SUNSHINE FAMILY HEALTHCARE

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CHILDHOOD IMMUNIZATIONS

I. I) Introduction
   A. A) I attempt to provide unbiased information to help you make the best health decisions for your family.
   B. B) We will consider the health of the community and the health of the individual in our conversation.
   C. C) We will discuss the development of the immune system in relationship to immunizations and food allergies/sensitivities. We will consider the risks and benefits of individual vaccines and factors that may affect each family's decision about when, with what, and how to vaccinate their children.
   D. D) This class is an introductory over-view about vaccines. Individual appointments to discuss what approach to immunizations is best for your family may be a useful follow-up.

A. II) Understanding the immune system and how immunizations work
   B. A) The immune system defends against infection from unwanted organisms (bacteria, viruses, parasites) in a series of steps:
      1. 1) Physical barriers (skin and mucous membranes)
      2. 2) White blood cells, specific proteins
      3. 3) Antibody formation
         a. (a) Recognizes antigen (ex. bacteria)
         b. (b) Through a complex process the immune system creates molecules (antibodies) that attack that specific antigen (bacteria)
         c. (c) An important part of the process is controlled by T cells. There are two main T cell responses:
            i. (i) Th1 - best one for dealing with viruses and bacteria
            ii. (ii) Th2 - best for dealing with parasites and worms. When over-stimulated this response causes allergies and asthma.
         d. (d) Antibody formation takes up to seven days. Antibodies usually become protective the second time the body is exposed to the antigen. Waiting until the body is infected and then immunizing will not help very much with an initial infection.
   C. B) How immunizations work

1. 1) Immunizations expose the body to very small amounts of an antigen and stimulate the formation of antibodies against it. Some of these antibodies become memory cells.
2. 2) If the body is later exposed to the infectious agent, the memory cells are activated and the immune system is much more capable of defending the body than if this were the first time it was seeing the infection.
3. 3) The effectiveness of vaccines depends on many factors. Most of the time the immunized person can be exposed to the disease without contracting it. If they do contract it, they have a greater chance of having a mild case.
4. 4) The repeated doses of some of the vaccines are necessary to build the antibody levels up high enough to get an optimal immune response. The number of shots needed in an initial series varies based on the development and response of the immune system when they are given. Some need to be repeated years later because the body's memory antibodies diminish to a level that is ineffective.
    a. (a) Individual responses vary depending on the age when the immunizations are given, the over-all health of the person, and the development of the immune system.
    b. (b) Some people may get high enough antibody levels with less than the full series for a given immunization. How immune a person is to a disease that she has been immunized against can be measured with an antibody titer, a blood test that your doctor can order.

III) Immune System Development

1. A) Development of the baby's immune system
    b. a. Babies are born with T cells (general immunity) but their immune system is not able to make antibodies very effectively. During the first year of life the immune system continues to develop. Once a child turns one year old, their immune system's ability to create antibodies (specific antibodies against specific diseases) is fully functional.
        i. i. When they are exposed to antigens (immunizations or illness) before 1yo it pushes a Th2 response (allergies) rather than a Th1 response (antibodies).
        ii. ii. This is not an optimal situation because the Th2 does not give as good an immune response to bacteria and viruses as Th1, and stimulating Th2 has a potential for activating allergies and asthma.
        iii. iii. Also a Th2 response is not as long lasting as a Th1 response.
    c. b. Breastfed babies continue to receive antibodies from the breast milk as long as they are nursing. It is unknown how much that passive immunity decreases when babies receive combinations of breast milk and formula or as foods are introduced. Breastfeeding is certainly protective but we do not know how effective.
    d. c. Conditions that decrease immune response or increase susceptibility to illness:
        i. i. Not breastfeeding
        ii. ii. Smoking in the household, second hand smoke exposure

iii. iii. Baby in daycare
iv. iv. Chronic health condition that compromises immunity

v. B) When to vaccinate?

e. a. The Centers for Disease Control (CDC) sets the federal schedules for which vaccines are recommended and when they are to be given

i. i. They seek to eliminate as many dangerous bacterial and viral diseases as possible by vaccinating as many people as possible (herd immunity). They have only been totally successful in eradication with smallpox.

ii. ii. The CDC guidelines are enforced by local public health organizations and school entry laws.

iii. iii. Attempts are made to time vaccines to give immunity when the disease could have the highest chance of causing harm to the individual (except for MMR and varicella).

iv. iv. The schedule is linked to standard pediatric wellness visits in the first year of life because at no other time in an individual's life are they seen as frequently in the health care system when they are in a healthy state.

1. 1. The current state recommended schedule of immunizations suggests giving most of the initial series of vaccines before a baby's immune system is capable of producing the optimal immune response, the development of specific antibodies to specific antigens.

f. b. Alternative schedules

i. i. Takes into consideration the timing of vaccination with the development of the infant immune system.

ii. ii. Consider a schedule based on

1. 1. When the immune system has developed sufficiently to produce the most appropriate response
2. 2. What the child's own risk factors are including health, life-style of family, nutrition, travel plans
3. 3. The degree of risk that a child would face if they acquire the infection

iii. iii. Alternative schedules do not meet the CDC recommendations or meet the requirements for school entry.

iv. iv. Since the vaccines are given at later ages and therefore induce a stronger immune response, fewer doses may be required to reach therapeutic levels that provide adequate immunity.

1. 1. Checking titers 6 months after each vaccine is given can determine if further vaccines in the series will be necessary to reach therapeutic immunity

1. C) General recommendations if vaccinating a healthy child (Not for chronically ill or high-risk children)

ii. i. Do not vaccinate with any sign of illness

iii. ii. Do not vaccinate if a child is not meeting their developmental or growth milestones
iv. iii. Consider status of breastfeeding and diet
v.iv. Add nutritional supplementation at least 2 months prior to vaccinating to optimize the immune system

vi. D) How many immunizations to give at once

b. a. We do not know of a reason why the immune system isn't capable of responding to multiple vaccines since they all stimulate different cells
c. b. The larger the immune response the body raises at the time the vaccine is given (multiple vaccinations would create a greater response) the more protection the person would have from actually getting the disease
d. c. On the other hand, the larger the immune response, the greater the chance of getting a temporary aggravation such as fever, inflammation or rash
e. d. Most naturopaths tend to recommend giving no more than 1 injection at a time (no scientific evidence for this). If there is a reaction to a vaccine, it is clear what the reaction was to.

f. E) If you choose exemption from vaccinations

g. a. In order for a child to attend any public or private school in Oregon or Washington they must either
    i. i. Meet the CDC vaccination guidelines or
    ii. ii. Claim and sign for exemption
h. b. Allowed reasons for exemption
    i. i. Medical
        1. 1. History of having the disease
        2. 2. Titers showing immune levels of antibodies against disease high enough to prevent infection
        3. 3. Medical reason that meets the CDC guidelines
    ii. ii. Religious - follow religious teachings that oppose immunization
    iii. iii. Philosophical
i. c. All states allow medical exemption and vary on religious and philosophical exemption
j. d. Oregon and Washington allow all 3
    i. i. Oregon's philosophical exemption is often not clearly stated on exemption forms but it is part of state law. Often forms only have a line for religious exemption with the assumption that the philosophical exemption is included in that.
k. e. Other issues to consider if you don't fully immunize along CDC guidelines
    i. i. Foreign travel may increase potential risk of exposure to diseases not common in the US
        1. 1. May not be allowed in a some countries without certain immunizations
    ii. ii. Lack of vaccination can be an issue for child participating

in sports or summer programs

iii. iii. Issue of vaccination comes up with any serious injury or surgery

iv. iv. Any child with a fever of unknown origin who is not immunized is more likely to be screened for meningitis with a spinal tap

v.v. You may encounter some antagonistic people in the health care profession if your child is not fully immunized

vi. vi. Your child's school can ask you to keep him home for up to 3 weeks if there is an outbreak of a disease that he is not immunized against

IV) State required immunizations

a. f. DTaP or DT or TDaP

i. i. Diphtheria

1. 1. Disease

a. a. Causes a respiratory infection with the rare complication of extensive organ and nerve damage.

b. b. Spread by intimate respiratory and physical contact

c. c. Around late 1900 mortality exceeded 130/100,000 cases

d. d. Less than 100 cases per year in USA

e. e. Incidence in Multnomah County in last 5 yrs – zero cases

2. 2. Vaccine

a. a. Effectiveness is tied to at least the first dose being given with Pertussis. Can give DT after that if you want to avoid Pertussis vaccination.

b. b. Conventional schedule - 2, 4, 6 and 15-18 months (4 infant doses), then boosters at 4-6 years old and 11-12 years old.

c. c. Alternative schedule

i. i. Rationale for alternative schedule for DTaP- 1 dose at 6 months gives some coverage, especially if child is in daycare, is not breastfed, or has potential for exposure to pertussis.

ii. ii. Get a better immune response by giving vaccines after 12 months.

iii. iii. Can check titer at 18 months to see if additional vaccines are needed to reach therapeutic levels.

ii. ii. Tetanus

1. 1. Disease

a. a. Fatal disease causing rigidity and spasm of muscles. Occurs with contaminated wounds, especially deep puncture wounds.

b. b. Organism is in the soil, especially around manure. Tetanus cannot be contracted from eating soil.
c. c. 10 cases in the USA in 2010.

2. 2. Vaccine
a. a. Does not provide complete immunity. Exposure can still cause tetanus but it greatly improves effectiveness of tetanus immunoglobulin given at time of injury.
b. b. CDC schedule - 2, 4, 6 and 15-18 months, then boosters every 10 years, or at time of injury.
c. c. Common to get swelling and pain at injection site, especially with later doses or if doses are given within two years of each other in adulthood.
d. d. Alternative vaccination schedule depends on risk of exposure (though often follows Diphtheria and Pertussis since it is frequently a combined vaccine)

i. iii. Pertussis (Whooping Cough)

1. 1. Disease
a. a. Causes a disease that paralyses respiratory tract-characterized by coughing spasms followed by whooping inhalation. (Very young infants may have coughing spasms without the whooping)
b. b. Spread by respiratory droplets
c. c. Can be fatal in infants less than 1 year old (often requires hospitalization and IV hydration)
d. d. Lasts about 3-9 weeks
e. e. Very infectious - 80% of household will become infected
f. f. Can lead to secondary bacterial pneumonia
g. g. Erythromycin (antibiotic) can be given to limit the spread to other people. The state recommends that any child under 7 who is exposed to pertussis and has not had 4 doses of vaccine should receive another dose.
h. h. Introduction of vaccine in the 1940's changed reported cases from 270,000 with 10,000 deaths per year to 1010 cases in 1976. There were 45 cases in Oregon in 2010 and 6 cases in Washington.

2. 2. Vaccine
a. a. Adverse effects decreased when form of vaccine was changed to acellular Pertussis
b. b. Conventional schedule - 2, 4, 6 and 15-18 months (4 infant doses)
c. c. Alternative schedule depends on risks and exposures.

b. HIB (Haemophilus influenzae type B)

1. Disease
    a. Initial infection is in the respiratory tract
    b. Most children have a brief infection without symptoms and then the immune system overcomes it
    c. Some children may be carriers without symptoms for months (1-5% of unimmunized children, mostly in preschool age)
2. Rarely, disease becomes invasive and travels through the blood to distant sites, may cause:
    a. Meningitis
        i. i. Infection of the lining of the brain and the fluid in the spinal cord and surrounding the brain
        ii. ii. Seen most ages 3-18 months
        iii. iii. 2-5% death rate
        iv. iv. 15-30% nervous system damage in survivors including: mental retardation, seizures, hearing loss and problems with learning, language, and body movement
    b. Epiglottitis
        i. v. Infection at the back of the throat with risk of suffocation
        ii. vi. Seen most ages 2-4 years
    c. Pneumonia (15%), arthritis (8%), cellulitis (6%)
3. Spread by airborne droplets or direct contact with body fluids
4. Incidence rate is very age dependent.
    a. Highest occurrence of invasive disease between 6-12 months
    b. By 5-6 years of age most children have had an asymptomatic infection and have developed natural immunity.
    c. Uncommon to see HIB disease after 5 years old
    d. Uncommon (less than 15%) incidence of invasive disease at less than 6 months of age.
    e. There were 6 cases of invasive disease in Oregon in 2010.
5. Mother passes her own immunity through breast milk to baby
    a. Large study in Sweden showed that breast feeding gave a strong protection to baby from HIB disease
    b. This protection appears to last as long as baby is breastfeeding, even when other forms of nutrition are added.
6. Factors besides age that make babies at greater risk of HIB invasive disease (might want to consider immunizing sooner)
    a. Stopping breastfeeding
    b. Being in daycare
    c. Repeated exposure to second-hand smoke
    d. More than 4 people in a household
    e. Having school-age children in the house
    f. Being Native or African American (higher incidence- tend to get sick at 4-6 months)
    g. Child has chronic disease

7. Vaccine

1. Very effective- 95-100% immunity from vaccine

a. 1997- Estimated 20,000 cases of invasive disease in USA- vaccine was introduced

b. 1999- 250 cases

2. Don't get much of an immune response if 1st immunization is given before 6 months

3. If given before 6 weeks it decreases effectiveness of later immunizations

4. Adverse reactions - 3 reported cases of Guillain-Barre Syndrome (a paralyzing disease)

5. Conventional schedule - 2, 4, 6 and 12-15 months (4 infant doses)

6. Alternative schedule

a. Consider immunizing if baby is not being breastfed, is in daycare, exposed to 2nd hand smoke, is Native or African American or has chronic illness

b. May want to start first vaccine after stopping breastfeeding

c. Can check titer at 18 mo. to see if additional vaccines are needed to reach therapeutic levels

c. Polio

i. Disease

1. 3 forms of the disease:

a. No symptoms but person sheds virus in the stool for up to several weeks (90%)

b. May have minor illness with fever, malaise, headache (8%)

c. May damage nerves causing varying degrees of paralysis that be permanent or resolve in 6 months to a few years (2%)

ii. Spread by infected stool contaminating water or food sources or getting on hands that then get into the mouth.

iii. Incidence of paralytic polio

1. Before introduction of vaccine in 1955 there was an average of 21,000 cases per year of paralytic polio in the US

2. Since 1979 there have been no cases of wild type polio in the US

1. 3. Less than 10 cases since then caused by use of the oral live polio vaccine. (Vaccinated people shed the virus in their stool and infected unimmunized people)

2. 4. Still having outbreaks of wild-type polio in parts of Asia, India and Africa

ii. iv. Breastfeeding

1. 1. Mother's immunity is passed to infant as long as he/she is breastfeeding

2. 2. A child immunized while breastfeeding has a poor immune response because the antibodies in the breast milk interfere with the process of the infant's antibody development. Consider starting immunization after weaning and prior to international travel.

iii. v. Vaccine

1. 1. Only the inactivated vaccine is now given in US which cannot spread or cause disease
2. 2. Oral form that sheds virus in stool for several weeks is the most widely administered vaccine in the rest of the world
3. 3. Special reasons to consider vaccination
    a. a. Not breastfeeding
    b. b. Travel to countries that still have active disease or use oral form of vaccine
4. 4. No documented serious adverse reactions to inactivated form except in people sensitive to streptomycin, neomycin, or polymycin B (antibiotics)
5. 5. Conventional schedule – 2m, 4m, once between 6 to12 months (3 infant doses) booster between 4-6 years

d. Hepatitis B

i. Disease

1. Causes liver inflammation with mild to severe symptoms such as jaundice, weakness, and liver pain that last up to 3 months.
2. Can be asymptomatic
3. If infection lasts more than 6 months it becomes chronic hepatitis (10% of people who are infected with the virus) 15-25% of chronic carriers will eventually die of liver disease.
4. Spread by contact with blood, saliva or semen entering a break in the mucosal barrier (blood born) - most commonly transmitted in US via:
    a. a. Sexual contact (54%)
    b. b. IV drug use (20%)
    c. c. Exposure as a healthcare worker
    d. d. Passed from infected mother to infant during pregnancy (4%) - we screen all pregnancies for hepatitis B in the 1st trimester
2. 6. Not highly contagious if not in one of the above groups and uncommon in early childhood

ii. vi. Incidence

1. 1. Estimated that there are 1.5 million carriers in the US
2. 2. Multnomah county averaged 32.4 cases of acute hepatitis B and 191 cases of chronic hepatitis B per year in the last 5 years - mostly in teenagers and young adults

iii. vii. Vaccine

1. 1. Infants are 98-100% protected after 3 doses - immunity lasts for more than 15 years
2. 2. Adverse reactions
    a. a. Mild temporary symptoms of local pain, fever, headache, fatigue, irritability
    b. b. Some association with multiple sclerosis - unclear if

there is enough evidence to sustain this

3. 3. State schedule- 0-2, 1-4, 16-18 mo (3 infant doses)
4. 4. Alternative schedule - if mother tested Hep B negative in pregnancy without possible later exposure during pregnancy then consider giving the vaccine in early teens if child is in high risk group (sexually active, IV drug user) or if in a medical profession.

e. MMR (Mumps, Measles Rubella)

Due to low incidence of any of these diseases in the population it is rare to gain natural immunity from an infection. While they do not usually cause long-term damage in children, contracting mumps or measles as an adult is much more serious. This vaccine has never contained thimerisol (a form of mercury used as a preservative in vaccines). This vaccine cannot be given to pregnant women.

i. Mumps

1.Disease

a. a. Causes a viral infection of the glands
b. b. Other symptoms may include fever, headache, chills, fatigue
c. c. Usually lasts up to 1 week
d. d. Spread by respiratory droplets or contact with infected saliva
e. e. Very contagious

2. 5. Incidence
   a. a. Before release of vaccine in 1967 about 92% of children had been exposed by 15 years old - by 1996 751 cases that year in US
   b. b. No longer a reportable disease
3. 6. Vaccine
   a. a. Given in combination
   b. b. 1 dose gives long-term immunity (only repeated because of measles part of vaccine)
   c. c. Most effective immunity if given after 16 months, not effective if given before 12 months
   d. d. Like the Measles and Rubella parts, it is a live, attenuated vaccine and contains chicken egg tissue (contraindicated with egg allergy), neomycin, human albumin, and gelatin
   e. e. Very few adverse reactions
   f. f. State Schedule for MMR: 2 doses – one at 12-15 months and a booster at 4-6 years, colleges may require a 3rd dose before entry.

ii. Measles

1. Disease

a. Progresses through stages with fever, runny nose and eyes, cough and rash

b. Spreads through respiratory droplets

c. Very contagious

2. Incidence

a. Before vaccine was introduced in 1963 almost everyone got measles, with an average of 450 deaths per year in the USA from complications such as pneumonia or encephalitis

b. Currently estimated to be 30 million cases per year worldwide with 880,000 associated deaths, especially in Africa and SE Asia

c. In 1980s outbreaks began appearing in high-school and college age students in the US (before vaccine was introduced, 90 % of US population had already had measles and most young adults were immune.) Two doses of vaccine didn't appear to provide sufficient immunity so colleges added requirement of 3rd dose before entry.

d. Introduction of mass immunization for measles has pushed the ages at which it is seen away from early childhood into adulthood where there is a greater chance of complications.

e. Up to 8 months of age babies are protected by mother's antibodies. Unfortunately, this protection is decreasing since mother's often have immunity only through the vaccine instead of having had wild measles, leading to a weaker immunity response. Therefore, fewer antibodies are being passed through the placenta to the baby and there are fewer in the breast milk.

f. Incidence in Multnomah county in the last 10 years - 1 case

3. Vaccine

a. See Mumps Vaccine above except for adverse reactions:

i. i. Most common: fever and rash

ii. ii. Rare to see low platelet counts or allergic reactions

iii. iii. Autism: Very controversial. See discussion under potential negative effects of vaccines

iii. Rubella (German measles)

1. Disease

a. Causes a mild disease with a low fever, rash and swollen lymph nodes - common to see no symptoms at all.

b. Spread by respiratory droplets

c. Highly contagious

2. Incidence

a. Before vaccine was introduced in 1963 almost all humans were exposed at some time

b. Now only outbreaks are among unvaccinated foreign born Hispanic adults

c. 2005 CDC believes that rubella is no longer present in

the US

d. No longer a reportable disease

3. Congenital rubella

a. If a non-immune pregnant woman, especially in the 1st trimester, gets rubella it can cause:

i. iv. Miscarriage or stillbirth

ii. v. Serious damage to her growing baby (80 % of women exposed in 1st trimester) including blindness, deafness, heart defects and mental retardation

b. Children are vaccinated to protect unborn children from exposure, not because the disease is dangerous to children once they are born

4. Vaccine

a. See Mumps vaccine

b. Cannot give vaccine during breastfeeding or pregnancy

c. 95% effective at producing long-term immunity

d. Adverse reactions occur more commonly in adults, especially women - fever, enlarged lymph nodes, temporary joint pain and inflammation, temporary nerve pain. Best given during childhood before puberty to decrease complications.

e. If you chose not to immunize as a baby you might consider running a titer on young teenage girls before puberty to check for immunity, or vaccinate to provide immunity during future pregnancies.

f. Varicella

i. Disease

1. Causes both:

a. Chicken Pox - usually a childhood illness characterized by fever and itchy rash

b. Shingles - occurs later in adulthood as a reactivation of the virus (must have had chicken pox or the varicella vaccine first) - painful, itchy lesions that may repeatedly break out - can cause blindness or neurological damage

2. Spread by respiratory droplets or contact with skin lesions

3. People who have never had chicken pox can catch it from contact with the lesions of someone with shingles.

ii. Incidence

1. 4 million cases with 5000-9000 hospitalizations and 100 deaths per year in US

2. By age 9-10 years 80-90% of US children have had chicken pox and are immune.

3. Not a reportable disease

iii. Complications of chickenpox (all rare in early childhood)

1. Secondary skin infections and pneumonia are the most common
2. Mostly seen in:
    a. Infants less than 1 year old, especially babies born to mothers who were infected right before birth (Mom doesn't have time to make antibodies to protect fetus), and the fetal death rate is up to 35%. Babies whose mothers are not immune from either pre-pregnant infection or vaccine (the vaccine gives less immunity than wild virus) are at risk.
    b. Immune compromised children (2^{nd} highest death rated)
    c. Adults and children 15 years or older - symptoms of chicken pox are worse and there is a much higher risk of complications than in early childhood

iv. Vaccine
1. Live attenuated vaccine first available in 1995
2. Contains MSG, gelatin, neomycin and cow serum
3. 70-90% effective - those immunized children who do get infected will have a milder case
4. Adverse effects
    a. Breakthrough infection of chicken pox (2.5 times greater chance if varicella is given within 1 month of MMR)
5. Uncommon possibility that virus can be shed after immunization
6. Immunity is not believed to be long term. Vaccinating young children and preventing the stronger immune response that an infection would cause may lead them to have a greater risk of adult chickenpox
7. Young children are vaccinated to protect young infants, pregnant women, and immune compromised children and adults from exposure, not because the disease is very dangerous to children.
8. State schedule - 1 dose at 12-28 months (either give with MMR or more than 1 month after MMR). Cannot be given sooner because there isn't an immune response to the virus before a year of age.
9. Alternative approach
    a. Consider exposing children after 1 year old to infected people to encourage wild-type infection
    b. If no known infection by puberty consider vaccine or run titer to see if immunity is established

V) General Potentially Serious Negative Reactions to Vaccines

a. g. Autoimmunity (Causing autoimmune diseases such as arthritis, Lupus)

i. i. Theoretical risk

ii. ii. 3 mechanisms must fail within the immune system before vaccines could cause autoimmunity.

iii. iii. However, a recent study linked the Hepatitis B vaccine as a possible causative factor for multiple sclerosis

b. h. Allergic reaction
   i. i. May be due to reacting to one of the vaccine additives (antibiotics, egg, gelatin, preservatives) or pushing the Th2 response instead of the Th1 response
   ii. ii. Manifesting with rashes, fever, inflammation
   iii. iii. Anaphylaxis (swelling of the respiratory tract causing difficult breathing)
      1. 1. May be life-threatening
      2. 2. Rarely reported as vaccine reaction

c. i. Autism
   i. i. 1999 a state agency in California discovered a 273% increase between 1987 and 1998 in children coming up with a diagnosis of autism. This was way out of proportion to the rise in other developmental disabilities. Their investigation also concluded that this could not be explained simply as a result of improved diagnostic techniques identifying cases that were previously being missed.
   ii. ii. Developmental disorders that have increased dramatically in the US since vaccines have been introduced
      1. 1. Currently 1 in every 68 families has an autistic child
      2. 2. 4 million children have ADHD (Attention Deficit Hyperactivity Disorder)
      3. 3. 1 in 6 children are classified as Learning Disabled
   iii. iii. Relationship with DTaP and MMR?
      1. 1. In looking for an explanation for such a drastic increase both the DTaP and the MMR vaccine have been suggested as causative factors. Theories have been proposed that the relationship may be due to:
         a. a. The part of the bacteria or virus that is present in the vaccines or
         b. b. Other additives in the vaccines, especially thimerosal (a mercury containing additive present historically in some vaccines though never in MMR) or
         c. c. A combination of both
      2. 2. DTaP faded out of the picture when studies of the fluid that bathes the spine and brain showed live measles virus from the vaccine (not the wild type) in children who had developed autism after the MMR vaccine.
      3. 3. MMR was further implicated when it was discovered that there were elevated antibodies to measles and rubella in autistic children but not in normal children
      4. 4. Autism is still a poorly understood illness and our understanding of it is a piecing together of facts and theories
         a. a. Many people currently feel that an individual with autism may have started with a predisposition for the condition that requires multiple stress factors for symptoms to manifest

b. b. Vaccines or thimerosal may be part of the stressors involved in "turning on" autism

5. 5. The causal relationship between vaccines and autism is highly debated and not accepted by the CDC or the leading professional organizations such as The American Academy of Pediatrics.

iv. iv. Relationship with Thimerosal (mercury preservative in some vaccines)

1. 1. The health community was slow in acknowledging the health risk of mercury accumulation in the body with multiple dosing of vaccines (Concern began over 30 years ago)
2. 2. A federal investigation on the possible relationship between vaccines and autism began in 1999.
    a. a. The first set of data showed a high relative risk (7.6) for autistic children who received vaccines with thimerosal. (Anything over 3.0 is considered to demonstrate a causative effect)
    b. b. Politics got involved and the data was reinterpreted to give a relative risk of 1.69
    c. c. Studies continue to come out demonstrating the causal relationship between thimerosal and autism and some public officials continue to insist it does not exist
        i. i. Despite these claims, all thimerosal has been removed from vaccines intended for pediatric use since 2002
        ii. ii. Current vaccines that still contain thimerosal
            1. 1. DT (not intended for pediatric use)
            2. 2. Some flu vaccines
            3. 3. Meningococcal vaccine
3. 3. One suggested mechanism is that autistic children have an enzyme defect that causes a decreased ability to detoxify compounds such as mercury leading to toxicity.

VI) Naturopathic approach to supporting the immune system

A. A) Can either be used to support the body's optimal immune response to vaccines or help boost the body's defense systems with illness if the child is not immunized.
B. B) Optimize parent's lifestyle, diet before conception
    1. 1) Especially eliminate smoking, including 2nd hand smoke (Cigarette smoke is the greatest contributor to poorly functioning immune systems)
    2. 2) Optimize nutrition, supplements and exercise
    3. 3) Consider a cleanse or detox
C. C) Breastfeed for at least a year
    1. 1) Maternal antibodies are extremely important in protecting the infant early in its life (passive immunity)
    2. 2) Other components of breast milk aid in defending the gut from infection and

promoting colonization of beneficial gut flora

D. D) Slow introduction of good quality unprocessed foods as baby turns to solid foods for nutrition

E. E) Probiotics

1. 1) Beneficial bacteria (vaginal birth, breast feeding, probiotics) to establish healthy gut flora. The intestines are one of the main centers of the immune system in the body.

F. F) 100,000 IU of Vitamin A given near the time of the immunization increases the immune response and decreases side effects of attenuated vaccines (such as MMR and Varicella). Vitamin A helps drive a Th1 response.

G. G) Vitamin D – dose varies by age and other factors

BOOKS

The Vaccine Book By: Robert Sears, MD

Vaccinations: A Thoughtful Parents Guide: How to Make Safe, Sensible Decisions about the Risks, Benefits, and Alternatives By: Aviva Jill Romm

VACCINE INFORMATION WEBSITES

CDC – http://www.cdc.gov/vaccines/schedules/

World Health Organization – http://www.who.int/immunization/diseases/en/

Vaccine Adverse Reporting System – http://vaers.hhs.gov/

Immunization Action Coalition – http://www.immunize.org/

American Academy of Pediatrics – http://www.cispimmunize.org/

Official Journal of the American Academy of Pediatrics – http://pediatrics.aappublications.org/

Johns Hopkins Bloomberg School of Public Health – http://www.vaccinesafety.edu

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Mothering Magazine – http://www.mothering.com