



Microbiology bulletin 42

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Potential disadvantages of culture free methodologies.

An interesting article has been published in the Centre for Disease Control and Prevention (CDC) Morbidity and Mortality Weekly Report (MMWR) in the US.

The article looks into the problems of trending data over a period of time when the laboratory methods used in isolating the organisms which are used to compile the data are changing.

In particular, the article looks at what they refer to as Culture Independent Diagnostic Tests (CIDT) such as methods which detect bacterial pathogen antigens, nucleic acid sequences, or bacterial toxins or the genes which code for toxin production. In all these instances, the organism is rarely cultured, so factors such as antimicrobial sensitivity which rely on demonstrable effects on the growth of the organism cannot be evaluated.

The report concludes that ideally all CIDT positive isolates should be confirmed by conventional cultural techniques so that full typing and antimicrobial susceptibility testing can be carried out.

How certain bacteria evade the hosts immune system.

In the very dim and distant past I remember attending immunology lectures at university which left me marvelling at the complexity of our immune system and wondering how it is that we ever succumb to infections.

In many cases the reason is that bacteria have evolved mechanisms to evade the host's immune system and two such mechanisms have been recently described. Both studies described how both Salmonella and Legionella can produce enzymes which disrupt the normal mechanism where the white blood cells (phagocytes) ingest the bacteria

in a process known as phagocytosis (also known as autophagy).

Legionella does this by producing a molecule called RavZ to disrupt the autophagy machinery, but until now it was not known exactly how RavZ achieves this effect.

Researchers at the Max Planck Society in Germany have now established that RavZ breaks apart a key molecule in the autophagy process called LC3-PE.

LC3-PE is a crucial molecule for one of the main events during autophagy, the creation of a membrane-bound 'sac' that engulfs bacteria or other debris, so that the cell can get rid of it. The researchers have demonstrated that the RavZ molecule uses a 'tweezer' and 'scissor' process to first extract LC3-PE from the cell membrane, and then break it into its two components, preventing autophagy.

In a second article published on-line researchers claim to have shown that the virulence of strains of Salmonella typhimurium can be linked to the production of certain molecules which enable the bacteria to evade the host's immune system by the disruption of the autophagy process.

HPA guidelines for RTE foods to be revised

I understand that the Health Protection Agencies "Guidelines for Ready to Eat Foods" document, which was last published in 2009 is under revision and has been sent out to the appropriate bodies for consultation.

In 2013 the Health Protection Agency became Public Health England, so as such the term HPA is now outdated.

The guidelines have proved a useful tool in helping clients apply appropriate criteria for their RTE products and I suspect many interested parties will await the revised document with interest.

Bdellovibrio bacteriovorus

The BBC Radio 4 programme “The Life Scientific” last week featured Professor Liz Sockett from Nottingham University. She is heading research into Bdellovibrio which is a gram negative bacterium which naturally infects other (potentially pathogenic) bacteria such as Salmonella and E coli. She describes the fascinating process by which the Bdellovibrio invade the target (host) bacteria by using enzymes to loosen the structure of the host cell wall which enables the Bdellovibrio to gain access to the internal cytoplasm. Incredibly the bacteria then “heals” the damage to the cell wall so that it doesn’t have to share any of the host nutrients with other bacteria.

The obvious implications around utilising this organism to treat conventional drug resistant bacteria are discussed.

The whole fascinating programme can be found on <http://www.bbc.co.uk/programmes/b08mb1fm>

Anti-Microbial Resistant bacteria in foodstuffs – FSA to initiate new survey

As mentioned in the December 2016 bulletin, in November last year the Royal Veterinary College published a review to assess the significance of the food chain in the context of antimicrobial resistance (AMR) with particular reference to products on retail sale in the UK.

The key recommendations following the survey were that there should be standardised criteria for the assessment of AMR and that data on AMR bacteria from British and imported pork meat in the UK was limited and dated. The report therefore concluded that further research and surveillance efforts are needed to ascertain AMR levels in both foodborne and commensal bacteria in pork meat in the UK.

With this in mind, the Food Standards Agency are looking to initiate an AMR survey later this year. This follows a recent survey in Denmark which found that 40% of fresh pork contained Methicillin Resistant Staph aureus (MRSA).

A fact sheet called “What you need to know about AMR” detailing how it can potentially be spread from food to cause infection and accompanying useful references can be found on the FSA website.

<https://www.food.gov.uk/news-updates/campaigns/amr>

Anti-Microbial Resistant bacteria in foodstuffs – FSA to initiate new survey

An outbreak of E coli 0157 which was thought to have been contained last year, appears to have resurfaced in Sweden due to people consuming the same affected batch of raw beef which had been held frozen.

Six people fell ill in February and March with the same strain (identified by whole genome sequencing) of E coli 0157 which affected more than twenty people who had consumed the same product in September 2016.

Unusual products associated with foodborne illness

Another item added which can be added to the list of unusual, strange and exotic foodstuffs which have been associated with foodborne illness is deer-antler tea.

The Los Angeles County Department of Public Health has warned against consuming local deer- antler tea due to a botulism risk. They have recently identified one confirmed and one suspected case of botulism occurring in adults. Preliminary investigation suggests that these cases may be associated with the consumption of the tea that was acquired during the month of March.

Salmonella in a fully baked product

Another example of how a fully baked product can become contaminated with Salmonella by post process contamination is illustrated by the Salmonella outbreak that affected and hospitalized 12 people who ate pork pies from The Pork Pie Shop in Victor Harbour, South Australia.

The infection was linked to the raw egg wash which was applied to the pies after they had been cooked. Other similar outbreaks have been associated with the gelatin which can sometimes be added to pork pies post bake.

Survey of ice in India

A survey carried out by Mumbai’s public health department has found that ice served at hundreds of hawkers and restaurants across the city is contaminated with E coli at a level of 70%.

The only silver lining is that a similar survey conducted just before last year’s monsoon found that 92% of the ice samples were contaminated.