



VICNETWORK

virtual immunization communication network

The Virtual Immunization Communication (VIC) Network is a project of the National Public Health Information Coalition (NPHIC) and the California Immunization Coalition, funded through a cooperative agreement with the Centers for Disease Control and Prevention.

VIC Network

A nationwide 'virtual' immunization community of health educators, public health communicators and others who promote immunizations

Objectives

- Describe communication strategies for public health professionals to use in counteracting anti-vaccine messages
- Identify fact based messages that engage parents and community members to help them make informed decisions
- Determine the best approach for communicating science to the public
- Identify resources and support for immunization providers who communicate with patients and parents about vaccine safety.

Communicating Good Science Under a Cloud of Doubt



Featuring **Paul A. Offit, MD**, Chief of the Division of Infectious Diseases and the Director of the Vaccine Education Center at the Children's Hospital of Philadelphia.

Delaying, Spacing Out, Separating, and Withholding Vaccines

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Division of Infectious Diseases

Children's Hospital of Philadelphia

University of Pennsylvania School of Medicine

Too Many Vaccines Too Early



JENNY MCCARTHY'S FIGHT TO SAVE SON

**LARRY
KING
LIVE**

CNN **AUTISM: FASTEST-GROWING DEVELOPMENTAL
DISORDER IN U.S. HITS 1 IN 150 KIDS**



**Fewer immunologic components
are in vaccines today than
100 years ago**

Number of antigens in vaccines

Year

Vaccine

of antigens

1900

Smallpox

198

Total

198

Number of antigens in vaccines

| <u>Year</u> | <u>Vaccine</u> | <u># of antigens</u> |
|-------------|--------------------|----------------------|
| 1960 | Smallpox | 198 |
| | Diphtheria | 1 |
| | Tetanus | 1 |
| | Pertussis (wc) | ~3000 |
| | <u>Polio (OPV)</u> | <u>15</u> |
| | Total | ~3215 |

Number of antigens in vaccines

| <u>Year</u> | <u>Vaccine</u> | <u># of antigens</u> |
|-------------|----------------|----------------------|
| 1980 | Diphtheria | 1 |
| | Tetanus | 1 |
| | Pertussis (wc) | ~3000 |
| | Polio (OPV) | 15 |
| | Measles | 10 |
| | Mumps | 9 |
| | <u>Rubella</u> | <u>5</u> |
| | Total | ~3041 |

Number of antigens in vaccines

| <u>Year</u> | <u>Vaccine</u> | <u># of antigens</u> |
|-------------|---------------------|----------------------|
| 2010 | Diphtheria | 1 |
| | Tetanus | 1 |
| | Pertussis (ac) | 2-5 |
| | Polio (IPV) | 15 |
| | MMR | 24 |
| | Hib | 2 |
| | Varicella | 69 |
| | Hepatitis A, B | 5 |
| | Rotavirus | 15 |
| | Influenza | 8 |
| | <u>Pneumococcus</u> | <u>8</u> |
| | Total | 150-153 |

**Immunological challenges from
the environment vastly exceed
challenges from vaccines**

Are infants too young to be vaccinated?

- u Humans first develop the capacity to respond to foreign antigens at about 14 weeks gestation.
- u However, few foreign antigens are present *in utero*. As a result, cells of the immune system are largely naïve at birth.

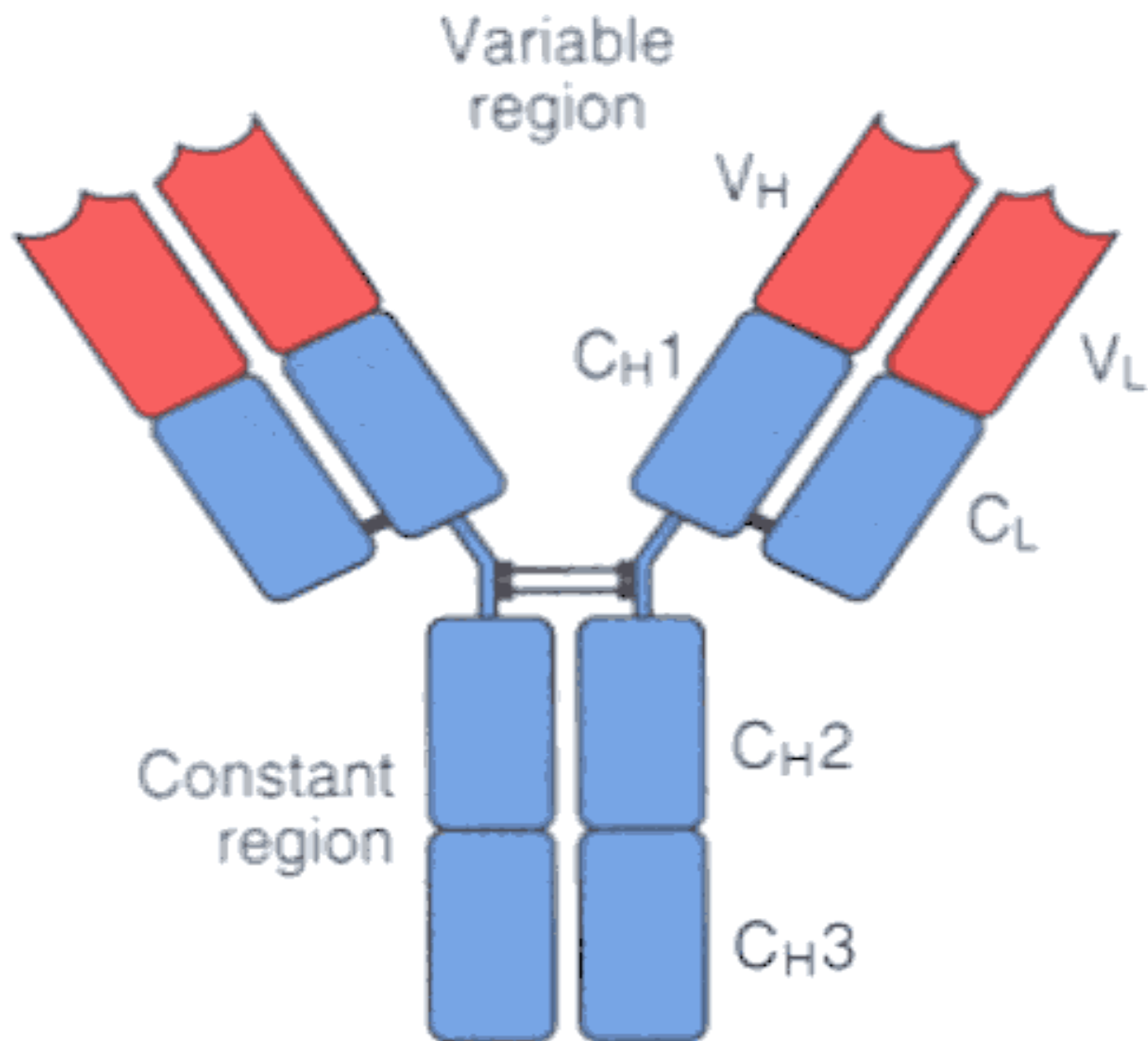
Are infants too young to be vaccinated?

- u From birth, infants are challenged by bacteria in the environment (colonizing bacteria on intestines, skin, and throat; bacteria inhaled on dust).**
- u Vigorous sIgA responses within the first week of life keeps colonizing bacteria from invading.**

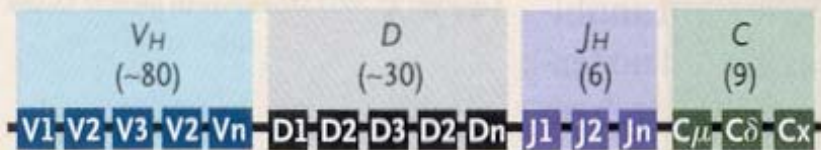
Are infants too young to be vaccinated?

- u Excellent immune response to HBV vaccine at birth.**
- u About 90% of infants will develop protective immune responses to HBV, Hib, DTaP, polio, and pneumococcal vaccines by 6 months of age.**
- u Need to be fully immunized against certain infections (Hib, pertussis, pneumococcus) by 6 months of age.**

**Children have an enormous
immunological capacity**

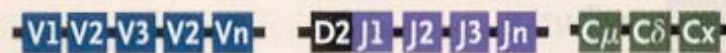


Heavy-Chain Genes



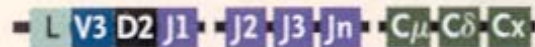
$D \rightarrow J_H$ rearrangement

Exonuclease deletion
N addition (TdT)



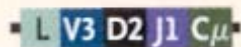
$V_H \rightarrow D-J_H$ rearrangement

Exonuclease deletion
N addition (TdT)



Rearranged DNA

Transcription
RNA splicing



mRNA
Translation

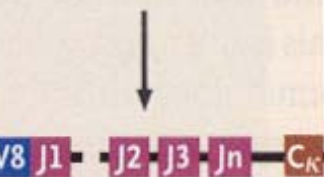
Variable region

Heavy-chain polypeptide

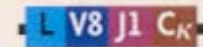
Light-Chain Genes



$V_K \rightarrow J_K$ rearrangement



DNA rearrangement



Rearranged DNA

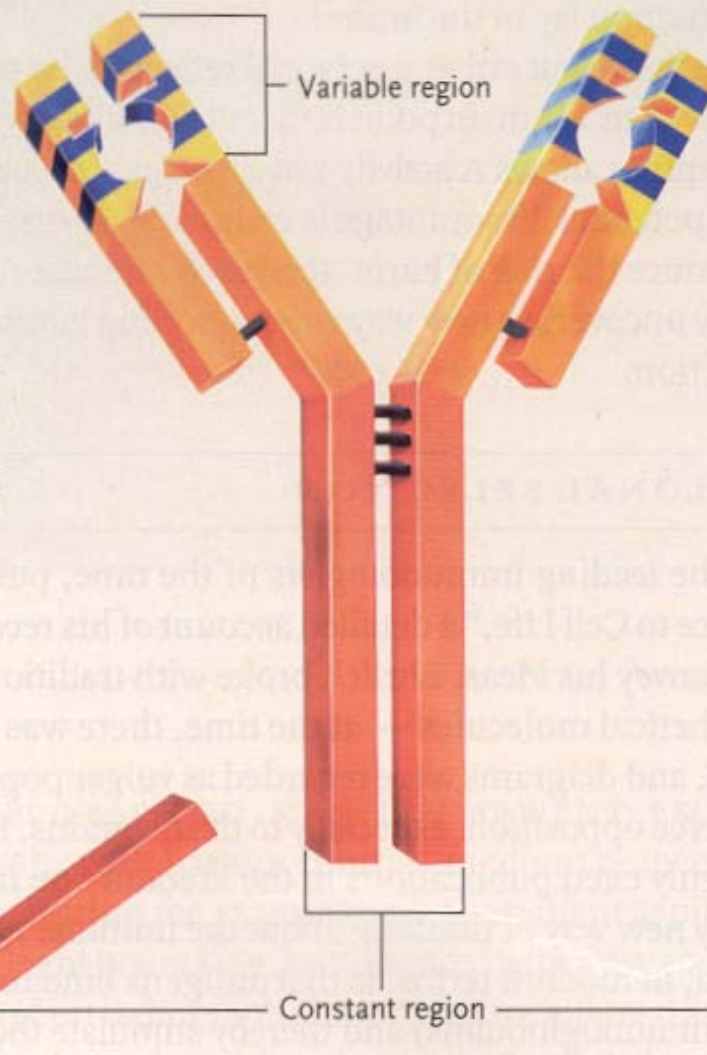
Transcription
RNA splicing



mRNA
Translation

Variable region

Light-chain polypeptide



How many is too many vaccines?

- u **Combinatorial and junctional diversity of antibody genes account for about 10^9 - 10^{11} different antibodies.**

How many vaccines can we respond to?

- u Each vaccine contains about 10 immunological components (proteins or polysaccharides) and each antigen contains about 10 epitopes (10^2 epitopes per vaccine).
- u Approximately 10^7 B cells are present per ml of blood.

Cohn M, Langman RE. The protecton: the unit of humoral immunity selected by evolution. *Immunol Rev* 1990;115:9-147.

How many vaccines can we respond to?

- u If we divide 10^7 circulating B cells per ml by 10^2 epitopes per vaccine, then each person can respond to about 10^5 different vaccines at the same time.
- u Therefore, the 14 vaccines given to infants in the first 2 years of life will “use up” about 0.01% of the immune system.

Limitations of analysis

- u Naïve lymphocytes are generated constantly. From studies of HIV-infected patients, about 2×10^9 naïve CD4+ T cells are generated each day.**
- u Therefore, vaccines never really “use up” the immune system.**

Ho DD, et al. Nature 1995;373:123-6

Aluminum Overload



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The Vaccine Book

Making the Right Decision for Your Child

Robert W. Sears, MD, FAAP

Dr. Bob's Alternative Vaccine Schedule

| | |
|------------------|------------------------------------|
| <i>2 months</i> | DTaP, Rotavirus |
| <i>3 months*</i> | Pc, HIB |
| <i>4 months</i> | DTaP, Rotavirus |
| <i>5 months*</i> | Pc, HIB |
| <i>6 months</i> | DTaP, Rotavirus |
| <i>7 months*</i> | Pc, HIB |
| <i>9 months</i> | Polio, Flu (2 doses [†]) |
| <i>12 months</i> | Mumps, Polio |
| <i>15 months</i> | Pc, HIB |
| <i>18 months</i> | DTaP, Chickenpox |

“The alternative schedule suggests only one aluminum containing vaccine at a time in infant years. By spreading out the shots, you spread out the exposure so infants can process the aluminum without it reaching toxic levels.”

Robert Sears, *The Vaccine Book*, p. 239

Aluminum

- u Aluminum is the third most abundant element on the earth's surface and the most abundant metal.**
- u As a consequence, aluminum is in the air we breathe, the food we eat, and the water we drink.**

Aluminum in food

- u The greatest source of aluminum is in food.
- u Adults typically ingest 5-10 mg of aluminum per day.
- u Aluminum is found naturally in teas, herbs, and spices.

Aluminum in food

- u Aluminum is also added to foods such as leavening agents, anti-caking agents, emulsifiers, and coloring agents.**
- u Found commonly in pancake mixes, self-raising flours, baking powder, processed cheese, and cornbread.**

Aluminum in food

u Aluminum is also found in breast milk and infant formulas.

u By 6 months of age:

| | |
|----------------|--------|
| Vaccines | 4 mg |
| Breast milk | 10 mg |
| Infant formula | 30 mg |
| Soy formula | 120 mg |

Disposition of aluminum

- u 100% of aluminum is absorbed following vaccination.**
- u Only 1% of aluminum is absorbed after ingestion.**

Disposition of aluminum

- u Aluminum enters the circulation, binds to transferrin, and is eliminated by kidneys.**
- u 50% eliminated in 24 hour**
85% eliminated in 13 days
96% eliminated in 3 years

Disposition of aluminum

u Aluminum is not completely eliminated from the body.

u End of 1st year of life:

| | |
|-------------|--------|
| Breast milk | 0.1 mg |
|-------------|--------|

| | |
|----------------|--------|
| Infant formula | 0.1 mg |
|----------------|--------|

| | |
|----------|--------|
| Vaccines | 0.1 mg |
|----------|--------|

| | |
|-------|-----------|
| Adult | 50-100 mg |
|-------|-----------|

How do we know aluminum is safe?

- u Aluminum can cause encephalopathy, osteomalacia, and anemia in two groups: severely premature infants and patients on chronic dialysis.**
- u Must meet two criteria: decreased or absent renal function AND large source of exogenous aluminum (i.e., IV solutions or antacids).**

How do we know aluminum is safe?

- u Circulating levels of aluminum in those with symptoms between 100-1,000 ng/ml.
- u Typically, children and adults have between 1-5 ng/ml of aluminum in blood.
- u Injected vaccines do not raise that level.

Aluminum references

Baylor, NW et al. Aluminum salts in vaccines—US perspective. *Vaccine* 2002;20:S18-S23

Bishop NJ et al. Aluminum neurotoxicity in preterm infants receiving intravenous feeding solutions. *N Engl J Med* 1997;336:1557-1561

Committee on Nutrition. Aluminum toxicity in infants and children. *Pediatrics* 1996;97:413-416

Keith LS, et al. Aluminum toxicokinetics regarding infant diet and vaccinations. *Vaccine* 2002;20:S13-S17

Pennington JA. Aluminum content in food and diets. *Food Additives and Contaminants* 1987;5:164-232

Too Many Shots at One Time

Are more shots more stressful?

- u Study showing that two shots are not more likely to induce cortisol (as a marker for stress) than one shot.

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

The Harm

Dr. Bob's Alternative Vaccine Schedule

| | |
|------------------|------------------------------------|
| <i>2 months</i> | DTaP, Rotavirus |
| <i>3 months*</i> | Pc, HIB |
| <i>4 months</i> | DTaP, Rotavirus |
| <i>5 months*</i> | Pc, HIB |
| <i>6 months</i> | DTaP, Rotavirus |
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Harm in alternative schedule

- u **Not science based**
- u **More likely to induce needle phobia**
- u **Increase time during which children are susceptible to vaccine-preventable diseases**
- u **Responsibility to the waiting room**
- u **No benefit**

Q & A Session



www.twitter.com/vicnetwork



Resources

www.chop.edu

Vaccine Education Center at Children's Hospital of Philadelphia

www.pkids.org

Parents of Kids with Infectious Diseases

www.immunize.org

Immunization Action Coalition

www.whyichoose.org

Why I Choose



Resources

www.aap.org

American Academy of Pediatrics

www.ecbt.org

Every Child By Two

www.cdc.gov/vaccines

CDC Vaccine Pages

For more info e-mail

info@VICnetwork.org

National Public Health Information Coalition
www.nphic.org

California Immunization Coalition
www.immunizeca.org

Thank you