

Financing institution: National Council of Scientific Research in Higher Education

Coordinating institution: University of Bucharest, Faculty of Biology, Microbiology-Botany Department

Project manager: Assoc. Prof. Carmen Chifiriuc (Balotescu)

Project code: TE 135/2010

Contract no: 76/2010

Project title: THE CORRELATION OF PSEUDOMONAS AERUGINOSA AND STAPHYLOCOCCUS AUREUS VIRULENCE AND/OR RESISTANCE PATTERN WITH THE CLINICAL OUTCOME OF NOSOCOMIAL INFECTIONS

Project budget: 750000 lei

Project duration: 36 months

Research team: See yearly evaluation reports

Proposal summary (half page)

Staphylococcus aureus and *Pseudomonas aeruginosa* are two of the most frequently isolated bacteria in nosocomial infections, being opportunistic pathogens responsible for serious infections in immunocompromised patients. The emergence of extended antibiotic-resistant *S. aureus* and *Ps. aeruginosa* strains has made it necessary to develop new strategies to understand the different mechanisms used by these bacteria at the different stages of the infectious process. This knowledge will provide us with the tools to prevent and at least improve the control of *S. aureus* and *Ps. aeruginosa* infections. Many studies showed the involvement of virulence factors in different type of infections, but clear correlations between a certain virulence profile and the initial severity and outcome of clinical infections are still missing. The purpose of the present project is to characterize the virulence and resistance profiles and correlate them with the clinical patterns of nosocomial infections produced by *S. aureus* and *Ps. aeruginosa* isolated in the intensive care units (ICUs) in Romania, in order to establish the associations between the presence of putative virulence genes and the outcome of infections caused by these bacteria and to investigate the fundamentals of the epidemiology of new highly virulent resistant multiresistant strains. In this purpose, we will use a complex,

phenotypic and molecular approach in order to detect the genes encoding for different cell-wall associated and extracellular virulence factors, the resistance markers as well as the quorum sensing systems and gene regulators. This is the first scientific attempt to harmonize complex phenotypic and genotypic laboratory methods in order to establish some virulence and resistance profiles of nosocomial agents that could be further used for clinical diagnosis, epidemiological investigations, or routine surveillance of nosocomial infections.

Project objectives

The setting up of the biological material required for the optimal development of the scientific activities (collection and optimal storage of a significant number of *S. aureus* and *Ps. aeruginosa* strains isolated from ICUs patients diagnosed with NI, from different clinical specimens);

2. Phenotypic and molecular screening of virulence factors in *Staphylococcus aureus* and *Pseudomonas aeruginosa* strains isolated from clinical specimens taken from ICU patients
3. Identification of molecular markers of quorum-sensing and virulence gene regulators in *Staphylococcus aureus* and *Pseudomonas aeruginosa* strains isolated from clinical specimens taken from ICU patients
4. Phenotypic and molecular screening of antibiotic resistance markers in *Staphylococcus aureus* and *Pseudomonas aeruginosa* strains isolated from clinical specimens taken from ICU patients
5. The univariate and multivariate analysis of the correlation of a certain virulence and/or resistance pattern with the clinical outcome of infectious process.

RESULTS- see yearly evaluation reports and work syntheses

Links of some of the articles presenting the results obtained during the project, citing the project at

Acknowledgements

ISI papers

1. <http://www.revistafarmacia.ro/20116/art.05.anghel.cris%20770-783.pdf>
2. <http://www.nanoscaleslett.com/content/7/1/209>
3. <http://solacolu.chim.upb.ro/p160-166web.pdf>
4. http://solacolu.chim.upb.ro/pag_383_387web.pdf
5. <http://www.google.ro/url?sa=t&rct=j&q=&esrc=s&source=web&cd=14&ved=0CEgQFjADOAo&url=http%3A%2F%2Ffoam-rc.inoe.ro%2Fdownload.php%3Ffidu%3D1334&ei=tgrPUfKlGoa74ASXhYCoCA&usg=AFQjCNGngiVpUcED8TTHg4-MxSaqnyHvA&bvm=bv.48572450,d.bGE>
6. <http://xplqa30.ieee.org/xpl/login.jsp?tp=&arnumber=6096421&url=http%3A%2F%2Fxpplqa30.ieee.org%2Fxppls%2Ficp.jsp%3Farnumber%3D6096421>

7. <http://www.sciencedirect.com/science/article/pii/S0169433212002899>
8. <http://www.ncbi.nlm.nih.gov/pubmed/?term=interaction+of+bacteria+isolated+from+clinical+biofilms+with+cardiovascular+prosthetic+devices+and+eukaryotic+cells.+Anaerobe+xxx+%282011%29+1e3%282011%29>

BDI papers

1. <http://www.ijabpt.com/pdf/6023-II-Carmen-lordache%5B1%5D.pdf>
2. <http://www.google.ro/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CEEQFjAC&url=http%3A%2F%2Fcore.kmi.open.ac.uk%2Fdownload%2Fpdf%2F5802351&ei=fgnPUDPxAYHi4QTZwoBw&usg=AFQjCNHccotQvodE44MOHVx9-qTn43zu1w&bvm=bv.48572450,d.bGE>
3. http://www.roami.ro/files/online/Archives_3%282010%29.pdf
4. http://biointerfaceresearch.com/wp-content/uploads/downloads/2013/03/62.BRIAC_Cotar_.pdf
5. <http://biointerfaceresearch.com/wp-content/uploads/downloads/2011/08/3.GrumezescuIssue4Vol1.pdf>
6. http://nanobioletters.com/wp-content/uploads/downloads/2013/04/18.LIANBS.Cotar_.pdf
7. <http://www.ncbi.nlm.nih.gov/pubmed/21462836>
- 8.

Chapters in books

<http://www.formatex.info/microbiology3/book/isbn1-contents.pdf>