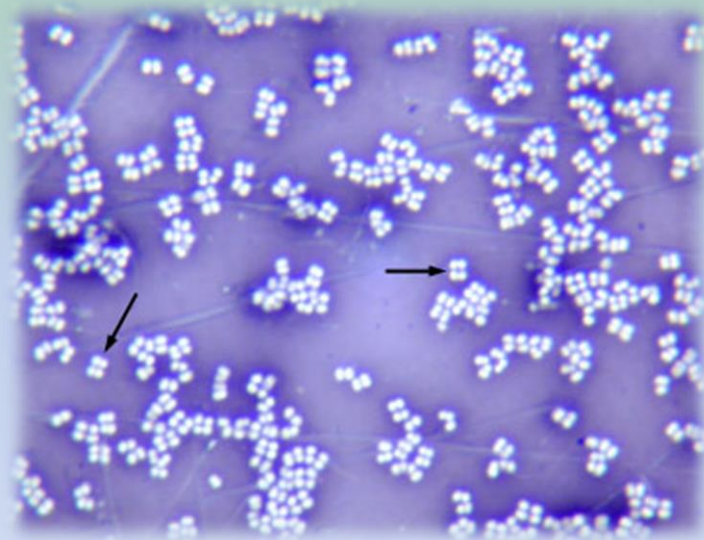


# Staphylococci and Micrococci

# Micrococci

- Micrococcus genus
- Gram positive cocci
- Related diseases:
  - Pulmonary infections
  - recurrent bacteremia
  - septic shock
  - septic arthritis
  - Endocarditis
  - Meningitis
  - pneumonia



# Steps in laboratory diagnosis of bacterial infection

## Specimen processing

- Macroscopic examination
- Gram stain observation
- Inoculation of media

## Culture

- Pure culture of the suspected pathogen

## Biochemical tests

- Perform tests necessary to identify suspected pathogen

## Antibacterial susceptibility tests

- Examine the related antibacterial drugs

## Report

- Report findings to clinician

# Identification of Micrococci:

- **Gram Stain**

1. Gram positive cocci
2. Characteristically in tetrads

- **Colony morphology**

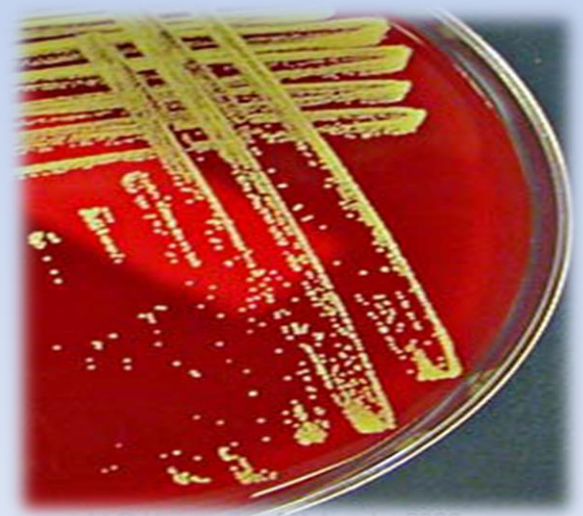
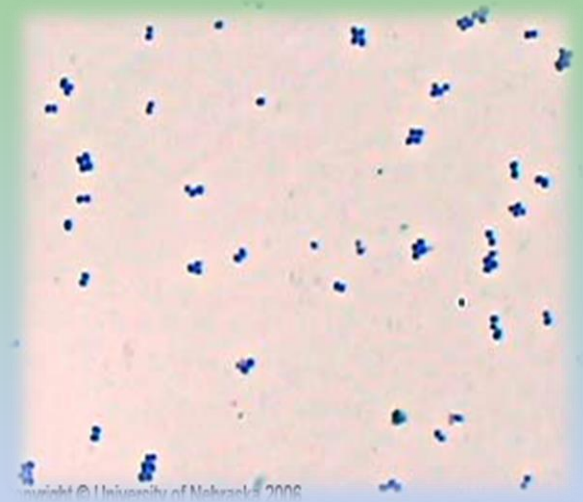
1. *Micrococcus luteus*= yellow pigment
2. *Micrococcus roseus*= pink pigment

- **Biochemical tests**

1. Catalase positive
2. Oxidase positive

- **Susceptibility tests**

1. Bacitracin sensitive



Staphylococcus

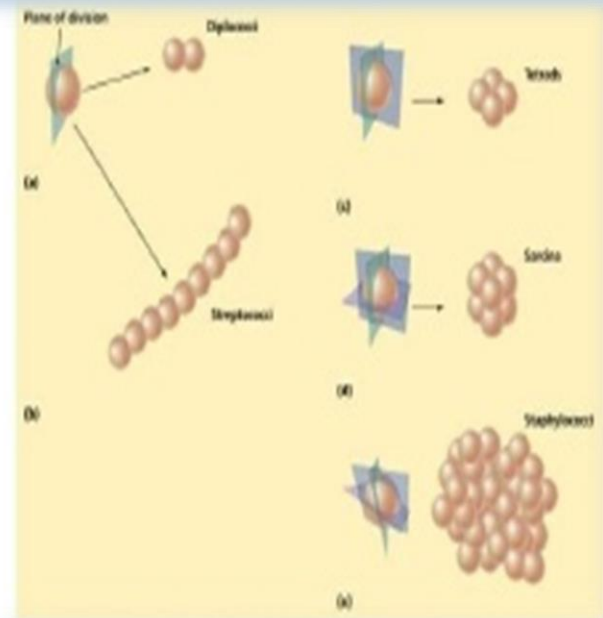
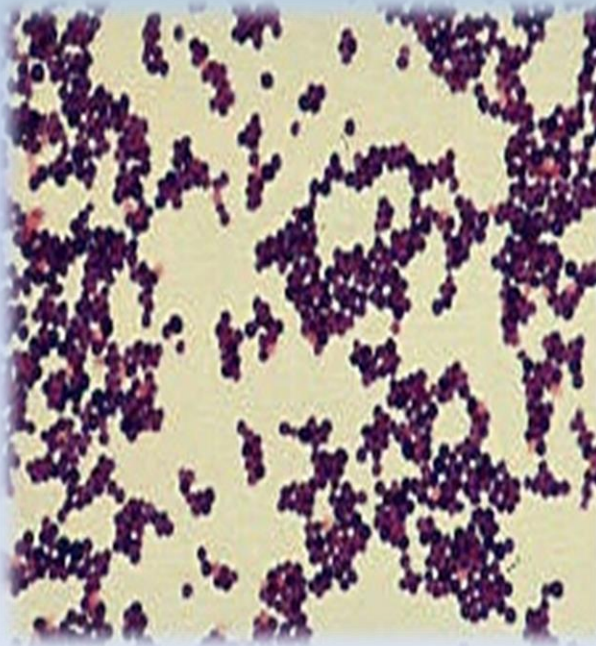
**Staphylococcus**

# Introduction

- Staphylococcus genus
- Groups:
  - A. Coagulase-positive
  - B. Coagulase-negative

# The structure

- Gram positive cocci
- Cell division occurs in different planes



# The physiology

- Salt-tolerant:
- Tolerate to desiccation:
- A major human pathogen
  - 60% intermittently colonised
  - 20% persistent
  - 20% Never



# *A. Staphylococcus aureus*

- Reservoir –
- Carriage sites –
- Colonizers
  - MRSA
  - MSSA

# Modes of transmission

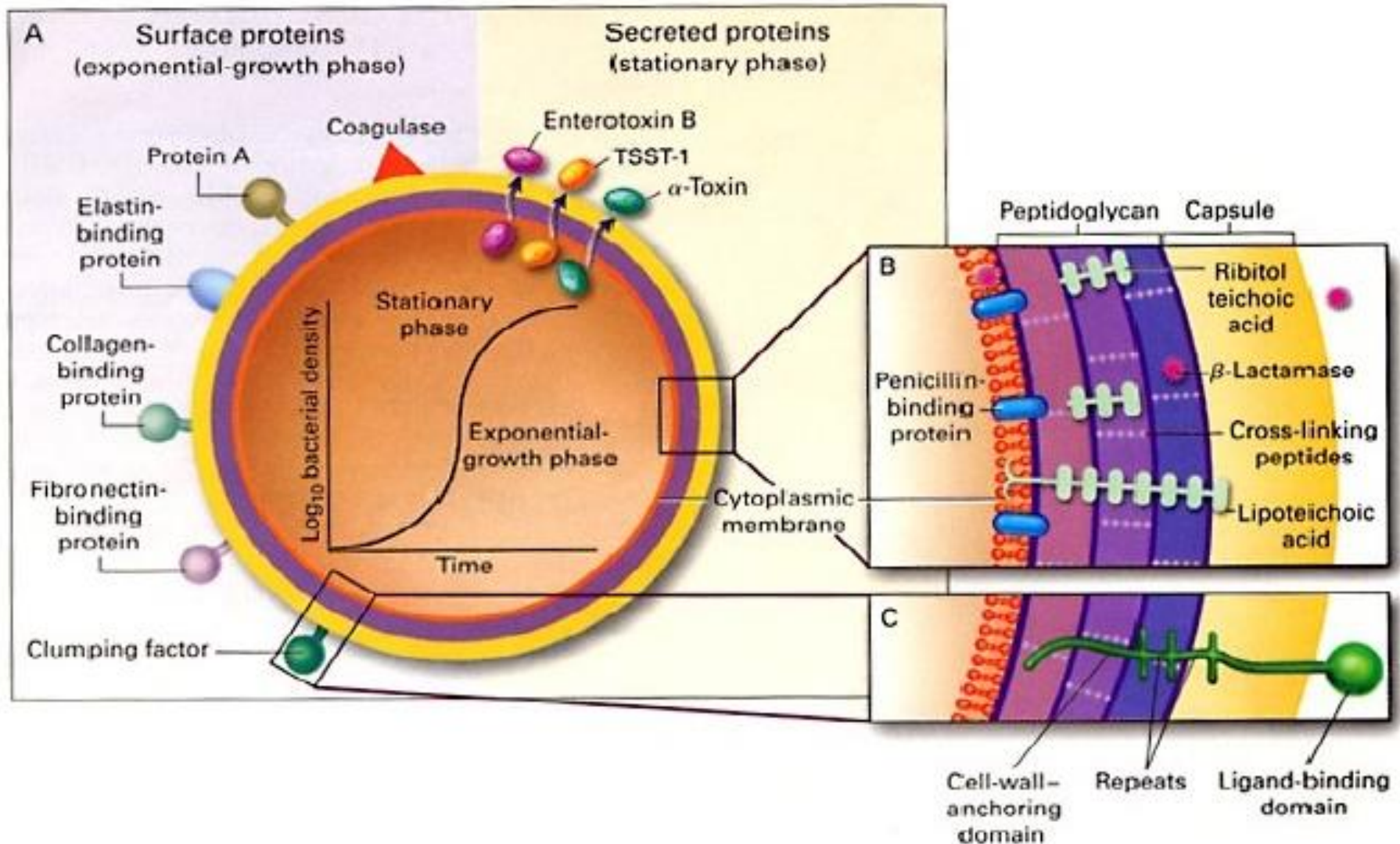
- Endogenous
- Exogenous
- Sources of infection

# Factors predisposing to *S. aureus* infections

Host factors

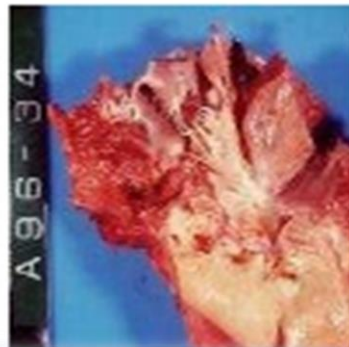
Pathogen factors

# Virulence factors and pathogenesis



# The diseases and the clinical presentation

## Pyogenic infections



## Toxin-mediated infections



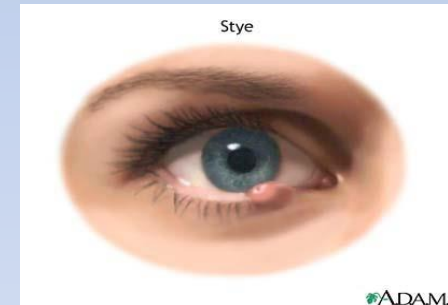
# Pyogenic infections

## A. Skin lesions

## B. Deep abscesses

## C. Systemic infections

- With obvious focus
- No obvious focus
- Assoc. with predisposing factors



# Toxin-mediated infections

- A. Staphylococcal food poisoning
- B. Scalded skin syndrome (SSS)
- C. Toxic shock syndrome (TSS)



# Laboratory diagnosis

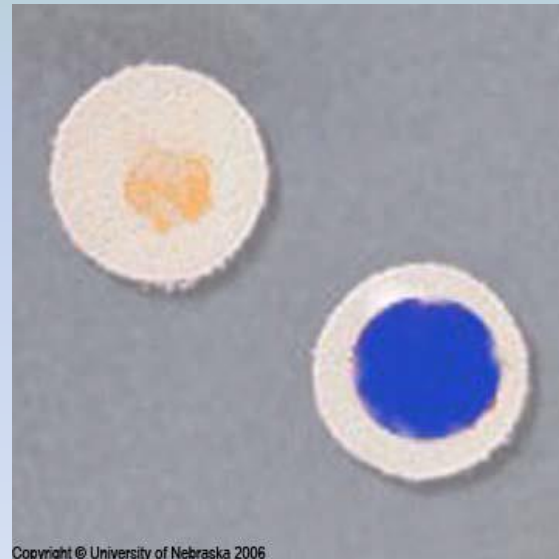
1. Specimen
2. Processing of specimens:
3. Identification of *S. aureus*:
  - Gram stain
  - Catalase test
  - Coagulase test
  - DNase test
  - Oxidase test
4. Rapid identification:
5. Susceptibility tests



# Laboratory diagnosis

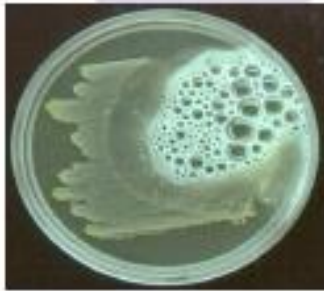
## Microdase (Modified Oxidase) Test

1. *Staphylococcus* species
2. *Micrococcus* species



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# Gram +ve (purple/blue) cocci



## Catalase test



Catalase +ve (clusters)  
**Staphylococcus**

Catalase -ve (chain)  
streptococcus

HAEMOLYSIS

Coagulase -ve

*S. epidermidis* OR *S. saprophyticus*

Coagulase



Novobiocin or Colistin (Polymyxin)

Coagulase +ve

*Staphylococcus aureus*

*S. saprophyticus*  
Resistant

*S. epidermidis*  
Sensitive

# Treatment

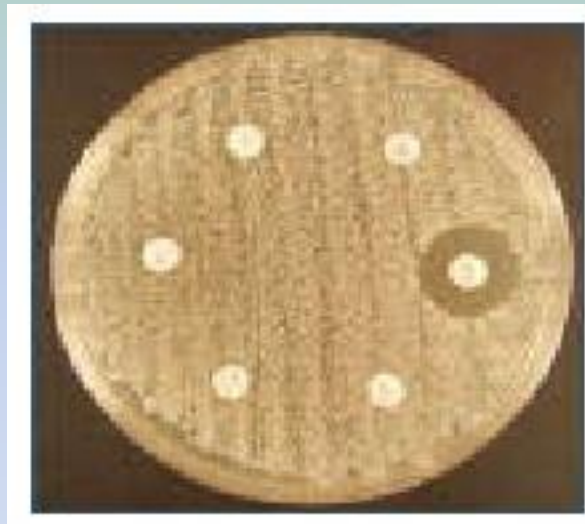
- Drain infected area
- Antibiotic treatment

# Antibiotic resistance

- Mechanisms
- Historical progression of antibiotic resistance of *S. aureus*

Antibiotic	Year introduced	Reports of resistance
Penicillin	1941	1940s
Streptomycin	1944	mid-1940s
Tetracycline	1948	1950s
Erythromycin	1952	1950s
Methicillin	1959	late 1960s
Gentamicin	1964	mid-1970s
Ciprofloxacin	1988	late 1980s
Vancomycin	1958	1997

# MRSA



# Prevention and control



# Coagulase-negative Staphylococci

*Staphylococcus epidermidis*

*Staphylococcus saprophyticus*

- Opportunistic pathogens