Translation in *Mycobacterium smegmatis*

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Mycobacterium tuberculosis is the bacterium that causes the disease tuberculosis. Tuberculosis is a common disease that one third of the world's population is affected by. Most of the affected people carry the bacteria in its latent form, but the bacteria can go from its latent form to active form any time. The most affected areas in the world are Africa and south-east Asia and there are at the moment drugs against tuberculosis, but the resistance towards theses are fast growing and new drugs are needed. The current drugs target the active cells, but no drugs target the translation of proteins in the cell. *M. tuberculosis* is not a good bacteria to do research on, since it is pathogenic. Instead of using this bacterium, its close relative *M. smegmatis* can be used. An advantage of using *M. smegmatis* is that it is non-pathogenic and has a shorter generation time in comparison to *M. tuberculosis.*

Translation is the process in which the cell is producing protein with the help of the ribosome. The process is aided by translation factors ,which are proteins that have important functions during the translation cycle. The translation can be divided into three phases; initiation, elongation and termination, which have their own translation factors.

Most studies of translation in bacteria have been done on *E. coli,* which is a gram negative bacteria in contrast to *M. tuberculosis* and *M. smegmatis* which are gram positive bacteria. There are possibilities that gram negative and gram positive bacteria differ in some aspects of translation and it is therefore important to study translation in the gram positive *M. smegmatis.* Drugs against various diseases are often designed to target the translation apparatus, but no drugs against tuberculosis exist that target the protein translation.

In this thesis I have found out that the class I release factors from *M. smegmatis* recognize the stop codon UAA, as they do in *E. coli.* The class I release factors are responsible for releasing the nascent polypeptide from the ribosome during the protein translation. In this aspect, the translation is not different between the gram negative *E coli* and the gram positive *M. smegmatis.* If *M. smegmatis* class I release factors recognize the two other stop codons, UAG and UGA, still needs to be investigated. Furthermore, a specific motif conserved in the class I release factors is methylated in *E. coli.* This methylation enhances the efficiency of the release factors. This is also true in *M. smegmatis,* where I got the *E.coli* methylating factor to methylate the motif in *M. smegmatis.* This methylation improves the efficiency of the release factors in *M. smegmatis.*

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