



Key Inforbits

- Father of Immunology
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- DTaP and Seizures
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August:



National Immunization Month

The Father of Immunology:



Edward Jenner (May 17, 1749 – January 26, 1823) was a country doctor in England who pioneered research on the smallpox vaccine.^{1,2} Since he worked in a rural community, most of his patients were farmers or people who worked on farms with cows. During a smallpox outbreak in 1788, Jenner observed that milk maids who were previously infected with cowpox never developed smallpox. This led to his hypothesis that if he could inoculate someone with a small amount of the pus in cowpox blisters, they would never contract the disease. In 1796, Jenner had the opportunity to test his hypothesis by injecting cowpox into James Phipps, the son of Jenner's gardener. Jenner first injected material from cowpox blisters into James for which he never became seriously ill.¹ Six weeks later, Jenner injected James with the smallpox virus. James never developed smallpox. After further research, Jenner reported his findings to the Royal Society in London in 1798.² His work was met with much skepticism and ridicule. Because of his findings, Jenner was labeled the 'Father of Immunology.'³

1. Barquet N, Domingo P. Smallpox: the triumph over the most terrible ministers of death. *Ann Intern Med.* 1997 Oct 15; 127(8): 635-642.
2. Atlas RM. Development of Microbiology as a Scientific Discipline. In: Atlas RM. *Principles of Microbiology.* St. Louis: Mosby; c1995. p. 14-22.
3. BBC [Internet]. London (UK): British Broadcasting Network; c2010. Historic figures: Edward Jenner (1749-1823); [cited 2010 Jul 14]; [about 2 screens]. Available from: http://www.bbc.co.uk/history/historic_figures/jenner_edward.shtml

Vaccines and Rheumatoid Arthritis

It is not an uncommon belief that vaccines may lead to inflammatory conditions. It has been theorized that the immune response caused by the vaccine attacks the body and leads to inflammatory conditions such as rheumatoid arthritis. A study was recently published in the *Annals of the Rheumatic Diseases* showing that there is no link between the type or number of vaccines received and rheumatoid arthritis. The study took place in Sweden and the sample size was 2,000 people that ranged in age from 18 – 70 years old. Several vaccinations were included in the study including: influenza; tetanus; diphtheria; tick-borne encephalitis; polio; pneumococcal; and hepatitis A, B, and C.

1. Preidt R. Vaccines don't appear to increase rheumatoid arthritis risk: findings challenge common myth about the illness, researchers say [Internet]. Norwalk (CT): ScoutNews, LLC; 2010 Jul 6 [updated 2010 Jul 6; cited 2010 Jul 12]. Available from: <http://consumer.healthday.com/Article.asp?AID=640825>.

DTaP and Tdap mix-up:

The ISMP Medication Errors Reporting Program has reported several errors involving mix-ups between adult and pediatric vaccines used to prevent diphtheria, tetanus, and pertussis. A majority of the problem lies in the fact that the names of these two agents are very similar.¹ The brand names for DTaP, which is used in patients who are six weeks to six years of age, are Daptacel[®], Tripedia[®] and Infanrix[®]. The brand names for Tdap, which is used in patients over seven years of age, are Boostrix[®] and Adacel[®].^{1,2} DTaP has higher antigen quantity of diphtheria and pertussis relative to Tdap, which is a booster shot; this is due to greater quantities of antigen needed for initial vaccination. There is no consequence for an adult receiving DTaP, other than a sore arm, and they would not need to get revaccinated. A pediatric patient receiving Tdap must be revaccinated with DTaP. Several recommendations have been made to prevent the mix-up of these two vaccines. One way is to store the pediatric vaccine separately from the adult vaccine. Another way is to convince providers to order the vaccine by brand names and not the abbreviations. Making parents or caregivers aware of the names of the vaccinations that are needed so they can write them down may help. One institution requires a time-out procedure before vaccine administration.¹

1. Institute for Safe Medication Practices [Internet]. Horsham (PA): Institute for Safe Medical Practices; c2010. DTaP – Tdap mix-ups now affecting hundreds of patients; 2010 Jul 1 [cited 2010 Jul 12]; [about 2 screens]. Available from: <http://www.ismp.org/Newsletters/acutecare/articles/20100701.asp>
2. Grabenstein J. 2010 Immunofacts Bound: Vaccines and Immunologic Drugs. Hagerstown: Lippincott Williams & Wilkins, 2009. p55-60.

DTAP and Seizures

In the past, it was believed that the diphtheria-tetanus-whole-cell pertussis (DTP) vaccine was associated with seizures; however, only limited population studies exist that determine the risk for seizures in patients after receiving the DTaP (diphtheria-tetanus-acellular pertussis) vaccine. That is no longer the case. A 10 year retrospective study involving 433,654 patients between the ages of 6 weeks to 23 months receiving DTaP was recently published in *Pediatrics*; 7191 seizure events were noted among the 433,654 patients. The authors concluded that there was no increase in seizure risk after DTaP vaccination among children included in the study. This study should reassure parents and clinicians that DTaP vaccination is safe in regards to seizures.

1. Huang WT, Gargiullo PM, Broder KR, Weintraub ES, Iskander JK, Klein NP, et. al. Lack of association between acellular pertussis vaccine and seizures in early childhood. *Pediatrics*; 2010 July 19; Published online. Available from: <http://pediatrics.aappublications.org/cgi/content/abstract/peds.2009-1496v1>

H1N1 Vaccine: Wasted Money or a Necessity?



Roughly 25% of the swine flu vaccine available to the public has expired. Approximately 40 million doses totaling \$260 million will need to be incinerated. On top of that, about 30 million more doses will expire soon. Therefore, more than 43% of the total supply will be unused and wasted. This leads to the question of why should so many swine flu vaccine doses be produced? According to the U.S. Department of Health and Human Services, it was more appropriate to be prepared for the worst case scenario than to be caught off guard with an inadequate supply. However, the swine flu was not as severe as initially feared. Demand for the vaccine never escalated as experts thought it would; there are several reasons why. First of all, tests showed that only one dose was adequate to cover most individuals; many initially believed that most patients would require two doses for the vaccine to provide immunity. Also, most of the vaccines did not become available until late 2009 after the peak of swine flu reports. The swine flu was not as deadly as it was initially thought. Approximately 12,000 deaths occurred due to the swine flu which is roughly 33% of the total deaths caused from the seasonal flu.

1. Stobbe M. AP IMPACT: Millions of vaccine doses to be burned [Internet]. New York (NY): The Associated Press; 2010 Jul 1 [updated 2010 Jul 1; cited 2010 Jul 12]. Available From: http://hosted.ap.org/dynamic/stories/U/US_MED_SWINE_FLU_VACCINE?SITE=AP&SECTION=HOME&TEMPLATE=DEFAULT.

Hope for HIV vaccine

As of December 2006, the estimate of individuals with HIV is approximately 39.5 million. Nearly 4.2 million people were newly diagnosed with HIV and 2.9 million people died from AIDs in 2006.¹ The battle with HIV has been difficult, but a vaccine for HIV may be close after a recent discovery.² Scientists have found antibodies in the blood from a HIV infected patient that kill more than 90% of HIV strains.^{2, 3} These antibodies could be used to produce a HIV vaccine, or they could be further developed to prevent or treat HIV infection. Scientists from the National Institute of Allergy and Infectious Diseases (NIAID) Vaccine Research Center found the two antibodies, VRC01 and VRC02. These two antibodies stop the replication of more HIV strains with more potency than any previous antibodies of the virus. The difficulty in finding an antibody that can neutralize the HIV virus lies in the fact that the virus constantly mutates its surface proteins. However, scientists have been able to identify certain areas of the surface that remain the same across all strains of HIV. VRC01 and VRC02 happen to work at one of these locations. The antibodies attach to the CD4 binding site inhibiting the viral cell from attaching to the host immune cell. "The discoveries we have made may overcome the limitations that have long stymied antibody-based HIV vaccine design," says Dr. Kwong, a member of the NIAID research team.²

1. Dumond JB, Kashuba DM. Pharmacotherapy of Human Immunodeficiency Virus Infection. In: Koda-Kimble MA, Young LY, Allredge BK, Corelli RL, Guglielmo BJ, Kradjan WA, et al. *Applied Therapeutics: The Clinical Use of Drugs*. 9th ed. Philadelphia: Lippincott Williams & Wilkins; 2009. pg. 69-1 – 69-33.
2. Sivitz L. NIH-Led scientists find antibodies that prevent most HIV strains from infecting human cells: Discovery to advance HIV vaccine design, antibody therapy for other diseases [Internet]. Bethesda (MD): US Department of Health and Human Services; 2010 Jul 7 [updated 2010 Jul 8; cited 2010 Jul 12]. Available from: <http://www.niaid.nih.gov/news/newsreleases/2010/Pages/HIVantibodies.aspx>
3. Zhou T, Georgiev I, Wu X, Yang YZ, Dai K, Finzi A, et al. Structural basis for broad and potent neutralization of HIV-1 by antibody VRC01 [Internet]. Washington DC: Highwire Press; 2010 Jul 8 [updated 2010 Jul 8; cited 2010 Jul 13]. Available from: <http://www.sciencemag.org/cgi/data/science.1192819/DC1/1>.

Whipping the whooping cough

The California Department of Public Health has declared an outbreak of pertussis as an epidemic.¹ According to the Centers for Disease Control and Prevention (CDC), "The reemergence of pertussis has been attributed to various factors, including increased awareness, improved diagnostics, decreased vaccination coverage, suboptimal vaccines, waning vaccine-induced immunity, and pathogen adaptation ... Pathogen adaptation is supported by several observations."² Pertussis is commonly known as the whooping cough. The number of cases reported to date is 910; there are also 600 other cases that are being investigated. So far, five infants have died from the disease. The CDC has reported 5120 cases of pertussis nationwide with some states seeing large increases in case. These states are Texas, Ohio, Michigan, and Arizona.¹ The CDC recommends that children receive 5 doses of DTaP. This includes a primary series of vaccinations at 2, 4, and 6 months. Additional doses are given at 15-18 months and at 4-6 years.³ Although this schedule is what the CDC recommends, the California Academy of Family Physicians recommends an accelerated DTaP schedule. The schedule is an initial vaccination at six weeks with following doses given every four weeks during the outbreak. Because the disease is passed along to children from adults, it is recommended that a single dose of Tdap should be administered in those people 11-18 years of age and 19-64 years of age.³ On June 30th, the CDC made the following recommendations to physicians:¹

- Insure all patients are up-to-date on vaccinations
- Consider diagnosis of pertussis in patients and their close contacts
- Consider atypical presentation of pertussis in infants (minimal or absent cough)
- Use correct diagnostic tests (culture is the gold standard)
- Treat cases with urgency
- Quickly report cases to public health departments

With these recommendations in place, California should see a decrease in pertussis activity.

1. AAFP news staff. Pertussis activity spiking in several states: vaccination critical in preventing illness [Internet]. Leawood (KS): American Academy of Family Physicians; 2010 Jul 6 [updated 2010 Jul 6; cited 2010 Jul 13]. Available from: <http://www.aafp.org/online/en/home/publications/news/news-now/health-of-the-public/20100706pertussis-spikes.html>.
2. Mooi FR, Van Loo IHM, Van Gent M, He Q, Bart MJ, Heuvelman KJ, et al. *Bordetella pertussis* strains with increased toxin production associated with pertussis resurgence. Emerg Infect Dis [serial on the Internet] 2009 Aug [cited 2010 Jul 19]. Available from: <http://www.cdc.gov/eid/EID/content/15/8/1206.htm>

3. Centers for Disease Control and Prevention [Internet]. Atlanta (GA): Centers for Disease Control and Prevention; ©2010. Vaccines in preventable diseases: pertussis (whooping cough) vaccination; updated 2010 Jul 2[cited 2010 Jul 13]; [about 4 screens]. Available from: <http://www.cdc.gov/vaccines/vpd-vac/pertussis/default.htm>.

Back to School

August is here and school starts soon. That means the teachers will be sending out checklists for school and classroom supplies. It is very important that parents supply their children with the supplies needed to succeed in the classroom; however, it is just as important to ensure the child meets the appropriate health standards to be present in the classroom. Each state requires children to receive certain vaccinations prior to attending school. Each state's immunization requirements should be posted on its department of health webpage. Here is a list of all vaccine requirements for the state of Alabama: ^{1, 2}

Vaccine	Age/Grade	Comments
DTaP (Diphtheria, Tetanus, and Pertussis)	Day Care, Head Start, K-12	<ul style="list-style-type: none"> • Age appropriate dosing in day care and Head Start • K-12→5 total doses (4 doses needed if 4th dose is given on or after 4th birthday)
Hib (<i>Haemophilus influenzae</i> type b)	Day Care, Head Start	<ul style="list-style-type: none"> • Age appropriate dosing
MMR (Measles, Mumps, and Rubella)	Day Care, Head Start, K-12, College	<ul style="list-style-type: none"> • Day care, Head Start, K-12→1 dose of mumps and rubella required given on or after 1st birthday • 2nd dose→28 days after 1st dose • College→2 doses MMR required
Pneumococcal	Day Care, Head Start	<ul style="list-style-type: none"> • Age appropriate dosing
Polio	Day Care, Head Start, K-12	<ul style="list-style-type: none"> • Day care, Head Start→age appropriate dosing • K-12→4 doses (3 doses needed if 3rd dose is given on or after 4th birthday)
Varicella	Day Care, Head Start, K-4	<ul style="list-style-type: none"> • Age appropriate dosing • Not required if documentation of positive varicella titer or date of varicella disease exists

1. National Network for Immunization Information [Internet]. Galveston (TX): National Network for Immunization Information; c2010. Alabama Vaccine and Immunization Requirements; updated 2006 Oct 24 [cited 2010 Jul 14]; [about 3 screens]. Available from: <http://www.immunizationinfo.org/vaccines/state-requirements/alabama>
2. Alabama Department of Public Health [Internet]. Montgomery (AL): Alabama Department of Public Health; c2010. Immunization Resources; [cited 2010 Jul 14]; [about 4 screens]. Available from: <http://www.adph.org/Immunization/Default.asp?id=538>



The last “dose” ...

“Education is the vaccine for violence.”

- Edward James Olmos (actor and director) (1947 -)

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