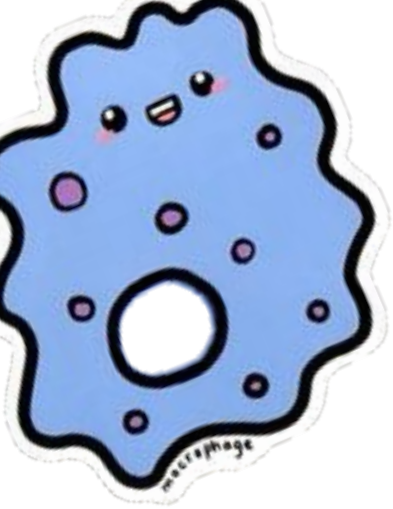
# Immunology

**Title :** Immunodeficiency Diseases

**Lec no :** 13

**Done By :** Tareq Sbool + Omar Shanaq + Johainah Taha

وَقُل رَّبِّ زِدْنِي عِلْمًا



# Introduction

Deficiencies of host defense systems result in an immunologic imbalance that can lead to a ① susceptibility to infection, an ② autoimmune disease, or a ③ predisposition to malignancies.

ما يميز هدول المرضى هو زيارتهم المتتابعة للمشفى و ال recurrent infection

## Types of immunodeficiency disorders

امراض اثرت على جهاز المناعة

### Primary

Causes in immune system component:

a. According of component:

* Complements. 20%
* Phagocytic. 20%
* B cells. → most common 50%.
* T Cells. 10%

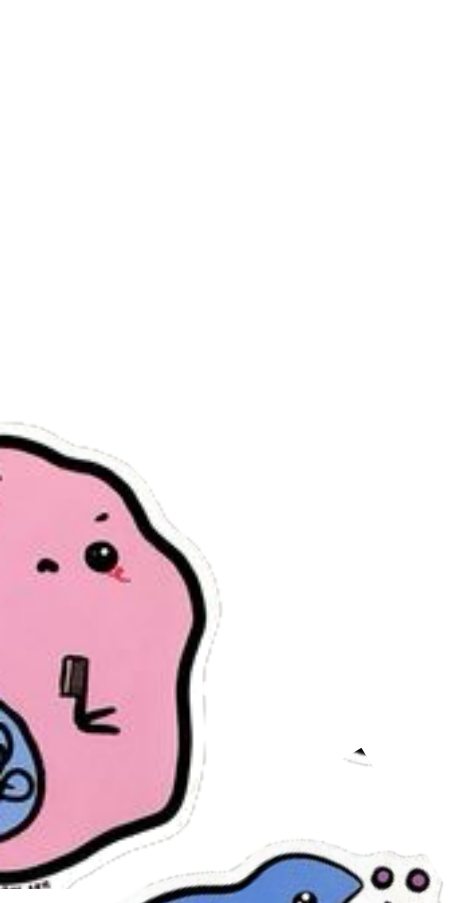
b. According to the etiology:

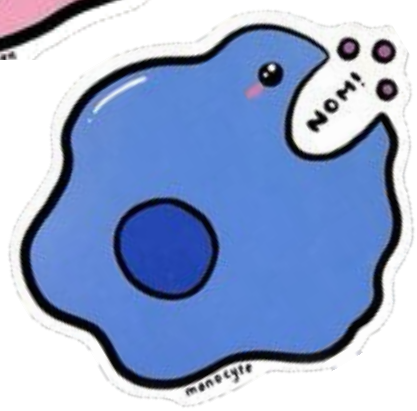
* Congenital (X-linked disease)
* Acquired (AIDS) → main target ال لهالمرض هو ال immune system لهيك ما اعتبرناه secondary
* Embryogenesis (Digoerge syndrome).
* Idiopathic

### Secondary

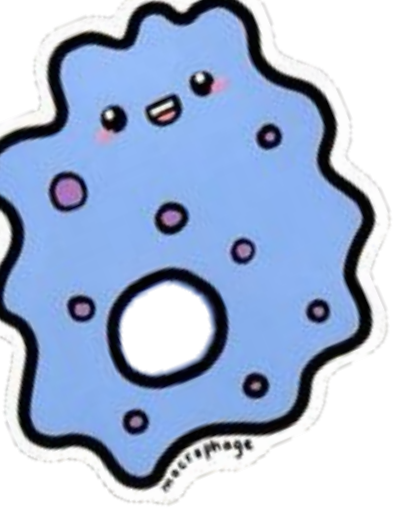
Non Immunogenic causes:

* Prematurity. → جهاز مناعة غير مكتمل
* Mal nutrition.
* Hodgkin`s and others malignancy.
* Injury, Burns, Splenectomy.
* Drugs. Like coticosteroids
* Diabetes
* Pregnancy





وقل رب زدني علماً



## 1. B-cell defect

B cell --> plasma cell --> antibody --> helps in opsonization for larg size extracellular bacteria --> damage

* Causative agents are most commonly extracellular organisms, namely pyogenic and enteric bacteria, because patients are deficient in serum antibodies necessary for phagocytosis.
* Recurrent infections with encapsulated bacteria
* Chronic sinupulmonary infections
* Sites of infection include the skin, sinuses, meninges, and the respiratory, urinary, and gastrointestinal tracts.


⬇️ هدول مهمين اسئلة كيسات

**Bruton's Agammaglobulinemia**

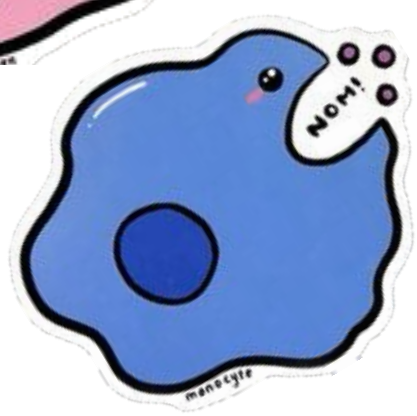
* Immunology:
* No B cells or non functional B cells including defective signaling or defective BCR
* Markedly low levels of Immunoglubulines
* Clinical:
* Child clinically well for first 6 months of life
* Recurrent upper/lower respiratory tract infections with encapsulated bacteria (S. pneumonia)
* Sepsis, meningitis, skin infections
* Short life span
* Treatment: IVIG, antibiotic therapy العلاج اني بعطيه antibody طالما الB cell عندهم مشكلة بانتاجهم

**IgA deficiency**

* Immunology:
* Most common humoral antibody deficiency
* Isolated low IgA level Found in mucous membranes

الدكتور حكى ممكن اجيب الكم سؤال case فيه هدول المعطيات و اسألك المريض شو معاه ؟

* Manifestation:
* 50-80% asymptomatic
* Recurrent sinopulmonary infections most frequent manifestation
* May have severe malabsorption (chronic diarrhea)
* Increased risk of autoimmune disorders
* Treatment: Broad spectrum antibiotics

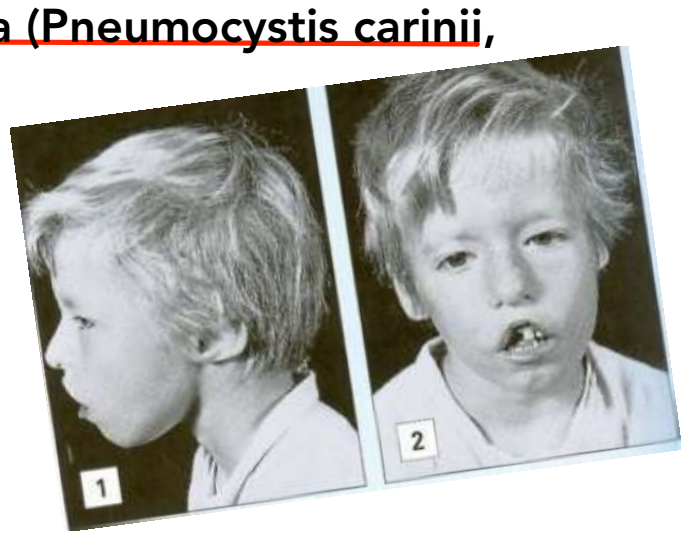

وَقُل رَّبِّ زِدْنِي عِلْمًا

الدكتور حكى ما نزكز
كثير على T-Cell

## 2. T-cell deficiency disorders

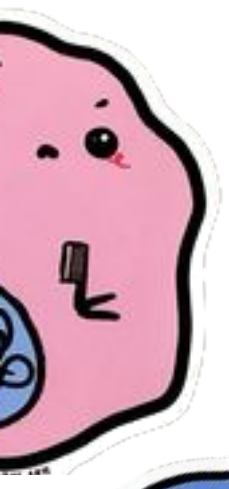
Increase risk for intercellular infecton (candida ,mycobacteria,viral).

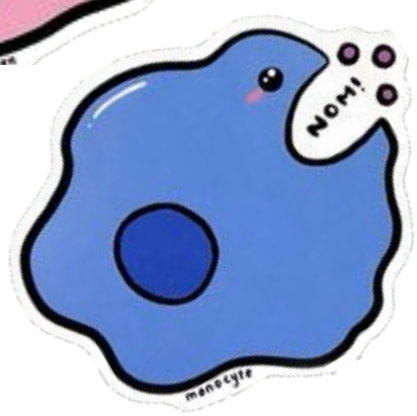
* Also known as cell-mediated (cellular) immuno-deficiencies, result from abnormalities in T-cell functions.
* Antibody production is also likely to be affected in patients with severe T-cell abnormalities because T cells are important immunoregulators of B-cell differentiation and function.
* Recurrent infections --Causative agents are intracellular pathogens (e.g., herpesviruses, mycobacteria, fungi (Candida), and protozoa (Pneumocystis carinii, Toxoplasma).



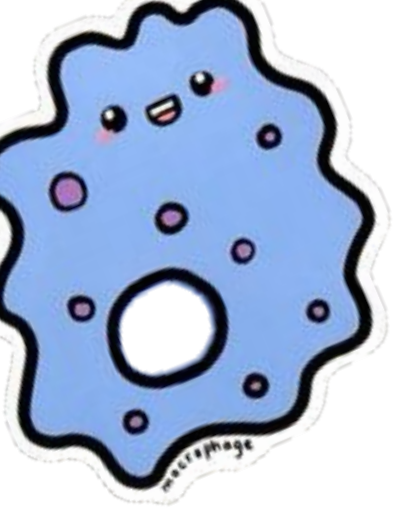

DiGeorge Syndrome
* Immunology:
* Poorly developed or functioning thymus
* Depression of T cell numbers
* Absence of T cell response
* Humoral response to T independent antigens only
* Clinical: Overwhelming infections with viruses, fungi, bacteria
* Treatment: correct hypocalcemia, cardiac defects, fetal thymus transplant

this syndrome is caused by a defect in the pharyngeal pouch leading to:
caradic defect , RS defect, Thyms defect.
-we can find in this patient : hypocalcemia, cardiac defects, pulmonany defect, thyms problem.




وقل رب زدني علماً




## 3. Combined Deficiencies

* Immunological abnormalities are combined to B cells and T cells

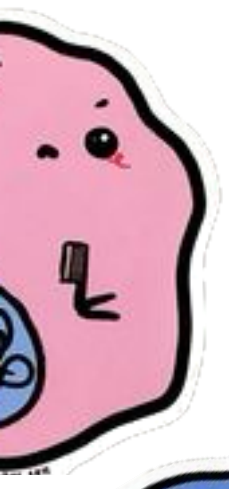
(mix between T +B cell defect )
-recurrent infection in all type

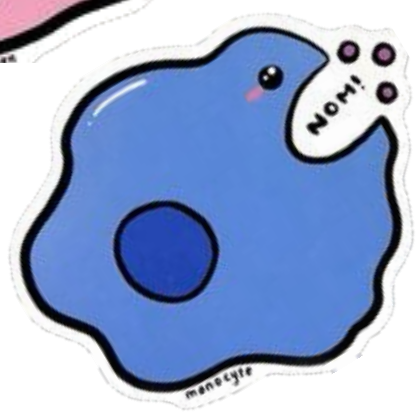
**Sever Combined Immune Deficiency (SCID)**

* Immunology:
* Defects in stem cell maturation with various genetic defects
* No TCR or defective TCR
* Defective cell signaling
* Defective IL 2
* Manifestations seen in first 3 months of life
* Recurrent, severe bacterial, viral, fungal, and protozoan infections (usually respiratory infections)
* Failure to thrive, diarrhea, dermatitis, candidiasis
* Death at early age
* Treatment: isolation, treat underlying infections, bone marrow transplant

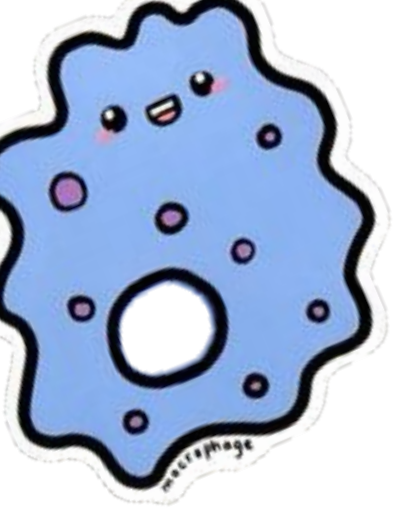
**Wiskott Aldrich Syndrome** مهمة syndrome هاي ال

* Immunology:
* X linked disorder
* Affects platelet numbers/function → Bleeding is complocation ← مهمة جدًا والدكتور ركز عليها
* Affects T cell function
* Cytoskeleton of lymphocytes affected
* Lower amounts of IgM
* characterized by eczema, thrombocytopenia (low platelet count), immune deficiency, and bloody diarrhea (secondary to the thrombocytopenia).
* Symptoms in infancy
* Recurrent, severe infections
* Eczema
* Thrombocytopenia (petechiae)
* Treatment: manage bleeding/infections, BMT bone marrow transplantion




وَقُل رَّبِّ زِدْنِي عِلْمًا



## 4. Phagocyte disorders

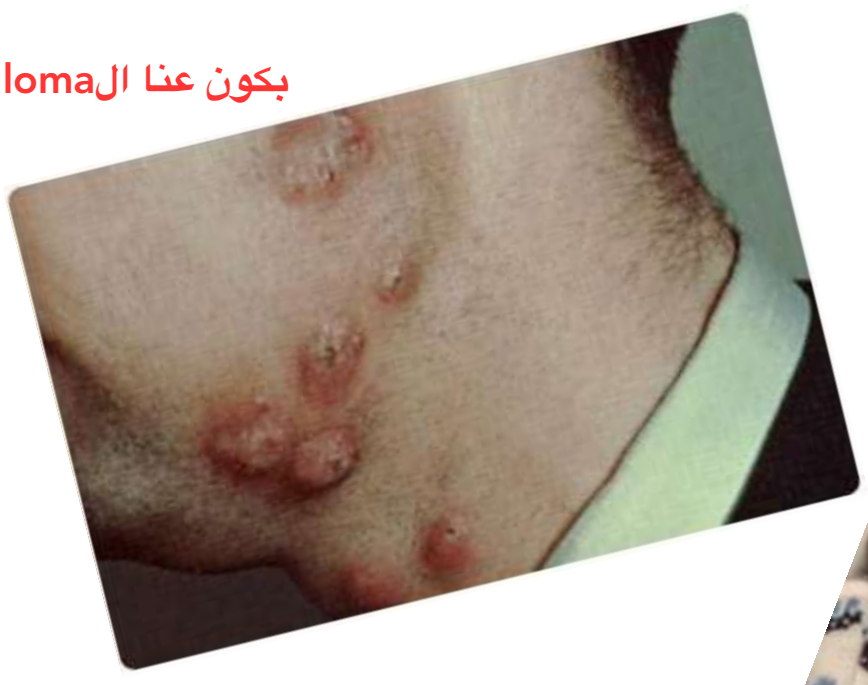
* Clinical features: Affected individuals are prone to infections with low-grade bacteria such as Staphylococcus aureus and gram-negative enteric bacteria.

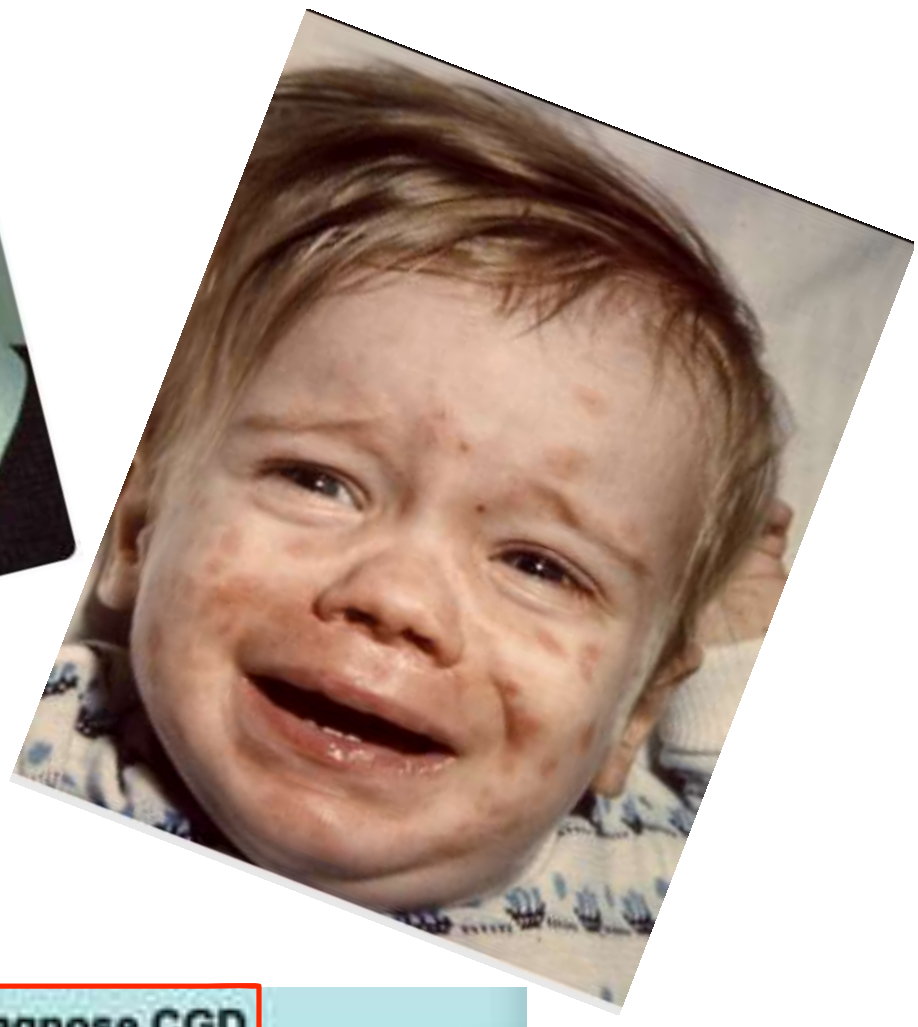
without killing bacteria just ingest it and keep it inside a prodect mass around it.

**Chronic Granulamatous Disease (CGD)**

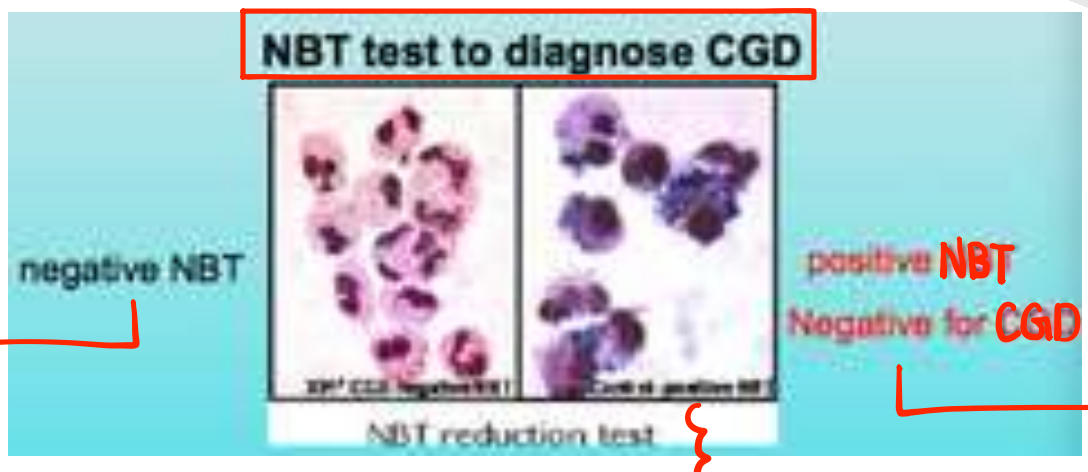
* Immunology:
* Non functional phagocytes
** * Defective NADPH oxidase  سؤال متوقع
* 75% X-linked recessive, 25% autosomal recessive
* Manifestation:
* Severe, recurrent staph aureus infections of lymph nodes, skin, and lung
* Dx: Nitroblue tetrazolium (NBT) test (مهم)
* Treatment: antimicrobial prophylaxis, IFN-gamma, BMT

بكون عنا الgranuloma





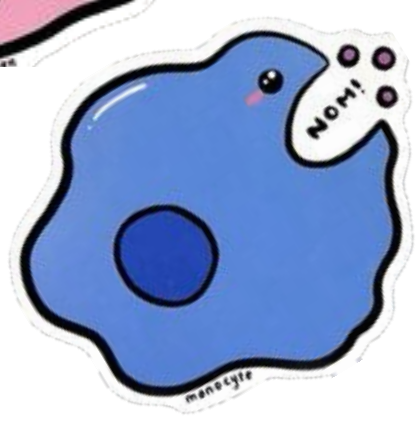
** مهم



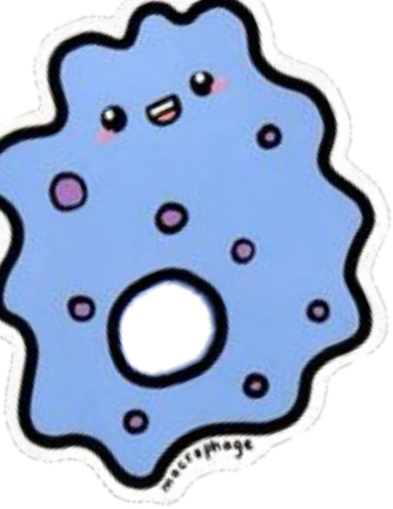

Pink

Purple

غير مصاب



وَقُل رَّبِّ زِدْنِي عِلْمًا



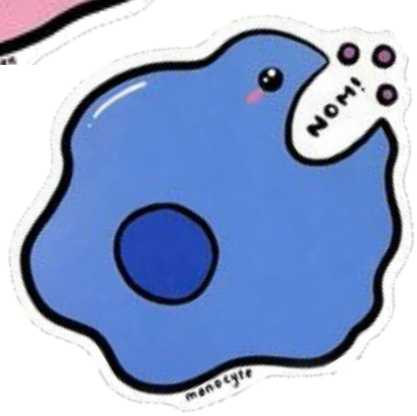
## 5. Complement Disorders

* Deficiency of early complement components (C1, C4, C2) results in a symptom complex resembling collagen vascular disorders (e.g., systemic lupus erythematosus (SLE)] and increased susceptibility to pyogenic infections.

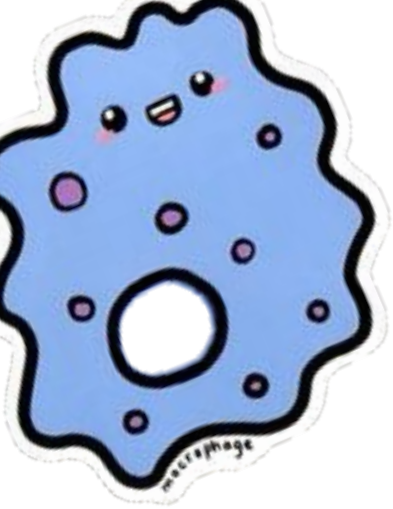
* C3 deficiency results in severe pyogenic infections. Several patients have also had SLE and glomerulonephritis.

* Deficiency of late complement components (C5, C6, C7, C8) results in systemic Neisseria infections such as meningococcal sepsis and meningitis, and disseminated gonococcal infections.

متوقع سؤال



وَقُل رَّبِّ زِدْنِي عِلْمًا



# Diagnosis of immunodeficiency disease

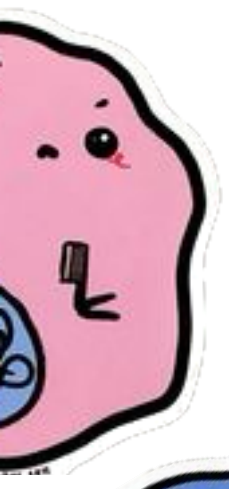
الدكتور طلب الي عليهم هايلايت

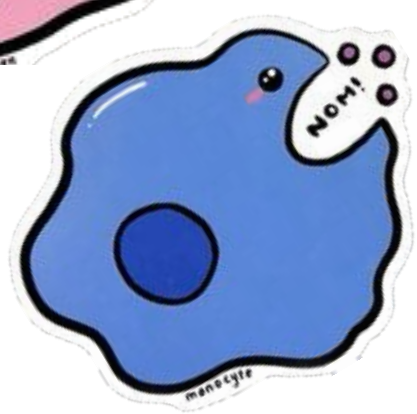
<u>laboratory investigation:</u>

- CBC: increase PMNL suspect phagocyte deficiency
- Culture: to know the organism and choose the antibiotics.
- ESR and CRP: inflammation markers for follow up.

<u>Specific tests:</u>

1. B-cells:
- Total Ig
- Selected IgA and IgG
- Antibodies for pervious vaccination
2. T cells:
- Lymphocyte count.
- Delayed hypersensitivity reaction
- T cells and macrophage function test.
3. Phagocyte:
- Neutrophil count
- NBT test for screening.
- Macrophage function test
4. Complement: Total and specific complement count.






وَقُل رَّبِّ زِدْنِي عِلْمًا