



## Department of Bacterial and Inflammatory Diseases

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**Enteric infections, tuberculosis and hospital infections, caused by bacteria, are all important and emerging health problems. Twenty years ago, antibiotics were thought to cure all bacterial diseases. Today, antibiotic-resistant bacteria are found everywhere, not only in hospitals, but also in community settings.**

The impact of the human bacterial microbiota on human health is crucial. In addition to traditional infectious diseases, bacteria have been proposed to play a role in a variety of conditions ranging from allergic diseases and cancer to disorders such as obesity and diabetes.

In many diseases, control of the inflammation process is an important part of the treatment. Although inflammation is indispensable to our immune defence, it can also cause unwanted tissue damage, for example in arthritis and myocardial infarction. Moreover, research on white cell traffic also benefits cancer research, because cancer cells and immune cells use same type of mechanisms for moving in the body.

### Goals

Our goal is to examine bacteria and their properties, their interaction with the human immune system and mechanisms of inflammation. This knowledge is used to prevent infectious diseases, to control their spread and to develop new options and policies for treating infectious and inflammatory diseases.

We monitor and study epidemics and drug-resistant bacteria actively. We also carry out research on the impact of the human microbiota on health as well as on the inflammatory response and prevention of tissue damage caused by inflammation.

### Study fields

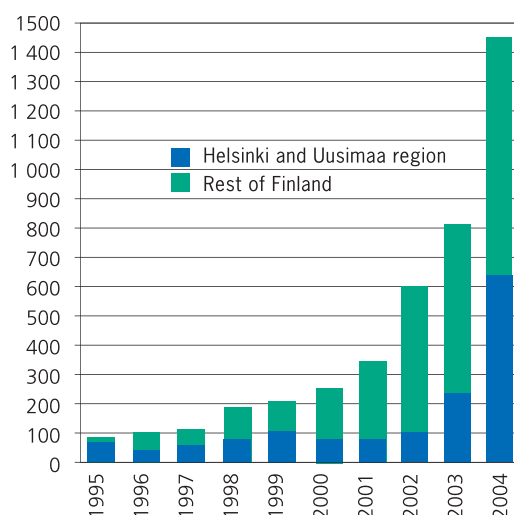
#### Enteric Bacteria Laboratory

The laboratory serves as the national reference laboratory for food-related zoonotic infections and also for all enteric bacteria that are important for public health. The goal is rapid detection of food-borne disease outbreaks and their prevention in collaboration with other authorities. Good control improves food hygiene in Finland and helps the food industry maintain and improve its competitiveness.

#### Mycobacterial Reference Laboratory

The laboratory is a national reference laboratory for diagnostics of *Mycobacterium tuberculosis* and other mycobacteria, including epidemiological surveillance and research. More than eight million new cases of tuberculosis are found each year in the world, in Finland only 400. Although very common in Russian and Baltic countries, multidrug-resistant tuberculosis is still rare in Finland. It is expected that these strains will emerge also in Finland in the coming years.

No of cases



MRSA cases in the capital city region and elsewhere in Finland in 1995–2004.

**Pertussis Laboratory**

Whooping cough, or pertussis, is a major cause of childhood morbidity and mortality. Despite high vaccination coverage, pertussis has recently resurged in countries such as Finland. The task of this laboratory is to study the molecular epidemiology of pertussis, to monitor emerging strains of *Bordetella pertussis*, to better understand the pathogenesis, transmission and evolution of this bacterium, and to help prevent the disease and develop and improve the vaccine.

**Hospital Bacteria Laboratory**

The laboratory is the national reference laboratory for hospital and health care-related infections and also for bacteria that cause severe infections. Transmissions and also infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA) are increasing in Finland. The main functions of the laboratory are epidemiological surveillance, consultation and scientific research on these bacteria. Maintaining and coordinating the bacterial culture collection of the national infection register is another major task.

**Antimicrobial Research Laboratory**

Antimicrobial resistance of bacteria is one of the biggest threats to health care. The main task of the laboratory is to create and develop an antibiotic policy that keeps antibiotics effective as long as possible. Our major goal is to monitor the antimicrobial resistance of the most important bacterial pathogens. Our second task is to understand and study the molecular mechanisms of bacterial resistance.

**Microbial Ecology Laboratory**

Microbial ecology laboratory studies the composition on, changes in and importance of the normal human microbiota, which is a complex and poorly known organ of the human body. Data on the importance of human microbiota to human health and disease are accumulating rapidly. Using new molecular and bacteriological techniques we strive to study and understand the role of bacteria in the human body.

**Anaerobe Reference Laboratory**

Anaerobic bacteria, which live in oxygen-free circumstances, are integral components of the commensal microbiota associated with mucous membranes of the human digestive tract. Our goal is to study the clinical significance of these bacteria and their impact on in oral and gastrointestinal health. This laboratory also serves as a reference laboratory for legionellae and bacteria that are difficult to identify.

**Cell Traffic Laboratory**

Human white cells are involved in every inflammation process, including classic inflammatory diseases, such as arthritis, autoimmune diabetes and transplant reactions, as well as the more recently recognized inflammatory disorders, such as atherosclerosis and ischaemia. We study the molecular mechanisms of white cell traffic from the blood into different tissues in healthy people and in several inflammatory diseases. Our goal is to prevent harmful cell traffic in inflammation and cancer by developing specific drugs and tools targeting the key mechanisms of cell migration.

**Microbial Immunology Laboratory**

The major task of the laboratory is to disclose the defects in the immune defence of patients with reactive arthritis. Reactive arthritis may develop after many infectious diseases, such as salmonella and yersinia enteric infections. In worst cases of arthritis, the disease causes severe damage to the joints and, like other rheumatic and musculoskeletal diseases, leads to extensive short- and long-term disability.

