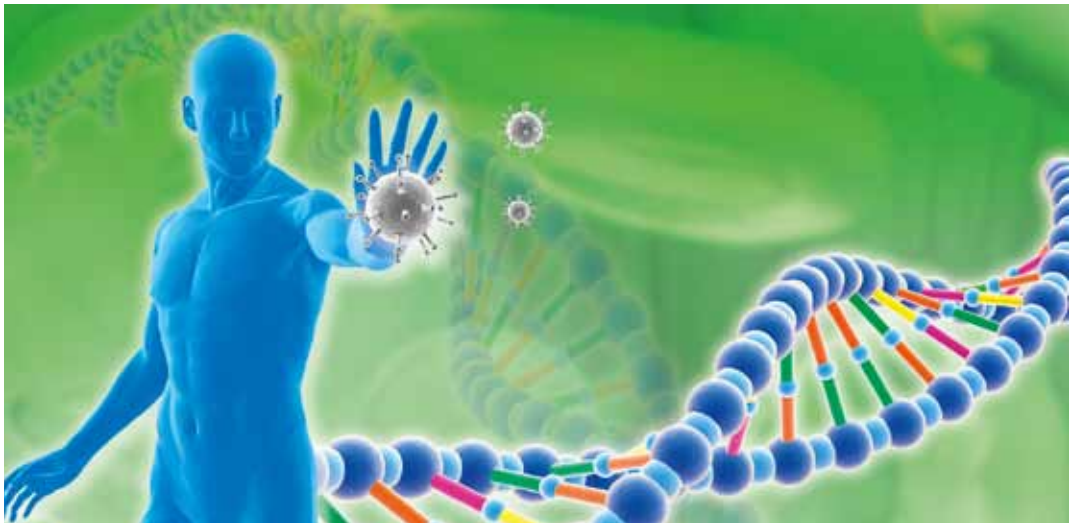
Bavarian research & innovation

FORPROTECT

Bavarian Research Cooperation for Infection Protection
by Means of New Diagnostic and Therapeutic Methods

IN VIVO VERITAS: New protective strategies against infections



The Bavarian Research Cooperation FORPROTECT develops new genome-based diagnostic methods and therapeutic approaches for combatting infection diseases and cancer.

The isolation and *in vitro* cultivation of pathogens is a milestone for fundamental research. Unfortunately, analysis of biological properties of pathogens in cell culture experiments and prepared media does not represent actual host-pathogen interactions during infection *in vivo*.

The pathogenesis of infection is a complex process and takes place in a special environment. Factors like the local tissue properties of the infected host and the interaction with other bacteria can influence the properties of the pathogen. On the one hand, these factors can inhibit the dissemination. On the other hand, these factors can also activate different programs of the pathogens leading to the production of different substances. Subsequently, these substances may induce the selection and dissemination of the pathogenic agents. Additional selection pressure may also lead to the alteration of the pathogen. Altogether, the pathogenic dissemination is impaired by the local conditions of the infected tissue. In contrast to this, the microbiological *in vitro* culture conditions are limited to the selection of multiplication-competent organisms in experimental settings and are not comparable to *in vivo* conditions.

Gene expression of pathogens cultivated *in vitro* often differs from the *in vivo* gene expression patterns. Additionally, pathogens develop resistance to current therapies. This highlights the need for the development of better diagnostic and therapeutic methods to win the race against time.

The aim of FORPROTECT is the development of novel genome-based diagnostic methods and therapeutic approaches facilitating advances in combatting bacterial and viral infections.

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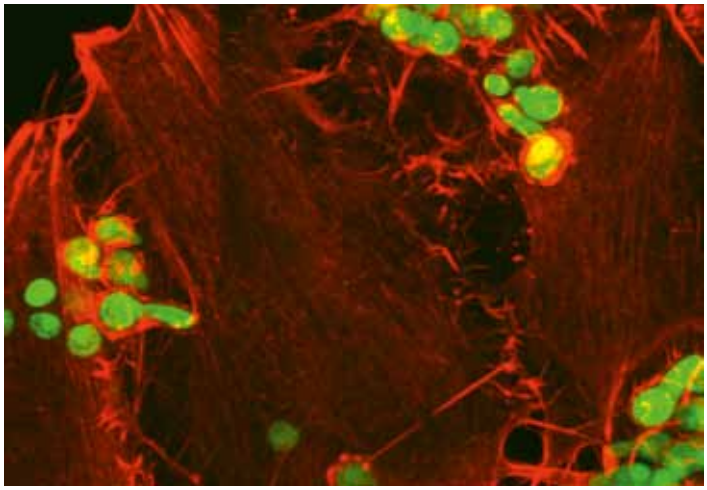
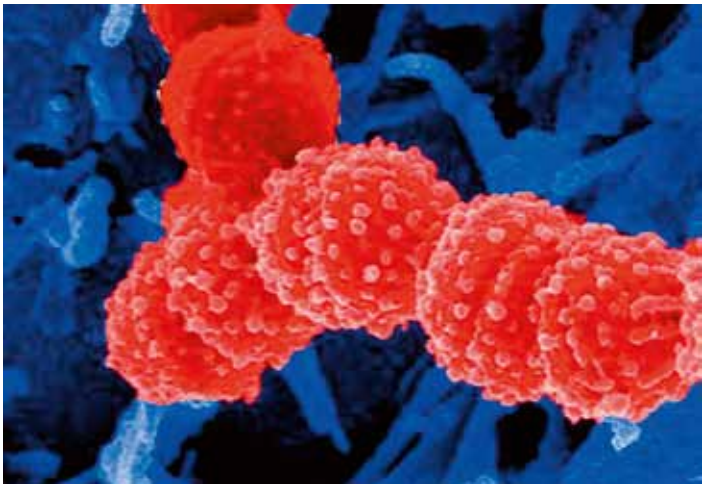
Funded by the Bavarian Research Foundation with about € 2.63 million (incl. 49.35 % industry) for three years.



Human epithelial cells (red) and spores of *Aspergillus fumigatus* (green).



Bacteria which cause severe infections are increasingly developing resistances against current therapies.

RESEARCH TOPICS

FORPROTECT is organized within eight projects in the two subject fields diagnostic and therapy:

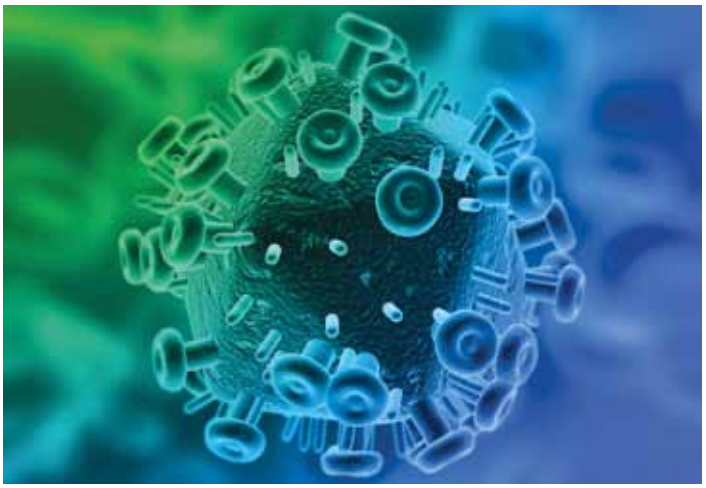
The fields of bacterial and fungal diagnostics concentrate on the development of rapid and specific diagnostic procedures. For this purpose, the main attention is directed to the description of *in vivo* simulation media and analysis of proteins by Matrix Assisted Laser Desorption Ionization Time of Flight mass spectrometers (MALDI TOF). Simulating *in vivo* conditions allows scientists to identify proteins responsible for causing diseases. In addition, MALDI-TOF provides the opportunity for rapid diagnostic tests of antibiotic resistance and specific virulence factors. These findings could open many doors for further, cutting-edge diagnostic and therapeutic procedures.

Diagnostics of viral diseases focus on the analysis of T cell and antibody based assays. Two projects are developing technologies of T cell analysis and specific viral epitope patterns recognition, describing viral proteins, operating only in specific cell types or tissues. These results are the basis for new diagnostic procedures and successful vaccine developments.

The field of therapy is working on the development of vector design and vaccines. Biological properties like replication, cell specificity and expression of prodrugs or other effector molecules were discovered by site directed mutagenesis of pathogens. Modified bacteria or viruses can be used directly as a vaccine or vector (transfer of active agent) for therapeutic purposes.

Economic Applications

Development of new methods for the diagnostics and therapies of bacterial, viral and fungal infections.



Model of a retroviral vector.

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MicroCoat Biotechnologie GmbH, Bernried
Mikrogen GmbH, Neuried
Sirion Biotech GmbH, Martinsried