

**Streptococcus**

**pyogenes**

# Objective!

- 1.) The etiology and morphologic characteristics of *S. pyogenes*.**
- 2.) The epidemiology and manifestation (signs & symptoms ) of *S. pyogenes* infections.**
- 3.) The extracellular products of *S. pyogene*, specifically to include:**
  - a. char. Of streptolysin-O**
  - b. prop. Of streptolysin-O**
  - c. sig. Of the streptolysin-O**
  - d. comp. Of strep-O to strep-S**
  - e. serologic test of antistreptolysin-O**
  - f. Method of antistreptolysin-O titration**
  - g. Rapid latex agglutination ASO procedure.**

# Introduction

**Lancefield Group A**

**Gram-positive cocci**

**M protein**

**phagocytosis**

**Fimbriae**

**Lipotechoic acid**

**M and R antigen**

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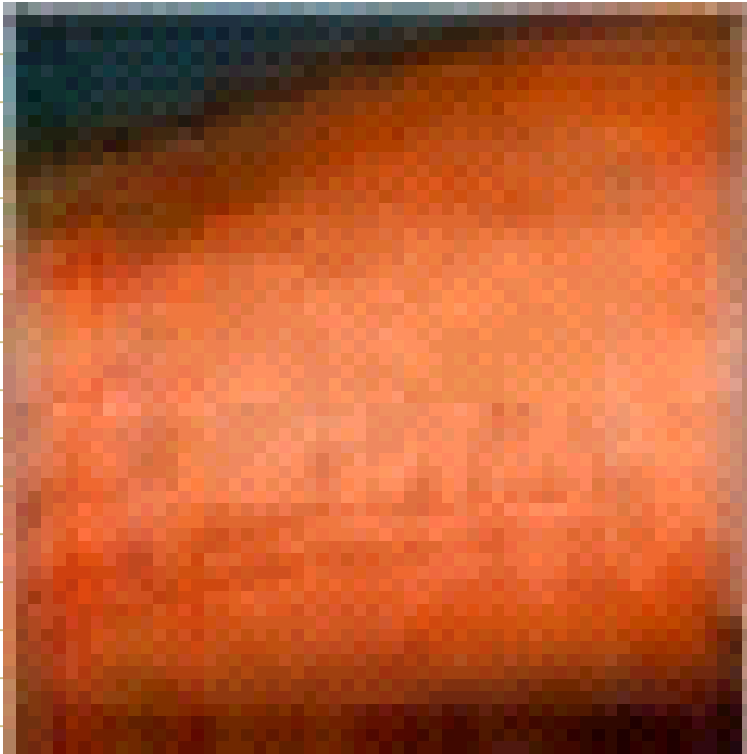
**S. pyogenes**

**Infection**

# Manifestation of *S. pyogenes* Infection

## Upper Respiratory Infection:

- \* RHINORRHEA
- \* COUGHING
- \* FEVER
- \* VOMITING
- \* ANOREXIA
- \* CERVICAL ADENOPATHY
- \* STREPTOCOCCAL PHARYNGITIS
- \* PHARYNGEAL ERYTHEMA
- \* SCARLET FEVER
- \* SKIN INFECTIONS



**RASH**

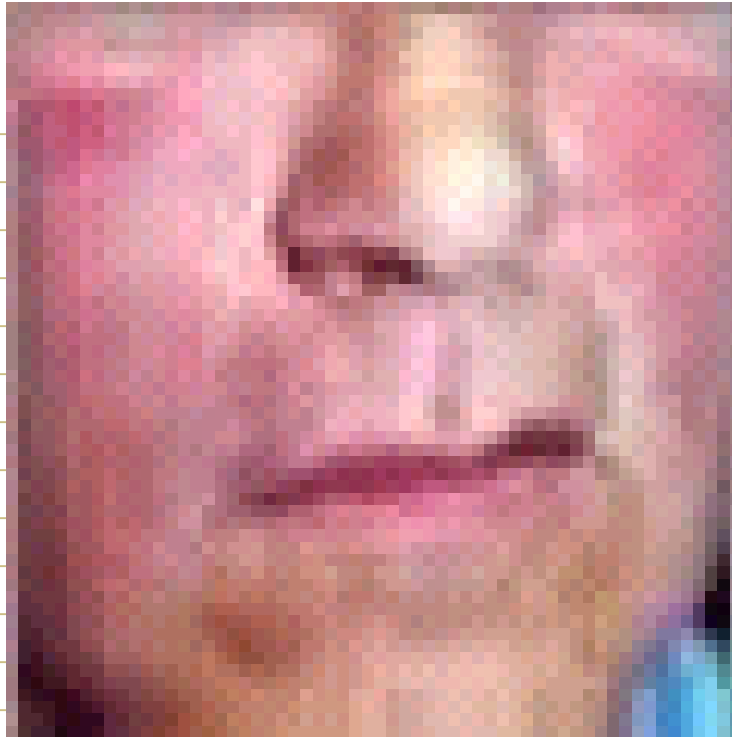


**Impetigo Contagiosa**

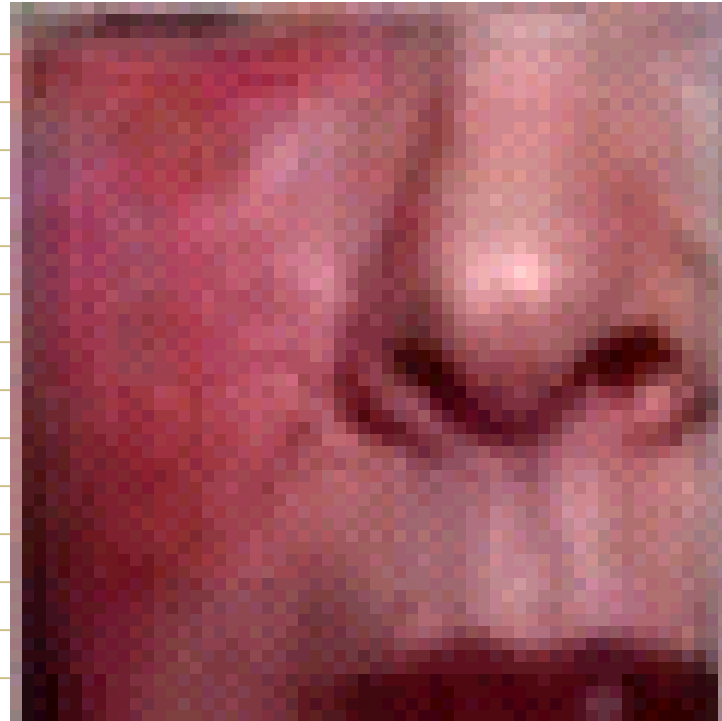


# Bulous Impetigo





## **Erysipelas in the Face**



**Erysipelas in the cheek**

# **COMPLICATIONS OF S. pyogenes Infection**

**The attendant complications of S. pyogenes infection include:**

**\*ACUTE RHEUMATIC FEVER**

**\*GLOMERULAR NEPHRITIS**

# **The extracellular products of *S. pyogenes***

**Streptolysin O (SLO) is a bacterial toxin produced by virtually all strains of *S. pyogenes*. It is one of two extracellular hemolysins, the other being streptolysin S (SLS). SLO is released during infection as indicated by antibody production it. The toxin is a protein with a molecular weight of approximately 70,000 which, in its reduced state brings about the lysis of red and white blood cells..**

# Properties of Streptolysin O

- oxygen lability
- hemolytically inactive
- Oxygen labile toxins
- activated by sulfhydryl
- Gram positive
- hemolysis of erythrocytes
- cardiotoxic
- interstitial myocarditis & systolic arrest in animals
- membrane cholesterol (binding site of slo)
- Erythrocyte membrane with ALFAFA saponin or filipin (inhibit the absorption of SLO).

# Significance of Antistreptolysin O Reaction

- Antigenic eliciting the formation of antibodies that effectively neutralize.

High proportion of patient with streptococcal infection show an antibody response during convalescence, therefore the measurement of serum streptolysin O has become a valuable and reliable indicator of streptococcal infection.

# Comparison of streptolysin O with Streptolysin S

270	NO	NO			NO			
272	YES	YES	5,800		YES	1002e/y	1eci-p ilpo	
	oxy-2's	non-TNA-non	MM	glycyl	baout	bebtqbe	inhibited	esae2ib

# Test for AntiStreptolysin O

## \* Neutralization Test

### Taking into account

Infection severity, previous exposure to streptococcal infection, individual ability to respond immunological to the toxin.

- There is no set normal titer for ASO.
- 125 todd's units normal in healthy adults.
- 5 to 125 todd's units ASO titers fluctuates in children.
- ASO titer decreases after age 50.
- Rheumatic fever seen during the symptom free period preceding the attack of the illness. (300 & 1500 todd's units 6 months from the onset of the disease.



# **Drugs commonly used in treatment of rheumatic fever**

**Sodium salicylate, Aureum salt & Amino phenazone with phenylbutazone (Irgapyrin).**

## **ANTIBIOTICS**

**Penicillin, Aureumycin, hormones, cortisones  
inhibit the production of the toxin**

# Method 1: Anti streptolysin O Titration

- Allow quantitative analysis of the antibody, this system defines a minimal hemolysis dose of SLO as that amount of toxin that will completely hemolyze 0.5 ml percent suspension of rabbit red blood cells, measured in todods units.

## materials

- saline (.85 percent
- streptolysin O buffer
- Red blood cells
- Test tube

# Interpretation

**The ASO titer expressed in todds units is the reciprocal of the serum dilution that completely neutralizes the SLO.**

**For example, a serum showing no hemolysis in tubes 1 through 4, a trace of hemolysis in tube 5, and marked to complete hemolysis in the remaining tube is reported as containing 125 todd units.**

**Before reporting results, always ensure that the controls give the expected results.**

# **Method 2: Rapid Latex Agglutination Antistreptolysin O Procedure**

- It is based on the principle that if polystyrene latex particles are coated with streptolysin O antigen visible agglutination will be exhibited in the presence of the corresponding antistreptolysin O antibody.

## **Materials:**

- ASO latex reagent
- 0.9 percent NaCl solution
- Positive control serum
- Negative control serum
- Glass slides with 6 wells

# Procedure

- 1. Label a 12 x 75 mm ;test tube.**
- 2. Pipette 1 ml of saline into each tube**
- 3. Add 1 drop of patient serum. Mix and invert it several times.**
- 4. Label 1 division of the 6 cell slide for positive control, negative and respective patient sera to be tested.**
- 5. Pipette 50 ul of the controls and p[atient sera onto the appropriately labelled cells. Use a fresh pipette for each specimen.**
- 6. Add 1 drop of latex reagent to each cell.**
- 7. Mix with applicator stick.**
- 8. Rotate the slide for exactly 3 minutes.**
- 9. Examine immediately with a bright source of direct light.**

# Interpretation:

- Agglutination- positive-
- No-agglutination-negative

If the patient is positive it demonstrate 200 ul or more ASO it should be retested quantitatively.

Patient serum should be prepared as follows:

dilution	U/ml
1;30	300
1;40	400
1;60	600
1;80	800
1;100	1000

# DISCUSSION

**Factors that can cause false-positive reaction.**

**A. bacterial contamination**

**B. lipemic serum & plasma**

**A titer with 200 u/ml or greater may be associated with rheumatic fever or glomerulonephritis. A patient with an elevated titer should be retested over a period of 4 to 6 weeks to plot the course of the titer.**