IMMU3102

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Innate Immunity

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- Independent of prior exposure, no specific recognition (it has a narrower specificity- it recognises hundreds maybe thousands of shapes), not improved by repeated infections (lacks memory).
- **Self-non-self discrimination is perfect** (better than adaptive immunity!) The receptors are encoded in the germline and recognise components of pathogens that are not present in humans
- Receptors on one persons macrophages are probably the same to those on another persons.
- Developmentally ancient

Adaptive

- Develops slowly on exposure- 5-7 days.
- Dependent on prior exposure, improved by repeated infections (memory)
- Specific
- Self-nonself discrimination imperfect
- Developmentally recent immune system

Innate Immunity

- **1. Speed** (early, rapid)
    - resident cells sit in peripheral sites and are already there, neutrophils are in the blood so they can rush there. Happens within minutes to hours and finished 12 hours
- **2. Duration** (short-lived)
    - very inflammatory and attracts lymphocytes to the area, but if it continues and is chronic it can be bad.
- **3. Repetitive-**
    - responds the same way each time a microbe is encountered
- **4. Interactive-**
    - with other cells of innate and adaptive immune system.

Functions

- Early protection
- Instructive: activation and shaping of adaptive immunity
- Components used and enahcned by adaptive immunity- e.g. complement pathways, phagocytosis and inflammation

<u>Pattern recognition receptors (PRRs):</u>

- Immune cells have receptors that only recognise patterns on surface of microbes.
- Can be cell surface Toll-like receptors
- Cystosolic: NOD-like receptors or RIG-1 for viruses
- These receptors recognise the shared structures (PAMPs).

PAMPS Pathogen associated molecular patterns-

- = different molecules express different microbial patterns.
    - E.g. Lipopolysaccharide
    - Mannose and complex carbohydrates
    - Ds RNA, unmethylated CpG DNA

DAMPS Damage associated molecular patterns:

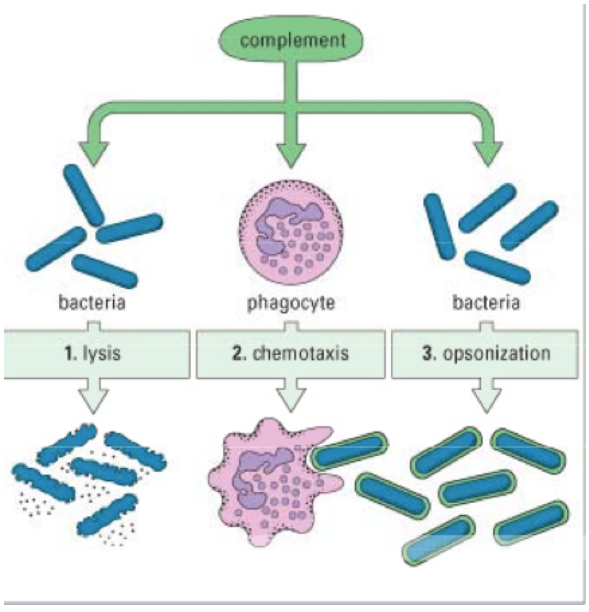
- the receptors can recognise these molecules that are released from damaged or necrotic cells.

PRRs: Soluble

- C-reactive protein and serum amyloid protein
- Complement
- Mannose binding ligand

	Structure	Ligand	Effect	Significance
C-reactive protein and serum amyloid protein (soluble PRR)	Pentraxins. C-reactive protein is produced by the liver within hours bacterial infection. Liver produces in response to IL-1, TNF.	Recognise bacterial cell walls= phosphorylcholine is common	Activate classical complement (bind C1q) Opsonisation	CRP used as a marker of bacterial infection. SAP: increased in chronic inflammation Too much SAP then it deposits in the tissues→ amyloidosis
Complement - C3 component	C3 is central component of complement enzyme cascade	Can be directly activated on surface of bacterial and	Opsonisation of pathogens via C receptors.	

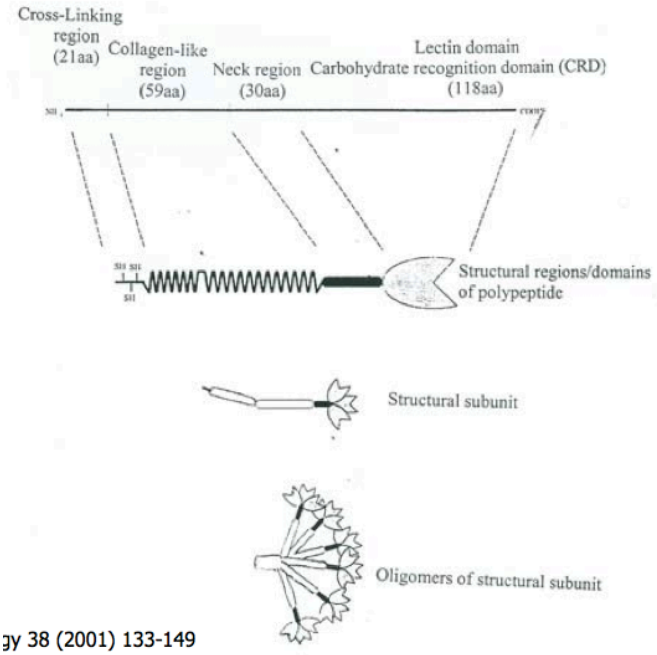
	(deficient in C3= die from bacterial infections)	fungal cell walls. But also activated via classical pathway (antibodies). But can do it on its own.	Inflammation caused by C3a and C5a fragments	
Mannose Binding ligand or protein (MBL/MBP)	The soluble protein is a Collectin and is a C-type lectin, which are characterised by collagen-like domain	Mannose-terminal mannose units is a sugar present on bacteria and fungi.	Lectin pathway of complement activation, cleaves C2 and C4. =opsonisation , cell recruitment	Deficiency in coding region, promoter, increased infection early childhood, synergise to increase infection in adults e.g. pateitns with cystic fibrosis.



Extra notes for table:

- Complement up-regulates adhesion molecules for recruitment
- C type lectin= defined as (means calcium dependent protein that binds to a carbohydrate)

- C-type lectins: Pulmonary surfactant proteins A,D also members of this family??
- Collectin= named cos of multiunit structure which increases capacity to do stuff.
- Associated: MBL-associated serine protease 1, MASP-1
- MBL-associated serine protease 2, MASP-2



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PRRs: Surface

Macrophage mannose receptor (MMR)

Scavenger receptors

Complement receptors (CR1-4)

Toll-like receptors: cell surface