



Questions and Answers about Vaccine Ingredients

Q. What ingredients are in vaccines?

A. All vaccines contain antigens. Antigens make vaccines work. They prompt the body to create the immune response needed to protect against infection. Antigens come in several forms. The form used in a vaccine is chosen because studies show it is the best way to protect against a particular infection.

Antigen forms include:

- **Weakened live viruses.** They are too weak to cause disease but can still prompt an immune response. Measles, mumps, rubella, rotavirus, chickenpox, and one type of influenza vaccine contain weakened live viruses.
- **Inactivated (or killed) viruses.** These viruses cannot cause even a mild form of the disease, but the body still recognizes the virus and creates an immune response to protect itself. The polio, hepatitis A, influenza and rabies vaccines contain inactivated viruses.
- **Partial viruses.** These are made up of the specific part of the dead virus that will prompt a protective immune response. Some vaccines are made this way including the hepatitis B and HPV vaccine.
- **Partial bacteria.** These vaccines work in two ways. First, the Hib, pneumococcal and meningococcal vaccines are made using part of the sugar coating (or polysaccharide) of the bacteria. The vaccine creates immunity against this sugar coating, providing protection against the bacteria. Second, vaccines against diphtheria, tetanus and pertussis (whooping cough) are made by inactivating the protein in the bacteria that causes harm.

Vaccines also contain other ingredients, which help make them safer and more effective. They include:

- **Preservatives.** They keep the vials from getting contaminated with germs.
- **Adjuvants.** They help the body create a better immune response. These are aluminum salts.
- **Additives.** They help the vaccine stay effective while being stored. Additives include gelatin, albumin, sucrose, lactose, MSG and glycine.
- **Residuals of the vaccine production process.** Some ingredients are needed to make the vaccine. Although these ingredients are removed, tiny (residual) amounts are left in the final product. Depending on how the vaccine is made, it may include tiny amounts of antibiotics (neomycin), egg protein or yeast protein.

Q. Why are these other ingredients in vaccines? Are they safe?

A. Each ingredient has a specific function in a vaccine. These ingredients have been studied and are safe for humans in the amount used in vaccines. This amount is much less than children encounter in their environment, food and water.

- **Aluminum salts.** Aluminum salts help your body create a better immune response to vaccines. Aluminum salts are necessary to make some of the vaccines we use more effective. Without an adjuvant like aluminum, people could need more doses of shots to be protected. Everyone is exposed to aluminum because there is much aluminum in the earth's crust. It's present in our food, air and water, including breast

milk and formula. The amount of aluminum in vaccines is similar to that found in 33 ounces of infant formula. Aluminum has been used and studied in vaccines for 75 years and is safe.

- **Formaldehyde.** Formaldehyde is used to detoxify diphtheria and tetanus toxins or to inactivate a virus. The tiny amount which may be left in these vaccines is safe. Vaccines are not the only source of formaldehyde your baby is exposed to. Formaldehyde is also in products like paper towels, mascara and carpeting. Our bodies normally have formaldehyde in the blood stream and at levels higher than in vaccines.
- **Antibiotics.** Antibiotics, such as neomycin, are present in some vaccines to prevent bacterial contamination when the vaccine is made. Trace amounts of antibiotics in vaccines rarely, if ever, cause allergic reactions.
- **Egg protein.** Influenza and yellow fever vaccines are produced in eggs, so egg proteins are present in the final product and can cause allergic reaction. Measles and mumps vaccines are made in chick embryo cells in culture, not in eggs. The much smaller amount of remaining egg proteins found in the MMR (measles, mumps, rubella) vaccine does not usually cause a reaction in egg allergic children.
- **Gelatin.** Some vaccines contain gelatin to protect them against freeze-drying or heat. People with severe allergies to gelatin should avoid getting gelatin-containing vaccines.

Q. Do vaccines contain antifreeze?

A: No. Antifreeze is typically made of ethylene glycol, which is unsafe. Polyethylene glycol (a chemical used in antifreeze and personal care products like skin creams and toothpaste) is used in vaccines and is safe. It is used to inactivate the influenza virus in some influenza vaccines. It is also used to purify other vaccines.

Q. Do vaccines contain mercury?

A: Thimerosal, a mercury-based preservative, was removed from most childhood vaccines in 2001. It is still present in some influenza vaccines. Thimerosal is still used in the manufacture of some vaccines to prevent contamination. The thimerosal is removed at the end of the manufacturing process. In some cases, a tiny amount of thimerosal remains. The remaining amount is so small, that it is not possible for it to have any effect. Valid scientific studies have shown there is no link between thimerosal and autism. In fact, autism rates have actually increased since thimerosal was removed from childhood vaccines. The American Academy of Pediatrics (AAP), the American Medical Association (AMA), the CDC, and the Institute of Medicine (IOM) agree that science does not support a link between thimerosal in vaccines and autism. For the IOM report, go to <http://www.iom.edu/CMS/3793/4705/4717.aspx>.

Q. Should vaccines be “greener”?

A. The amount of each additive used in vaccines is very small. In fact, we are exposed to much higher levels of these chemicals in our everyday lives. In vaccines, these ingredients are used to make the vaccine safer and more effective. Each vaccine is tested many times to make sure it is safe and works. Taking ingredients out might affect the ability of the vaccine to protect a child.

The information contained in this publication should not be used as a substitute for the medical care and advice of your pediatrician. There may be variations in treatment that your pediatrician may recommend based on individual facts and circumstances.