

## Department of Health Sciences

## Molecular Epidemiology and Genetics

### Team

Nateson Balashubramanian, PhD (Postdoc)  
Rosario Mato, PhD (Invited Aux.Prof., DCV)  
Carlos Florindo, PhD student (co-supervision)  
Célia Leão, PhD student (co-supervision)  
Inês Silvestre, MSc student (supervision)  
Tiago Dias, MSc student (co-supervision)

### Collaborations



## Ilda Santos Sanches

(PI. Group and Team Leader)

- BSc Biology (1983)  
FCUL
- PhD Molecular Biology (1991)  
FCT/UNL

Associate Professor  
(DCV. FCT/UNL)

## Objectives

The main research interest of our laboratory is to understand the dynamics of populations of bacterial pathogens from human and animal origin and the molecular mechanisms involved in pathogen adaptation and virulence.

Research activities:

- Comparison of phenotypes/genotypes of species/strains from different niches, clinical origins and hosts.
- Study of antibiotic resistance patterns and mechanisms of resistance.
- Analysis of the genomic structure and potential for horizontal gene transfer of phages (bacterial virus) and of other mobile genetic element.
- Investigation of the biological activity of new materials and new biocompounds against various pathogens.

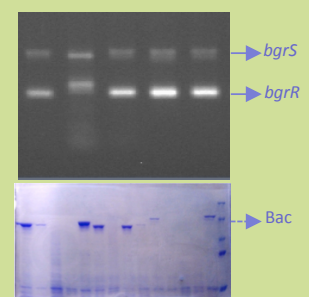
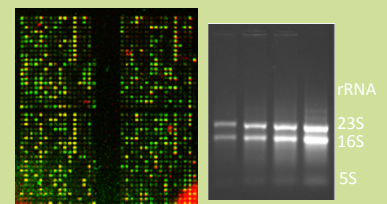
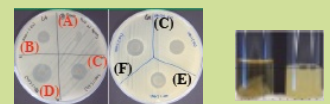
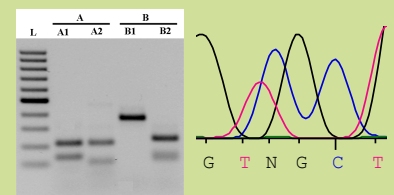
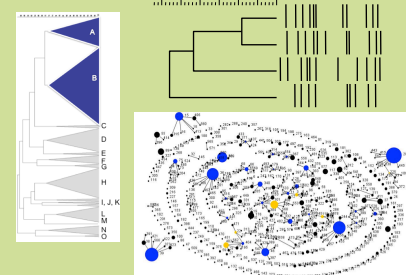
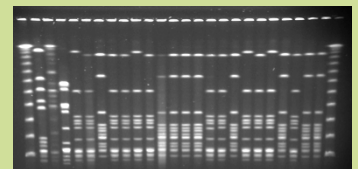
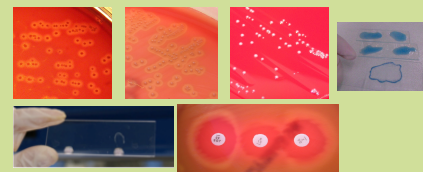
## Methodology

- Multiple molecular schemes for strain and clone assessment: antibiotyping, capsule serotyping, virulence genotyping, pulsed-field gel electrophoresis (PFGE), sequencing of single and multiple loci (MLST), single- and multiplex-PCR, RT-PCR.
- Antimicrobial drug testing: disk diffusion, minimal inhibitory concentration.
- Phage isolation, purification and characterization by physical mapping, DNA sequencing, Transmission Electron Microscopy (TEM)\* and transduction assays.
- Genomic, transcriptomic and proteomic analysis\* of virulence gene content and expression among strains of animal and human streptococcal species.
- in vitro (human and animal cell lines)\* and in vivo (Zebrafish)\* testing for strain infection potential.

\* in collaboration with colleagues from FCT/UNL and other institutions: INSA, CIISA-FMV/UTL, BioFig-FCUL (Portugal); Helmholtz Centre for Infection Research, Ulm University (Germany); Institute of Experimental Medicine (Russia)

## Expected Results

- Identification of streptococcal clones and lineages for whole genome comparison.
- Identification of novel genotypic features of human and animal streptococci (*S. agalactiae*): serotypes, insertion sequences in the capsule locus; allelic variation of virulence genes and correlation between (non-)production of DNases and specific genetic lineage(s).
- Clarification of the zoonotic potential of the animal streptococci (*S. dysgalactiae* subsp. *dysgalactiae*) and the capability of dissemination to different tissues of the hosts to take advantage of new niches.



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