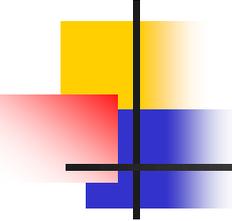




Henry J. Kanarek, MD
Kanarek Allergy Asthma Immunology
4601 West 109 Street
Overland Park, KS 66211
Tel:913-451-8555 Fax: 913-327-8553
www.kallergy.com



Immunodeficiency

- Primary immunodeficiency is a diagnosis made when the immune system is not able to handle infections
- There are many different deficiencies, some diagnosed at birth others appear as the person ages
- The next few slides are from The Jeffrey Modell foundation to help clinicians screen patients www.Jeffreymodell.org
- Also log on to www.primaryimmune.org for great immune deficiency resources

10 Warning Signs of Primary Immunodeficiency

Primary Immunodeficiency (PI) causes children and adults to have infections that come back frequently or are unusually hard to cure. 1:500 persons are affected by one of the known Primary Immunodeficiencies. If you or someone you know is affected by two or more of the following Warning Signs, speak to a physician about the possible presence of an underlying Primary Immunodeficiency.

- 1** Four or more new ear infections within 1 year.
- 2** Two or more serious sinus infections within 1 year.
- 3** Two or more months on antibiotics with little effect.
- 4** Two or more pneumonias within 1 year.
- 5** Failure of an infant to gain weight or grow normally.
- 6** Recurrent, deep skin or organ abscesses.
- 7** Persistent thrush in mouth or fungal infection on skin.
- 8** Need for intravenous antibiotics to clear infections.
- 9** Two or more deep-seated infections including septicemia.
- 10** A family history of PI.

Presented as a public service by:



Jeffrey Modell
Foundation | Curing PI
Worldwide



Funding was made possible in part by a grant from the U.S. Centers for Disease Control and Prevention (CDC).



National Heart,
Lung, and Blood
Institute (NHLBI)



NATIONAL
CANCER
INSTITUTE



PPTA
Plasma Protein Therapeutics Association



National Institute of
Allergy and Infectious
Diseases (NIAID)



NICHD
National Institute of Child Health and Human Development



These warning signs were developed by the Jeffrey Modell Foundation Medical Advisory Board. Consultation with Primary Immunodeficiency experts is strongly suggested. © 2013 Jeffrey Modell Foundation

For information or referrals, contact the Jeffrey Modell Foundation: info4pi.org | 866-INFO-4-PI

10 FOR ADULTS Warning Signs of Primary Immunodeficiency

Primary Immunodeficiency (PI) causes children and adults to have infections that come back frequently or are unusually hard to cure. 1:500 persons are affected by one of the known Primary Immunodeficiencies. If you or someone you know is affected by two or more of the following Warning Signs, speak to a physician about the possible presence of an underlying Primary Immunodeficiency.

- 1 Two or more new ear infections within 1 year.
- 2 Two or more new sinus infections within 1 year, in the absence of allergy.
- 3 One pneumonia per year for more than 1 year.
- 4 Chronic diarrhea with weight loss.
- 5 Recurrent viral infections (colds, herpes, warts, condyloma).
- 6 Recurrent need for intravenous antibiotics to clear infections.
- 7 Recurrent, deep abscesses of the skin or internal organs.
- 8 Persistent thrush or fungal infection on skin or elsewhere.
- 9 Infection with normally harmless tuberculosis-like bacteria.
- 10 A family history of PI.

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Funding was made possible in part by a grant from the U.S. Centers for Disease Control and Prevention (CDC).



National Heart,
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NATIONAL
CANCER
INSTITUTE



PPTA
Pharmaceutical Therapeutics Association



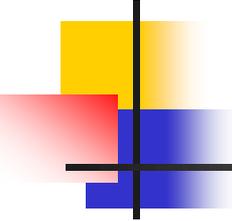
National Institute of
Allergy and Infectious
Diseases (NIAID)



National Institute of
Child Health and
Development (NICHD)

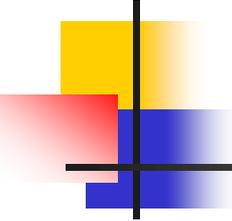


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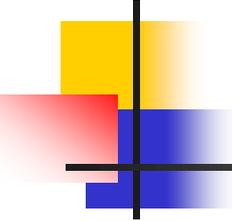
Common Variable Immunodeficiency

- Common Variable is the most common of all immunodeficiency's
- Impaired antibody quantity and quality
 - Hypogammaglobulinemia (low levels of immunoglobulins) with impaired antibody specificity (poor ability to do their job)
- Frequently is associated with:
 - Recurrent sinusitis
 - Bronchial diseases-hard to manage and treat
 - Irritable bowel-weight loss, diarrhea
 - Blood problems like anemia and clotting
 - Autoimmune and oncologic diseases



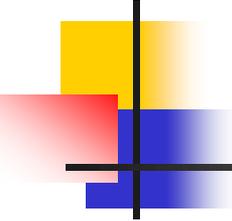
Primary Immunodeficiency

- Diagnosis of an immunodeficiency is more common than what most physicians are aware of, that is why diagnosis can take 4-7 years to make
- No person should have ear tubes placed or sinus surgery without undergoing a simple immune work up
- Patients that require 2 rounds of antibiotics in a year, or are frequently ill need to be evaluated to avoid more health problems



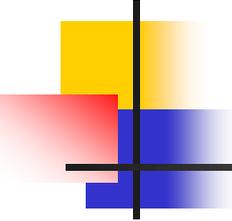
Immunodeficiency

- There are more states screening to detect serious life threatening immunodeficiency diseases at birth, at this time Kansas or Missouri do not screen newborns for any immunodeficiency
- This presentation will focus on immune deficiency typically seen in patients seeking help at the primary care physician level
- The goal is to quicken the time for diagnosis and treatment for primary immunodeficiency



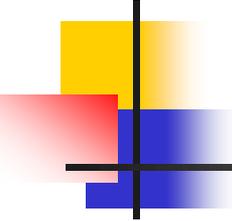
Common Variable Immunodeficiency, lab work to order

- Strep Pneumococcal titers 23 serotypes
 - If low titers vaccinate with Pneumovax23
 - Repeat titers in 4 weeks
- Immunoglobulin titers
- CBC/Diff
- ESR, and CRP
- T and B cells
- Sometimes add EBV panel looking for Mono Nucleosis



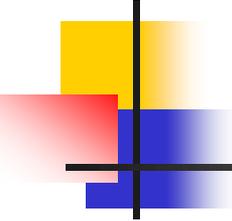
Streptococcus Pneumoniae

- Major bacteria to cause ear infections, sinusitis, pneumonia, and meningitis
- Children are vaccinated at 2,4,6, 18 months of age with the Prevnar 13 (serotypes)
- Prevnar vaccine is Streptococcus Pneumoniae conjugated with Diphtheria this allows for a stronger immune response
- Older patients receive this vaccine because their immunity has decreased



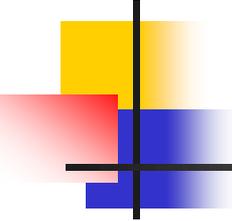
Streptococcus Pneumoniae

- Since this bacteria is so overwhelming in causing disease it seems to correlate well with a person's overall immune status
- Most people visit the doctor because of ear infections, sinusitis, bronchitis or pneumonias
- Immunoglobulin levels are very important but tying their levels to their ability to protect against Streptococcus Pneumoniae is key
- Boosting our Streptococcus Pneumoniae immunity can clear up many problems related to a low immune system



Streptococcus Pneumoniae

- Vaccinate with the polyvalent 23 Pneumovax if over 2 years of age and repeat the titers in 4 weeks
- One of the following indicates a normal response to the Streptococcus pneumoniae vaccine:
 - 50% of the serotypes are within the normal range
 - and/or
 - 50% (70% for adults) of the titers increase by 2 to 4 fold
- This may be all the patient needs to feel better and be less ill
- If a poor response or even if there is a response, watching the patient overtime may make the diagnosis of Common Variable Immunodeficiency or of Specific Antibody Deficiency



Case History

- 13 year old female with frequent sinus infections, fatigue, missing school
- She receives antibiotics with every infection, and the mother says antibiotics quit working
- Immunodeficiency labs are ordered and the next slide shows that her pneumococcal titers are low, this is why she maybe ill all the time

Collected: 11/02/12 08:27
 Received: 11/02/12 13:19

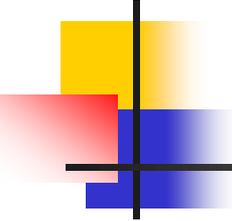
 Specimen ID: [REDACTED]
 Specimen: Serum / Clot, Gel

Immunology	Result	Reference Range
IgG	751	650-1600 mg/dL
IgA	108	40-350 mg/dL
IgM	122	49-310 mg/dL
Allergy Testing	Result	Reference Range
IgE	191.3 H	6.0-110.0 U/mL

S. pneumoniae IgG Abs

Type 1 Abs	0.6 L	>1.0 ug/mL
Type 3 Abs	2.4	>1.0 ug/mL
Type 4 Abs	<0.2 L	>1.0 ug/mL
Type 5 Abs	1.7	>1.0 ug/mL
Type 6B Abs	2.3	>1.0 ug/mL
Type 7F Abs	1.4	>1.0 ug/mL
Type 8 Abs	0.2 L	>1.0 ug/mL
Type 9N Abs	1.2	>1.0 ug/mL
Type 9V Abs	2.9	>1.0 ug/mL
Type 12F Abs	<0.2 L	>1.0 ug/mL
Type 14 Abs	1.1	>1.0 ug/mL
Type 18C Abs	<0.2 L	>1.0 ug/mL
Type 19F Abs	1.9	>1.0 ug/mL
Type 23F Abs	1.2	>1.0 ug/mL

REFERENCE RANGE FOR S. pneumoniae IgG Abs



Case History

- Labs show her immunoglobulin G is low but normal, IgA and IgM are normal
- Her pneumococcal titers were low. A level of 1.3 ug/ml is protective and only 6 titers were protective
- She received a Pneumovax23 vaccination
- 4 weeks later the titers were measured and the majority of her titers increased by 2 to 4 times their previous level
- Her mother on follow up reported she feels better and has not required antibiotics in a long time
- She will need to repeat the pneumococcal titers in 6 months to assure continued protection

Collected: 02/28/13 10:49

Specimen ID:

Received: 02/28/13 14:55

Specimen:


Immunology
Result
Reference Range

IgG	834	650-1600 mg/dL
IgA	130	40-350 mg/dL
IgM	144	49-310 mg/dL

Collected: 02/28/13 10:49

Specimen ID:

Received: 02/28/13 14:55

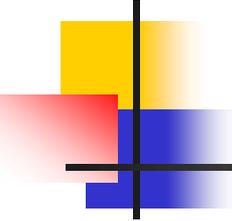
Specimen:

Serum / Clot, Gel


Immunology
Result
Reference Range
S. pneumoniae IgG Abs

Type 1 Abs	9.6	>1.0 ug/mL
Type 3 Abs	>20.0	>1.0 ug/mL
Type 4 Abs	7.6	>1.0 ug/mL
Type 5 Abs	>20.0	>1.0 ug/mL
Type 6B Abs	>20.0	>1.0 ug/mL
Type 7F Abs	18.8	>1.0 ug/mL
Type 8 Abs	16.5	>1.0 ug/mL
Type 9N Abs	12.7	>1.0 ug/mL
Type 9V Abs	4.5	>1.0 ug/mL
Type 12F Abs	0.4 L	>1.0 ug/mL
Type 14 Abs	8.8	>1.0 ug/mL
Type 18C Abs	13.6	>1.0 ug/mL
Type 19F Abs	12.9	>1.0 ug/mL
Type 23F Abs	12.3	>1.0 ug/mL





Case History, 56 year old female

- The next patient has low pneumococcal titers and received a Pneumovax23
- She had been healthy but 5 years ago fatigue set in, along with one bout of pneumonia, and constant sinus infections

DOB: [REDACTED] **AGE:** 56

Gender: F

Phone: [REDACTED]

Patient ID: NG

Health ID: 8573005541938428

Collected: 04/17/2013 / 15:49 CDT

Received: 04/17/2013 / 23:35 CDT

Faxed: 04/22/2013 / 08:01 CDT

KANAREK, HENRY MD

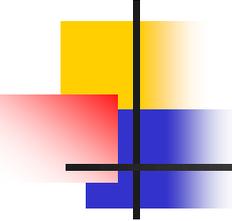
Attn: ADULT-PED ALLERGY/

FOXHILL MED

4601 W 109TH ST STE 350

OVERLAND PARK, KS 66211-1349

Test Name	In Range	Out Of Range	Reference Range	Lab
IMMUNOGLOBULINS				KS
IMMUNOGLOBULIN A	152		81-463 mg/dL	
IMMUNOGLOBULIN G	1537		694-1618 mg/dL	
IMMUNOGLOBULIN M		278 H	48-271 mg/dL	
CBC (INCLUDES DIFF/PLT)				KS
STREPTOCOCCUS PNEUMONIAE				XE
IGG AB (14 SEROTYPES)				
SEROTYPE 1 (1)	1.0		mcg/mL	
SEROTYPE 3 (3)	1.3		mcg/mL	
SEROTYPE 4 (4)	0.5		mcg/mL	
SEROTYPE 5 (5)	5.0		mcg/mL	
SEROTYPE 8 (8)	1.2		mcg/mL	
SEROTYPE 9 (9N)	0.7		mcg/mL	
SEROTYPE 12 (12F)	0.4		mcg/mL	
SEROTYPE 14 (14)	8.3		mcg/mL	
SEROTYPE 19 (19F)	3.9		mcg/mL	
SEROTYPE 23 (23F)	1.4		mcg/mL	
SEROTYPE 26 (6B)	4.1		mcg/mL	
SEROTYPE 51 (7F)	3.7		mcg/mL	
SEROTYPE 56 (18C)	1.1		mcg/mL	
SEROTYPE 68 (9V)	0.8		mcg/mL	

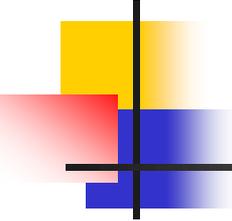


Case History, 56 year old female

- A repeat measurement of her pneumococcal titers shows that she did not increase her titers 2 times or 4 times pre-vaccination levels
- She continues to require frequent antibiotics
- She has a Diagnosis of: Specific Antibody Deficiency

ACCESSION: 4172012	DOB: [REDACTED]	Kanarek, Henry J HENRY J. KANAREK MD PA 4601 W. 109th St. Ste. 350 Overland Park, KS 66211-1349 913-451-8555
COLLECTED: Dec 20, 2013 12:00 am	GENDER: Female	
RECEIVED: Dec 20, 2013 6:55 pm	ACCT #: -1	
REPORTED:	PHONE	
SENDER: PRLIS.PRL	ZIP: 64503	

Test Name	In Range	Out of Range	Reference Range	Loc.
Immunoglobins (G, M, A)				
IGG	1414		647-1797 mg/dL	
IGA	153		75-451 mg/dL	
IGM	233		49-310 mg/dL	
S. pneumoniae IgG Abs				
TYPE 1 ABS	1.5		>1.0 ug/mL	
TYPE 3 ABS	1.3		>1.0 ug/mL	
TYPE 4 ABS		0.6	L >1.0 ug/mL	
TYPE 5 ABS	5.4		>1.0 ug/mL	
TYPE 6B ABS	3.1		>1.0 ug/mL	
TYPE 7F ABS	1.6		>1.0 ug/mL	
TYPE 8 ABS		0.9	L >1.0 ug/mL	
TYPE 9N ABS		0.5	L >1.0 ug/mL	
TYPE 9V ABS		0.6	L >1.0 ug/mL	
TYPE 12F ABS		0.3	L >1.0 ug/mL	
TYPE 14 ABS	4.4		>1.0 ug/mL	
TYPE 18C ABS		1.0	L >1.0 ug/mL	
TYPE 19F ABS	1.4		>1.0 ug/mL	
TYPE 23F ABS	1.2		>1.0 ug/mL	

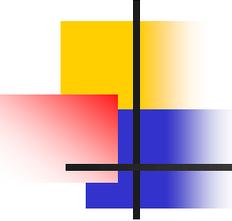


Specific Antibody Deficiency with Normal Immunoglobulins

- Normal antibody quantity but poor antibody quality
- Poor response to pneumococcal vaccine
- Immunoglobulin levels may be normal but the poor quality allows for recurrent infections
- Recurrent infections can lead to permanent tissue and organ damage
- The patient is frequently ill and requires frequent antibiotics
- Treatment can be prophylactic antibiotics, even Immunoglobulin G replacement

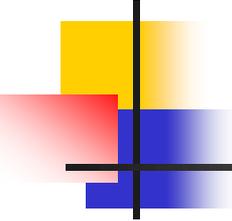
Common Variable Immunodeficiency, Specific Antibody Deficiency Treatment

- Boost the immune system
 - Sleep well, eat well, moderate exercise
 - Reduce school hours, arrive at 9:00, attend class 4 days a week, change lifestyle to allow rest
- Prophylactic antibiotics
 - For example daily during the winter
- Treat associated diseases
 - Iron, nutrition, anti-inflammatory if arthritis, inhalers for respiratory problems
- Intravenous or subcutaneous Immunoglobulin G infusions



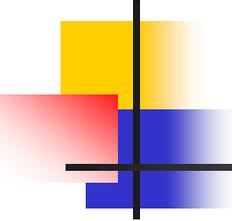
Immunoglobulin G infusions

- Intravenous infusions are given monthly since the life span of Immunoglobulins is 4 weeks
- Subcutaneous infusions can be given weekly or every 2 weeks
- Depending on the diagnosis, infusions may be temporary or for life
- Monitoring trough levels of IgG (levels immediately before next infusion), and the patients overall health determines the dosing
- Typically the patient receives $\frac{1}{2}$ gram per kilogram monthly



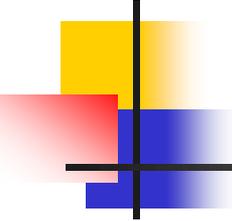
Subcutaneous Immunoglobulin G

- A wind up syringe is used to push the immunoglobulin
- Small tube is connected to syringe and splits into 2 to 6 small tubes with subcutaneous needles at the end
- Needles are applied to fatty areas of the body such as the abdomen, thighs or upper buttocks area
- Infusion can take 1 to 3 hours



Diagnostic Considerations

- Always ill in a previously healthy individual
- Requiring frequent antibiotics compared to family and friends
- Hard to treat respiratory problems, does not behave like asthma alone, look for bronchiectasis
- Severe irritable bowel and other severe gastro- intestinal problems
- Anemias and blood clotting disorders
- Poor response to vaccinations



Questions?

Visit our website at KAllergy.com or contact our office at drkanarek@kallergy.com