

# Immunodeficiency Algorithm

1. Recurrent infections:
  - In 1 year - OM x 8; Sinusitis x 2; Pneumonia x 2; or any 2 deep-seated infections (osteo, CNS, etc.)
  - Recurrent deep skin or organ abscesses
  - Persistent thrush (mouth or other skin sites) after 1y/o
2. Poor response to antibiotics:
  - Need for IV or prolonged course (>2 mo) to clear infections
3. Infection with signature organisms - PCP, Serratia, Aspergillus, Nocardia, Pseudomonas
4. Family history of Primary Immunodeficiency
5. Classic clinical presentation:
  - Ex. DiGeorge or Ataxia Telangectasia
6. Failure to Thrive



LABS

- CH50 - tests entire complement cascade (\$83)

- CBC/Differential (\$40)
- Neutrophil oxidative burst assay - AKA NBT assay (\$86)

- CBC/Differential (\$40)
- Quantitative IgM, IgG, IgA, & IgE (\$127)
- Anti-tetanus titers (\$57)
- Anti-pneumococcal titers pre- & 4 wks post immunization

- CBC/Differential (\$40)
- T & B cell subset analysis (\$202)
- DTH reaction to Candida & Tetanus



DEFECT TYPE

- ### Complement
- Recurrent disseminated Neisserial infections.
  - Pyogenic bacterial infections.
  - Angioedema of face, hands, feet, or GI tract.
  - Autoimmune symptoms (Lupus).
  - History suggestive of autosomal dominant inheritance.

- ### Phagocytic
- Soft tissue abscesses or lymphadenitis.
  - Infection with catalase + organisms (Staph aureus, Serratia, E. coli, Aspergillus).
  - Poor wound healing.
  - Delayed separation of the umbilical cord.
  - Chronic gingivitis and periodontal disease.
  - Mucosal ulcerations.

- ### B Cell
- Recurrent bacterial sino-pulmonary infections or sepsis, particularly with encapsulated organisms.
  - Chronic or recurrent gastroenteritis (Giardia and Enterovirus common).
  - Chronic enteroviral meningoencephalitis.
  - Arthritis
  - Unexplained bronchiectasis.

- ### T Cell
- *Pneumocystis carinii* pneumonia.
  - Fungal infections.
  - GVHD (rash, abnormal LFT's, and chronic diarrhea).
  - Recurrent, severe, or unusual viral infections.
  - Failure to thrive.

**Combined**

Troy R. Torgerson MD PhD 3/2001

# Specific Immunodeficiencies

## Complement

- Hereditary Angioedema:
  - Defects in C1 esterase inhibitor.
- Various Complement component deficiencies.

## Phagocytic

- Cyclic Neutropenia
- Chronic Granulomatous Disease:
  - Defect in production of reactive oxygen intermediates in phagosomes so bacteria can be phagocytosed but not degraded.
- Leukocyte Adhesion Deficiency:
  - 2 types. Defects in cell surface adhesion molecules so cells unable to migrate to sites of infection.
- Chediak-Higashi Syndrome

## B Cell

- Selective IgA Deficiency
- Common Variable Immunodeficiency
- IgG Subclass Deficiencies
- X-Linked Agammaglobulinemia:
  - Defect in Bruton's tyrosine kinase (Btk) so signal from B Cell antigen receptor not transmitted into cell and no antibodies made

## T Cell

- Wiskott-Aldrich Syndrome:
  - Thrombocytopenia, tiny platelets, BAD eczema, and T cell deficiency due to defects in the cytoskeletal WASP protein important for T cell and platelet function.
- DiGeorge anomaly
  - Developmental defect of thymus associated with T cell dysfunction, congenital heart disease and hypoparathyroid.

## Combined

- Severe Combined Immunodeficiency:
  - Varying types caused by several different defects but most with severe disruption of both B and T cell function.
- Hyper-IgM Syndrome:
  - Defect in CD40 ligand present on T cells so they are unable to signal B cells to switch from making IgM to other immunoglobulin isotypes.
- Adenosine Deaminase Deficiency:
  - Results in buildup of purine metabolites which are toxic to both B and T cells.
- X-Linked Lymphoproliferative Disease - Unable to handle EBV infection.
  - ~50% die of fulminant mono & another 30% get EBV+ lymphomas.
  - ~30% develop hypogammaglobulinemia after EBV infection.