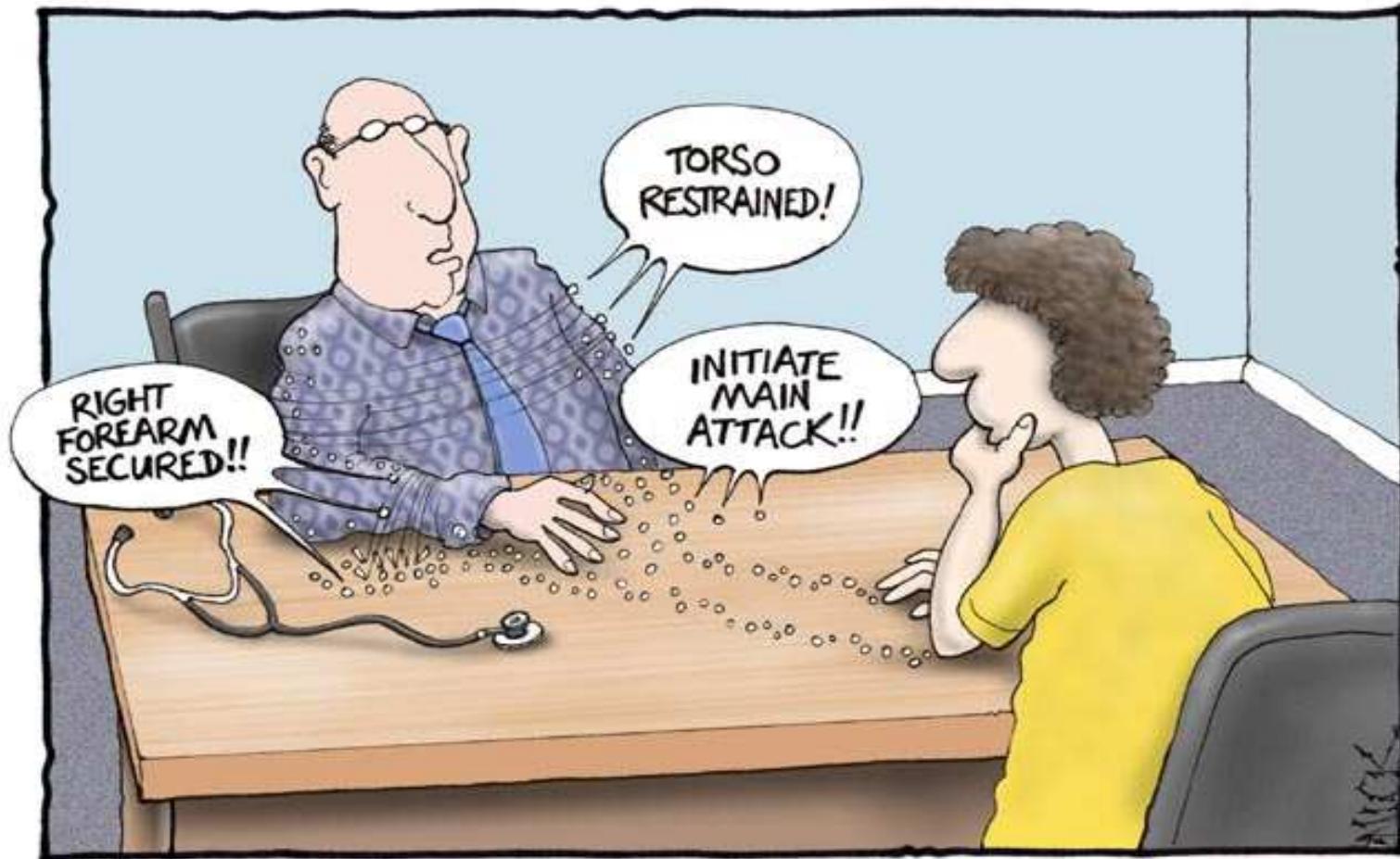


The Immune System



"In my professional opinion, your immune system is over-stimulated."

Vocabulary

- **Infection**
 - Invasion by foreign organisms such as viruses, fungi, bacteria
- **Immunity**
 - Long term resistance to re-infection by organisms previously encountered
- **Antigens**
 - Any material that elicits an immune response

Types of Immunity

- **Innate (inborn) immunity**
 - Immunity that is genetically coded
 - You never suffer from an illness for which you have innate immunity
- **Acquired (adaptive) immunity**
 - **Active**
 - As a response to an actual or artificial exposure
 - **Passive**
 - Immunity introduced by antibodies from an outside source

Acquired Immunity

Natural Immunity

Passive
Antibodies from mother;
In bloodstream at birth

Active
The result of infection

Artificial Immunity

Passive
Antibody transfer
Gamma globulin shot

Active
The result of
immunization

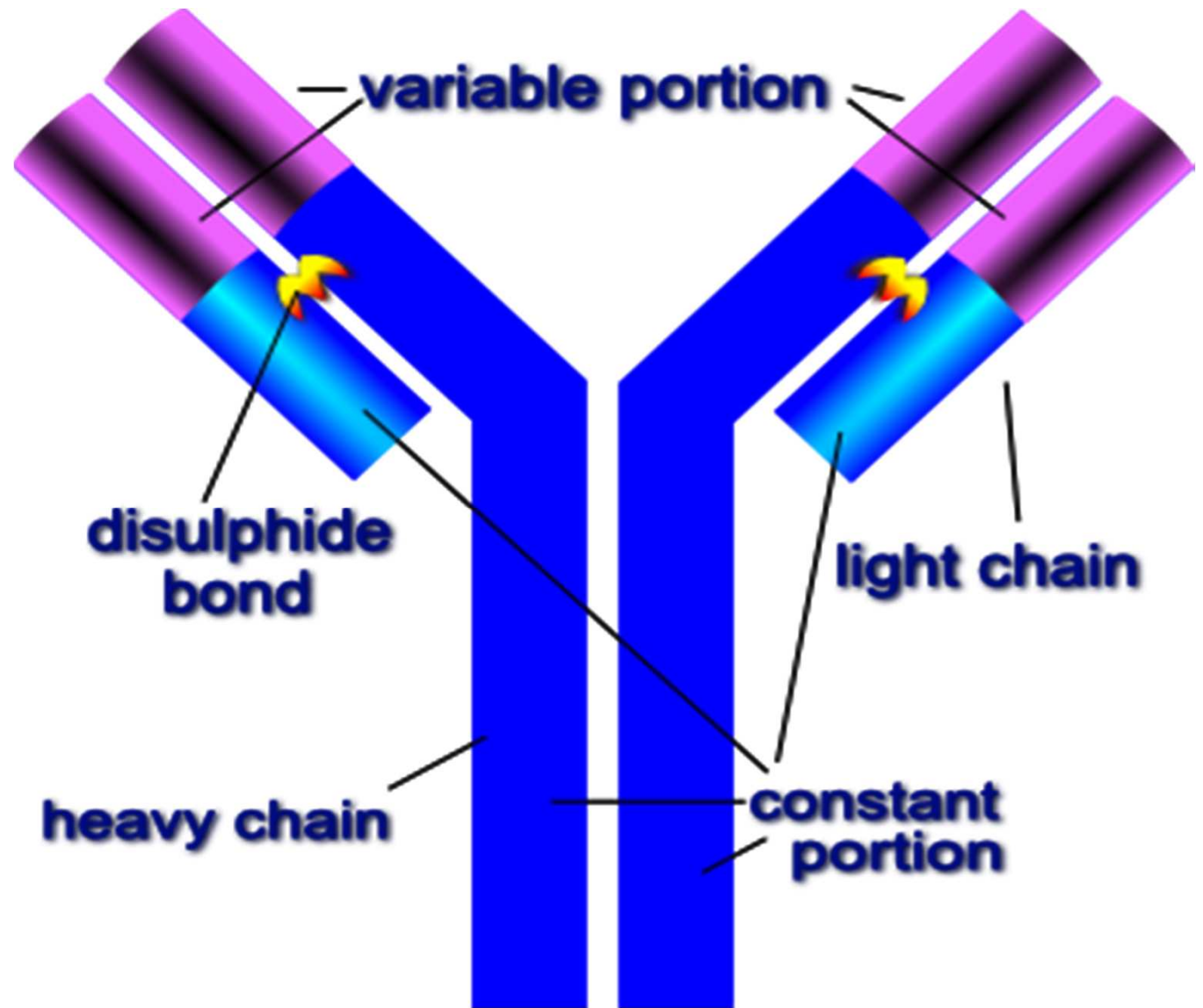
Lymphocytes - Immune Cells

- Bone marrow makes a variety of **B** cells
 - **B** cells produce antibodies
- Thymus makes a variety of **T** cells
 - Killer **T** cells are responsible for cell-mediated (non-specific response to antigen) immunity
 - Helper **T** cells interact with **B** cells to produce antibodies
 - Suppressor **T** cells interact with **B** cells to suppress antibody production

Antibodies

- Highly specific proteins that bind to "nonself" materials
- Each **B** cell can make only one antibody, and all descendants will produce the same antibody
- **B** Cells have antibodies on their surface identical to the one that they produce
- Long lived **B** cells (Memory Cells) quickly produce large quantities of antibodies to prevent illness

Antibody Structure



Edward Jenner and Smallpox (1798)

- Observation
 - Milk maids who got cowpox were resistant to cowpox
- Experiment
 - Injected a boy with pus from cowpox sores on infected udders
- Results
 - Boy was protected against smallpox
 - **Vaccination**, from *vaca*, Latin for cow



The Cow-Pock — or — the Wonderful Effects of the New Inoculation! — viz. the Publications of J. Anselmi Society.

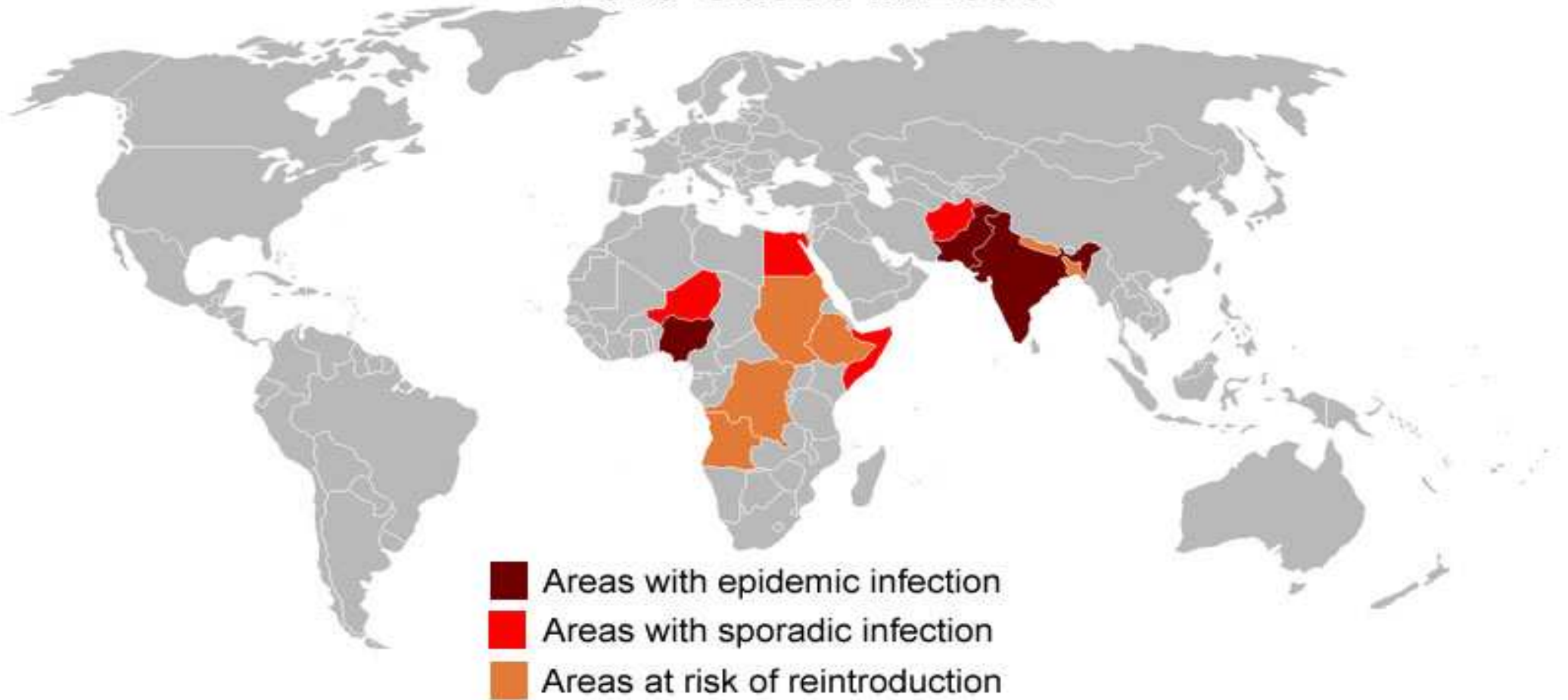
Small Pox

- Vaccination led to world-wide eradication announced in 1979 by World Health Organization



Polio: Not Eradicated

Polio Cases in 2006



Diphtheria: Not Eradicated

Worldwide Diphtheria Cases
1997 - 2006



Immunization Schedule

Recommended Immunization Schedule for Persons Aged 0 Through 6 Years—United States • 2009

For those who fall behind or start late, see the catch-up schedule

Vaccine ▼	Age ►	Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	19–23 months	2–3 years	4–6 years
Hepatitis B ¹	HepB	HepB	HepB	see footnote 1	HepB							
Rotavirus ²			RV	RV	RV ²							
Diphtheria, Tetanus, Pertussis ³			DTaP	DTaP	DTaP	see footnote 3	DTaP					DTaP
<i>Haemophilus influenzae</i> type b ⁴			Hib	Hib	Hib ⁴	Hib						
Pneumococcal ⁵			PCV	PCV	PCV	PCV					PPSV	
Inactivated Poliovirus			IPV	IPV	IPV							IPV
Influenza ⁶												Influenza (Yearly)
Measles, Mumps, Rubella ⁷							MMR			see footnote 7		MMR
Varicella ⁸							Varicella			see footnote 8		Varicella
Hepatitis A ⁹												HepA (2 doses)
Meningococcal ¹⁰												HepA Series
												MCV

Range of recommended ages

Certain high-risk groups

Incubation Periods

Disease	Incubation period
Cholera	1-3 days
Influenza	1-4 days
Scarlet fever	1-4 days
Common cold	2-5 days
Ebola	2-21 days
Rocky Mountain spotted fever	2-14 days
SARS	up to 10 days
Polio	7-14 days
Pertussis	7-14 days
Measles	9-12 days
Smallpox	7-17 days
Generalized tetanus	7-21 days
Chicken pox	14-16 days
Mumps	14-18 days
Rubella (German measles)	14-21 days
Infectious mononucleosis	28-42 days

Autoimmune Diseases

1. Diseases caused by the immune system attacking "self"

- Rheumatoid arthritis
- Multiple Sclerosis
- Type I Diabetes
- Lupus



Rheumatoid arthritis