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## MULTIDRUG RESISTANT ACINETOBACTER BAUMANNII: A MAJOR CONCERN IN THE HOSPITAL SETTING

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.....ACINETOBACTER – non-motile, but in motion  
/ A. T. Bernards /

### ABSTRACT

An attempt to estimate the significance of *Acinetobacter baumannii* for hospital pathology is done. The data obtained for five years period of time show that this microorganism is a problem predominantly for patients with respiratory tract infections, bloodstream infections and postsurgical wound infections in ICU. The strains resistance' investigation to antimicrobial drugs shows high level resistance and multiresistance of *A.baumannii* strains developing significantly in the last years. Since 2004 it was also registered resistance of clinical *A.baumannii* strains to carbapenems. Our preliminary results demonstrate that 30.5% of the *A.baumannii* strains investigated carry genes, encoding VIM 1 enzymes, some of the strains comprise OXA 23 genes, but there were not detected genes, encoding IMP carbapemenases.

### INTRODUCTION

*Acinetobacters* /*A.baumannii* / are pre-eminently opportunistic pathogens and have emerged as such in hospitals in the past three decades. As with other opportunistic pathogens, increasingly complicated medical handling, including invasive procedures, prolonged hospitalization of patients with impaired defence mechanisms and the use of broad-spectrum antimicrobial agents have made the way for *A.baumannii* to settle as nosocomial pathogen. Infections, caused by *A.baumannii* include bacteraemia, urinary tract infections, respiratory tract infections, meningitis, endocarditis and others. One of the main reason also for the increased interest in this microorganism is the impressive patterns of resistance / so called multidrug and pan-drug resistance/ to antimicrobial drugs as in shown by clinical strains which also have the ability to spread rapidly in hospitals.

The aim of this study is to estimate the epidemiology and the significance of multidrug resistant *Acinetobacter* infections for the hospital infectious pathology.

### MATERIALS AND METHODS

The investigation was done at the MMA – Sofia. In the hospital are disposed 800 beds,

including two ICU, seven surgery units and it is regional center for trauma and emergency patients treatment.

All groups of antibiotics, including carbapenems, quinolones, third and fourth generation of cephalosporines are used in the hospital as a tool for treatment. A

retrospective matched investigation was performed including strains, isolated for the last five years – from 2003 until 2007.

The identification of the strains was done by automated system VITEC TWO v. 4.1. /Biomerieux/ France and by the schema, developed by us /Savov,E. et al 1981 / The resistance of *A.baumannii* strains to antimicrobial drugs was done by automated system VITEC TWO v. 4.1. /Biomerieux/ and disk-diffusion method of Bauer, A. et al 1966 according to the recommendations of CLS I 2005.

### RESULTS AND DISCUSSION

Microorganisms of the genus *Acinetobacter* are widespread in nature and have been isolated from environmental and hospital sources. For the last years, however, many outbreaks of multiresistant *A.baumannii* strains has occurred / Sunenshine,R. et al 2007 /. Our study assessed that the group of Nonfermenting-gram negative bacteria

/NFGB / takes about between 13-17% in the etiological structure of nosocomial infections

at the MMA – Sofia. / Fig. 1/ and A.baumannii comprises about 7-10% /Fig. 2/.

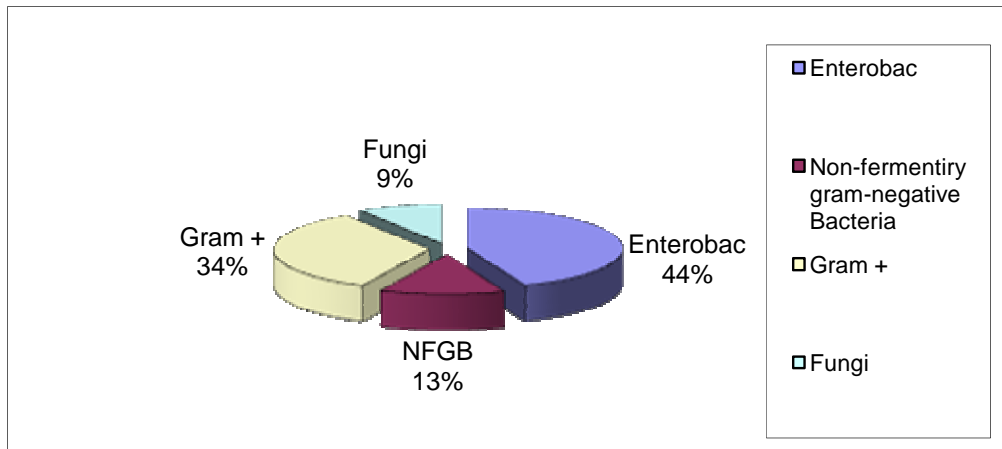
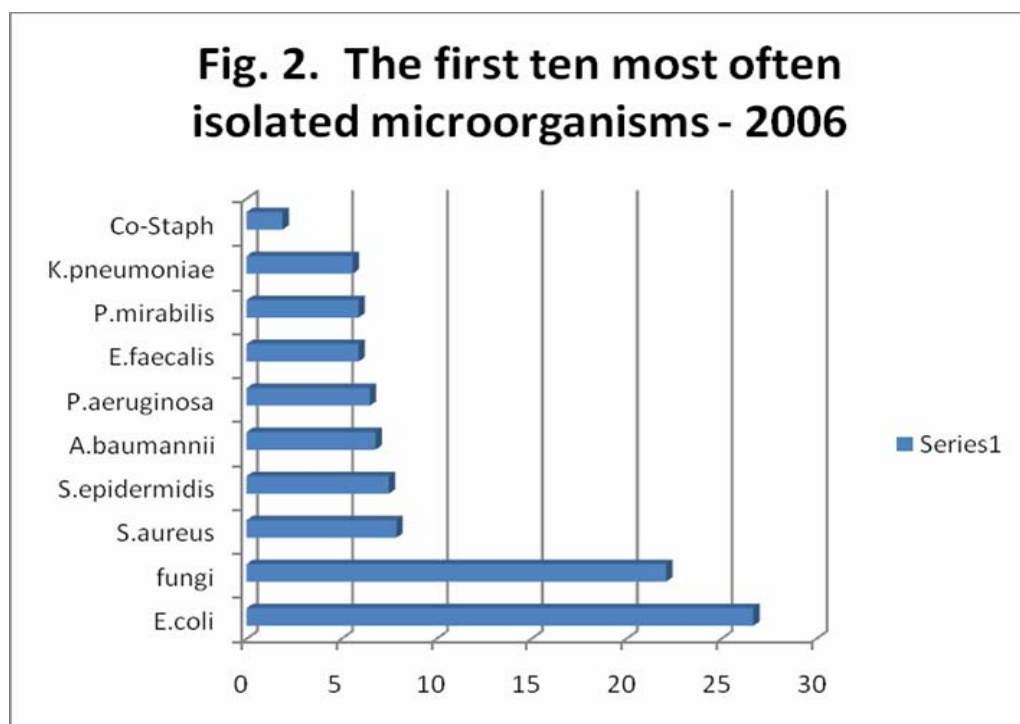


Figure 1. Structure of the bacterial infections



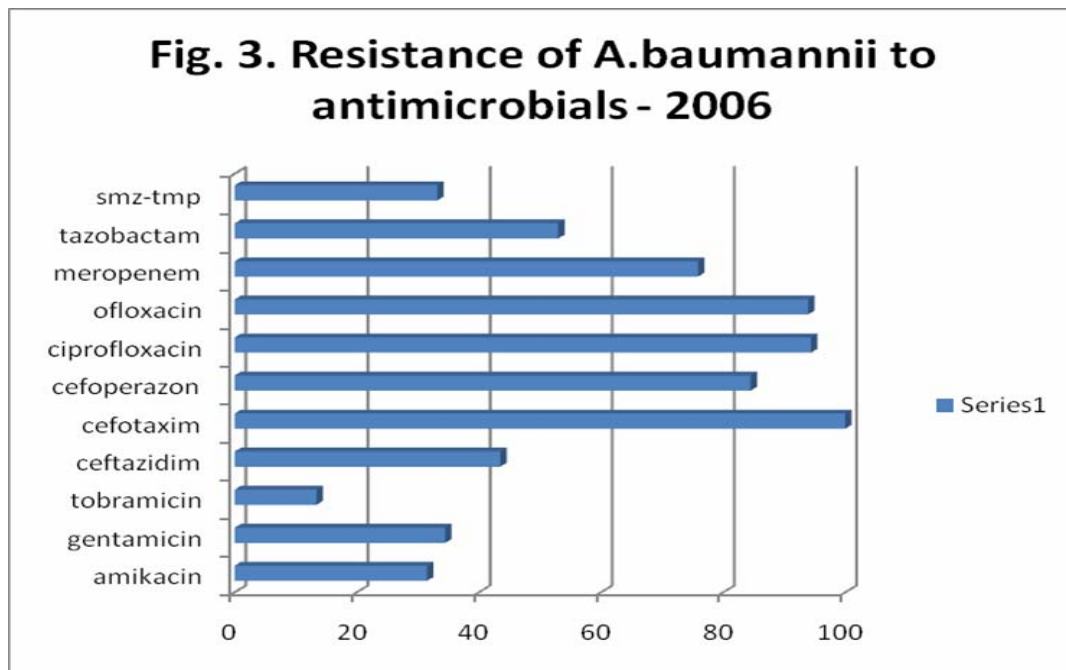
We found no a trend toward increased rate of A.baumannii for the period of investigation, with exception 2005 with level of 14%. Our data show that A.baumannii is isolated as an important pathogen and takes the first place with relative part of 24% in respiratory tract infections, takes also third place in bloodstream infections with 9.6% and in wound infections with 8.8% respectively and is very problematic pathogen for ICU' patients. NNIS data are very similar to these, reported by us, and according to them, A.baumannii proportion increased

significantly in ICU' patients with healthcare-associated pneumonia, urinary tract and surgical site infections / Sunenshine,R. et al 2007/. Additionally, indication of an increase in the number of reported A.baumannii bloodstream infections in patients at military medical facilities in which service members injured in Iraq, Kuwait, and Afganistan are treated. /Scott,P. et al 2004/.

The strains resistance' investigation to antimicrobial drugs shows high level resistance or multiresistance of A.baumannii

strains developing significantly in the last two decades. It was demonstrated a high resistance to beta-lactams, including third generation of cephalosporins – ceftazidime and cefotaxime, quinolones – more than 90% of *A.baumannii* strains are resistant to ciprofloxacin and ofloxacin and aminoglycosides. Since 2004 it was also registered resistance of clinical *A.baumannii*

strains to carbapenems. The data obtained by us for 2006 show that 75% of the stains, isolated from respiratory system in ICU' patients are resistant to meropenem and imipenem. /Fig. 3/. Our preliminary results demonstrate that 30.5% of the *A.baumannii* strains investigated carry genes, encoding VIM 1 enzymes, but there were not detected genes, encoding IMP carbapemenases.

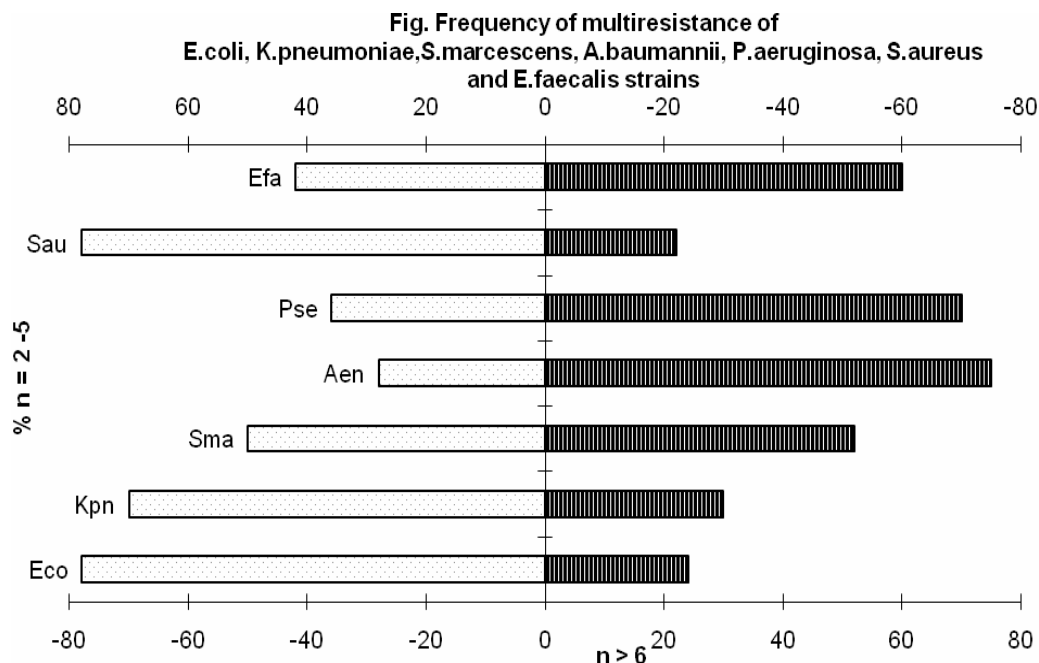


Because of the lack of a standard definition for multidrug resistance in the literature, we accepted the definition proposed by Sunenshine, R. et al 2005 which defines multidrug resistance as resistance to all or all but 1 antimicrobial drug class commonly prescribed for treatment of patients with gram-negative infections, with the exclusion of polymyxins. By this way we estimated that more than 75% of *A.baumannii* strains are multiresistant to most of antimicrobials used in clinical practice /Fig.4 /. Many national and foreign communications reveal the isolation of *A.baumannii* resistant to almost all commercially available antimicrobial agents, drastically limiting the therapeutic options. / Savov, E., 2002, Savov, E. 2005, Murray, C. et al 2005 / Also, there were established variations in the resistance of *A.baumannii* to different groups of antimicrobials happened in different continents, regions, countries, hospitals, s.c „pandrug resistance” /Diomedi, A. 2005/. In this connection, to optimize the therapy of these infections with the development of

new antibacterial agents is raised and very important at present.

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**Figure 4**

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