Small molecules have big impact for TB bacteria

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Mycobacterium tuberculosis (Mtb) possesses extraordinary survival ability by masking itself from the host immune system and persisting for decades inside the host. Speaking at the Society for General Microbiology's spring meeting in Edinburgh today, Dr Kristine Arnvig provides further insight into how the bacterium causes tuberculosis (TB) by fine-tuning its behaviour in response to its surroundings to escape detection.

Understanding the genetic tools and tricks used by Mtb to control its behaviour is likely to give an idea how it manages to survive for such long periods. "This kind of research should give us new biological targets upon which to base new, faster-acting drugs and vaccines and enable us to take on TB - a respiratory infection that is one of the biggest threats to global health," suggested Dr Arnvig.

Together with her colleague Dr Douglas Young at the National Institute for Medical Research, London, Dr Arnvig demonstrated that, like other pathogenic bacteria, Mtb can produce tiny molecules called small RNAs. These molecules are able to subtly tweak the production of key bacterial components in response to environmental signals. This helps maximise the survival of the pathogen allowing it to progressively break down lung tissue.

Small RNAs float around the cell and are often the mirror image of key bacterial genes, to which they can stick to like Velcro™. This mechanism can enhance or inhibit the normal production of bacterial

molecules from these genes. Other pathogenic bacteria including Salmonella spp, Staphylococcus aureus and Vibrio cholerae are already known to rely on small RNAs when adapting to their host environments and causing disease.

The small RNAs in Mtb are induced under certain stress conditions that signal as a warning to the bacterium."We think that the small RNAs may play a crucial role in allowing Mtb to alter its pattern of gene expression in response to the environmental conditions that it experiences within the host during infection," explained Dr Arnvig. "Understanding this regulatory system will help us to design new drugs that specifically attack the persistent form of Mtb which manages to hide from the immune system and resist the action of existing drugs."

Provided by Society for General Microbiology