Title: DETECTION OF CARBAPENEM-HYDROLYZING OXACILLINASES AND GENETIC DIVERSITY AMONG *Acinetobacter* spp. ISOLATED IN THE STATE OF RIO DE JANEIRO

Authors: Oliveira, E. A.[1], Mondino, S.S.B.[1], Paula, G.R.[2], Mondino, P.J.J.[3], Mendonça-Souza, C.R.V.[1]

Institutions: [1] Programa de Pós-Graduação em Patologia, Departamento de Patologia - UFF - Universidade Federal Fluminense (R. Marquês do Paraná – 303 - 4º andar, Centro – 24033900 – Niterói, RJ), [2] Departamento de Tecnologia Farmacêutica - UFF- Universidade Federal Fluminense (R. Mário Viana – 523 – Santa Rosa – 24241002 - Niterói, RJ), [3] Departamento de Patologia, - UFF - Universidade Federal Fluminense (R. Marquês do Paraná – 303 - 4º andar, Centro – 24033900 – Niterói, RJ)

Abstract:

In Brasil, the main mechanism of carbapenem resistance in *Acinetobacter* spp. is the production of carbapenem-hydrolyzing oxacillinases (OXA), particularly the OXA-23, followed by OXA-143. The aim of this study was the detection of oxacillinases production among *Acinetobacter* spp. isolates and the analysis of the genetic diversity among the OXA-producing strains. A total of 130 *Acinetobacter* spp. isolates were recovered from March to December 2013 from patients attending three tertiary hospitals: two located in the city of Niterói, RJ: Hospital Universitário Antônio Pedro (HUAP; n = 62) and Clínica de Saúde e Maternidade Santa Martha (CSMSM; n = 61) and one, in São Gonçalo, RJ: Hospital São José (HSJ; n = 7). *Acinetobacter* spp. isolates were identified using a VITEK 2 automated system (bioMerieux) and antimicrobial susceptibility was determined by disk diffusion. The presence of genes encoding carbapenem-hydrolyzing oxacillinases was detected by PCR using specific primers for the genes: $bla_{\text{OXA-23}}$, $bla_{\text{OXA-24}}$, $bla_{\text{OXA-51}}$, $bla_{\text{OXA-58}}$ and $bla_{\text{OXA-143}}$. The genetic diversity of OXA-positive isolates was analyzed by pulsed field gel electrophoresis (PFGE). High rates of resistance to the carbapenems tested (imipenem: 91.5%; meropenem: 90.8%) were observed. The $bla_{\text{OXA-23}}$ gene was detected in 109 (83.8%) of the 130 isolates and all of them, except three, were carbapenem resistant. In addition, the majority of the isolates (90%) were positive for $bla_{\text{OXA-51}}$ gene and one isolate simultaneously presented the $bla_{\text{OXA-58}}$, $bla_{\text{OXA-51}}$ and $bla_{\text{OXA-23}}$ genes. A total of 49 OXA-23-producing strains (HUAP, n = 28; CSMSM, n = 21) were analyzed by PFGE. A high genetic diversity was found as well as the occurrence of predominant clonal groups among the OXA-23 positive strains analyzed: group A (7/28; 25%) and group B (5/28; 11.7%) were observed in HUAP and group G (11/21; 52.4%), in CSMSM. Although the intra-hospital spread was observed, there was no inter-hospital spread. The results obtained in this work indicated that OXA-23 production was the main mechanism of carbapenem resistance among the studied population. The presence of predominant clonal groups in HUAP and CSMSM points to their importance in raising the rate of resistance to carbapenems in these hospitals.

Key words: *Acinetobacter* spp, carbapenem-hydrolyzing oxacillinases, genetic diversity

Funding: Prograd/UFF e Proppi/UFF