LECTURE 4 BACTERIAL PATHOGENESIS

DEFINITIONS

Pathogens	Micro-organisms that cause disease (when isolated from an infected individual, are most likely to be the cause of disease) – pathogenic organisms have an inherent ability to cause disease
Opportunistic pathogens	Cause disease when defence mechanisms have been compromised e.g. chemotherapeutic drugs
Normal microbiota (commensals, normal flora)	Diverse group of microbes associated with the body from shortly after birth until death – found on skin and mucous membranes After birth – because before birth the amniotic fluid is a sterile environment Normal microbiota inhabit our skin and mucous membranes Very important – if we were sterile, it would be deleterious for our health
Arrow	Organisms can move between the definitions – pathogens can be normal microbiota depending on where in the body it infects, and vice versa E.g. *staphylococcus aureus* – it is perfect pathogen (has all the things that make a good pathogen), however in 30% of the population, it can be present in us and cause no harm
Virulent organism	One that is most likely to be the cause of disease i.e. a pathogen (virulence is a measure of a microbe's ability to harm host) i.e. a pathogen
Avirulent organism	One that will not cause disease in host with a **normal immune system** e.g. opportunistic pathogens
Virulence determinants	Pili/ fimbriae – allow organism to adhere Siderophores – allow organisms to pick up iron Capsules – mask PAMPs and defend from PRR Toxins – cause disease Enzymes – allow organism to spread through body etc. These virulence determinants can come from gene acquisitions from other bacteria (often bacteriophages) and also through conjugation → sex pili can transfer the genes

NORMAL MICROBIOTA (COMMENSALS, NORMAL FLORA)

- Colonise surfaces/ niches but **don't cause disease** i.e. lacking in some virulence factors
- Have a **specific and sustainable** association with their host (not all organisms can be commensals – can survive in a particular location in the body e.g. some can live in the mouth but not in the gut)
- Can be pathogenic if moved (i.e. association is "**site-specific**") e.g. *Staphylococcus aureus* can be normal microbiota in the nose, but if moved elsewhere may become pathogenic
- Contribute to an efficient immune system (non-specifically stimulate the immune system – train the immune system to recognize foreign material) and help with host metabolism (e.g. produce certain vitamins that we would otherwise not produce, that are needed for survival)
- Protect host against disease (prevent colonization of pathogenic bacteria; produce pathogen growth inhibitors: fatty acids, bacteriocidins etc. deplete nutrients)
- Can be transient or permanent (however, we have shared "core" microbiota that all of us have)

NORMAL MICROBIOTA VS. PATHOGENS

- Both commensals and pathogens **colonise,** but the outcome of colonization differs for commensals and pathogens
    - Commensals live **mutualistically** with host (role in human nutrition and metabolism)