SUPERANTIGENS

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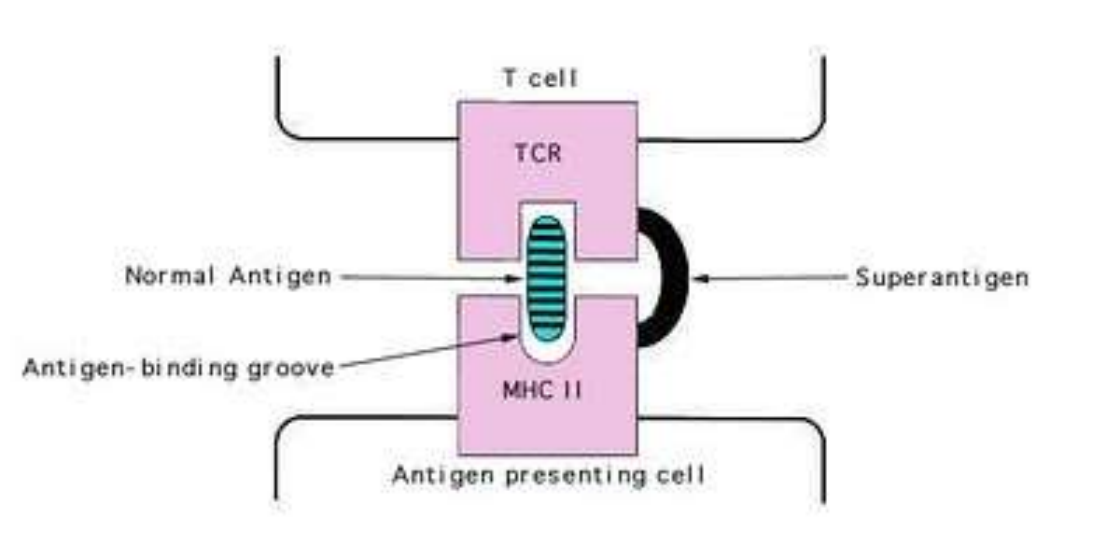
INTRODUCTION

- Superantigens (SAGs) are class of microbial antigens (viral, bacterial or mycoplasma proteins).
- They non specifically activate large number of T cells and as a result they cause cytokine strom.
- SAGs bind simultaneously to specific Vβ regions of T cell receptors and to the α chain of MHC class II molecules.
- SAGs requires no antigen processing.

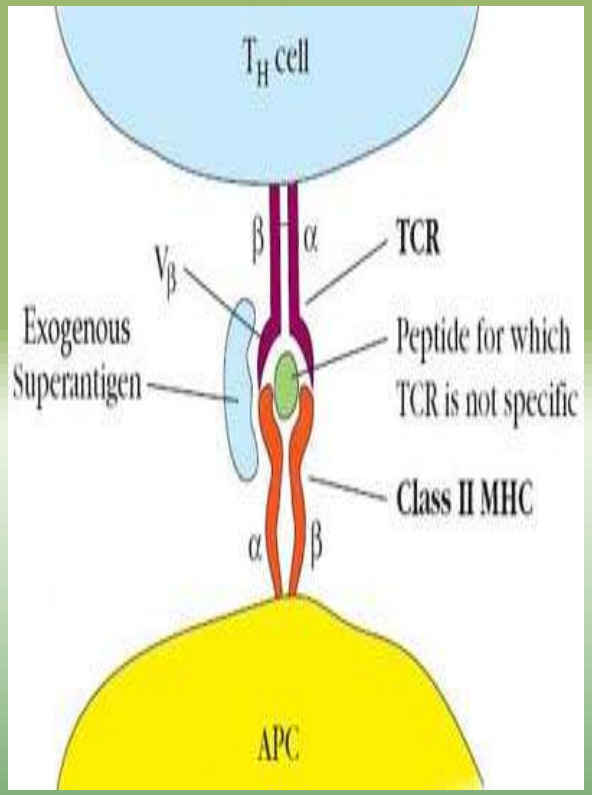
DIFFERENCES

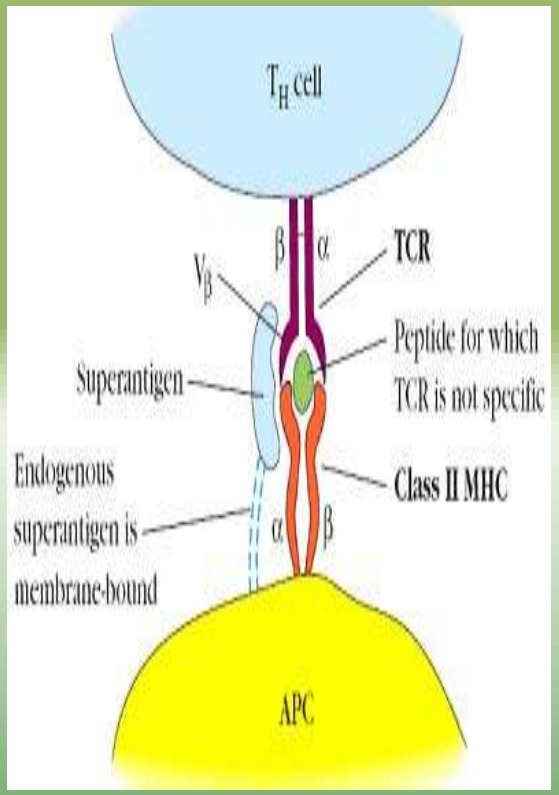
Antigens	Superantigens
• Specific activation of T cells	Non specific activation of T cells
• Binds to particular epitope on the TCR	Binds to Vβ chain of TCR
• Activate 0.01-0.001% of T cells	Activate 20-30% of T cells



TYPES OF SUPERANTIGENS

- **Exogenous SAGs:** soluble proteins secreted by bacteria and a variety of exotoxins (e.g., SE, SPE, and TSST).
- **Endogenous SAGs:** cell membrane protein encoded certain viruses that infect mammalian cells (e.g., MMTV, and EBV).
- **B-cell SAGs:** These SAGs stimulate predominantly B cells. Formation of immune complexes.





SUPERANTIGEN TOXINS

•**Staphylococcal SAg**
Staphylococcal enterotoxin A, B, C, D, E, G, H, I, J,(most studied A, B and TSST1), TSST-1 [staphylococcal enterotoxin F]
. Staphylococcal protein A (SpA), [B-cell Superantigen]

•**Streptococcal SAg**
Streptococcal pyrogenic exotoxins (SPE): SPE-A, SPE-B, SPE-C, SPE-D, SPE-F, -derived Superantigen)
SPE-G, SPE-H, SPE-J, SMEZ, Mitogenic factor (MF), SSA

•**Mycoplasma arthritidis Sag-** MAM (mycoplasma arthritidis

•**Human liver sialoprotein-** Protein Fv (B-cell SAg)

•**EB Virus -** HERV-K18 env

•**HIV -** HIV-gp120 (B-cell SAg) .

•**Yersinia pseudotuberculosis**-YPM, **Yersinia enterocolitis?**

•**Peptostreptococcus magnus-** Protein L (B-cell SAg)

• **Rabies?**

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STRUCTURE OF SUPERANTIGEN

- Three dimensional
- Tightly packed
- Binding regions

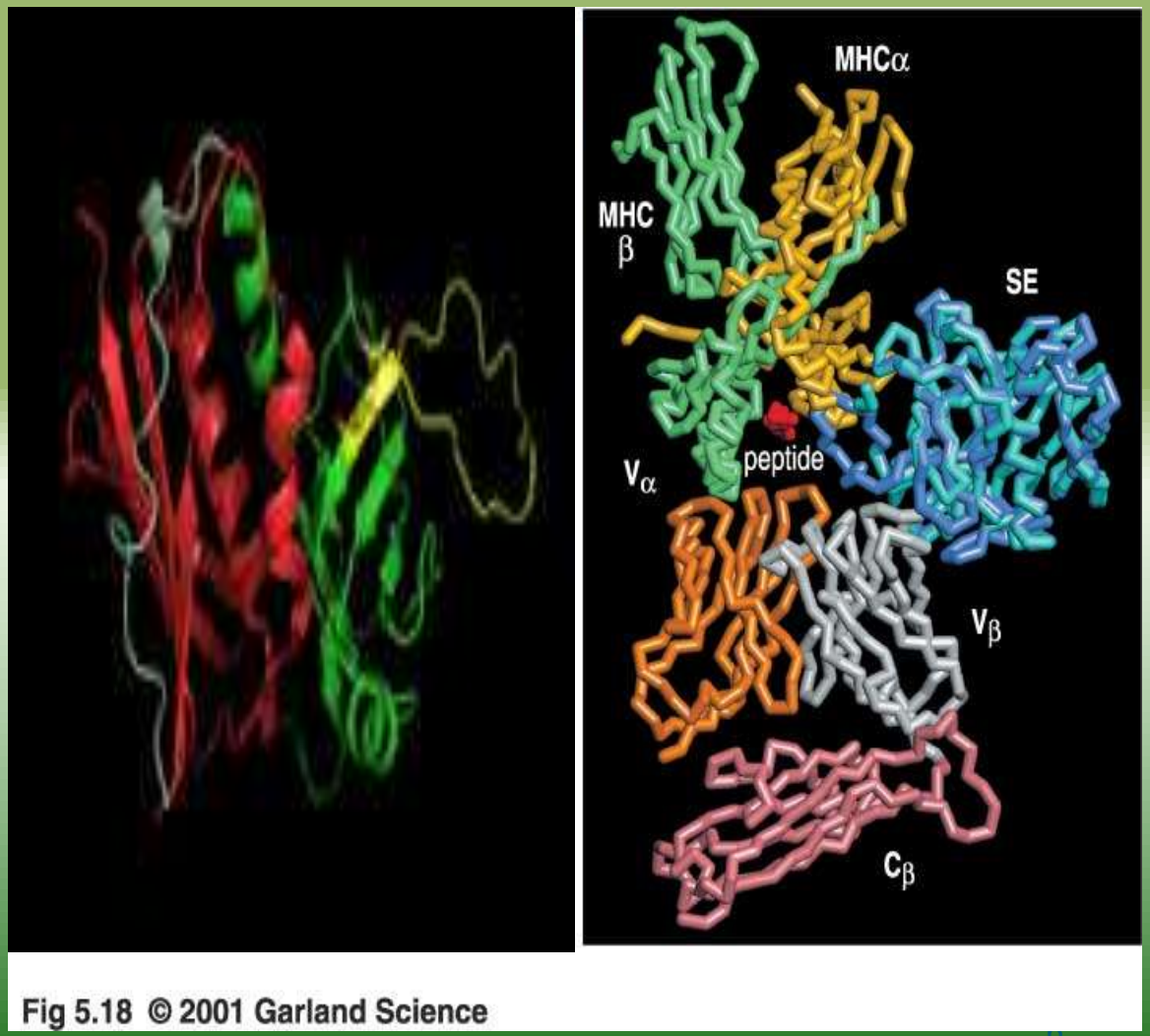
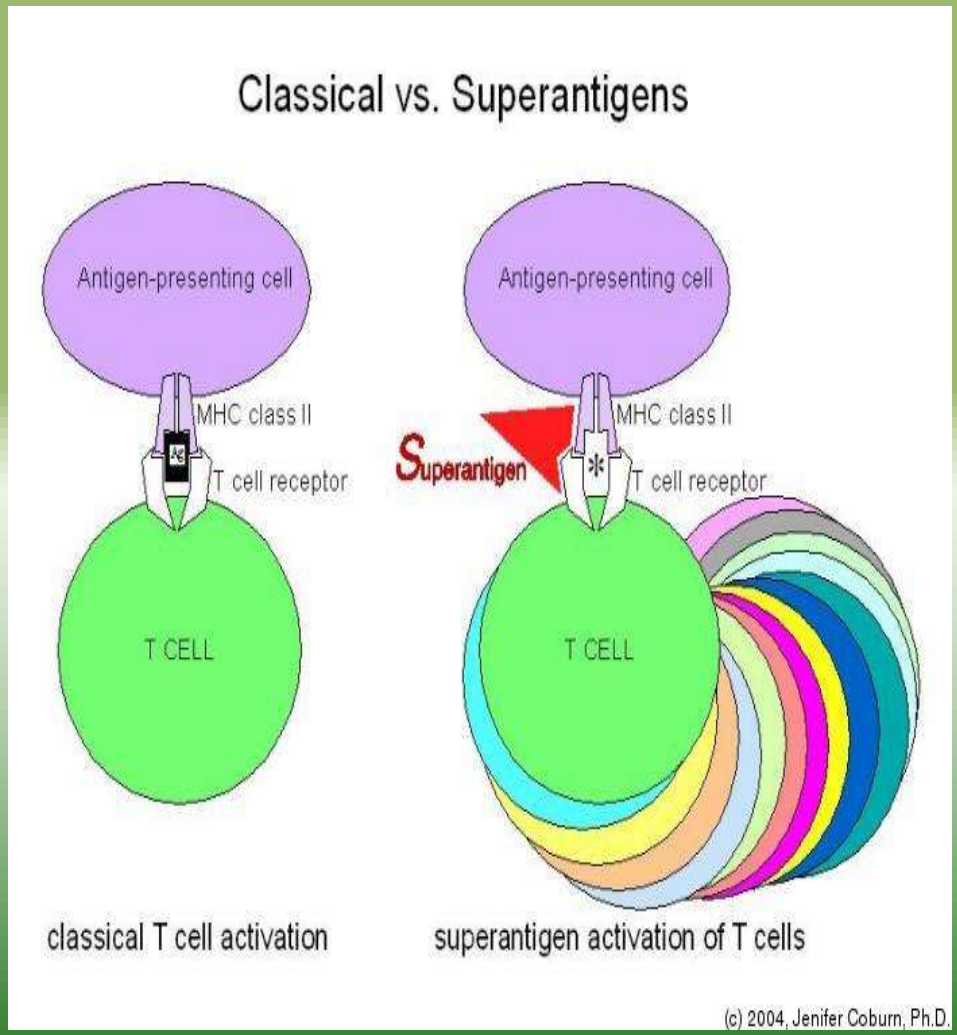


Fig 5.18 © 2001 Garland Science

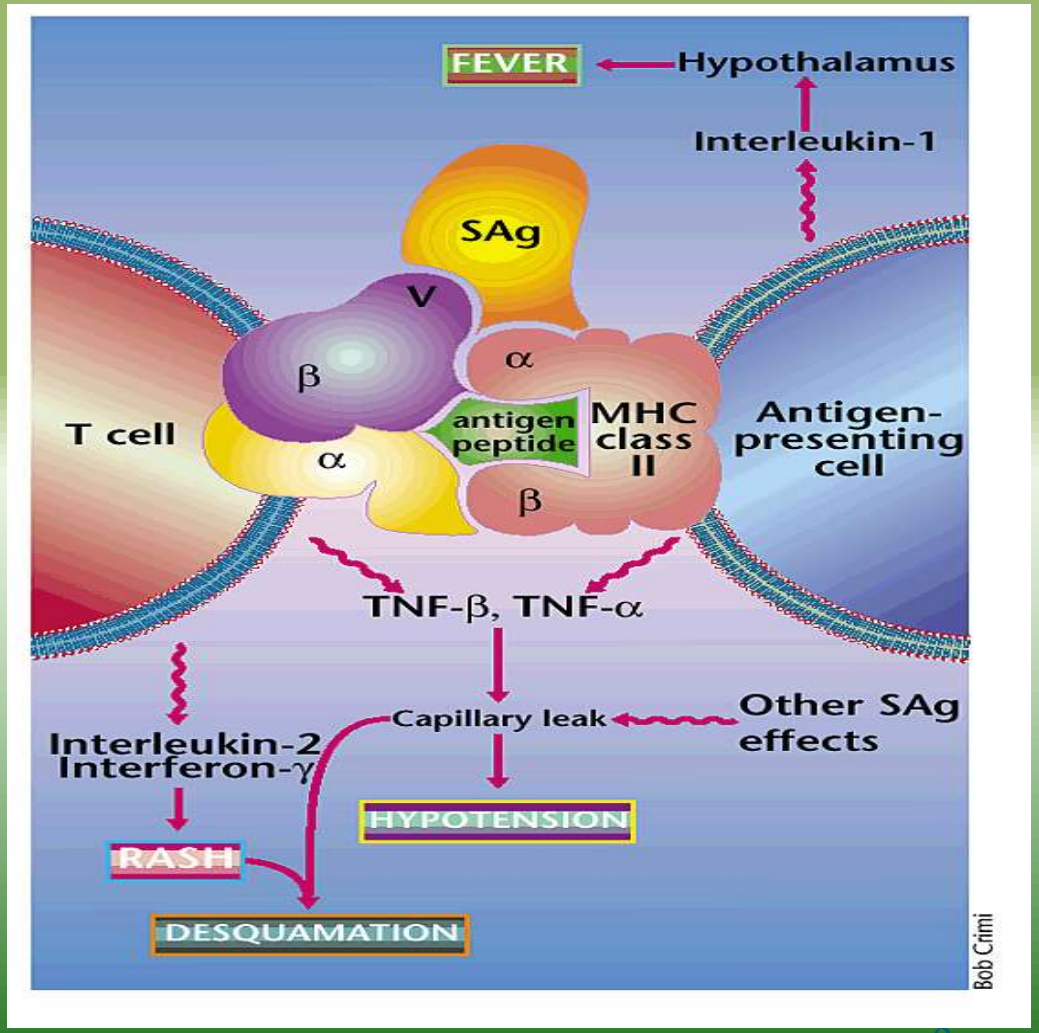
MECHANISM OF ACTION

- Binding to MHC class ll
- Binding to T cell receptor
- T cell signalling



SIGNIFICANCE

- Direct Effects
  -Inflammatory activity
  -Anergy and Deletion
  -Cytotoxicity
  -Isotype switch
- Indirect Effects
  -Emesis
  -Mitogenic activity
  -Monocytic cell activation



TOXIC SHOCK SYNDROME

- Staphylococcal toxin (TSST-1)
- Streptococcal toxin (STSS/ TSLS)

- Symptoms
  * Sudden high fever usually over 39°C
  * Vomiting
  * Diarrhoea
  * Rash that looks like sunburn
  * Dizziness
  * Muscle aches
  * Sore throat
  * Fainting or near fainting when standing up
  * Skin peeling may occur in later stages of the illness.

SUMMARY

- SAGs remain the most powerful cell mitogen discovered which can lead to massive T cell activation and excessive cytokine release.

- **REFERENCES**

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THANK YOU