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## From days to hours

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## **From days to hours: Development and implementation of metagenomic DNA-sequencing in clinical microbiology diagnostics**

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The gold standard of clinical microbiology diagnostics is to culture the pathogen, which takes 1-3 days and has poor sensitivity. Due to the long turnaround time, critically ill patients are administered empiric broad-spectrum antibiotics prior to pathogen identification and an estimated ~20% of patients receive ineffective treatment causing excess mortality. The wide deployment of broad-spectrum antibiotics is also the main reason for the development of multi resistant bacteria, a health crisis predicted by WHO to cause 20% of all deaths in 2050 if there is no change in our use of antibiotics.

To overcome the limitations of current methods, we are exploring the use of DNA sequencing on the MinION platform for pathogen identification in critically ill hospitalised patients. This has the potential to revolutionise clinical microbiology diagnostics by lowering turnaround times from multiple days to <6 hours, providing medical doctors with the basis for a more informed choice of treatment. We will utilise methods developed for archaeogenetics (the study of ancient DNA) to enrich microbial DNA with the aim of obtaining higher sensitivity at a reduced cost. Furthermore, we will use methods from machine learning to separate DNA profiles of diseased from that of healthy individuals to increase analysis specificity.