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## Key Inforbits

- How do Vaccines Work?
- Vaccine Controversy: Fact or Fiction
- School Vaccines/Travel Vaccines
- College Vaccines
- Vaccines Every Adult Should Have

## August is... National Immunization



## Awareness Month

### HOW DO VACCINES WORK?

Vaccinations help people develop immunity to certain diseases. "Immunization is defined as rendering a person protected from an infectious agent."<sup>1</sup> So how exactly do vaccinations work to protect us from these diseases?

#### Key Terms<sup>1,3</sup>

**Antigen:** substance that the body deems harmful attacks; induces an immune response

**Antibody:** immunoglobulin that the body produces to attack and destroy the antigens

**T-lymphocytes:** white blood cells that destroy harmful bacteria; memory cells

**B-lymphocytes:** white blood cells that produce antibodies

There are two types of immunity<sup>2</sup>:

- **Active Immunity:** the result of exposing the body to the infection. This process can be achieved either by way of natural immunity, exposing the body to the actual disease, or by vaccine-induced immunity. Vaccine-induced immunity is when the body is exposed to either a killed or weakened form of the infection. When our bodies are introduced to these antigens it triggers an immune response; antibodies are produced which protect us from the infection. Sometimes after vaccinations, patients experience slight side effects and in some cases symptoms of the infection. These symptoms are your body's normal reactions to being exposed to the imitation infection "and should be expected as the body builds immunity" to the infection.<sup>3</sup> The body is able to remember the steps it took to initially protect the body and is able to replicate this process in the event of future exposure to the same infection. The T-lymphocytes react to being exposed to the same infections, and B-lymphocytes help attack

these infections. Occasionally people will develop a disease soon after receiving a vaccination and unfortunately claim that the vaccine caused it. In actuality the body just did not have enough time to build up immunity against

the infection. Active immunity has the capability to protect people from the infection for an extended period of time and potentially a lifetime.

- **Passive Immunity:** the result of the body being given the actual antibodies instead of the body producing its own in reaction to exposure to the infection. Examples of this type of immunity are a newborn acquiring antigens from its mother and giving a patient immunoglobulins. Protection is immediate with this type of immunity, but its effects are short-lived, only lasting a few weeks to months.
  1. Hayney MS. Vaccines, Toxoids, and Other Immunobiologics. In: DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM, editors. *Pharmacotherapy: A pathophysiologic approach*. 9th ed. New York: McGraw-Hill Medical; c2014. Chapter 102.
  2. Centers for Disease Control and Prevention [Internet]. Atlanta: Centers for Disease Control and Prevention c1946-2015 [updated 2014 May 19; cited 2015 Jun 24]. Immunity Types; [about 1 screen]. Available from: <http://www.cdc.gov/vaccines/vac-gen/immunity-types.htm>
  3. Centers for Disease Control and Prevention [Internet]. Atlanta: Centers for Disease Control and Prevention c1946-2015 [updated 2013 Feb; cited 2015 Jun 24]. Understanding How Vaccines Work; [about 2 screens]. Available from: <http://www.cdc.gov/vaccines/hcp/patient-ed/conversations/downloads/vacsafe-understand-color-office.pdf>

## **VACCINE CONTROVERSY: FACT OR FICTION**

Vaccines prevent many transmittable diseases and have decreased the incidence of diseases such as measles, mumps, and polio by more than 99%. Diseases such as pertussis (whooping cough), tetanus, hepatitis, and chicken pox have decreased more than 85% since the development of their vaccinations.<sup>1</sup> Complications from measles can include pneumonia, encephalitis, seizures, and even death. Complications from chicken pox include high fever, pneumonia, and superinfections that can cause necrotizing fasciitis (flesh eating disease). So why do people decide against vaccinations? Below are some common myths and truths about vaccinations.

### ***Fiction: Vaccines cause autism.***

- **Fact:** They do not! A British physician performed a study suggesting that the MMR vaccine is responsible for the increasing incidence of autism. The study was found to have had procedural errors, conflicts of interest, and ethical violations, which caused him to lose his medical license. Several studies have been performed since, and none have found a link between vaccines and autism.<sup>2</sup>

### ***Fiction: Vaccines contain harmful toxins such as formaldehyde and mercury.***

- **Fact:** These chemicals are considered toxic but in large amounts. If vaccines contain any of these substances at all, it is in trace amounts and not harmful to humans. No scientific study has found that the amount or type of any of these toxins causes adverse effects.

### ***Fiction: Vaccines are not worth the risk.***

- **Fact:** The incidence rate of a severe allergic reaction to a vaccine is approximately one case for every one to two million injections.<sup>2</sup>

### ***Fiction: Vaccines can give us the disease they are trying to prevent.***

- **Fact:** Most vaccines contain a killed or inactivated strand of the disease itself and cannot make you sick. The live vaccines contain a strain of pathogen that is weakened and cannot cause the disease. Most reactions to the injections are the body's immune response following the vaccination.<sup>2</sup>
  1. Immunization Action Coalition [Internet]. St. Paul: Immunization Action Coalition c.1994-2015 [2013; cited 2015 Jun 24]. Vaccines work! CDC statistics demonstrate dramatic declines in vaccine-preventable diseases when compared with the pre-vaccine era; [about 1 screen]. Available from: <http://www.immunize.org/catg.d/p4037.pdf>
  2. Public Health [Internet]. c2015 [cited 2015 Jun 24]. Vaccine Myths Debunked. [about 3 screens]. Available from: <http://www.publichealth.org/public-awareness/understanding-vaccines/vaccine-myths-debunked/>
  3. Food and Drug Administration [Internet]. Silver Spring: U.S. Food and Drug Administration c. 1906-2015 [2014 May 1; cited 2015 Jun 24]. Common ingredients in U.S. licensed vaccines; [about 5 screens]. Available from: <http://www.fda.gov/BiologicsBloodVaccines/SafetyAvailability/VaccineSafety/ucm187810.htm>



## SCHOOL VACCINES<sup>1</sup>

What Vaccination Should I get?	When should I get it?	How many doses?	What Else Do I Need to Know About the Vaccine?
DTaP (diphtheria, tetanus, pertussis)	4-6 years old	1 dose	This should be the fourth dose your child receives.
Tdap (tetanus, diphtheria, pertussis)	11-12 years old	1 dose	Adolescents should receive a Tdap vaccination regardless of when last dose of diphtheria, tetanus, and pertussis vaccine was given
MMR (measles, mumps, rubella)	4-6 years old	1 dose (booster)	All school aged children and adolescents need 2 doses of MMR vaccine with a minimum of 4 weeks in between each dose
Varicella (chicken pox)	4-6 years old	1 dose (booster)	Varicella is a live vaccine. Children need 2 doses at least 3 months apart from 12-15 months and 4-6 years
IPV (inactivated polio vaccine)	4-6 years old	1 dose	This should be the fourth dose your child receives.
Influenza vaccine	Yearly	1 dose	Children 6 months to 2 years should receive the inactivated vaccine. Children older than 2 can receive the live vaccine if available
HPV (human papillomavirus)	11-12 years old	3 doses	Administer HPV 2 or 4 to females and only HPV 4 to males.

1. CDC immunization schedules. [Internet]. Atlanta: Center for Disease Control and Prevention. C1946-2015. Recommended immunization schedules for persons aged 0 through 18 years. 2015 Apr 6 [cited 2015 Jul 6]; [about 3 screens]. Available from: <http://www.cdc.gov/vaccines/schedules/downloads/child/0-18yrs-child-combined-schedule.pdf>

## COLLEGE VACCINES

Do you know someone going off to college this year? Here are some questions they need to ask so they'll be prepared for that first day of class:

What Vaccines Do I Need? <sup>1</sup>	When Should I Get Vaccinated? <sup>2</sup>	How Many Doses Should I Receive? <sup>2</sup>	What Else Do I Need to Know About the Vaccine? <sup>1,2</sup>
Td booster	Every 10 years	1 dose	This vaccine prevents tetanus, also called lockjaw, from occurring. This disease causes your muscles to tighten all over your body, and it results in death in 10% of cases.
Meningococcal	First-year college students through the age of 21 who live in residency halls	1 dose if you've previously received the vaccine before your 16 <sup>th</sup> birthday. If you've received the vaccine since your 16 <sup>th</sup> birthday, there is no need to receive an additional dose.	The bacteria that causes meningococcal disease is transmitted by saliva, such as from kissing or coughing. So it's important for young adults living in close contact, for example in a dorm, to receive the vaccine. Alabama does not, but 36 states do require students receive this vaccine before beginning college. See this website for state by state recommendations: <a href="http://www.immunize.org/laws/menin.asp">http://www.immunize.org/laws/menin.asp</a>
HPV (Human Papillomavirus)	Females: 11-26 years old Males: 11-21 years old; 22-26 years old if immunocompromised or have sex with men	This vaccine is a 3-dose series. You should get the 2 <sup>nd</sup> dose 1-2 months after receiving the initial dose. You should receive the 3 <sup>rd</sup> dose 3-4 months after the 2 <sup>nd</sup> dose.	HPV is transmitted during skin-to-skin sexual contact. There's a new HPV case every 20 minutes. This virus causes genital warts and certain types of cancers, but most of them can be prevented with this series of vaccinations.

1. CDC: vaccine information for adults [Internet]. Atlanta: Centers for Disease Control and Prevention c1946-2015. What vaccinations are recommended for you; 2014 Sep 18 [cited 2015 Jul 1]; [about 2 screens]. Available from: [http://www.cdc.gov/vaccines/adults/rec-vac/index.html?s\\_cid=cs\\_650](http://www.cdc.gov/vaccines/adults/rec-vac/index.html?s_cid=cs_650)
2. CDC: immunization schedules [Internet]. Atlanta: Centers for Disease Control and Prevention c1946-2015. Recommended adult immunization schedule, by vaccine and age group; 2015 Apr 6 [cited 2015 Jul 1]; [about 2 screens]. Available from: <http://www.cdc.gov/vaccines/schedules/hcp/imz/adult.html>
3. IAC: state information [Internet]. Saint Paul, MN: Immunization Action Coalition c1994-2015. Meningococcal prevention mandates for colleges and universities; 2015 Jan 15 [cited 2015 Jul 1]; [about 2 screens]. Available from: <http://www.immunize.org/laws/menin.asp>

## VACCINES ALL ADULTS SHOULD RECEIVE

Even after the age of 18 years, it is important to maintain the recommended vaccination schedule for many important reasons such as decreasing your risk of becoming sick, spreading disease to others, and developing cancer.<sup>1</sup> The following are the general vaccine recommendations and frequency for a healthy adult. Some medical conditions may require additional or different vaccinations, so check with your pharmacist if you are unsure.<sup>2</sup>

Vaccine	Recommendation	What Else Do I Need to Know About the Vaccine?
Flu Vaccine	Every Year	Different types of vaccines are available for differing needs of the patient
Tetanus vaccine	Every 10 years	If not received during childhood, Tdap is given once as a supplement to the Td shot. Resume Td shots every 10 years.
Pneumococcal Vaccine	65 years or older	You may have to receive two different vaccinations separated by one year if no record of receiving PCV13 variation.
Shingles Vaccine	60 years or older	This vaccine is a one-time dose

1. Why Vaccines are Important for You. CDC – National Center for Health Statistics – Homepage. [updated 2014 Mar 26; cited 2015 Jul 6]. Available from <http://www.cdc.gov/vaccines/adults/reasons-to-vaccinate.html>
2. What Vaccines are Recommended for You. CDC – National Center for Health Statistics – Homepage. [updated 2014 Sep 18; cited 2015 Jul 6]. Available from <http://www.cdc.gov/vaccines/adults/rec-vac/index.html>

## TRAVEL VACCINES

Traveling to a foreign country, preparing for an upcoming cruise on the seas, or helping with a mission trip to a country in need? The CDC and World Health Organization recommend all people traveling to foreign countries receive immunizations appropriate to the destination of travel. For example, typhoid fever, yellow fever, and Japanese encephalitis are infectious diseases not typically encountered in the US, but they may require vaccination if you are traveling to an area with increased risk of acquiring these diseases.<sup>1</sup> The CDC offers a simple tool to recommend vaccinations for travelers and clinicians here: <http://wwwnc.cdc.gov/travel/destinations/list>. For example, students planning a summer trip to study in Italy would want to consider



Hepatitis A, Hepatitis B, and rabies vaccinations in addition to the recommended vaccinations for their age.<sup>2</sup>

1. International Travel and Health. World Health Organization – homepage. [updated 2015 May; cited 2015 Jul 6]. Available from <http://www.who.int/ith/vaccines/en/>
2. Destinations. CDC – National Center for Health Statistics – Homepage. [cited 2015 Jul 6]. Available from <http://wwwnc.cdc.gov/travel/destinations/list>

## The Last Dose

**“Vaccines save lives; fear endangers them. It’s a simple message parents need to keep hearing.”**

– Jeffrey Kluger, writer and journalist [1954 - ]

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