



Fighting the Antibiotic Nightmare

Ref. 2018-02

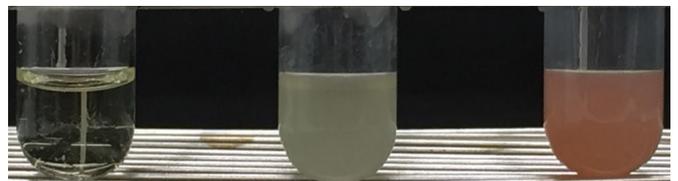
Original title: A genome wide screen for drug resistance and drug tolerance mechanisms in *Mycobacterium abscessus* – a pathogen referred to as “antibiotic nightmare”

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Summary

The bacterium known as *Mycobacterium abscessus* (*M. abscessus*) is particularly likely to infect the lungs of cystic fibrosis (mucoviscidosis) patients. Doctors call it an “antibiotic nightmare” because its resistance to antibiotics makes it harder to treat successfully.

The objective of this project by Peter Sander’s research team is to understand the mechanisms for drug resistance and tolerance in *M. abscessus* in order to develop innovative treatment strategies.



Mycobacterium abscessus inactivates the antibiotic Nitrocefim. This reaction is shown by the colour red (right). If the *M. abscessus* mutant is unable to inactivate the antibiotic, this is shown by the cloudy yellowish colour (centre). This mutant is therefore vulnerable to the antibiotic. The clear solution (left) shows the antibiotic Nitrocefim without bacteria.

Background – A Dangerous Infection

The bacterium *Mycobacterium abscessus* (*M. abscessus*) is an emergent pathogen that leads to serious lung infections, predominantly in cystic fibrosis (mucoviscidosis) patients. Cystic fibrosis is a congenital metabolic disorder that causes the production of viscous mucous. This leads to an increased susceptibility to lung infections.

M. abscessus is highly resistant to almost all antibiotics. This means that these medicines are either ineffective or insufficiently effective. As a result, there is currently no effective standard treatment. The healing of infections with *M. abscessus* is extremely rare, even with lengthy and expensive therapies.

Objectives and Methods – The Search for Resistant Genes

Peter Sander's research group has recently developed an innovative genebased technique. This technique could provide the tools to explain how *M. abscessus* impedes the effect of various antibiotics that are otherwise perfectly effective.

Using a technique known as highthroughput screening, the researchers will be able to characterise hundreds of thousands of unique bacterial variants simultaneously. These findings will allow for the identification of genes for drug resistance and tolerance in bacteria.

Significance – Hope for Patients with Cystic Fibrosis

The planned investigations should clear the path for the development of innovative treatment strategies. The results of this project will benefit cystic fibrosis patients in particular.

Length of the Project

This project will begin on 1 September 2018 and is expected to last until February 2021.

	Amount
Total research budget	CHF 330'000
Grants promised/received by third parties	CHF 150'203
Grants pending from third parties	CHF 64'290
Grants being sought from the Swiss Lung Association	CHF 115'507
Amount to be acquired by researchers	CHF 5'507
Contribution from Research Fund of the Lung Association	CHF 37'000
Donations required from third parties	CHF 73'000

