

# GRK 1870: "Bacterial Respiratory Infections – Common and Specific Mechanisms of Pathogen Adaptation and Immune Defence"

Spokesperson: Prof. Dr. rer. nat. Sven Hammerschmidt

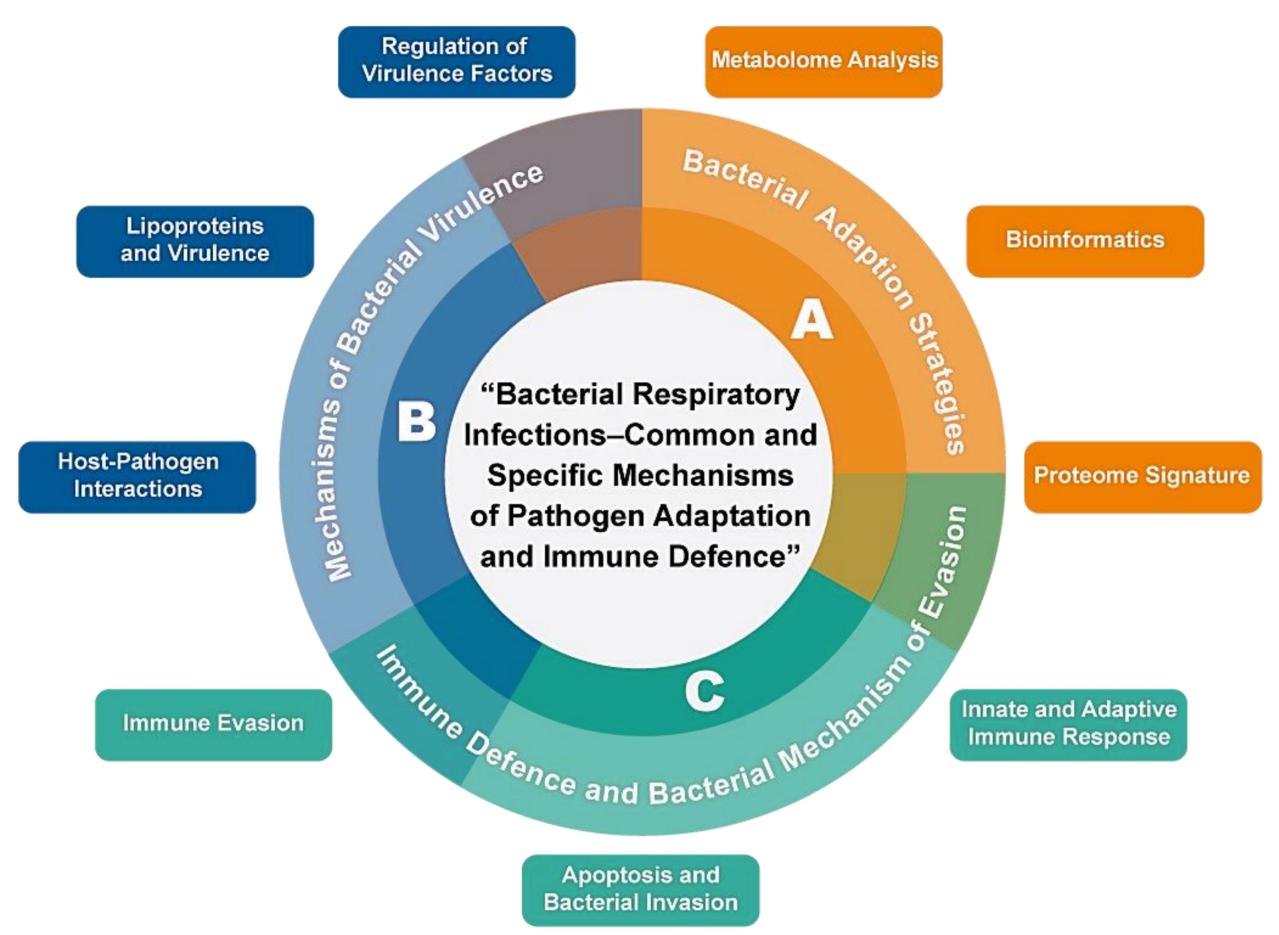
## **OVERVIEW**

In the GRK 1870 *BacRes*, specialists in infection biology, microbiology, immunology, functional genomics and bioinformatics will study pathogenesis mechanisms of three multifaceted respiratory bacterial pathogens that pose serious treatment problems: *Burkholderia pseudomallei*, *Streptococcus pneumoniae* (pneumo-cocci) and *Staphylococcus aureus*. We assess the regulation and expression of virulence factors, explore OMICs signatures of bacteria and host cells during colonization and infection, determine structure-function relationships of surface-exposed lipoproteins and transporters, and study mechanisms of immune defence. Specific added value will be derived from comparing the three bacterial species in the same experimental systems, to identify shared or unique molecular mechanisms employed to meet the challenges of proliferating in a respiratory environment.

#### PARTICIPATING INSTITUTES AND DEPARTMENTS and Greifswald associates Institute of Institute for **Genetics and Functional Genomics** and Dutch associates **Biochemistry** Microbiology Department of Genetics Faculty of Mathematics & Natural Science Faculty of Mathematics & Natural Science Faculty of Mathematics & Natural Science Groningen **Genetics and Functional Genomics GRK 1870** Department of **Bacterial Respiratory Infections Functional Genomics University Medicine Amsterdam** UMC ( St Radboud Institute of Immunology **Institute for Mathematics** Friedrich-Loeffler-Institute Erasmus MC and Computer Science of Medical Microbiology **Department of Immunology University Medicine** Faculty of Mathematics & Natural Science Rotterdam **University Medicine**

# Main goals of project area B Role of lipoproteins and regulators on adherence, phagocytosis and immune evasion 60 min **Interactions with** Testing the virulence of WT and host proteins QS-mutants in different pathogenicity models cell lines (RAW 264.7) HeLa cells or BMM's) (Balb/c, a.o.) Localization **Regulation and Expression** Impact of lipoproteins and regulators on virulence of S. aureus and pneumococci

# RESEARCH PROGRAM



Main goals of project area A

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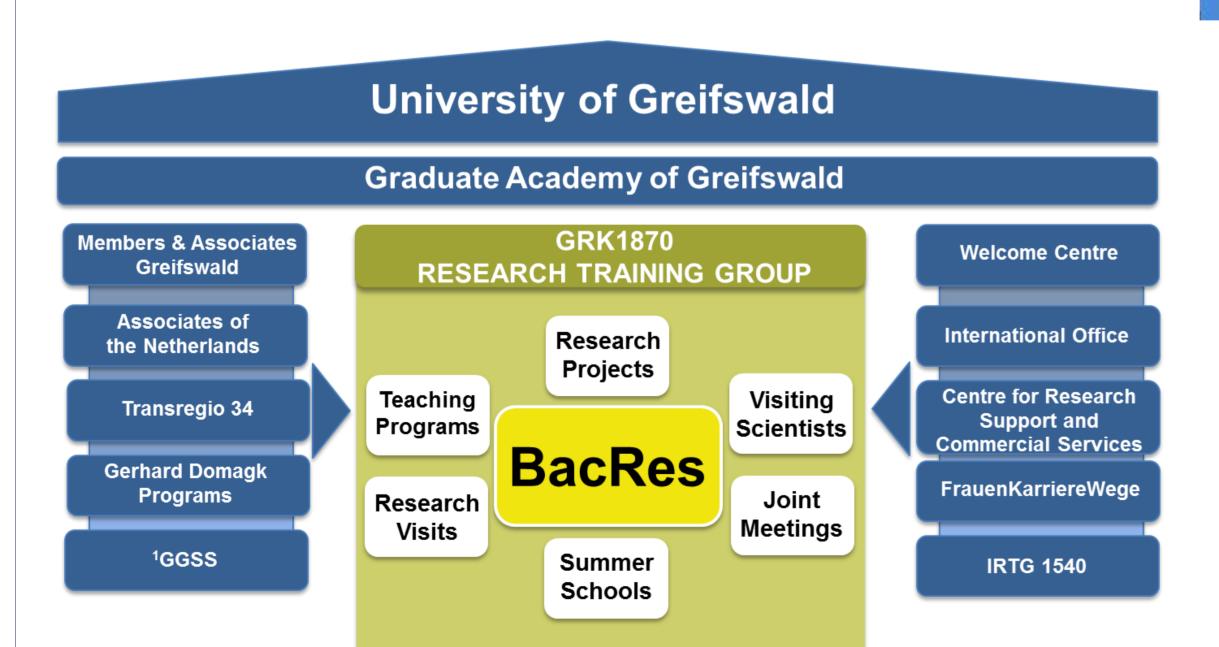
infection-related stress conditions

- different physiological conditions in in vitro liquid cultures (e.g. nutrient, iron limitations, anaerobic)
- cell-culture based infections
- simultaneous analysis of pathogen adaptation and host response – using primary cells and a complex in vitro cell culture system
- in vivo conditions in animal infections

Figure 1: Scheme of the three project areas of the GRK 1870 BacRes and their working topics.

#### Main goals of project area C **Modulation of adaptive immune** Allergic reactions to S. aureus **Caspase activation by** T cell response to Salg4 as a major allergen response by *S. aureus* lipolytic **OVA-expressing** *S. aureus* B. pseudomallei enzymes Salg4 Th1 NLRC4 NLRP3 IL-18 | IL-1β Th2 caspasepyroptosis caspase-9 bacterial caspase-7 **Allergy** epithelial cells PARP cleavage

## TEACHING PROGRAM



D39∆gln0411 D39∆gln1098

**D39** 

**Figure 2**: Organisation of the qualification concept of the GRK 1870 *BacRes*. <sup>1</sup>GGSS: *Greifswald Graduate School in Science* – Fast Track PhD-program of the Faculty of Mathematics and Science.

The Research Training Group offers a structured teaching program of 100-120 hours per year including:

- Summer Schools/Retreats (annually)
- National and International Scientific Meetings
- Young Investigators Meetings
- Workshops (e.g. Good Academic Practice, Laboratory Safety (GenTG §15), Laboratory Animal Science (TierSchG §9), Statistics and Bioinformatics)
- Seminars (Colloquium of Microbiology and Infection, Journal Club, Method Seminar)
- Key Qualifications (Oral and Poster Presentations in English, Project Management, Career Planning and Networking, Courses in Standard Software Programs, One's Own Research Proposal, Academic Writing)

and optionally a participation in the Graduate Exchange Program (staying in one of the institutions of our Dutch associates) or working in the laboratories of our industrial collaboration partner bioMerieux.

### Contact: Prof. Dr. Sven Hammerschmidt

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