° to 8° C. The vaccine should not be frozen. The shelf life is up to 1 year. The vials must be shaken vigorously before withdrawing the individual doses

ADMINISTRATION: The vaccine is administered intramuscularly using a dose of 0.5 mL

Side effect:

1. Local reactions of redness, swelling, induration, and tenderness and
2. Systemic reactions: drowsiness, vomiting, crying, and low-grade fever. Moderate-to-severe reactions include high fevers of 40.5° C (105° F) or higher, persistent and inconsolable crying of more than 3 hours' duration, hypotonic-hyporesponsive episodes, and febrile seizure

DaPT;

In this vaccine the Pertussis component is acellular and it has fewer side effects than the previous vaccine.

CONTRAINDICATIONS (CI)

- Encephalopathy within 7 days
- Progressive or unstable neurological disorders
- Anaphylactic reaction to a previous dose

PRECAUTIONS

- Severe systemic reactions such as:
 - Temp > 40.5°C
 - Persistent inconsolable crying > 3 hours
 - Collapse episodes
 - Convulsions
 - NB/ Vaccination should be deferred in the event of a moderate to severe acute illness until the illness subsides

Polio Vaccine

Two polio vaccines have been developed: enhanced-potency IPV and OPV

PREPARATIONS:

- | | |
|-----------------------|------------------------|
| A. Oral (OPV) | SABIN(Live attenuated) |
| B. Inactivated (eIPV) | SALK (killed) |

Routine polio vaccination in the United States is currently accomplished with IPV, which is administered subcutaneously (or intramuscularly) with a dose of 0.5 mL and consists of formaldehyde-killed poliovirus. OPV, in contrast, is a live attenuated vaccine that is administered orally. Though still used routinely in many countries

STORAGE: opv should be frozen but IPV should arrive at the office unfrozen and should be refrigerated between 2° and 8° C. The shelf life is up to 18 months.

ADMINISTRATION:

- | | |
|-------|----------------|
| • OPV | 2 drops orally |
| • IPV | SC injection |

PRECAUTIONS & CONTRAINDICATIONS (CI):

- | | |
|--------|-----------------------------|
| A. OPV | pregnancy, immunodeficiency |
| B. IPV | neomycin hypersensitivity |

ADVERSE REACTIONS:

OPV paralytic disease (rare)

Haemophilus Influenzae Type B Vaccine

In the prevaccination era, 1 in 200 children developed invasive Hib disease by the age of 5 years.³¹ The most recent surveillance data show that the annual number of cases decreased by 99%.

STORAGE

Hib vaccines should arrive in insulated containers to prevent freezing. They should arrive unfrozen and should be refrigerated immediately and stored between 2° and 8° C. Freezing reduces or destroys potency. Shelf life is up to 2years

ADMINISTRATION: im

If a child receives different brands of Hib vaccine at 2 and 4 months of age, then a Hib vaccine dose should be given at 6 months should be followed by a booster at 12 to 15 months of age.

ADVERSE EVENT:.

Adverse events after Hib vaccination are mild and infrequent. Between 5% and 30% will have a local reaction consisting of swelling, redness, or pain. Systemic adverse events such as fever are uncommon

CONTRAINDICATIONS AND PRECAUTIONS

The only contraindication to Hib vaccination is a history of severe (anaphylactic) allergic reaction after a prior dose of Hib vaccine or a vaccine component. Vaccination should be deferred in the event of a moderate to severe acute illness until the patient's health improves

Measles, Mumps & Rubella (MMR)

MMR vaccine is a combination of 3 live attenuated vaccines that together protect against measles, mumps, and rubella. The purpose of the measles and mumps vaccines is to protect against these specific diseases; the purpose of the rubella vaccine is to prevent congenital rubella syndrome by preventing the occurrence of rubella, which, itself, is a mild disease, in the general population, thereby preventing its spread to susceptible pregnant women. The incidence of all 3 viruses has declined more than 99% compared with the prevaccination era

STORAGE: It should be refrigerated on arrival and stored between 2° and 8° C (never frozen). The shelf life is up to 2 years. On reconstitution, the vaccine should be stored in a dark place between 2° and 8° C and must be used within 8 hours

ADMINISTRATION: administration of 2 doses of MMR vaccine for children; these doses are 0.5 mL delivered subcutaneously. The 1st dose should be given at 12 to 15 months of age and the 2nd before elementary school entry (4 to 6 years of age)

ADVERSE REACTIONS

- Fever, rash (7 days post vaccination)
- Arthralgia, arthritis (rubella)
- Encephalitis [rare] (measles, mumps)
- Suppression of PPD skin test (measles)
- Convulsions in prone children(measles)
- Thrombocytopenia

PRECAUTIONS & CONTRAINDICATIONS

- Pregnancy
- Anaphylaxis to eggs
- Immunodeficiency and immunosuppression
- Immunoglobulins Recent receipt of a blood transfusion, blood products within 3-11 months
- Moderate or severe acute illness (defer vaccination until illness improves)

Rotavirus Vaccine

Rotavirus is the most common cause of severe gastroenteritis in infants and young children in The CDC estimates that rotavirus infection leads to 55,000 hospitalizations each year for acute gastroenteritis

In February 2006, an attenuated pentavalent bovine-human rotavirus vaccine (PRV) was licensed for use

The 1st dose should be given between 6 and 12 weeks of age. An interval of 4 to 10 weeks should pass between doses in the series.. Age should be calculated based on chronologic age. Premature infants can be immunized if they are clinically stable and are being or have been discharged from the hospital nursery. If a child spits out or vomits after vaccination, then the dose should not be repeated; the series should simply continue according to the recommended intervals

STORAGE: The recommended dose of PRV is 2 mL orally. PRV should be transported and stored at 2° to 8° C (36° to 46° F) and protected from light

CONTRAINDICATIONS AND PRECAUTIONS: Contraindications to PRV include a severe (anaphylactic) allergic reaction after a prior dose of the vaccine or its components. Vaccination should be deferred for children with a moderate-to-severe acute illness until the illness improves. Other precautions to use include altered immunocompetence, preexisting chronic gastrointestinal disease, and history of intussusception

ADVERSE REACTIONS: Within a week of receiving PRV, children are slightly (1% to 3%) more likely to have mild, temporary diarrhea or vomiting than unvaccinated children. Unlike a previously licensed rotavirus vaccine, no evidence has been found that PRV causes intussusception or other serious adverse events

Varicella Prophylaxis

ADMINISTRATION:

- 0.5 ml IM
- 12 months and above.....2 doses

INDICATIONS:

- All children 12 months-18 years: (if no history of varicella)

EFFICACY:

- 70-90%

PRECAUTIONS & CONTRAINDICATIONS:

- Immunocompromised patients
- Within 5 months of IG
- Children on long term salicylates

SIDE EFFECTS:

- Fever, rash
- Zoster

Hepatitis A

NATURE OF VACCINE:

- Killed formalin inactivated vaccine.

INDICATIONS:

- Children 1 year and above
- Susceptible children in endemic areas
- Chronic liver disease
- Hemophilia

ADMINISTRATION:

- IM injection
- 2 doses, at least 6 months apart

ADVERSE REACTIONS:

- Local reactions, fever
- Rare: anaphylaxis

Pneumococcal Prophylaxis

PREPARATIONS:

- Purified capsular polysaccharide of 23 serotypes of *Streptococcus pneumoniae*
- 7 valent conjugated vaccine

ADMINISTRATION:

- IM / SC 1 dose/booster 5 years

INDICATIONS:

- Primary vaccination (conjugate vaccine)
- Children 2 yr. or older with
 - Anatomical or functional asplenia
 - Sickle cell disease
 - Nephrotic syndrome
 - Immunosuppression

SIDE EFFECTS:

- Soreness, erythema, fever, myalgia
- Anaphylactic reactions (rare)

Meningococcal Prophylaxis

PREPARATIONS:

- Quadrivalent conjugate quadrivalent

ADMINISTRATION: SC

INDICATIONS:

- Control of outbreaks
- Children with complement deficiencies or asplenia

SIDE EFFECTS:

- Local erythema and discomfort
- Transient fever

Influenza Virus

Nature of vaccine:

- Killed vaccine.
- Live attenuated

Preparations:

- Whole and "split virus" vaccines.
- "Split virus" vaccines are recommended for children 6 months and older.
- Composition of the vaccine is changed annually.

ADMINISTRATION:

- IM (killed).
- Live attenuated (intranasal).
- 1 dose during influenza season.
- Children 6 months-9 years should receive an additional dose, 4 weeks after the 1st dose, if not previously immunized.

Indications:

- chronic cardio-respiratory disease
 - asthma
 - cystic fibrosis
 - bronchopulmonary dysplasia
- Sickle cell anemia.
- Chronic salicylate therapy.
- Diabetes mellitus.
- Chronic renal disease.
- Chronic metabolic disease.
- Immunosuppressive conditions: cancer, HIV etc.
- Hospital personnel with significant patient contact.

Contraindication:

- Anaphylaxis to previous dose.
- Hypersensitivity to eggs.

Adverse Reaction:

- Soreness at injection site.
- Allergic response.
- Guillain-Barré Syndrome.