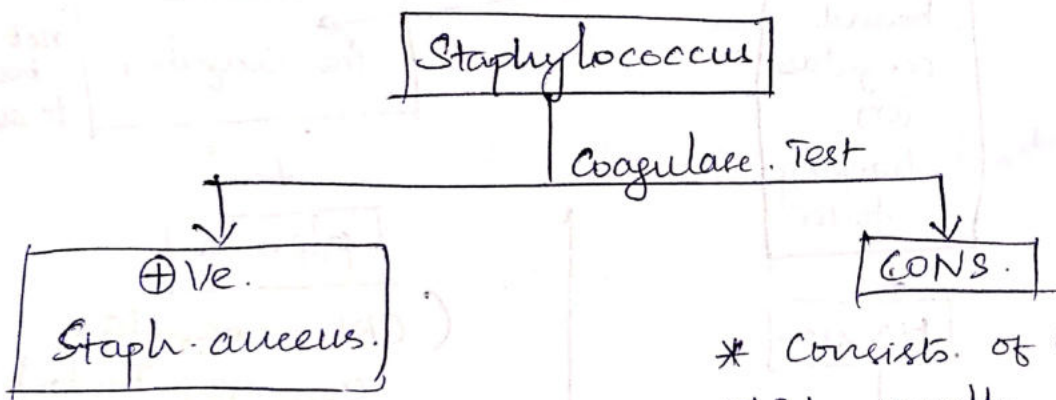


1) GPC - STAPHYLOCOCCUS: (Genus).

- * There are so many species (sps). in Staphylococcus.
- * Imp. Sps. of this Genus is Staph. Aureus, which can cause disease in Humans.
- * Other Sps. are usually (not always). Beneficial in that they live as commensals.
- * Staph. Aureus can be differentiated from other Sps. by Coagulase Test. Coagulase enzyme is present only in Staph. aureus.
- * Others are CONS. → Coagulase Negative Staphylococcus.



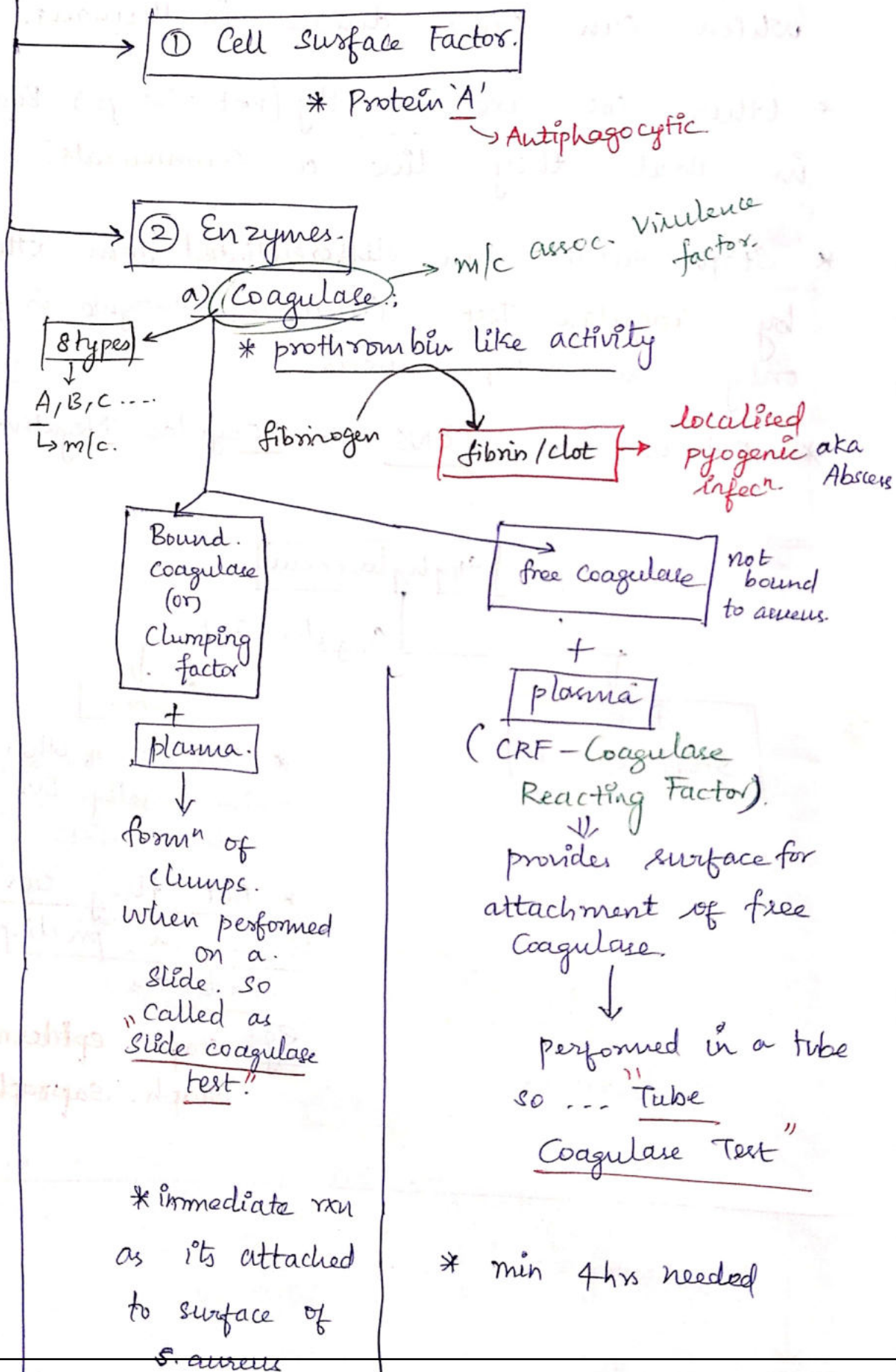
* Consists of other Sps which usually live as COMMENSALS.

* But they can cause disease in ^{Certain} predisposing conditions.

Eg: Staph. epidermidis.
Staph. saprophyticus.

Staph. aureus:

* They can cause disease why? ③ Virulence factors are present in it.



b) DNase : * Causes ~~for~~ breakdown of ~~pus~~ DNA.

(viscous) pus
* DNA $\rightarrow$ Thickness of pus.

* DNA $\xrightarrow{\text{DNase}}$ Thinning of pus.
(or)
watery pus.

c) Hyaluronidase:

* causes breakdown of Connective Tissue

* lead to spread of infection why?

Bcoz it break downs B.M. which acts as Barrier...

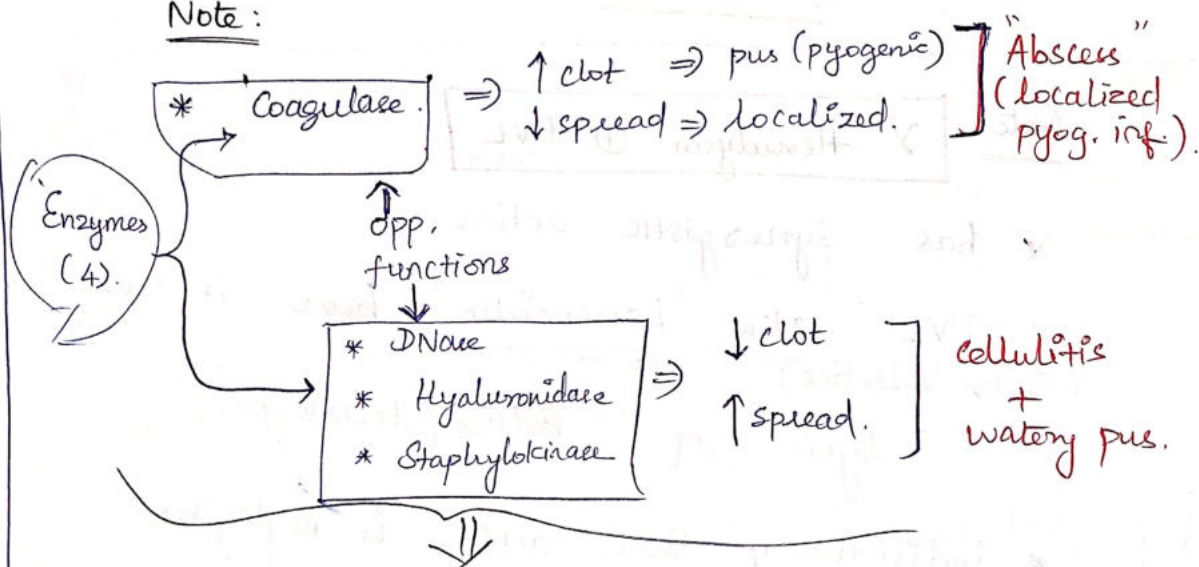
d) Staphylokinase:

* causes lysis of clot (FIBRINOLYTIC).

* $\therefore$ clot $\downarrow\downarrow$ spread of infectⁿ

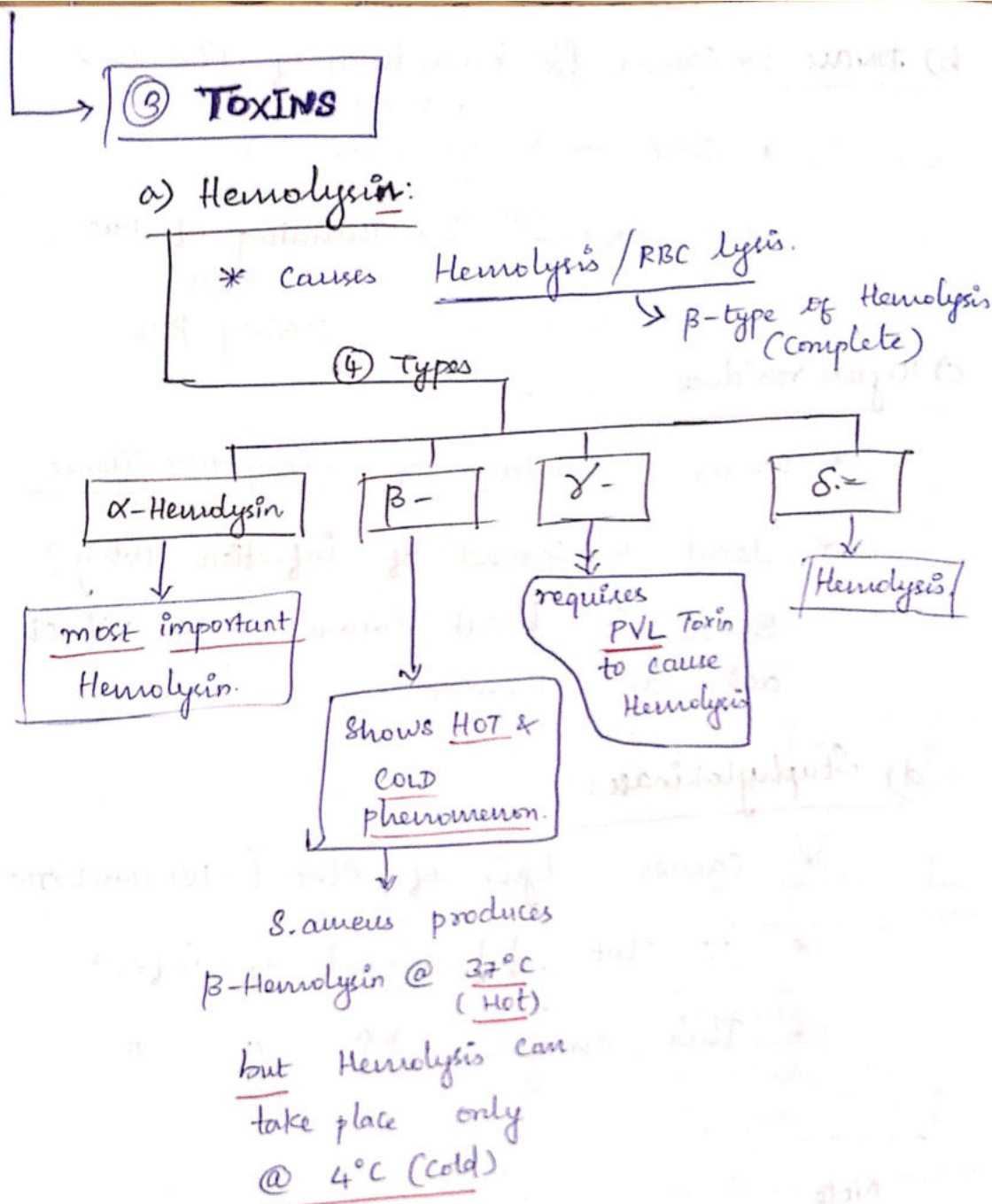
* This enzyme $\uparrow\uparrow$ " "

Note:



* These are the (2) opp. manifestatⁿ of inf. of *S. aureus*.

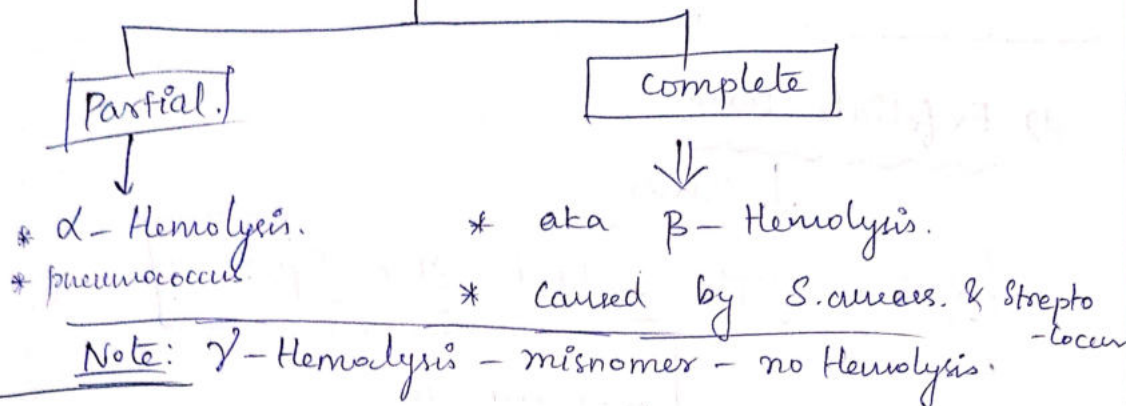
* m/c assoc. virulence factor $\rightarrow$ Coagulase
 $\downarrow$ so
m/c is Abscess.



Note: γ Hemolysin $\oplus$ PVL Toxin

- * has synergistic action
- * PVL aka "Leucocidin" bcoz it causes (Panton Valentine).
lysis of WBCs (leucocytes).
- * individually their action is negligible only when they act together they can cause Hemolysis that's why they are together called Synergo Hymenotrophic Toxin.

Types of Hemolysis



b) TSST - Type 1 / Pyrogenic Exotoxin (PE).

* (Toxic Shock Syndrome Toxin)

* it is a Super-Ag $\xrightarrow{\text{so Causes}}$ Exaggerated Immune Response

Advantage
* eliminate Ag

DisAdv.
* damage to Host Tissue

$\downarrow$ leads to

TSS.
(Toxic Shock Syndrome)

c) Enterotoxin: (12 types - (A, B, C, ...)).

* $\downarrow$ intestine

* Causes damage to Intestine

⊗ Diarrhoea & Food Poisoning
 $\downarrow$ Vomiting.

* Super - Ag.

* preformed Toxin $\Rightarrow$ formed by Staph. aureus even before entering the host.

So IP (Incubation Period) is v. less. (TP = $\leq 1-6$ hrs)

* For post formed Toxins IP is more.

d) Exfoliate Toxin:

↓ causes

SSSS - Staph. Scalded Skin Syndrome

manifests as.

in Children

↓

Ritter's Disease.

in Adults

↓

Toxic Epidermal Necrolysis.

↓

Necrosis & Removal of epidermis

↓

Underlying skin is visible

↓

This is "Nikolsky's sign."

CLINICAL MANIFESTATION: / Diseases caused by Staph.

SKIN:

- * Abscess.
- * Cellulitis.
- * Botryomycosis (myco-fungi but caused by Staph. aureus)

Systemic:

1) * Infective Endocarditis. (Endocardium $\xrightarrow{\text{consists of}}$ Valves)

Also Refer
Staph. epidermidis.

damage to Native valve

www.FirstRanker.com value-sang

2) * Nosocomial pneumonia. (m/c org - ^{hosp} S. aureus.)

↓
Hospital acquired. ⇒ why?

* already pt will be weak &

* pt. may easily acquire ^{hosp} S. aureus infecⁿ from Health care workers other pts...

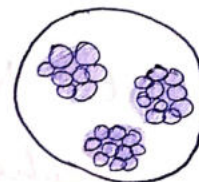
3) * Osteomyelitis. (m/c org - ^{hosp} S. aureus).

DIAGNOSIS:

i) Microscopy:

* Gram stain → GPC. ● - violet & Round

* Arrangement: Clustered



∴ McConkey Agar (MA) Contains Bile salts.
(Bile salts → ⊖ → Gram ⊕ve org.)

(ii) Culture: So ^{hosp} S. aureus can't grow on MA.

* Selective Media:

(i) Mannitol salt agar
(or)

(ii) Salt milk agar
(or)

(iii) Ludlam's medium

} only Staph. aureus will grow

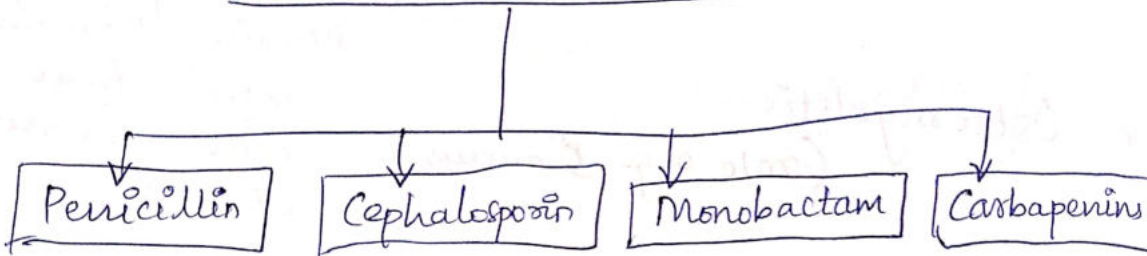
(iii) ID: (Biochem. Test).

* Catalase Test → ⊕ve.

* Coagulase " → ⊕ve.

⊗ MRSA - (^{marker} Methicillin Resistant Staph. aureus)
↓ is.

* S.A. resistant to ^{not only} Methicillin but also ALL ④ β -lactam antibiotics



* Methicillin is only a MARKER for all ④ above Antibiotics. That's why ~~if~~ S.A. resistant to ~~Methicillin~~ β -lactam A.b. are called "MRSA"

* But Nowadays, the marker used is Cefoxitin (f).

Mechanism of Resistance:

* With the help of Gene Transfer (m/c Transducⁿ) S.A. acquires a gene called mec A gene present in SCC (Staph. chromosomal cassette)

* Differentiating "Non Resistant S.A" vs MRSA:

Detection Methods: AST - Antimic. Suscep. Testing

1) Disk Diffusion method:

Antibiotic Marker used - Cefoxitin Disc

If Resistant to Cefoxitin. → MRSA

other wise

(ii) molecular (PCR) method:

* Detect mec-A gene
↓
MRSA ✓

Treatment of MRSA:

* All β -lactams can't kill MRSA so...

DOC (Drug of choice) $\Rightarrow$ VANCOMYCIN (Glycopeptide)

* But Nowadays, they are becoming resistant to Vancomycin also., called as VRSA/VISA
(Vancomycin Indeterminate S.A.)

* For VRSA, Daptomycin (or) Linezolid
(or) Streptogramins (or) 5th Gen. Cephalosporins

although MRSA is resistant to all β -lactams.
5G's can be used.

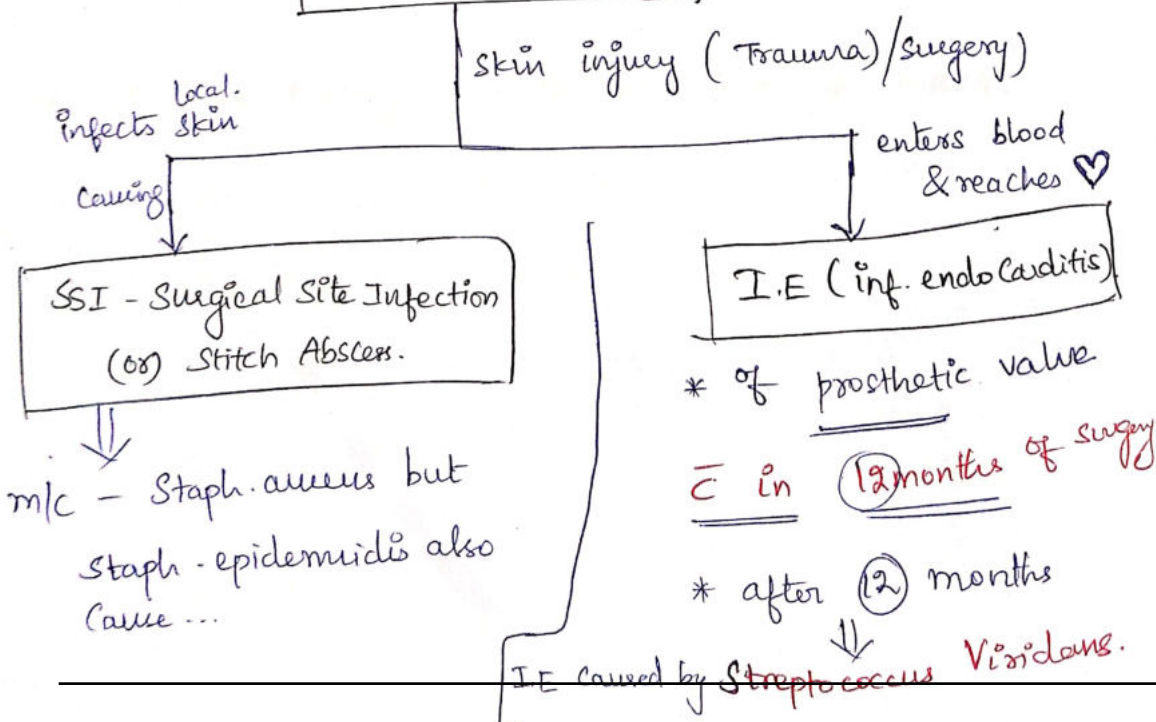
CONS
(Coagulase Negative ^{coccus} ~~Staph.~~ ~~Staph.~~)

* usually Commensals but can cause Disease in predisposing Conditions.

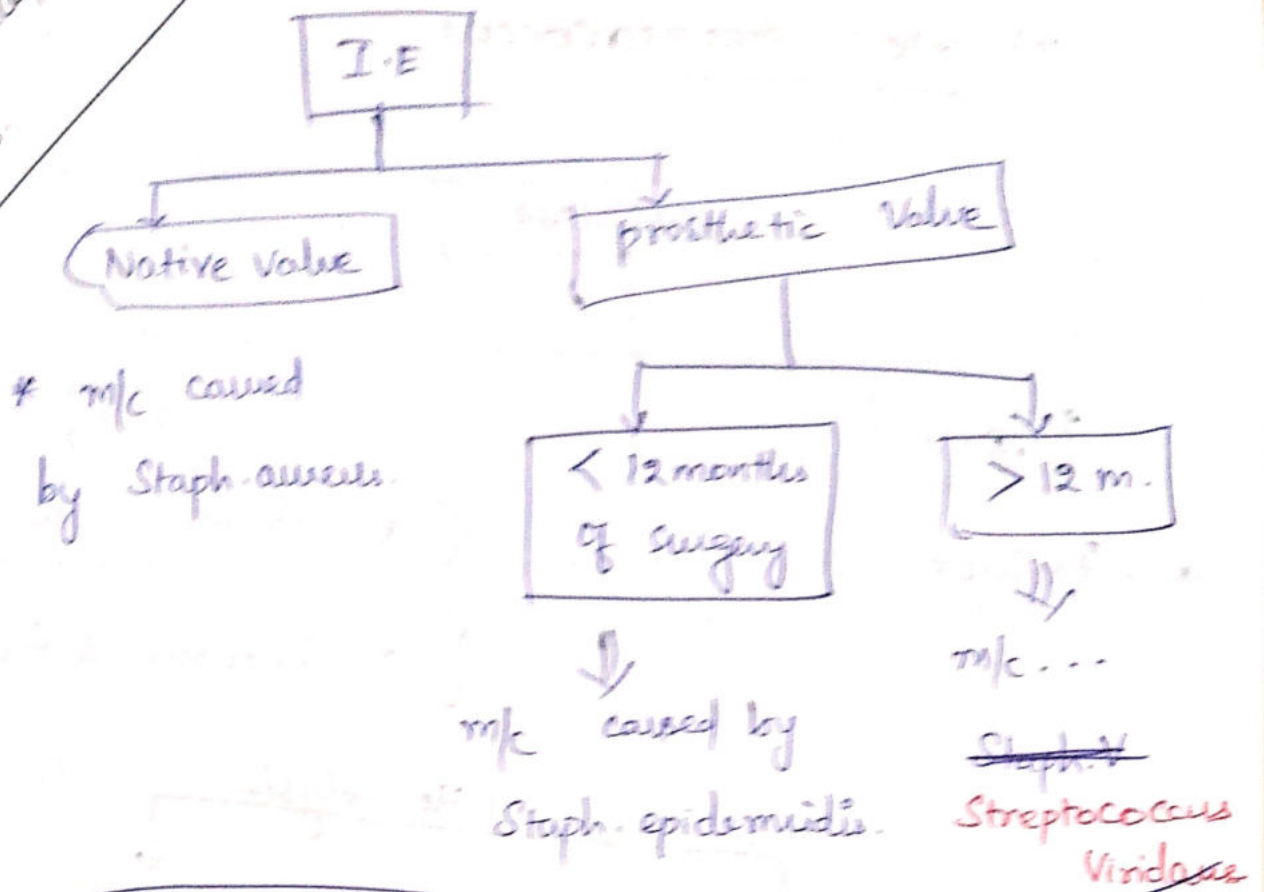
Eg: Staph. epidermidis.
Staph. saprophyticus.

	Staph. epidermidis	Staph. saprophyticus
Commensal in	SKIN	Female Urethra.
predisposing Condition	Skin Injury (Trauma/surgery)	Sexually Active Young Woman <u>UTI</u>
NOVOBIOCIN sensitivity	Sensitive	only Resistant Sps. of Staphylococcus

Staph. epidermidis



Native valve if
inf. should be replaced
with prosthetics.



Although all ③ can cause all ② types of I.E.
Here the m/c causative org. is mentioned.

