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Kansas Department of Health and Environment
Division of Health Care Finance

FEBRUARY 2019

KMAP GENERAL BULLETIN 19032

HPV Vaccine Coverage

Effective with dates of service on and after March 1, 2019, the recombinant human papillomavirus (HPV) vaccine (such as Gardasil® 9) billed under *CPT*® code 90651, will be covered for men and women from 9 to 45 years of age.

Reimbursement of *CPT* codes for vaccines covered under the Vaccines for Children (VFC) program will not be allowed for children 18 years of age and younger.

Note: The effective date of the policy is March 1, 2019. The implementation of State policy by the KanCare managed care organizations (MCOs) may vary from the date noted in the Kansas Medical Assistance Program (KMAP) bulletins. The **KanCare Open Claims Resolution Log** on the KMAP Bulletins page documents the MCO system status for policy implementation and any associated reprocessing completion dates, once the policy is implemented.

KMAP
Kansas Medical Assistance Program
- Bulletins
- Manuals
- Forms

Customer Service
- 1-800-933-6593
- *7:30 a.m. - 5:30 p.m.*
  Monday - Friday

DXC Technology is the fiscal agent of KMAP.

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Kansas
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Lee A. Norman, M.D., Acting Secretary

Laura Kelly, Governor

KANSAS SCHOOL KINDERGARTEN THROUGH GRADE 12 IMMUNIZATION REQUIREMENTS FOR 2019-2020 SCHOOL YEAR

Immunization requirements and recommendations for the 2019-2020 school year are based on the Advisory Committee on Immunization Practices (ACIP) and the Centers for Disease Control and Prevention (CDC) recommendations. The current recommended and minimum interval immunization schedules may be found on the CDC webpage. The best disease prevention is achieved by adhering to the recommended schedule. However, if a child falls behind, the minimum interval schedule is implemented. To avoid missed opportunities, immunization providers may use a 4-day grace period, in most instances, per age and interval between doses. In such cases, these doses may be counted as valid.

K.S.A. 72 - 6261 - Kansas Statutes Related to School Immunizations Requirements and K.A.R. 28-1-20 defines the immunizations required for school and early childhood program attendance published in the June 26, 2008 Kansas Register.

- **Diphtheria, Tetanus, Pertussis (DTaP/Tdap):** Five doses required. Doses should be given at 2 months, 4 months, 6 months, 15-18 months, and 4-6 years (prior to kindergarten entry). The 4th dose may be given as early as 12 months of age, if at least 6 months have elapsed since dose 3. The 5th dose is not necessary if the 4th dose was administered at age 4 years or older. A single dose of **Tdap** is required at entry to 7th grade.

- **Hepatitis A:** Two doses required. Doses should be given at 12 months with a minimum interval of 6 months between the 1st and 2nd dose. (Provisional based on expected revision to K.A.R. 28-1-20 prior to school year)

- **Hepatitis B:** Three doses required. Doses should be given at birth, 1-2 months, and 6-18 months. Minimum age for the final dose is 6 months.

- **Measles, Mumps, and Rubella:** Two doses required. Doses should be given at 12-15 months and 4-6 years (prior to kindergarten entry). Minimum age is 12 months and interval between doses may be as short as 28 days.

- **Meningococcal (Serogroup A,C,W,Y):** Two doses required. Doses should be given at entry to 7th grade (11-12 years) and 11th grade (16-18 years). For children 16-18 years, only one dose is required. (Provisional based on expected revision to K.A.R. 28-1-20 prior to school year)

- **Poliomyelitis (IPV/OPV):** Four doses required. Doses should be given at 2 months, 4 months, 6-18 months, and 4-6 years (prior to kindergarten entry). Three doses are acceptable if 3rd dose was given after 4 years of age **and** at least 6 months have elapsed since dose 2.

- **Varicella (chickenpox):** Two doses are required. Doses should be given at 12-15 months and 4-6 years (prior to kindergarten entry). The 2nd dose may be administered as early as 3 months after the 1st dose, however, a dose administered after a 4-week interval is considered valid. No doses are required when student has history of varicella disease documented by a licensed physician.

Legal alternatives to school vaccination requirements are found in K.S.A. 72-6262.

In addition, to the immunizations required for school entry the following vaccines are recommended to protect students:

- **Human Papillomavirus (HPV):** Two doses *recommended* at 11 years of age or three doses if the series is started after 15 years.
- **Influenza:** Annual vaccination *recommended* for all ages $\geq$ 6 months of age. Number of doses is dependent on age and number of doses given in previous years.

Vaccination efforts by school and public health officials, immunization providers, and parents are key to the success of protecting our children and communities from vaccine preventable diseases. Thank you for your dedication.

Rev. 2/12/2019

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LICENSED CHILD CARE FACILITIES AND EARLY CHILDHOOD PROGRAMS OPERATED BY SCHOOLS IMMUNIZATION REQUIREMENTS FOR 2019-2020 SCHOOL YEAR

Immunization requirements and recommendations for the 2019-2020 school year are based on the Advisory Committee on Immunization Practices (ACIP) and the Centers for Disease Control and Prevention (CDC) recommendations. The current recommended and minimum interval immunization schedules may be found on the CDC webpage. The best disease prevention is achieved by adhering to the recommended schedule. However, if a child falls behind, the minimum interval schedule is implemented. To avoid missed opportunities, immunization providers may use a 4-day grace period, in most instances, per age and interval between doses. In such cases, these doses may be counted as valid.

K.A.R. 28-1-20 defines the immunizations required for children attending child care facilities and early childhood program licensed by the Kansas Department of Health and Environment. The complete regulation is published in the June 26, 2008 Kansas Register.

- **Diphtheria, Tetanus, Pertussis (DTaP):** Five doses required. Doses should be given at 2 months, 4 months, 6 months, 15-18 months, and 4-6 years (prior to kindergarten entry). The 4th dose may be given as early as 12 months of age, if at least 6 months have elapsed since dose 3. The 5th dose is not necessary if the 4th dose was administered at age 4 years or older.
- **Haemophilus influenzae type b (Hib):** Three to four doses required for children less than 5 years of age. Brands of vaccine approved for a three-dose series should be given at 2 months, 4 months, and 12-15 months. Brands of vaccine approved for a four-dose series should be given at 2 months, 4 months, 6 months, and 12-15 months. Total doses needed for series completion is dependent on the type of vaccine administered and the age of the child when doses were given.
- **Hepatitis A:** Two doses required. Doses should be given at 12 months with a minimum interval of 6 months between the 1st and 2nd dose.
- **Hepatitis B:** Three doses required. Doses should be given at birth, 1-2 months, and 6-18 months. Minimum age for the final dose is 6 months.
- **Measles, Mumps, and Rubella:** Two doses required. Doses should be given at 12-15 months and 4-6 years (prior to kindergarten entry). Minimum age is 12 months and interval between doses may be as short as 28 days.
- **Pneumococcal conjugate (PCV):** Four doses required for children less than 5 years of age. Doses should be given at 2 months, 4 months, 6 months, and 12-15 months. Total doses needed for series completion is dependent on the age of the child when doses were given.
- **Poliomyelitis (IPV/OPV):** Four doses required. Doses should be given at 2 months, 4 months, 6-18 months, and 4-6 years (prior to kindergarten entry). Three doses are acceptable if 3rd dose was given after 4 years of age **and** at least 6 months have elapsed since dose 2.
- **Varicella (chickenpox):** Two doses are required. Doses should be given at 12-15 months and 4-6 years (prior to kindergarten entry). The 2nd dose may be administered as early as 3 months after the 1st dose, however, a dose administered after a 4-week interval is considered valid. No doses are required when student has history of varicella disease documented by a licensed physician.

Legal alternatives to school vaccination requirements are found at K.S.A. 72-6262.
In addition to the immunizations required for children attending child care facilities licensed by KDHE and early childhood programs operated by schools, other vaccine recommendations are:

- **Rotavirus:** Two or three doses are recommended for < 8 months of age; not required. Total doses needed for series completion is dependent on the type of vaccine administered and the age of the child when doses were given.
- **Influenza:** Annual vaccination recommended for all ages ≥ 6 months of age. Number of doses is dependent on age and number of doses given in previous years.

Vaccination efforts by school and public health officials, immunization providers and parents are key to the success of protecting our children and communities from vaccine preventable disease. Thank you for your dedication.

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Lee A. Norman, M.D., Acting Secretary

Laura Kelly, Governor

February 25, 2019

TO: All Immunization Providers and School Nurses

FROM: Phil Griffin, Bureau of Disease Control and Prevention Deputy Director

RE: Implementation of New 2019 – 2020 School Entry Vaccinations

The Kansas Department of Health and Environment Immunization Program would like to provide the following implementation schedule for the new school entry vaccination requirements for Hepatitis A vaccine and Meningococcal ACWY vaccine. This implementation plan is associated with the Kansas School Kindergarten Through Grade 12 Immunization Requirements For 2019 – 2020 School Year memo that was released February 12, 2019 and may be found on the KIP web page for school vaccination requirements.

Requirement:

- **Hepatitis A:** Two doses required. Doses should be given at 12 months with a minimum interval of 6 months between the 1st and 2nd dose. (Provisional based on expected revision to K.A.R. 28-1-20 prior to school year)

Implementation Schedule:

School Year	Grade Entry Required to be Vaccinated												
	K	1	2	3	4	5	6	7	8	9	10	11	12
2019 - 2020	■	■											
2020 – 2021	■	■	■	■									
2021 – 2022	■	■	■	■	■	■							
2022 – 2023	■	■	■	■	■	■	■	■					
2023 – 2024	■	■	■	■	■	■	■	■	■	■			
2024 - 2025	■	■	■	■	■	■	■	■	■	■	■	■	■

Requirement:

- **Meningococcal (Serogroup A,C,W,Y):** Two doses required. Doses should be given at entry to 7th grade (11-12 years) and 11th grade (16-18 years). For children 16-18 years, only one dose is required. (Provisional based on expected revision to K.A.R. 28-1-20 prior to school year)

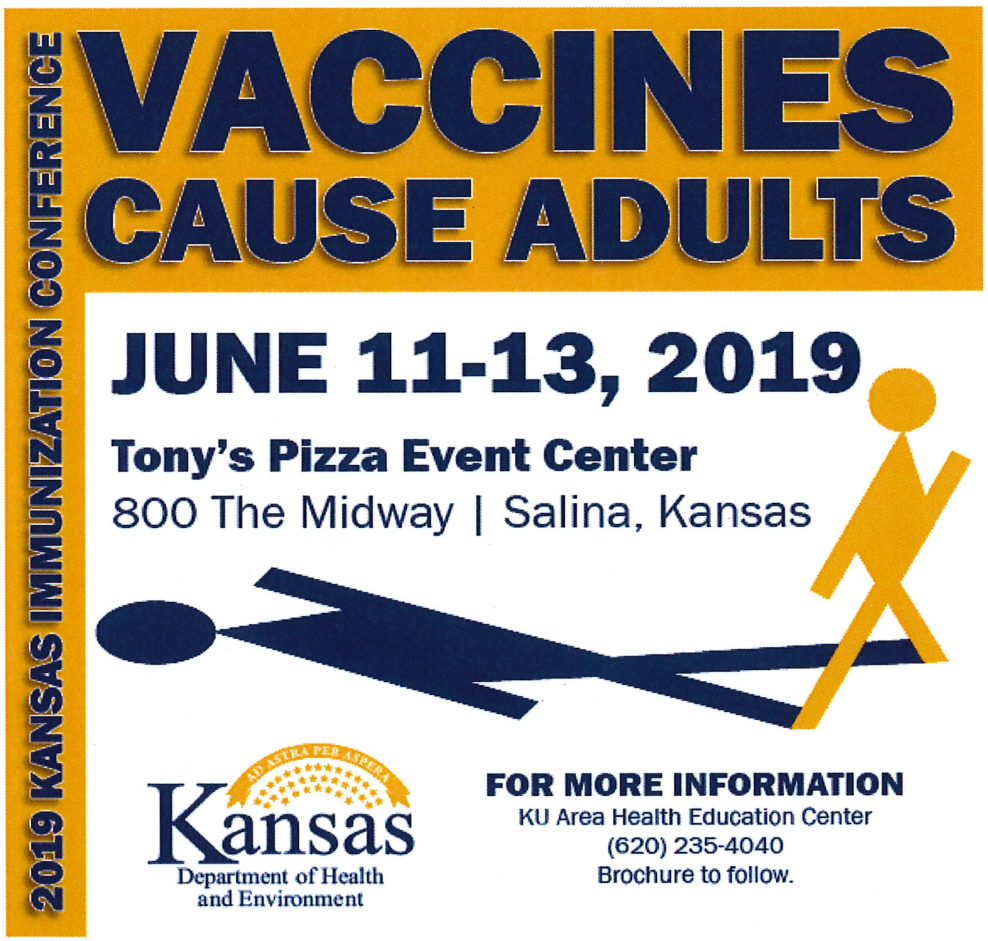
Implementation Schedule:

School Year	Grade Entry Required to be Vaccinated					
	7	8	9	10	11	12
2019 - 2020	■				■	
2020 – 2021	■	■			■	■
2021 – 2022	■	■	■		■	■
2022 – 2023	■	■	■	■	■	■

2019 Kansas Immunization Conference

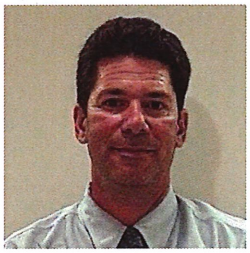
We are pleased to announce that the hotel contracts have been signed and room blocks are now available at seven hotels in Salina for the 2019 Kansas Immunization Conference. Please see the chart below for a list of hotels and details related to number of rooms in our block, room rate and deadline for guaranteed rate. Note that rooms will book quickly in Salina, particularly for the last night as the annual River Festival will follow our conference. When booking, please mention the Kansas Immunization Conference to get the rate listed.

Hotel	Rooms	Rate	Deadline	Phone
Hilton Garden Inn	10	$132.00	5/9/2019	785-309-0440
Country Inn and Suites	43	$82.00	6/1/2019	785-827-1271
Hampton Inn	90	$129.00	5/27/2019	785-823-9800
Holiday Inn Salina	5	129.99 Doubles	5/11/2019	785-404-6767
Holiday Inn Salina	35	$94.00 King	5/11/2019	785-404-6767
Holiday Inn Express	30	$94.00	5/10/2019	785-404-3300
Candlewood Suites	20	$85.00 Singles	5/13/2019	785-823-6939
Candlewood Suites	10	$94.00 Doubles	5/13/2019	785-823-6939
Courtyard by Marriott	15	$129.00	5/5/2019	785-309-1300



Kansas Immunization Program

Knowledge Injection Series (KIP-KIS)



Vaccine Safety

April 18, 2019

12 P.M.

Presenter: Daniel Salmon, PhD, MPH

Institute of Vaccine Safety Director

John Hopkins Bloomberg School of Public Health

During his tenure, he has led the expansion of the Institute's website, a trusted resource for parents and professionals across the world. The site offers information on associations between potential adverse events and routine immunization in the United States. In addition to summarizing the scientific literature and providing causality assessments, the site links to supplemental information about specific adverse events.

Before joining the Institute, Salmon was the Director of Vaccine Safety in the National Vaccine Program Office at the US Department of Health and Human Services. As director, he coordinated, evaluated and provided leadership for federal vaccine safety programs. During the 2009-10 H1N1 influenza pandemic, he oversaw the federal vaccine safety monitoring program—the most comprehensive vaccine safety monitoring effort in US history.

Salmon's work focuses on optimizing the prevention of childhood infectious diseases through the use of vaccines. He currently studies issues around post-licensure vaccine safety and the factors associated with parental decisions to vaccinate, or not vaccinate, their children. This work fits nicely with the Institute's mission to provide an independent assessment of vaccines and vaccine safety to help guide decision makers and educate physicians, the public and the media about key issues surrounding the safety of vaccines.

Educational Objectives:

1. Discuss the importance of vaccine safety in the context of mature immunization programs.

2. Identify the strengths and limitations of the many processes to ensure vaccines are very safe throughout a product lifecycle.

Continuing education credit will be available.

For more information and to complete advanced registration, click here.

Q&A TOO MANY VACCINES? WHAT YOU SHOULD KNOW

Volume 4
Winter 2018

Today, young children receive vaccines to protect them against 14 different diseases. Because some vaccines require more than one dose, children can receive as many as 27 inoculations by 2 years of age and five shots at one time. For this reason, some parents ask their doctors to space out, separate or withhold vaccines. The concern that too many vaccines might overwhelm a baby's immune system is understandable, but the evidence that they don't is reassuring.

Q. What are the active components in vaccines?

A. Vaccines contain parts of viruses or bacteria that induce protective immune responses. These active ingredients are called immunological components.

Vaccines that protect against bacterial diseases are made from either inactivated bacterial proteins (e.g., diphtheria, tetanus and pertussis [whooping cough]) or bacterial sugars called polysaccharides (e.g., *Haemophilus influenzae* type b [Hib] and pneumococcus). Each of these bacterial proteins or polysaccharides is considered an immunological component, meaning that each evokes a distinct immune response.

Vaccines that protect against viral diseases (e.g., measles, mumps, rubella, polio, rotavirus, hepatitis A, hepatitis B, chickenpox and influenza) are made of viral proteins. Just like bacterial proteins, viral proteins induce an immune response.

Q. Do children encounter more immunological components from vaccines today than they did 30 years ago?

A. No. Although children receive more vaccines now than ever before, most people would probably be surprised to learn that the number of immunological components in vaccines has dramatically decreased.

In the late 1980s and early 1990s, children received vaccines that protected against eight diseases: measles, mumps, rubella, diphtheria, tetanus, pertussis, *Haemophilus influenzae* type b and polio. The total number of bacterial and viral proteins contained in these vaccines was a little more than 3,000.

Today, children receive vaccines that protect against 14 diseases, but the total number of immunological components in these vaccines is only about 150. This dramatic reduction is the result of scientific advances in protein chemistry and protein purification that have allowed for purer, safer vaccines.

Q. Can too many vaccines overwhelm an infant's immune system?

A. No. Compared with the immunological challenges that infants handle every day, the challenge from the immunological components in vaccines is minuscule. Babies begin dealing with immunological challenges at birth. The mother's womb is a sterile environment, free from viruses, bacteria, parasites and fungi. But after babies pass through the birth canal and enter the world, they are immediately colonized with trillions of bacteria, which means that they carry the bacteria on their bodies but aren't infected by them. These bacteria live on the skin, nose, throat and intestines. To make sure that colonizing bacteria don't invade the bloodstream and cause harm, babies constantly make antibodies against them.

Colonizing bacteria aren't the only issue. Because the food that we eat, the water that we drink and the dust that we inhale contain bacteria, immunological challenges from the environment are unending. Viruses are also a problem. In the first few years of life, children are constantly exposed to a variety of different viruses that cause runny noses, cough, congestion, fever, vomiting or diarrhea.

Given that infants are colonized with trillions of bacteria, that each bacterium contains between 2,000 and 6,000 immunological components, and that infants are infected with numerous viruses, the challenge from the 150 immunological components in vaccines is minuscule compared to what infants manage every day. Indeed, a scraped knee is probably a greater immunological challenge than all childhood vaccines combined.

continued >

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Vaccine Education Center

Learn more: vaccine.chop.edu

Q&A TOO MANY VACCINES? WHAT YOU SHOULD KNOW

Q. How many vaccines can children effectively handle at one time?

A. A lot more than they're getting now. The purpose of vaccines is to prompt a child's body to make antibodies, which work by preventing bacteria and viruses from reproducing themselves and causing disease. So, how many different antibodies can babies make? The best answer to this question came from a Nobel Prize-winning immunologist at the Massachusetts Institute of Technology named Susumu Tonegawa, who first figured out how people make antibodies, and Mel Cohn and Rod Langman, immunologists at the University of California, San Diego, who figured out how many different immunological challenges people could handle at one time.

Tonegawa discovered that antibodies are made by rearranging and recombining many different genes. People can make about 10 billion different antibodies. Cohn and Langman calculated that given the number of antibody-producing cells in a child's bloodstream and the number of immunological components contained in vaccines, babies could effectively respond to about 100,000 vaccines at one time. Although this number sounds overwhelming, remember that every day children are defending themselves against a far greater number of immunological challenges in their environment. The difference is that while we are aware of immunologic challenges from vaccines, we are unaware of the challenges encountered during every day activities.

Q. How do we know that multiple vaccines can be given safely?

A. The Food and Drug Administration (FDA) requires extensive safety testing before vaccines are licensed. Before a new vaccine can be licensed by the FDA, it must first be tested by something called "concomitant use studies." Concomitant use studies require new vaccines to be tested with existing vaccines.

These studies are performed to make sure the new vaccine doesn't affect the safety or effectiveness of existing vaccines given at the same time, and vice versa. Because concomitant use studies have been required for decades, many studies have been performed showing that children can be inoculated with multiple vaccines safely.

Q. What is the harm of separating, spacing out or withholding vaccines?

A. Delaying vaccines can be risky. The desire by some parents to separate, space out or withhold vaccines is understandable. This choice, however, is not necessarily without consequence.

First, delaying vaccines only increases the time during which children are susceptible to certain diseases, some of which are still fairly common. Chickenpox, whooping cough (pertussis), *Haemophilus influenzae* type b, influenza and pneumococcus still cause hospitalizations and deaths in previously healthy children every year. Although some people may not realize it, before the chickenpox vaccine, every year between 70 and 100 children died from the disease. And, because some children are not vaccinated against influenza, each year in the U.S. about 75 to 150 children die from influenza. Many of these were previously healthy children who were not considered to be at increased risk of influenza.

Second, spacing out or separating vaccines will require children to visit the doctor more often for shots. Researchers have found that children experience similar amounts of stress, as measured by secretion of a hormone called cortisol, whether they are getting one or two shots at the same visit. These findings suggest that although children are clearly stressed by receiving a shot, two shots aren't more stressful than one. For this reason, more visits to the doctor created by separating or spacing out vaccines will only increase the stress of getting shots. The choice to separate or space out vaccines also increases the risk of vaccine administration errors.

References

Offit PA, Quarles J, Gerber MA, et al. Addressing parents' concerns: do multiple vaccines overwhelm or weaken the infant's immune system? *Pediatrics*. 2002;109(1):124-129.

Tonegawa S, Steinberg C, Dube S, Bernardini A. Evidence for somatic generation of antibody diversity. *Proc Natl Acad Sci* USA. 1974;71(10): 4027-4031.

Cohn M, Langman RE. The protection: the unit of humoral immunity selected by evolution. *Immunol Rev*. 1990;115:11-147.

Ramsay DS, Lewis M. Developmental changes in infant cortisol and behavioral response to inoculation. *Child Dev*. 1994;65(5):1491-1502.

This information is provided by the Vaccine Education Center at Children's Hospital of Philadelphia. The Center is an educational resource for parents and healthcare professionals and is composed of scientists, physicians, mothers and fathers who are devoted to the study and prevention of infectious diseases. The Vaccine Education Center is funded by endowed chairs from Children's Hospital of Philadelphia. The Center does not receive support from pharmaceutical companies.

Children's Hospital of Philadelphia®
Vaccine Education Center

Learn more: vaccine.chop.edu

Q&A VACCINES AND AUTISM: WHAT YOU SHOULD KNOW

Volume 3
Winter 2019

Some parents are concerned that vaccines can cause autism. Their concerns center on three areas: the combination measles-mumps-rubella (MMR) vaccine; thimerosal, a mercury-containing preservative previously contained in several vaccines; and the notion that babies receive too many vaccines too soon.

Q. What are the symptoms of autism?

A. Symptoms of autism, which typically appear during the first few years of life, include difficulties with behavior, social skills and communication. Specifically, children with autism may have difficulty interacting socially with parents, siblings and other people; have difficulty with transitions and need routine; engage in repetitive behaviors such as hand flapping or rocking; display a preoccupation with activities or toys; and suffer a heightened sensitivity to noise and sounds. Autism spectrum disorders vary in the type and severity of the symptoms they cause, so two children with autism may not be affected in quite the same way.

Q. What causes autism?

A. The specific cause or causes of autism in all children are not known. But one thing is clear: Autism spectrum disorders are highly genetic. Researchers figured this out by studying twins. They found that when one identical twin had autism, the chance that the second twin had autism was greater than 90 percent. But when one fraternal twin had autism, the chance that the second twin had autism was less than 10 percent. Because identical twins have identical genes and fraternal twins don't, these studies proved the genetic basis of autism. Researchers have successfully identified some of the specific genes that cause autism.

Some parents wonder whether environmental factors — defined as anything other than genetic factors — can cause autism. It's possible. For example, researchers found that thalidomide, a sedative, can cause autism if used during early pregnancy. Also, if pregnant women are infected with the rubella virus (German measles) during early pregnancy, their babies are more likely to have autism.

Q. Does the MMR vaccine cause autism?

A. No. In 1998, a British researcher named Andrew Wakefield raised the notion that the MMR vaccine might cause autism. In the medical journal *The Lancet,* he reported the stories of eight children who developed autism and intestinal problems soon after receiving the MMR vaccine. To determine whether Wakefield's suspicion was correct, researchers performed a series of studies comparing hundreds of thousands of children who had received the MMR vaccine with hundreds of thousands who had never received the vaccine. They found that the risk of autism was the same in both groups. The MMR vaccine didn't cause autism.

Some parents wary of the safety of the MMR vaccine stopped getting their children immunized. As immunization rates dropped, particularly in the United Kingdom and, to some extent, the United States, outbreaks of measles and mumps led to hospitalizations and deaths that could have been prevented.

Q. Does thimerosal cause autism?

A. No. Multiple studies have shown that thimerosal in vaccines does not cause autism. Thimerosal is a mercury-containing preservative that was used in vaccines to prevent contamination. In 1999, professional groups called for thimerosal to be removed from vaccines as a precaution. Unfortunately, the precipitous removal of thimerosal from all but some multi-dose preparations of influenza vaccine scared some parents. Clinicians were also confused by the recommendation.

Since the removal of thimerosal, several studies have been performed to determine whether thimerosal causes autism. Hundreds of thousands of children who received thimerosal-containing vaccines were compared to hundreds of thousands of children who received the same vaccines free of thimerosal. The results were clear: The risk of autism was the same in both groups; thimerosal in vaccines did not cause autism.

continued >

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Q&A VACCINES AND AUTISM: WHAT YOU SHOULD KNOW

Q. Is autism caused by children receiving too many vaccines too soon?

A. Several facts make it very unlikely that babies are overwhelmed by too many vaccines given too early in life.

First, before they are licensed, new vaccines are always tested alone and in combination with existing vaccines. These studies determine whether new vaccines alter the safety and efficacy of existing vaccines and, conversely, whether existing vaccines affect the new vaccine. These studies, called concomitant use studies, are performed every time a new vaccine is added to the existing vaccination schedule.

Second, although the number of vaccines has increased dramatically during the past century, the number of immunological components in vaccines has actually decreased. One hundred years ago, children received just one vaccine, for smallpox. The smallpox vaccine contained about 200 immunological components. Today, with advances in protein purification and recombinant DNA technology, the 14 vaccines given to young children contain only about 150 immunological components.

Third, the immunological challenge from vaccines is minuscule compared to what babies typically encounter every day. The womb is sterile, containing no bacteria, viruses, parasites or fungi. But when babies leave the womb and enter the world, they are immediately colonized by trillions of bacteria that live on the linings of their nose, throat, skin and intestines. Each bacterium contains between 2,000 and 6,000 immunological components. And babies often make an immune response to these bacteria to prevent them from entering the bloodstream and causing harm. The challenge that vaccines present is tiny in comparison to that from the environment.

Fourth, children have an enormous capacity to respond to immunological challenges. Susumu Tonegawa, a molecular biologist who won a Nobel Prize for his work, showed that people have the capacity to make between 1 billion and 100 billion different types of antibodies. Given the number of immunological components contained in modern vaccines, a conservative estimate would be that babies have the capacity to respond to about 10,000 different vaccines at once. Although this sounds like a huge number, when you consider the number of challenges that babies face from bacteria in their environment, it's not.

Here's another way to understand the difference in scale between immunological challenges from vaccines and natural challenges from the environment. The quantity of bacteria that live on body surfaces is measured in grams (a gram is the weight of about one-fifth of a teaspoon of water). The quantity of immunological components contained in vaccines is measured in micrograms or nanograms (millionths or billionths of a gram).

Q. Are the studies showing that neither the MMR vaccine nor thimerosal causes autism sensitive enough to detect the problem in small numbers of children?

A. The studies showing that neither the MMR vaccine nor thimerosal causes autism, called epidemiological studies, are very sensitive. For example, epidemiological studies have shown that a rotavirus vaccine used between 1998 and 1999 in the United States caused intestinal blockage in one out of every 10,000 vaccine recipients; that measles vaccine caused a reduction in the number of cells needed to stop bleeding (platelets) in one out of every 25,000 recipients; and that an influenza (swine flu) vaccine used in the United States in 1976 caused a type of paralysis called Guillain-Barré syndrome in one out of every 100,000 recipients.

About one out of every 59 children in the United States is diagnosed with an autism spectrum disorder. Even if vaccines caused autism in only 1 percent of autistic children, the problem would have easily been detected by epidemiological studies.

Q. If I am concerned that vaccines cause autism, what is the harm in delaying or withholding vaccines for my baby?

A. A study by Michael Smith and Charles Woods found that children who were fully vaccinated in the first year of life were not more likely to develop autism than those whose parents had chosen to delay vaccines. Further, all of the evidence shows that vaccines don't cause autism, so delaying or withholding vaccines will not lessen the risk of autism; it will only increase the period of time during which children are at risk for vaccine-preventable diseases. Several of these diseases, like chickenpox, pertussis (whooping cough) and pneumococcus (which causes bloodstream infections, pneumonia and meningitis) are still fairly common. Delaying or withholding vaccines only increases the time during which children are at unnecessary risk for severe and occasionally fatal infections.

REFERENCES

AUTISM REFERENCES

Because autism research is continually evolving, a great way to stay up-to-date is to visit the Autism Science Foundation's research pages at:

www.autismsciencefoundation.org/research-year

Alarcon M, Abrahams BS, Stone JL, et. al. Linkage, association, and gene-expression analyses identify CNTNAP2 as an autism-susceptibility gene. Am J Hum Genet. 2008;82(1):150-159.

Arking DE, Cutler DJ, Brune CW, et. al. A common genetic variant in the neurexin superfamily member CNTNAP2 increases familial risk of autism. Am J Hum Genet. 2008;82(1):160-164.

Bailey A, LeCouteur A, Gottesman I, et al. Autism as a strongly genetic disorder: evidence from a British twin study. Psychol Med. 1995;25:63-77.

Bauman M. Autism: clinical features and neurological observations. In: Tager-Flusberg H, ed. Neurodevelopmental Disorders. Cambridge, MA: The MIT Press;1999;383-399.

Chess S, Fernandez P, Korn S. Behavioral consequences of congenital rubella. J Pediatr. 1978;93:699-703.

Folstein S, Rutter M. Infantile autism: a genetic study of 21 twin pairs. J Child Psychol Psychiatry. 1977;18:297-321.

Gai X, Xie HM, Perin JC, et al. Rare structural variation of synapse and neurotransmission genes in autism. Mol Psych. 2011; 1-10.

Glessner JT, Wang K, Cai G, Korvatska O, et al. Autism genomewide copy number variation reveals ubiquitin and neuronal genes. Nature. 2009;459:569-573.

International Molecular Genetic Study of Autism Consortium (IMGSAC). A genomewide screen for autism: strong evidence for linkage to chromosomes 2q, 7q, and 16p. Am J Hum Genet. 2001;69:570-581.

Moessner R, Marshall CR, Sutcliffe JS, et al. Contribution of SHANK-3 mutations to autism spectrum disorder. Am J Hum Genet. 2007;81: 1289-1297.

Rodier PM. The early origins of autism. Sci Am. 2000;282:56-63.

Smith MJ and Woods CR. On-time vaccine receipt in the first year does not adversely affect neuropsychological outcomes. Pediatrics. 2010;125(6): 1134-1141.

Strömland K, Nordin V, Miller M, Akerström B, Gillberg C. Autism in thalidomide embryopathy: a population study. Dev Med and Child Neurol. 1994;36:351-356.

Wang K, Zhang H, Ma D, Bucan M, et al. Common genetic variants on 5p14.1 associate with autism spectrum disorders. Nature. 2009;459: 528-533.

Wassink TH, Piven J, Vieland VJ, et al. Evidence supporting WNT2 as an autism susceptibility gene. Am J Med Genet. 2001;105:406-413.

AUTISM AND VACCINES REFERENCES

Afzal MA, Ozoemena LC, O'Hare A, et al. Absence of detectable measles virus genome sequence in blood of autistic children who have had their MMR vaccination during the routine childhood immunization schedule of UK. J Med Virol 2006;78:623-630.

Dales L, Hammer SJ, Smith NJ. Time trends in autism and in MMR immunization coverage in California. JAMA. 2001;285:1183-1185.

Davis RL, Kramarz P, Bohlke K, et al. Measles-mumps-rubella and other measles-containing vaccines do not increase the risk for inflammatory bowel disease: a case control study from the Vaccine Safety Datalink project. Arch Pediatr Adolesc Med. 2001;155:354-359.

DeStefano F, Bhasin TK, Thompson WW, Yeargin-Allsopp M, Boyle C. Age at first measles-mumps-rubella vaccination in children with autism and school-matched control subjects: a population-based study in metropolitan Atlanta. Pediatrics. 2004;113:259-266.

DeStefano F, Chen RT. Negative association between MMR and autism. Lancet. 1999;353:1986-1987.

Farrington CP, Miller E, Taylor B. MMR and autism: further evidence against a causal association. Vaccine. 2001;19:3632-3635.

Fombonne E, Chakrabarti S. No evidence for a new variant of measles-mumps-rubella-induced autism. Pediatrics. 2001;108:E58.

Fombonne E, Cook EH Jr. MMR and autistic enterocolitis: consistent epidemiological failure to find an association. Mol Psychiatry. 2003;8: 133-134.

Honda H, Shimizu Y, Rutter M. No effect of MMR withdrawal on the incidence of autism: a total population study. J Child Psychol Psychiatry. 2005;46(6):572-579.

Hornig M, Briese T, Buie T. et al. Lack of association between measles virus vaccine and autism with enteropathy: a case-control study. PLoS ONE 2008;3(9):e3140.

Kaye JA, del Mar Melero-Montes M, Jick H. Mumps, measles, and rubella vaccine and the incidence of autism recorded by general practitioners: a time trend analysis. BMJ. 2001;322:460- 463.

Madsen KM, Hviid A, Vestergaard M, et al. A population-based study of measles, mumps and rubella vaccination and autism. N Engl J Med. 2002;347:1477-1482.

Marshall JA, Buikema A, et al. Autism occurrence by MMR vaccine status among US children with older siblings with and without autism. JAMA. 2015;313(15):1534-1540.

Peltola H, Patja A, Leinikki P, Valle M, Davidkin I, Paunio M. No evidence for measles, mumps and rubella vaccine associated inflammatory bowel disease or autism in a 14-year prospective study. Lancet. 1998;351: 1327-1328.

Smeeth L, Cook C, Fombonne E, et al. MMR vaccination and pervasive developmental disorders: a case-control study. Lancet 2004;364;963-969.

Taylor B, Miller E, Farrington CP, et al. Autism and measles, mumps and rubella vaccine: no epidemiological evidence for a causal association. Lancet. 1999;353:2026-2029.

Taylor LE, Swerdfeger AL, Eslick GD. Vaccines are not associated with autism: an evidence-based meta-analysis of case-control and cohort studies. Vaccine 2014;32:3623-3629.

Uchiyama T, Kurosawa M, Inaba Y. MMR-vaccine and regression in autism spectrum disorders: negative results presented from Japan. J Autism Dev Disord 2007;37:210-217.

Wilson K, Mills E, Ross C, McGowan J, Jadad A. Association of autistic spectrum disorder and the measles, mumps and rubella vaccine: a systematic review of current epidemiological evidence. Arch Pediatr Adolesc Med. 2003;157:628-634.

IMMUNOLOGICAL CAPACITY AND TOO MANY VACCINES REFERENCES

DeStefano F, Price CS, Weintraub ES. Increasing exposure to antibody-stimulating proteins and polysaccharides in vaccines is not associated with risk of autism. J Pediatr 2013;163:561-567.

Glanz JM, Newcomer SR, Daley MF, DeStefano F, et al. Association between estimated cumulative vaccine antigen exposure through the first 23 months of life and non-vaccine-targeted infections from 24 to 47 months of age. JAMA 2018;319(9):906-913.

Hviid A, Wholfahrt J, Stellfeld M, et al. Childhood vaccination and nontargeted infectious disease hospitalization. JAMA 2005;294(6): 699-705.

Iqbal S, Barile JP, Thompson WW, and DeStefano F. Number of antigens in early childhood vaccines and neuropsychological outcomes at age 7-10 years. Pharmacoepidemiol Drug Saf 2013;22:1263-1270.

Offit PA, Quarles J, Gerber MA, et al. Addressing parents' concerns: do multiple vaccines overwhelm or weaken the infant's immune system? Pediatrics. 2002;109:124-129.

Sherrid AM, Ruck CE, Sutherland D, et al. Lack of broad functional differences in immunity in fully vaccinated vs. unvaccinated children. Pediatr Res 2017;81(4):601-608.

Smith MJ and Woods CR. On-time vaccine receipt in the first year does not adversely affect neuropsychological outcomes. Pediatrics 2010;125; 1134-1141.

THIMEROSAL REFERENCES

Andrews N, Miller E, Grant A, Stowe J, Osborne V, Taylor B. Thimerosal exposure in infants and developmental disorders: a retrospective cohort study in the United Kingdom does not support a causal association. Pediatrics. 2004;114:584-591.

Christensen DL, Baio J, Van Naarden Braun K, Charles J, Constantino JN, et al. Prevalence and characteristics of autism spectrum disorder among children age 8 years – Autism Developmental Disabilities Monitoring Network, 11 Sites, United States, 2012. MMWR 2016;65(3):1-23.

Fombonne E, Zakarian R, Bennett A, Meng L, McLean-Heywood D. Pervasive developmental disorders in Montreal, Quebec, Canada: prevalence and links with immunizations. Pediatrics. 2006;118:E139-150.

Heron J, Golding J. Thimerosal exposure in infants and developmental disorders: a prospective cohort study in the United Kingdom does not support a causal association. Pediatrics. 2004;114:577-583.

Hviid A, Stellfeld M, Wohlfahrt J, Melbye M. Association between thimerosal-containing vaccines and autism. JAMA. 2003;290:1763-1766.

Madsen KM, Lauritsen MB, Pedersen CB, et al. Thimerosal and the occurrence of autism: negative ecological evidence from Danish population-based data. Pediatrics. 2003;112:604-606.

Picciotto IH, Green PG, Delwiche L, et. al. Blood mercury concentrations in CHARGE study children with and without autism. Environ Health Perspect. 2010;118(1):161-166.

Price CS, Thompson WW, Goodson B, et. al. Prenatal and infant exposure to thimerosal from vaccines and immunoglobulins and risk of autism. Pediatrics. 2010;126:656-664.

Schechter R, Grether J. Continuing increases in autism reported to California's developmental services system: mercury in retrograde. Arch Gen Psychiatry. 2008;65:19-24.

Stehr-Green P, Tull P, Stellfeld M, Mortenson PB, Simpson D. Autism and thimerosal-containing vaccines: lack of consistent evidence for an association. Am J Prev Med. 2003;25:101-106.

Thompson WW, Price C, Goodson B, et al. Early thimerosal exposure and neuropsychological outcomes at 7 to 10 years. N Engl J Med 2007;357(13):1281-1292.

Tozzi AE, Bisiacchi P, Tarantino V, et. al. Neuropsychological performance 10 years after immunization in infancy with thimerosal-containing vaccines. Pediatrics. 2009;123(2):475-482.

Verstraeten T, Davis RL, DeStefano F, et al. Study of thimerosal-containing vaccines: a two-phased study of computerized health maintenance organization databases. Pediatrics. 2003;112:1039-1048.

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