
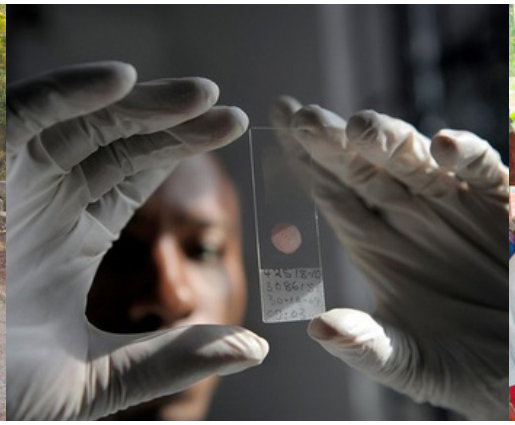


Photo: Kristina Persson

Global health – focusing on infectious diseases

We are making great progress within medical research, yet people all over the world are suffering terribly from health problems that are preventable and treatable with knowledge and simple resources. Lund University is working actively to ensure that our research and acquired knowledge contribute to solving global health problems. Here, we present four research fields within global health, focusing on infectious diseases; these are particularly urgent areas in which we need your help to move the research forward.

GLOBAL INFECTIOUS DISEASES

Infectious diseases are not a new problem. Throughout history, various pandemics have ravaged populations and millions of people have died. Infectious diseases are still a major problem and continue to cause a great deal of suffering and death in society today. Research has provided us with new cures and vaccines, but many people still get ill and die every year from various contagious diseases.

Infectious diseases are often particularly difficult to combat because the bacteria or viruses that cause them continuously mutate; drugs developed to fight one version of a virus, for example, suddenly cease to be effective against a mutation. Resistance to antibiotics is another impending threat to world health. For some diseases, we have never succeeded in developing treatments which cure, but can only alleviate illness. We are currently living in a global community, with a lot of travel and migrational flows. This means that infectious diseases such as tuberculosis are increasing in regions where they were previously rare.

Below is a presentation of four research fields we have chosen to highlight, in which we need your help to move the research forward. We hope that you will want to support us in this work!

INFLUENZA VIRUS

Influenza viruses vary greatly and their properties can change rapidly. We investigate how various influenza viruses affect the infected cells at the molecular level. We have developed a method which can be used on a large scale to identify cellular proteins which bind to the influenza virus's RNA (a kind of genome). Our aim in studying this is to achieve a greater understanding of what differentiates influenza viruses with high pathogenicity from influenza viruses with a lower pathogenicity. This would allow epidemics of influenza viruses with high pathogenicity to be discovered at an early stage, enabling us to limit their spread. Increased knowledge of how the influenza virus functions and causes disease will also facilitate the development of new drugs against influenza.

Help us to achieve our goals:

- To identify the properties of influenza viruses which lead to serious illness. We want to understand what differentiates today's influenza strains from the deadly influenza virus which caused the Spanish 'flu.
- To predict the emergence of new epidemics of influenza virus with high fatality at an early stage in order to limit their spread to the extent possible.

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MALARIA

We want to find out how an individual becomes immune to malaria, in order to use that knowledge to develop a vaccine against the disease. We have ongoing studies in Uganda where we are studying the immune system in children who get malaria. We follow the children over their first year of life to monitor the development of their immune system against malaria. We study the function of certain specific antibodies which could potentially work in a future vaccine.

We have developed a unique method of investigating one of the immune system's most important cells, known as B-cells, directly in fresh blood, and we can now identify the B-cells which only recognise malaria, which was not previously possible.

The new method allows us to find out when the malaria-specific cells appear in the blood after contamination with malaria. There are also atypical B-cells, which do not function normally, and might explain why it takes such a long time to develop immunity to malaria. We are also conducting studies on Swedish malaria patients, who caught malaria after a stay abroad.

Help us to achieve our goals:

- Use studies of B-cells and various markers for immunity to find out why it takes such a long time to develop immunity to malaria. We have collected samples from children in Uganda in order to be able to compare different levels of immune system markers, antibodies and B-cells.
- Use this knowledge to produce a functioning vaccine and thereby save many lives.

TUBERCULOSIS

By analysing a large number of different antibacterial peptides, we have identified AMP, antimicrobial peptides, which effectively kills the TBC bacterium without damaging other cells.

The bactericidal effect of these peptides has been studied in various cell models. We discovered that these peptides could also eliminate TBC bacteria in the body's cells, where it is difficult for the immune system and antibiotics to reach them. The bactericidal effect of the peptides was also analysed in studies on animals, where we were able to reduce the amount of bacteria by 86% after only five days of treatment.

Our hope is that these antimicrobial peptides will function as an alternative to the prevailing TBC treatment, particularly in the cases of multidrug-resistant pulmonary tuberculosis, and reduce the duration of treatment by several months.

Help us to achieve our goals:

- To conduct more studies in cells and animals with a view to observing the effects of various doses of antimicrobial peptides (AMP).
- To investigate whether peptides work together with antibiotics and see how AMP spread in the lung.
- To study the effect of peptides on multidrug-resistant tuberculosis bacteria
- To test the effectiveness of AMP in clinical trials on ill patients at Skåne University Hospital in Malmö.

HIV

We have built up a research station in Adama, a city in central Ethiopia with just over 300 000 inhabitants. The studies are based on all healthcare centres and hospitals in the area, and we use research laboratories in Ethiopia and in Lund.

Our research team has developed and evaluated methods which can be used in low-income countries to detect TBC in HIV-positive patients. We have found that one in five HIV-positive patients also has TBC, a disease which, in most cases, has not been detected with the methods currently available.

Our research team is also studying how resistant forms of HIV emerge and spread in Ethiopia, and we are constructing new techniques which make it easy to identify patients who are carrying resistant HIV.

Help us to achieve our goals:

- To study the properties of HIV which lead to a more rapid development of the disease and higher prevalence in various segments of the population.
- To develop new methods for the diagnosis of TBC in HIV-positive patients, which can be used within healthcare in low-income countries.
- To map and understand how resistant HIV spreads in Ethiopia and other parts of East Africa.
- To develop methods which can be used in primary healthcare centres to detect resistant HIV in HIV-positive patients.

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