

STAPHYLOCOCCI

- The genus Staphylococcus has 30 spp. •
- Three of which have clinical importance •
S. aureus, S. epidermidis, & S.saprophyticus •
- *S.aureus* is coagulase + which •
differentiates it from other spp.
- The coagulase (-) are normal flora. •
- About 75% of Staph. infections are due •
to *S. epidermidis.*

STAPHYLOCOCCI

Staphylococcus is a Gram +ve, catalase + •
coccus that gives rise to:

cutaneous lesions such as boils –

exfoliative infection such as TSS –

osteomyelitis –

wound, burn and post-surgical infections –

The symptoms of disease are primarily •
those of acute inflammation

TABLE 16-1

Features of Human Staphylococci

SPECIES	COAGULASE	COMMON HABITAT	PATHOGENIC FEATURES	
			CATHETER COLONIZATION	FURUNCLES
<i>S. aureus</i>	+	Anterior nares, perineum	+	+
<i>S. epidermidis</i>	-	Anterior nares, skin	+ ^a	-
<i>S. saprophyticus</i> ^c	-	Urinary tract	+	-
Others	-	Various	+ ^a	-

^a Some strains produce surface slime.

^b Including exfoliatin pyrogenic and toxin superantigens.

^c Species statistically associated with urinary infection in young women.

relatively specific for *S. aureus*. In most strains, the peptidogly

Morphology & Structure

- Gram (+) SPHERICAL CELLS tend to be - arranged in grape-like clusters.
- Non-flagellate, non-motile & non-spore forming
- Aerobic but are facultatively anaerobic -
- The cell wall consists of a typical G+ - peptidoglycan interspersed with a teichoic acid

Cell Wall Structure of G+ & G-

CHAPTER 4: FUNCTIONAL ANATOMY OF PROCARYOTIC AND EUCARYOTIC CELLS

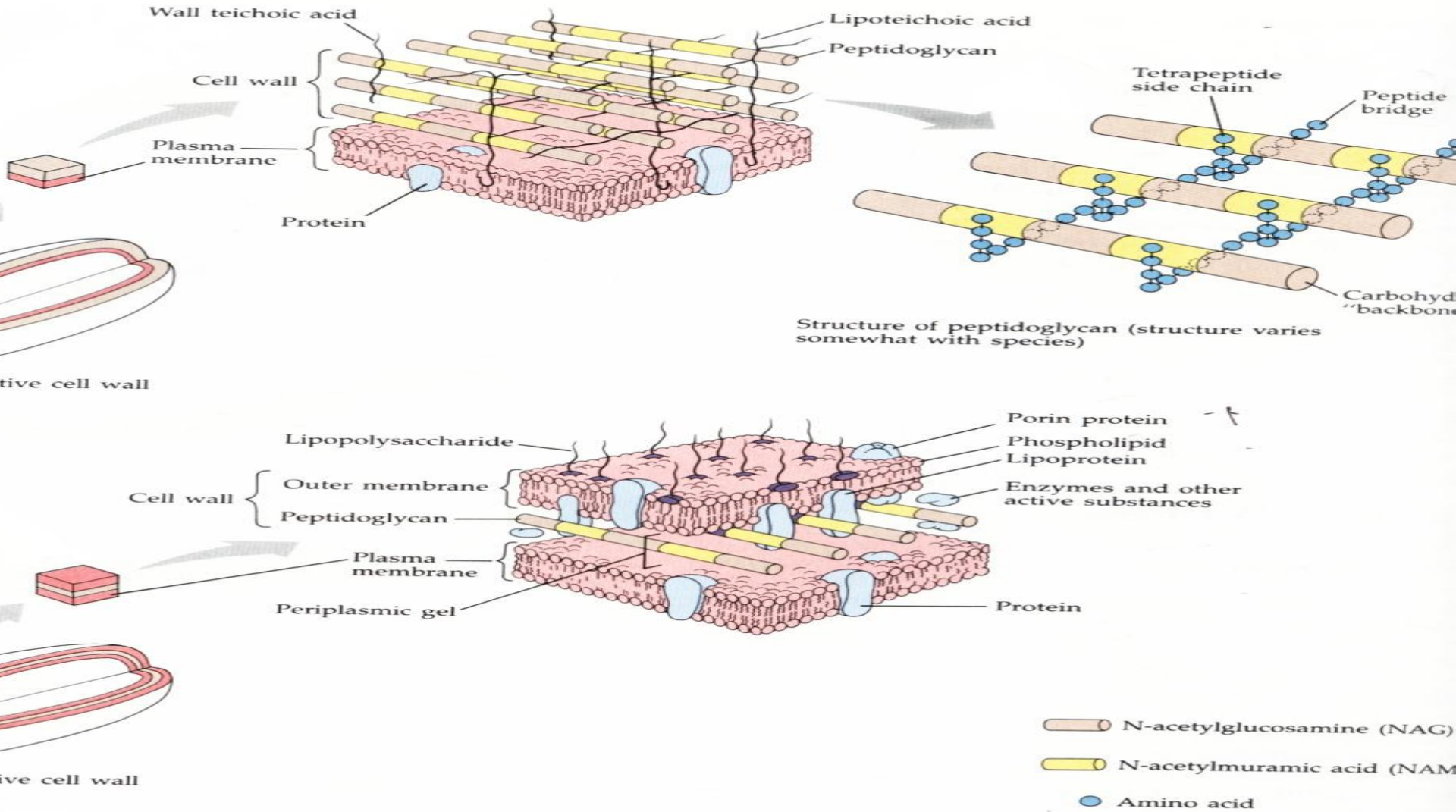


FIGURE 4.10 Bacterial cell wall. (a) Gram-positive cell wall showing the

Pathogenicity

- Understand the antiphagocytic adaptations of *S aureus*
- Appreciate the pathogenesis of abscesses
- The skin is a hostile environment for bacteria (see also next slide).
- However, *Staphylococcus* is adapted to this habitat
- *S. "epidermidis"* is a very common commensal of skin.
- Coagulase negative. Pathogenic only in compromised patients
- *S. aureus* less common commensal. Coagulase positive.
- Primary pathogen.
- * New varieties of MRSA are common commensal in hospital infections.

Staphylococcus

Organism that invade and then cause disease through acute & chronic inflammation

TOXINES:

1- α -Toxin: secreted by coagulase + only. It lyses the CM by direct insertion into the lipid Bi-layer to form trans-membrane pores.

2- β -toxin: degenerate many kinds of cells

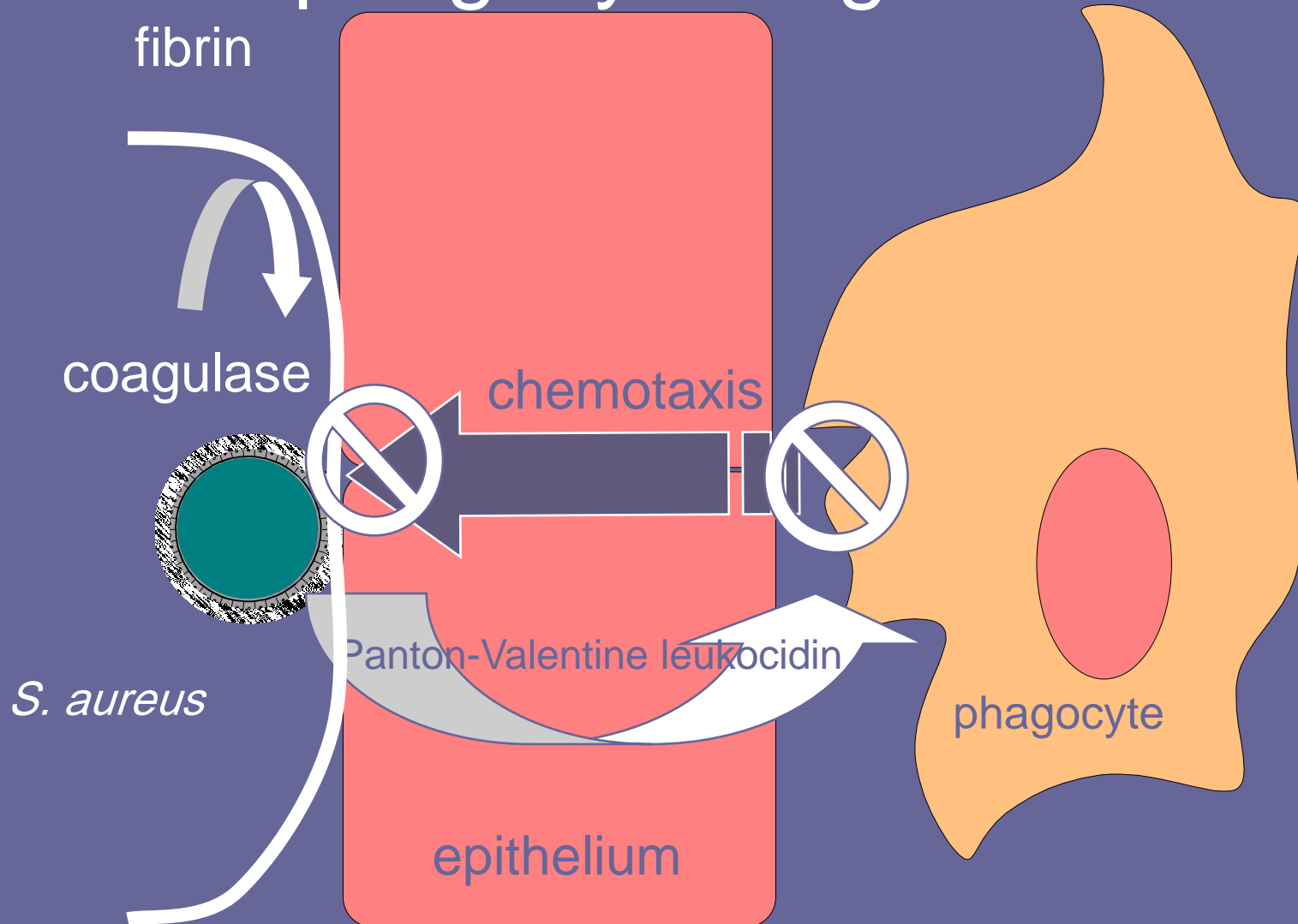
3- γ toxin: lyses the red blood cells.

4-Staph. Enterotoxins:such as TSST-1 which stimulate gastrointestinal symptoms. They tolerate gastric acidity & boiling for about 20 mints.

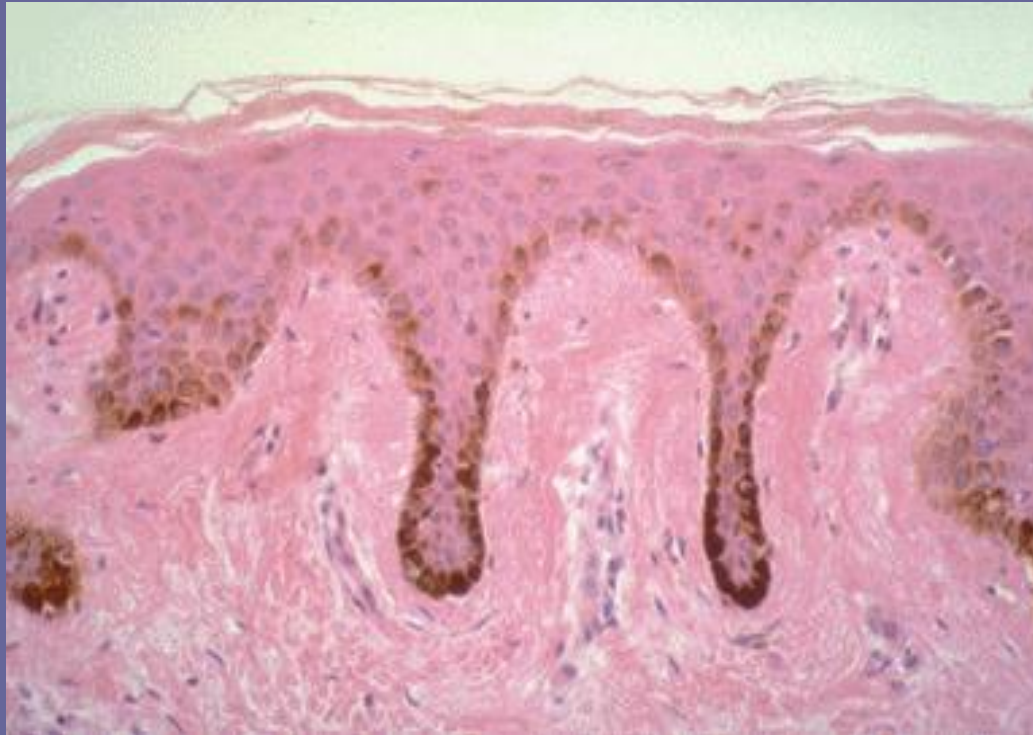
Toxines(cont.)

- 5- Exfoliatin: causes intracellular splitting of the epidermis. They are two of the same MW. Epidermolytic toxin A & Epidermolytic toxin B. The first one is chromosome mediated and the B is plasmid mediated.
- 6- Toxic Shock Syndrome Toxin: similar to TSST-1 associated with fever, shock and Multi-systems involvement including skin rash.

Abscess-formation 1: inhibition of phagocyte migration

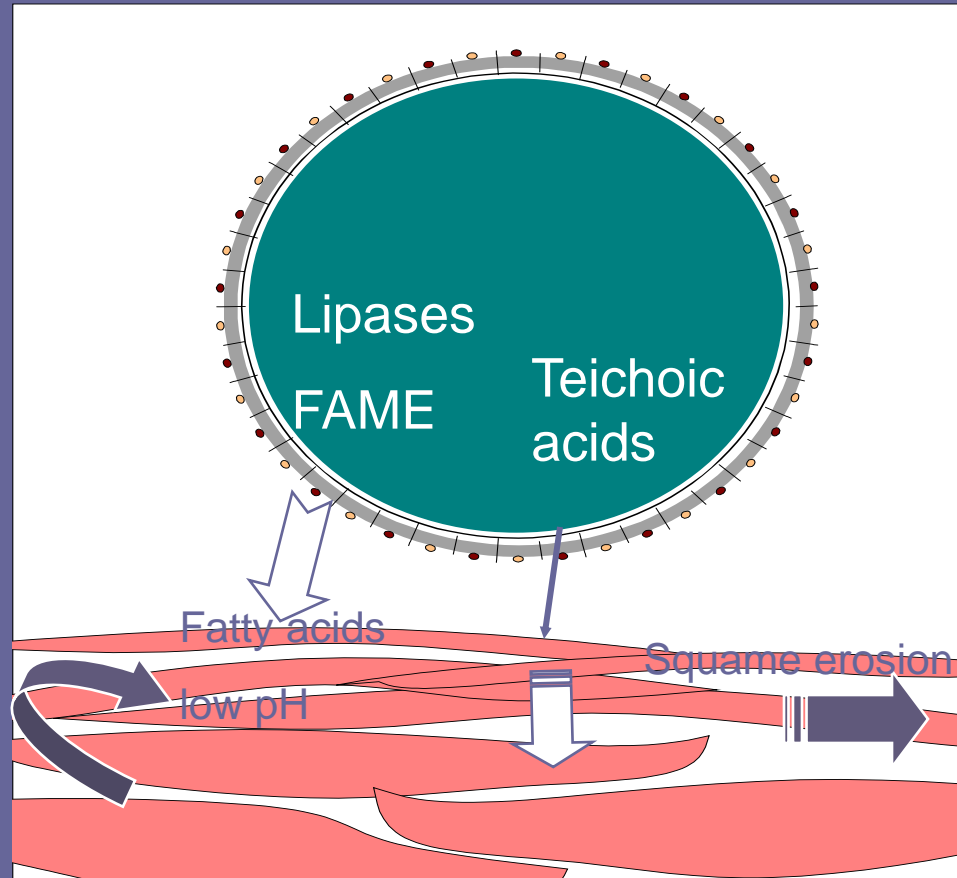


Normal skin

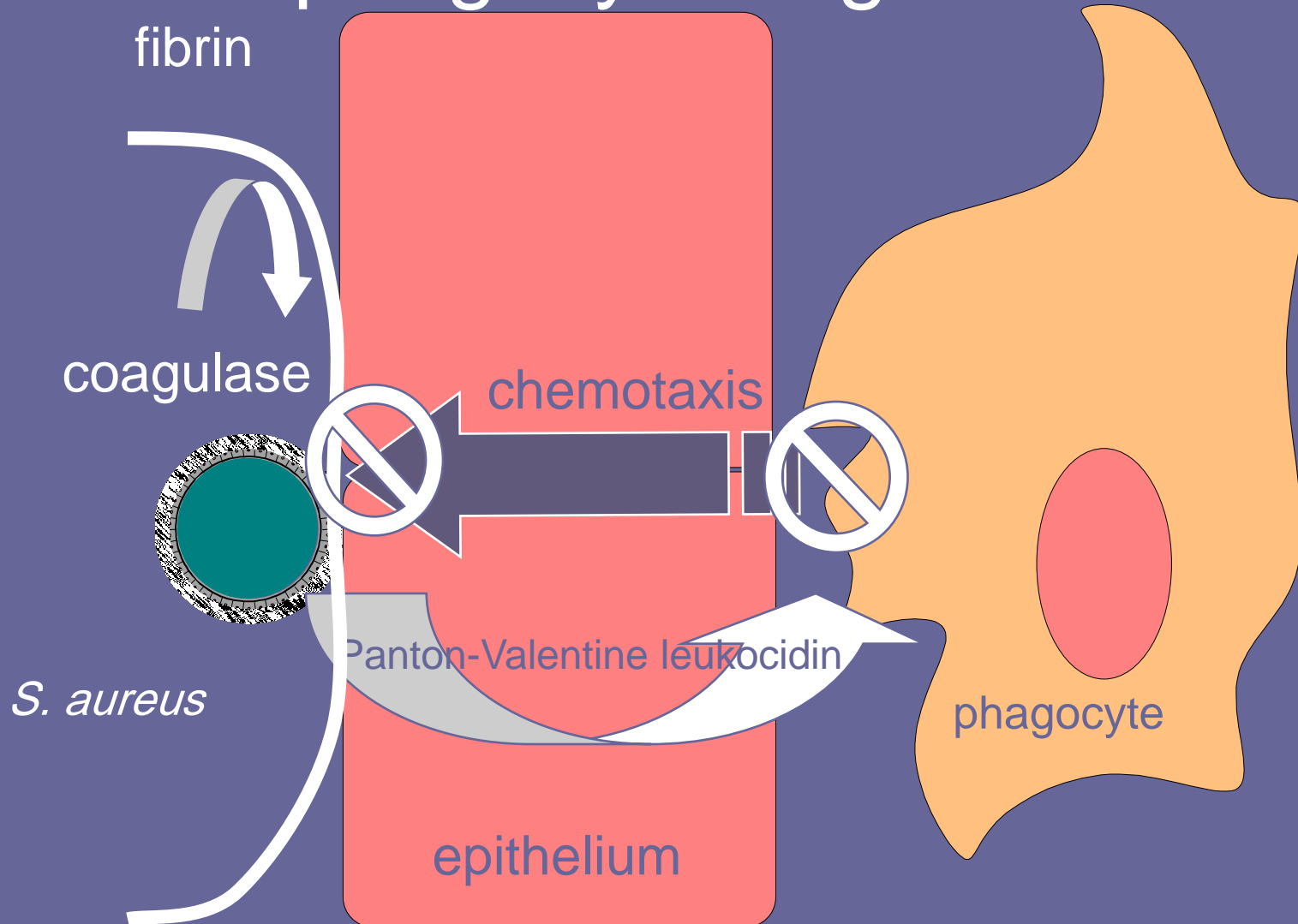


← keratinized
squamous
epithelium

Staphylococcus: epidermal colonization & adhesion



Abscess-formation 1: inhibition of phagocyte migration



Inhibits phagocytosis



Intracellular survival

Polysaccharide capsule



Elastase
hyaluronidase



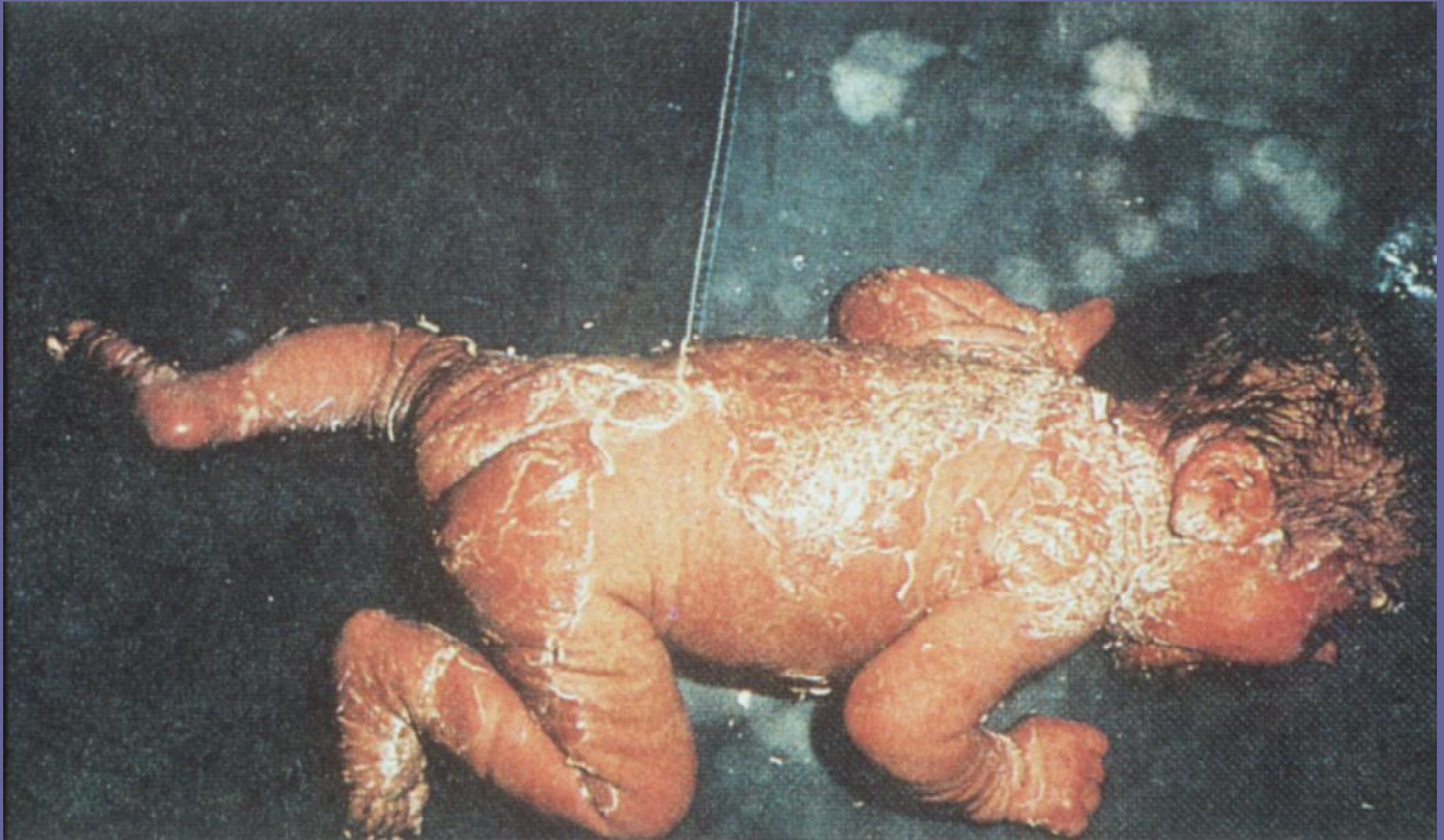
catalase

Proliferating *Staphylococci*

Toxic shock syndrome



Scalded skin syndrome



Morphology & Structure

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Lab. Diagnosis

- 1- Samples: Surface swab, pus, blood, •
tracheal aspirate or spinal fluid for culture.
- 2-Direct staining with Gram stain. •
- 3-Culture : Inoculation of swab samples •
on Nutrient Agar containing 7.5% NaCl
Blood Agar plates then incubate the
plates at 37C for 18-24 hrs.

Identification & Sub typing

1- White colonies turn a buff golden can be observed after overnight incubation at 37C •

2- Coagulase test can easily differentiate between *S. aureus* & other species. •

(Coagulase: bind to prothrombin forming a complex that initiates the polymerization of •

fibrin. It is demonstrated by incubating •

S. aureus in plasma, this produces a fibrin clot. •

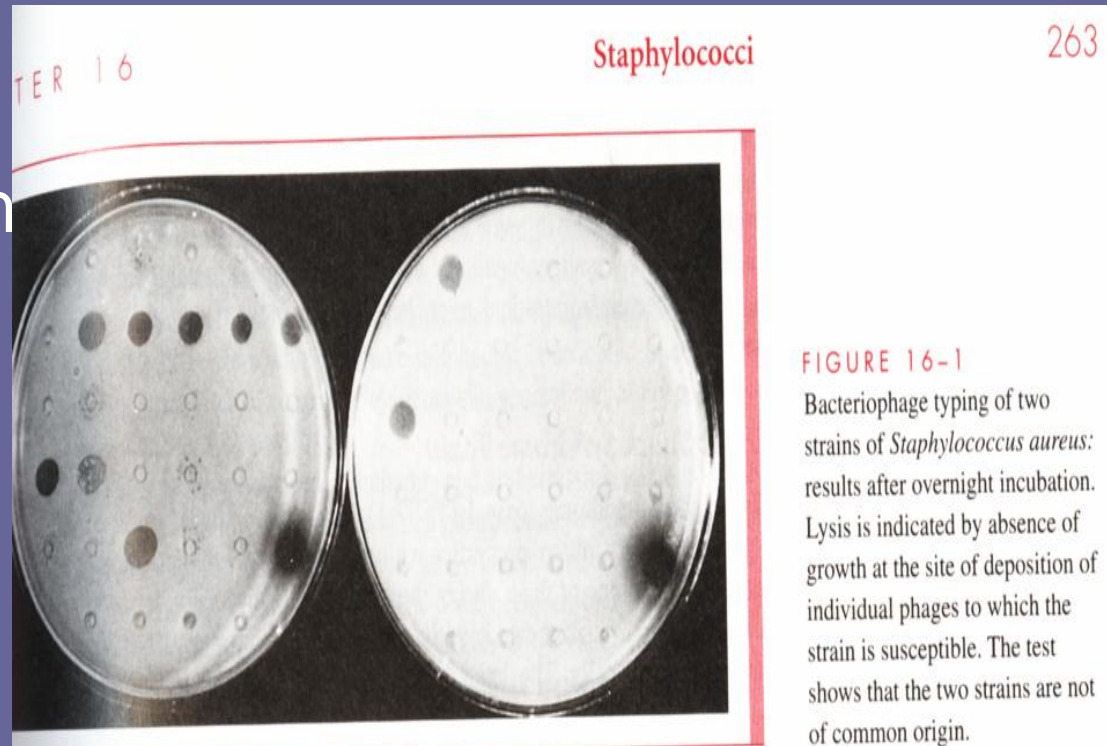
(This the base for quick test called •

Clumping Slid Test) •

3- Blood haemolysis & pigment production appear after several days of inoculation. •

3- Typing

1- Phage typing :
performed only in
reference
laboratories.



tin

n causes intercellular splitting of the epidermis between the stratum spinosum and stratum granulosum, presumably by disruption of intercellular junctions. Two antigens of exfoliatin are antigenic in humans, and circulating antibody confers immunity to their effects.

Exfoliatin splits intercellular junctions

AB Susceptibility

_ Broth micro dilution or disk diffusion •
should be done routinely for Staph. •
Isolates.

Penicillin resistant strains can be predicted •
as B-lactamas producers (about 90% of •
S. aureus produce B-Lactamase) •