

# Vaccines with Diluents: How to Use Them

Be sure to reconstitute (mix) the following vaccines correctly before administering them! Reconstitution means that the lyophilized (freeze-dried) vaccine powder in one vial must be mixed with the diluent (liquid) in another.

- Only use the diluent provided by the manufacturer for that vaccine as indicated on the chart.
- ALWAYS check the expiration date on the diluent and vaccine. NEVER use expired diluent or vaccine.
- Never freeze diluents.

| Vaccine product name                                       | Manufacturer    | Lyophilized (powder) vaccine | Liquid diluent (may contain vaccine)          | Time allowed between mixing and use <sup>a</sup> | Diluent storage environment |
|------------------------------------------------------------|-----------------|------------------------------|-----------------------------------------------|--------------------------------------------------|-----------------------------|
| Abrysvo                                                    | Pfizer          | RSV                          | Sterile water                                 | 4 hrs                                            | Refrigerator or room temp   |
| ActHIB (Hib)                                               | Sanofi          | Hib                          | Sodium chloride 0.4%                          | 24 hrs                                           | Refrigerator                |
| Arexvy                                                     | GSK             | RSV                          | ASO1E adjuvant suspension                     | 4 hrs                                            | Refrigerator                |
| COVID-19, Pfizer-BioNTech, 6 mos through 4 yrs formulation | Pfizer-BioNTech | see footnote <sup>b</sup>    | Sodium chloride 0.9%                          | 12 hrs                                           | Refrigerator or room temp   |
| Dengvaxia (DEN4CYD)                                        | Sanofi          | Dengue                       | Sodium chloride 0.4%                          | 30 min                                           | Refrigerator                |
| Hiberix (Hib)                                              | GSK             | Hib                          | Sodium chloride 0.9%                          | Immediately <sup>c</sup>                         | Refrigerator or room temp   |
| Imovax (RAB <sub>HDCV</sub> )                              | Sanofi          | Rabies                       | Sterile water                                 | Immediately <sup>c</sup>                         | Refrigerator                |
| Ixchiq                                                     | Valneva         | Chikungunya                  | Sterile water                                 | Immediately <sup>c</sup>                         | Refrigerator                |
| M-M-R II (MMR)                                             | Merck           | MMR                          | Sterile water                                 | 8 hrs                                            | Refrigerator or room temp   |
| Menveo <sup>d</sup> (MenACWY)                              | GSK             | MenA                         | MenCWY component                              | 8 hrs                                            | Refrigerator                |
| Penbraya (MenABCWY)                                        | Pfizer          | MenACWY                      | MenB component                                | 4 hrs                                            | Refrigerator                |
| Penmenvy (MenABCWY)                                        | GSK             | MenACWY                      | MenB component                                | Immediately <sup>c</sup>                         | Refrigerator                |
| Pentacel (DTaP-IPV/Hib)                                    | Sanofi          | Hib                          | DTaP-IPV component                            | Immediately <sup>c</sup>                         | Refrigerator                |
| Priorix (MMR)                                              | GSK             | MMR                          | Sterile water                                 | 8 hrs                                            | Refrigerator or room temp   |
| ProQuad (MMRV)                                             | Merck           | MMRV                         | Sterile water                                 | 30 min                                           | Refrigerator or room temp   |
| RabAvert (RAB <sub>PCECV</sub> )                           | GSK             | Rabies                       | Sterile water                                 | Immediately <sup>c</sup>                         | Refrigerator                |
| Rotarix <sup>d</sup> (RV1)                                 | GSK             | RV1                          | Sterile water, calcium carbonate, and xanthan | 24 hrs                                           | Refrigerator or room temp   |
| Shingrix (RZV)                                             | GSK             | RZV                          | ASO1B adjuvant suspension                     | 6 hrs                                            | Refrigerator                |
| Varivax (VAR)                                              | Merck           | VAR                          | Sterile water                                 | 30 min                                           | Refrigerator or room temp   |
| Vaxchora (CVD 103-HgR)                                     | Bavarian Nordic | Cholera                      | Buffer solution plus bottled water            | see footnote <sup>e</sup>                        | Refrigerator                |
| YF-VAX (YF)                                                | Sanofi          | YF                           | Sodium chloride 0.9%                          | 60 min                                           | Refrigerator or room temp   |

Always refer to package inserts for detailed instructions on reconstituting specific vaccines. In general, follow the steps below.

- For single-dose vaccine products (exceptions: Rotarix, Vaxchora), select a syringe and needle of proper length to be used for both reconstitution and administration of the vaccine. For Rotarix and Vaxchora, see the package insert.
- Before reconstituting, check labels on both the lyophilized vaccine vial and the diluent to verify that
  - they are the correct two products to mix together,
  - the diluent is the correct volume, and
  - neither the vaccine nor the diluent has expired.
- Reconstitute (i.e., mix) vaccine **before use** by:
  - removing the protective caps and wiping each stopper with an alcohol swab,
  - inserting needle of syringe into diluent vial and withdrawing contents, and
  - injecting diluent into lyophilized vaccine vial and rotating or inverting to thoroughly dissolve the lyophilized powder.
- Check the appearance of the reconstituted vaccine.
  - Reconstituted vaccine may be used if the color and appearance match the description on the package insert.
- If there is discoloration, particulate matter, obvious lack of resuspension, or the vaccine cannot be thoroughly mixed, mark the vial as "DO NOT USE," return it to proper storage conditions, and contact your state or local health department immunization program or the vaccine manufacturer.
- If reconstituted vaccine is not used immediately or comes in a multidose vial, be sure to
  - clearly mark the vial with the date and time the vaccine was reconstituted,
  - maintain the product at 2°–8°C (36°–46°F); do not freeze, and
  - use only within the time indicated on chart above.

- If the reconstituted vaccine is not used within this time period, it must be discarded.
- The Pfizer-BioNTech COVID-19 formulation for children age 6 mos through 4 yrs is a liquid concentrate that requires dilution.
- For purposes of this guidance, Immunize.org defines "immediately" as within 30 minutes or less.
- Rotarix and Menveo vaccines are available as either a liquid formulation that does not require dilution or as a lyophilized vaccine that requires reconstitution. Both formulations of the Rotarix vaccine are administered by mouth; they should not be administered as an injection.
- Vaxchora dilution: 30 minutes if sucrose or unflavored stevia added; 4 hours if sucrose or unflavored stevia have **not** been added.

**Vaccine abbreviations in column 3:**  
 Hib = *Haemophilus influenzae* type b  
 MenA = Meningococcal serogroup A  
 MenACWY = Meningococcal serogroups A, C, W, Y  
 MMR = Measles, mumps, & rubella  
 MMRV = MMR + varicella  
 RSV = Respiratory syncytial virus  
 RV1 = Rotavirus vaccine, monovalent  
 RZV = Zoster vaccine, recombinant  
 YF = Yellow fever

