



**ACINETOBACTER 2019**  
12<sup>th</sup> INTERNATIONAL SYMPOSIUM  
ON THE BIOLOGY OF ACINETOBACTER  
SEPTEMBER 4-6 | FRANKFURT, GERMANY



# Results of the pilot study on molecular characterisation of MDR clinical *Acinetobacter baumannii* isolates from neighbouring countries

I. Goic-Barisic, A. Kovacic, D. Medic, S. Jakovac, T. Petrovic, M.  
Tonkic, A. Novak, Z. Rubic, M. Radic, J. Hrenovic

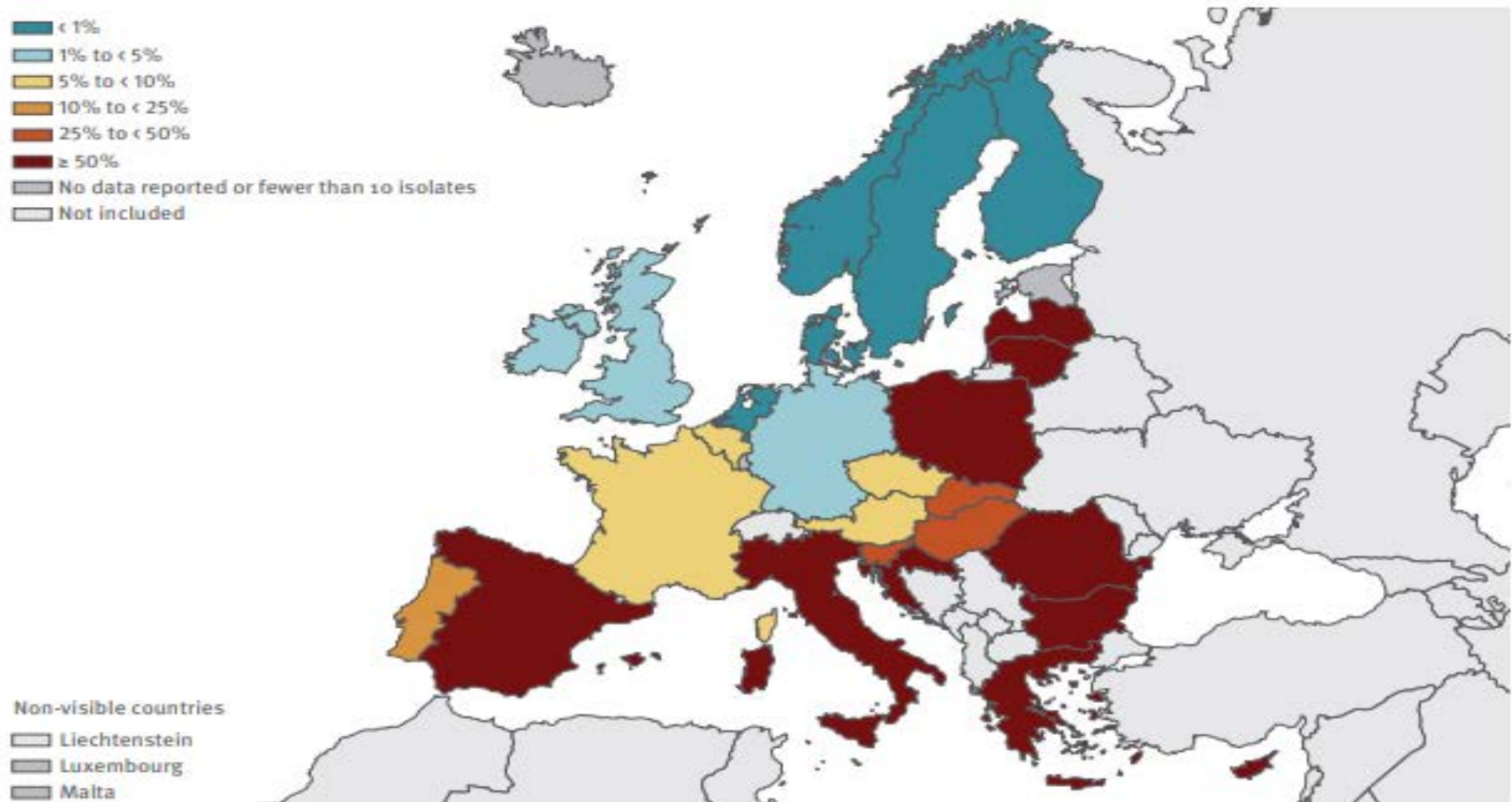


SVEUČILIŠTE  
U SPLITU  
MEDICINSKI  
FAKULTET



# ECDC

**Figure 3.23. *Acinetobacter* spp. Percentage (%) of invasive isolates with combined resistance to fluoroquinolones, aminoglycosides and carbapenems, by country, EU/EEA countries, 2017**



# Published data from Serbia



genomeA announcements™

Published as *Microbiology Resource Announcements* starting 12 July 2018

[Genome Announc.](#) 2015 Nov-Dec; 3(6): e01390-15.  
Published online 2015 Dec 10. doi: [10.1128/genomeA.01390-15](https://doi.org/10.1128/genomeA.01390-15)

PMCID: PMC4675936  
PMID: [26659671](https://pubmed.ncbi.nlm.nih.gov/26659671/)

## Whole-Genome Sequence of a European Clone II and OXA-72-Producing *Acinetobacter baumannii* Strain from Serbia

[Laurent Dortet](#)<sup>a,b,c</sup>, [Rémy A. Bonnin](#)<sup>b,c</sup>, [Delphine Girlich](#)<sup>b,c</sup>, [Dilek Imanci](#)<sup>d</sup>, [Sandrine Bernabeu](#)<sup>a,b,c</sup>,  
[Nicolas Fortineau](#)<sup>a,b,c</sup> and [Thierry Naas](#)<sup>¶a,b,c</sup>

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Format: Abstract ▾

[PLoS One](#). 2015 Mar 30;10(3):e0122793. doi: [10.1371/journal.pone.0122793](https://doi.org/10.1371/journal.pone.0122793). eCollection 2015.

### Carbapenem-resistant *Acinetobacter baumannii* from Serbia: revision of CarO classification.

[Novovic K](#)<sup>1</sup>, [Mihajlovic S](#)<sup>1</sup>, [Vasiljevic Z](#)<sup>2</sup>, [Filipic B](#)<sup>3</sup>, [Begovic J](#)<sup>1</sup>, [Jovcic B](#)<sup>4</sup>.

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Antimicrobial Agents  
and Chemotherapy



## First Occurrence of OXA-72-Producing *Acinetobacter baumannii* in Serbia

[Laurent Dortet](#)<sup>a,b,c</sup>, [Rémy A. Bonnin](#)<sup>b,c</sup>, [Sandrine Bernabeu](#)<sup>a,b,c</sup>, [Léila Escaut](#)<sup>d</sup>, [Daniel Vittecoq](#)<sup>d</sup>, [Delphine Girlich](#)<sup>e</sup>, [Dilek Imanci](#)<sup>f</sup>,  
[Nicolas Fortineau](#)<sup>a,b,c</sup>, [Thierry Naas](#)<sup>¶a,b,c</sup>

[Antimicrob Agents Chemother.](#) 2018 Jun 26;62(7). pii: e00219-18. doi: [10.1128/AAC.00219-18](https://doi.org/10.1128/AAC.00219-18). Print 2018 Jul.

## OXA-72-Mediated Carbapenem Resistance in Sequence Type 1 Multidrug (Colistin)-Resistant *Acinetobacter baumannii* Associated with Urinary Tract Infection in a Dog from Serbia.

[Misic D](#)<sup>1</sup>, [Asanin J](#)<sup>2</sup>, [Spergser J](#)<sup>3</sup>, [Szostak M](#)<sup>#3</sup>, [Loncaric I](#)<sup>#3</sup>.

# Published data from Bosnia and Herzegovina 2011-2015

*Medicinski Glasnik*, Volumen 8, Number 2, August 2011

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## **LETTER TO THE EDITOR**

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### **Multidrug-resistant *Acinetobacter baumannii*- the pathogen with no borders?**

Ivana Goić-Barišić<sup>1</sup>, Vanja Kaliterna<sup>2</sup>

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**Corresponding author:** Ivana Goić-Barišić, Department of Clini-

## **ORIGINAL ARTICLE**

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### **Emergence of extensive drug-resistant (XDR) *Acinetobacter baumannii* in the Clinical Center University of Sarajevo, Bosnia and Herzegovina**

Amela Dedeić-Ljubović<sup>1</sup>, Đana Granov<sup>1</sup>, Mirsada Hukić<sup>2,3</sup>

<sup>1</sup>Department of Clinical Microbiology, Clinical Centre University of Sarajevo, <sup>2</sup>Department of Medical Science, Academy of Sciences and Arts of Bosnia and Herzegovina, <sup>3</sup>International Burch University, Sarajevo, Bosnia and Herzegovina



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*Letters to the Editor / Journal of H*

**Outbreak in Croatia caused by a new carbapenem-resistant clone of *Acinetobacter baumannii* producing OXA-72 carbapenemase**

# Published data from Bosnia and Herzegovina 2017-2018

[Turk J Med Sci](#). 2017 Apr 18;47(2):715-720. doi: 10.3906/sag-1507-180.

**Molecular characteristics and antibiotic resistance of *Acinetobacter baumannii* beta-lactamase-producing isolates, a predominance of intrinsic blaOXA-51, and detection of TEM and CTX-M genes.**

[Ibrahimagić A](#)<sup>1</sup>, [Kamberović F](#)<sup>2</sup>, [Uzunović S](#)<sup>1</sup>, [Bedenić B](#)<sup>3,4</sup>, [Idrizović E](#)<sup>1</sup>.

[Infect Genet Evol](#). 2018 Mar;58:192-198. doi: 10.1016/j.meegid.2017.12.021. Epub 2017 Dec 22.

**Arrival of carbapenem-hydrolyzing-oxacillinases in *Acinetobacter baumannii* in Bosnia and Herzegovina.**

[Petrović T](#)<sup>1</sup>, [Uzunović S](#)<sup>2</sup>, [Barišić I](#)<sup>3</sup>, [Luxner J](#)<sup>4</sup>, [Grisold A](#)<sup>5</sup>, [Zarfel G](#)<sup>6</sup>, [Ibrahimagić A](#)<sup>7</sup>, [Jakovac S](#)<sup>8</sup>, [Slaćanac D](#)<sup>9</sup>, [Bedenić B](#)<sup>10</sup>.

# Carbapenem resistance of *A. baumannii* in Croatia for the period 2005. - 2008.

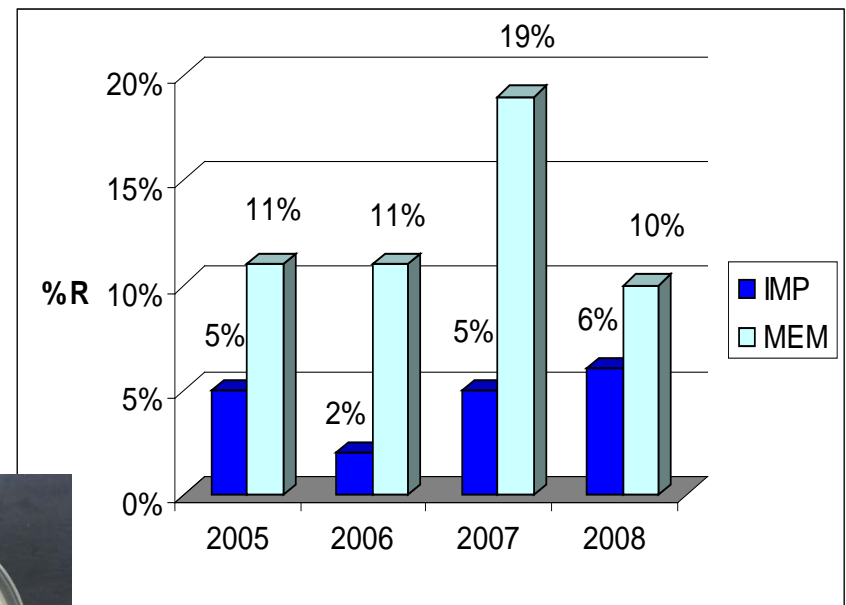
**2002 – 2009**

*A. baumannii*

• IMI R < 10%

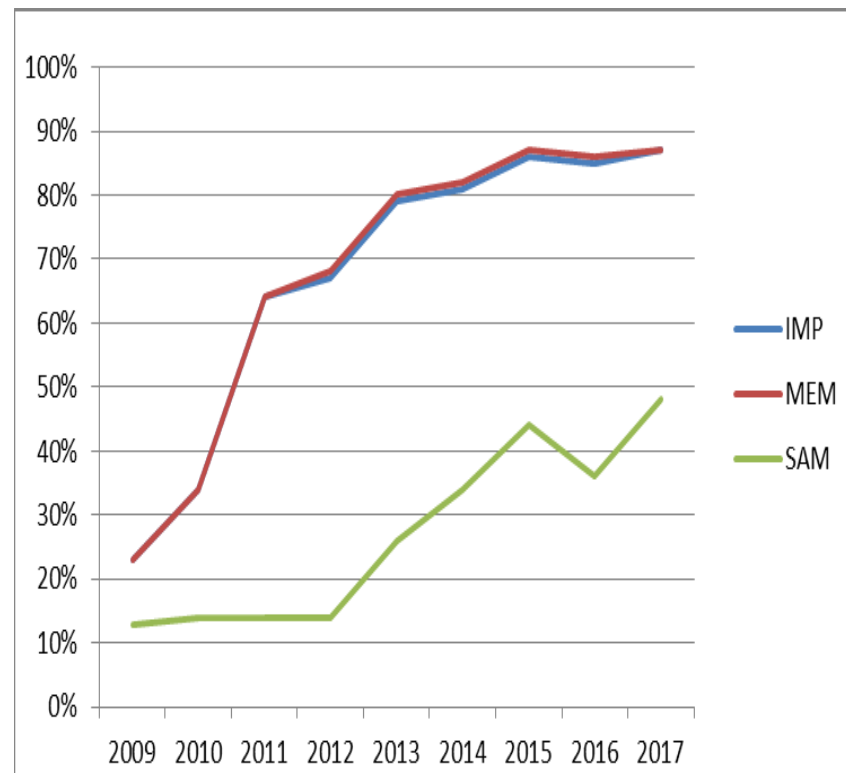
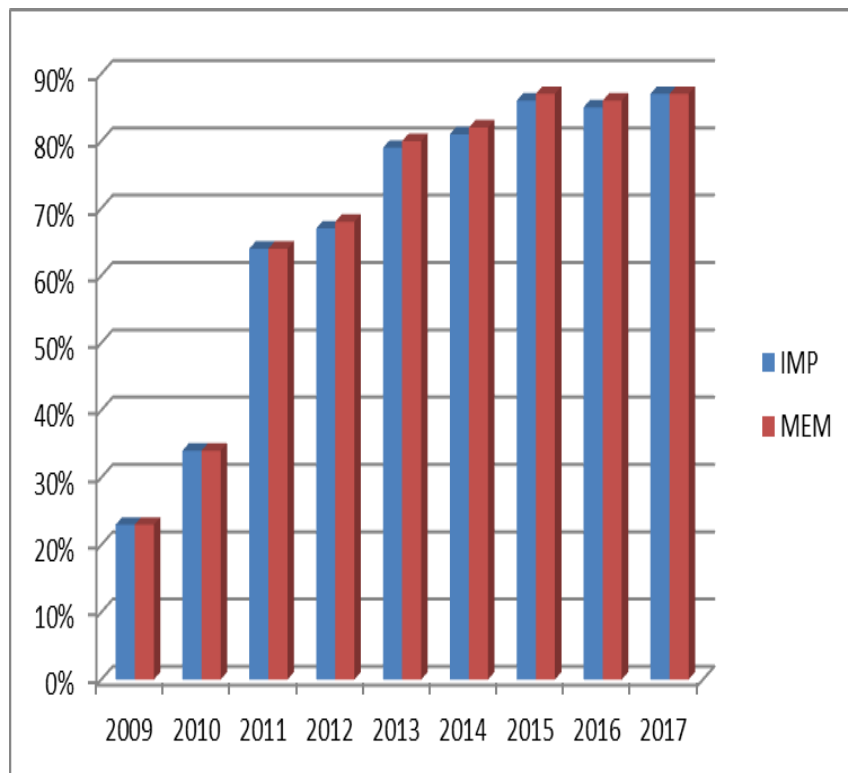
• OXA 107

• European clone 1



Croatian Committee for  
Antibiotic Resistance Surveillance

# Resistance to carbapenems in Croatia 2009-2017



# Published data from Croatia

## BRIEF COMMUNICATION

### First Report of Molecular Characterization of Carbapenem-Resistant *Acinetobacter baumannii* in Different Intensive Care Units in University Hospital Split, Croatia

I. GOIC-BARISIC<sup>1</sup> - B. BEDENIC<sup>2</sup>  
M. TONKIC<sup>1</sup> - S. KATIC<sup>3</sup> - S. KALENIC<sup>3</sup>  
V. PUNDA-POLIC<sup>1</sup>



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Bacteriology

### Occurrence of OXA-107 and IS*Aba*1 in Carbapenem-Resistant Isolates of *Acinetobacter baumannii* from Croatia

Ivana Goic-Barisic, Branka Bedenic, Marija Tonkic, Anita Novak, Stjepan Katic, Smilja Kalenic, Volga Punda-Polic, Kevin J. Towner

### Outbreak in Croatia caused by a new carbapenem-resistant clone of *Acinetobacter baumannii* producing OXA-72 carbapenemase



[I. Goic-Barisic<sup>a,\\*</sup>](#)   , [K.J. Towner<sup>b</sup>](#), [A. Kovacic<sup>c</sup>](#), [K. Sisko-Kraljevic<sup>c</sup>](#), [M. Tonkic<sup>a</sup>](#), [A. Novak<sup>a</sup>](#), [V. Punda-Polic<sup>a</sup>](#)

[European Journal of Clinical Microbiology & Infectious Diseases](#)

March 2014, Volume 33, Issue 3, pp 471–478 | [Cite as](#)

### Carbapenem resistance and acquired class D beta-lactamases in *Acinetobacter baumannii* from Croatia 2009–2010

[Authors](#) [Authors and affiliations](#)

M. Vranić-Ladavac, B. Bedenić  , F. Minandri, M. Ištók, Z. Bošnjak, S. Frančula-Zaninović, R. Ladavac, P. Visca 

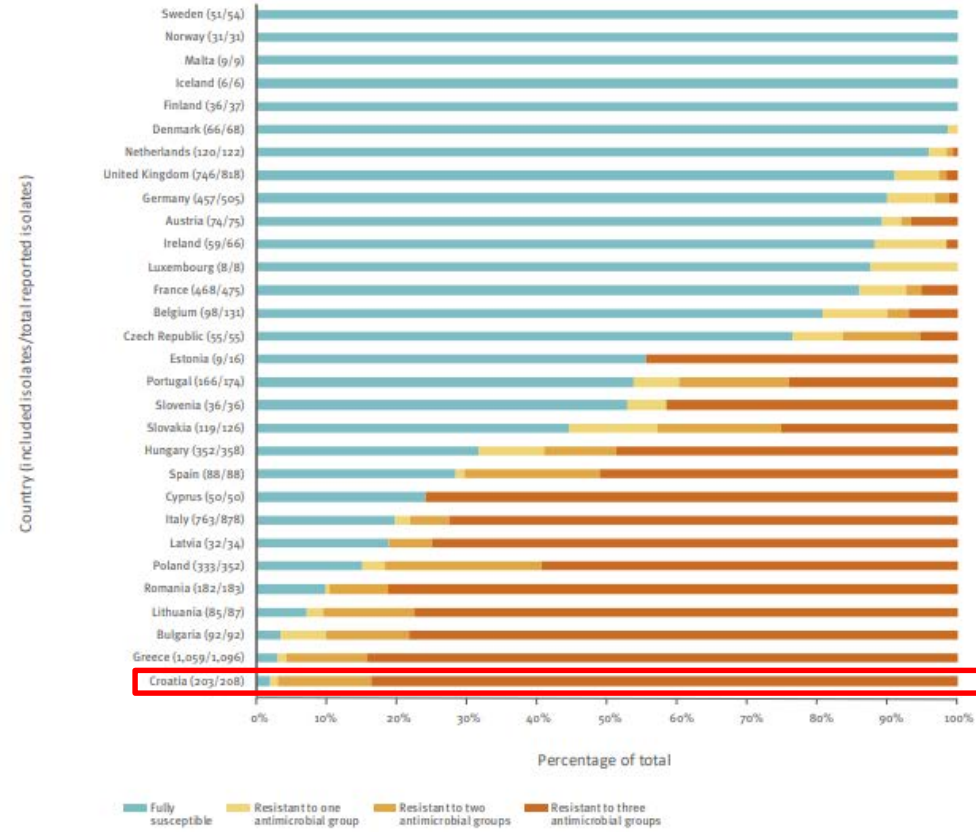


# CROCMID 2016 – CROCMID 2019

Figure 3.19. *Acinetobacter* spp. Distribution of isolates: fully susceptible and resistant to one, two and three antimicrobial groups (among isolates tested against fluoroquinolone, aminoglycoside and carbapenems), EU/EEA countries, 2016



Figure 3.19. *Acinetobacter* spp. Distribution of isolates: fully susceptible and resistant to one, two and three antimicrobial groups (among isolates tested against fluoroquinolones, aminoglycosides and carbapenems), EU/EEA countries, 2017



# Study design

- the aim of this pilot study is to compare the genotype resemblance and resistance mechanism of MDR clinical isolates of *A. baumannii* in region of southeastern Europe
- 12 clinical isolates of carbapenem-resistant *A. baumannii*

# Study design

- three different hospitals in neighbouring countries Croatia (UHS), Bosnia and Herzegovina (UHM), and Serbia (IPHV)
- all collected isolates shared high level of resistance to carbapenems with MIC >32mg/L to both imipenem and meropenem
- beside the carbapenem-resistance, isolates were uniformly resistant to gentamicin and ciprofloxacin, but susceptible to colistin

# Study design

- four isolates originated from University Hospital of Split, **Croatia**, were isolated from the tracheal and bronchoalveolar aspirates of patients from adult and paediatric Intensive Care Units in different outbreaks periods from 2009-2018
- all isolates belong to IC 2

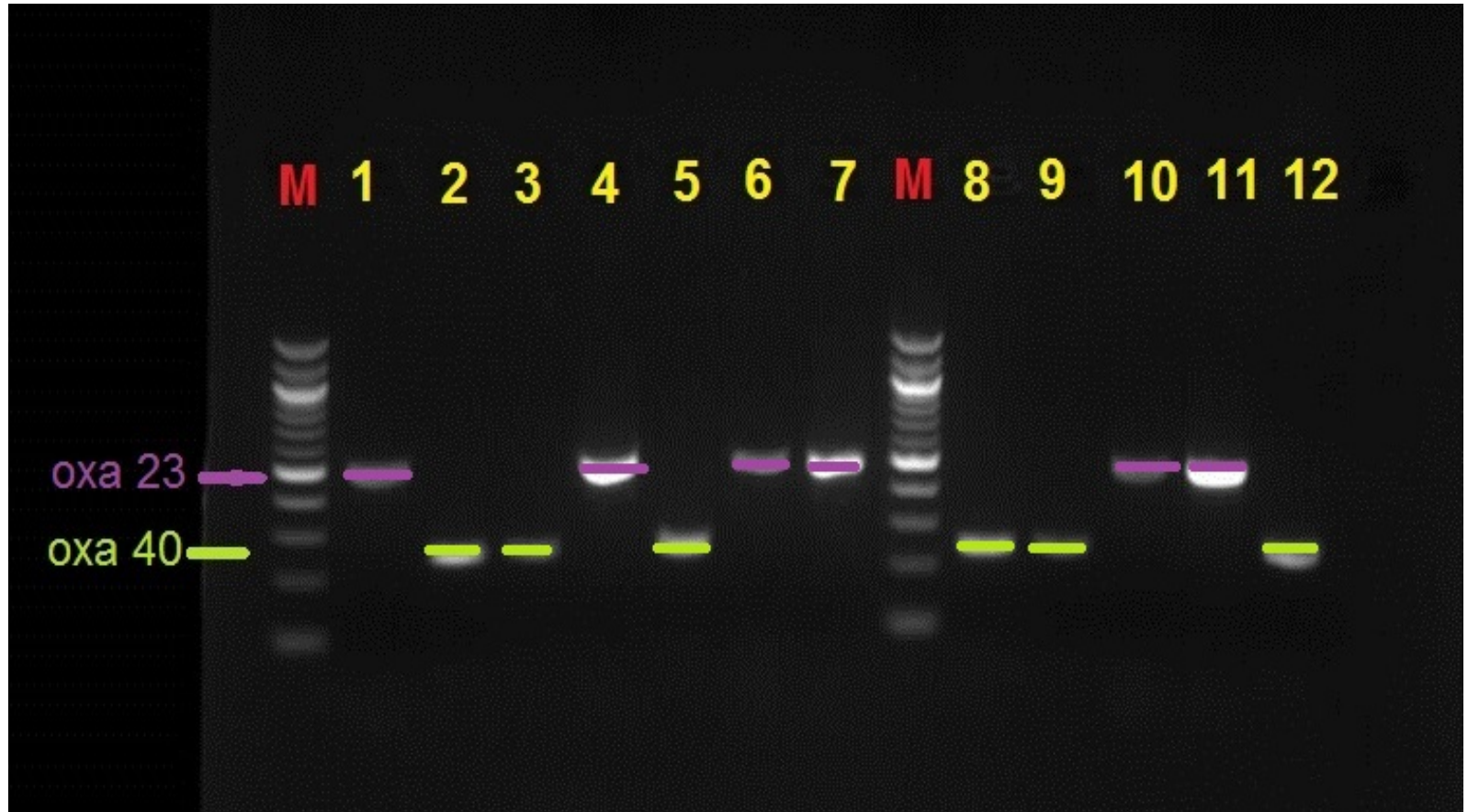
# Study design

- two isolates were collected from University Hospital Mostar, **Bosnia and Herzegovina** in the beginning of 2018, from urine sample and wound swab
- six isolates came from different wards of Clinical Centre of Vojvodina, one hospital in university-affiliated medical centre Novi Sad, **Serbia** and were collected from blood cultures during 2017 and 2018

# Study design

- multiplex polymerase chain reaction (PCR) using specific primers for *bla*OXA-51-like, *bla*OXA-40-like, *bla*OXA-23-like, *bla*OXA-58-like and *bla*OXA-143-like genes was performed to investigate carbapenem resistance
- the relatedness of collected *A. baumannii* isolates was assessed by using pulsed-field gel electrophoresis (PFGE)

# Multiplex PCR results from 12 clinical isolates of *A. baumannii*

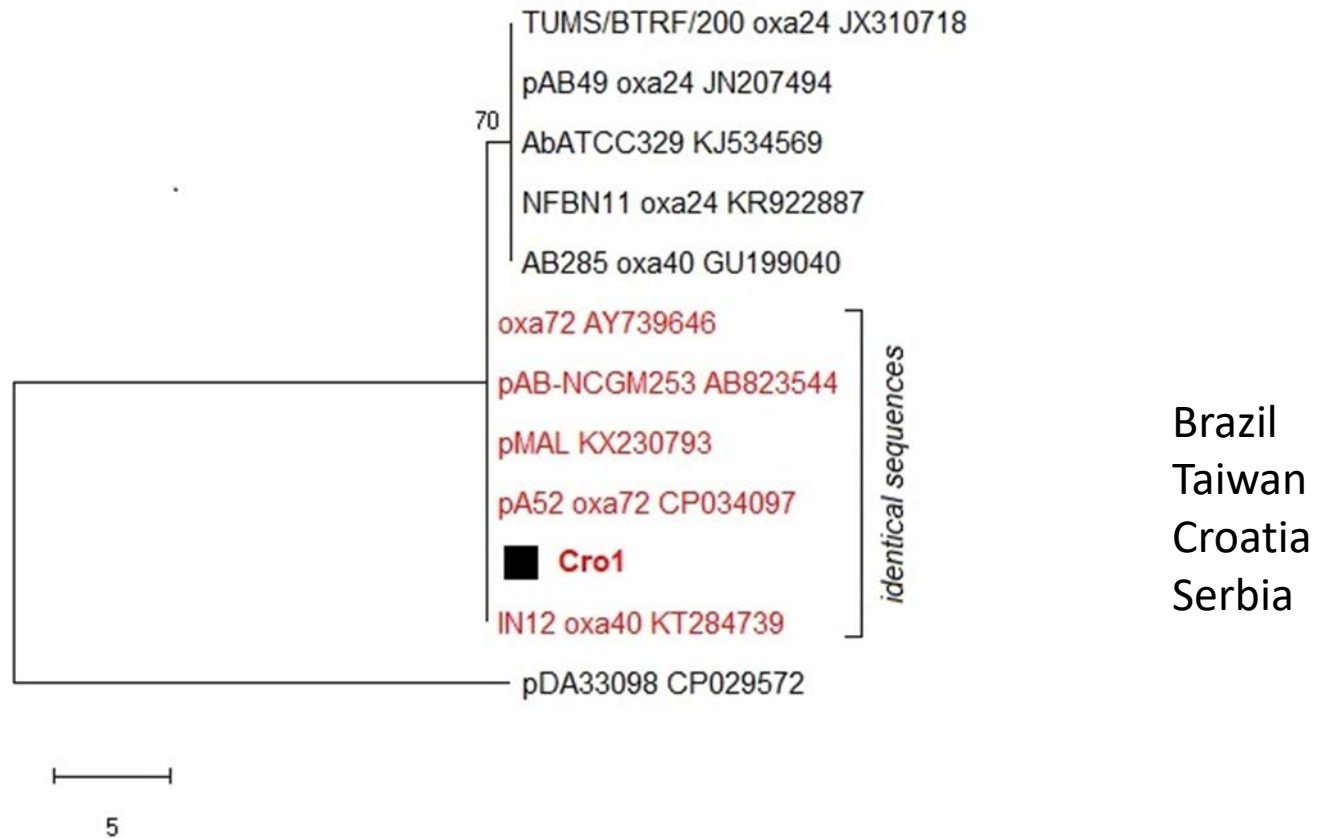


# Results

- the multiplex PCR confirmed the presence of *bla*OXA-40-like genes in half (6/12) of the collected isolates from neighbouring countries, besides the presence of *bla*OXA-23 gene
- all obtained amplicons of *bla*OXA genes were sequenced on both strands (commercial service MacroGen Europe, The Netherlands)



# Neighbour-joining phylogenetic tree inferred on *bla*OXA-72 gene



# Results

- identical sequences were obtained from 6 clinical isolates harboured OXA-72 oxacillinases confirming long time (more than a decade) of this mechanism of resistance to carbapenems in south-eastern Europe
- the *bla*OXA-72 gene sequence determined in this study has been marked as **Cro1** and deposited in GenBank under number **MN366238**

# Results

- identical sequences were obtained from 6 clinical isolates harboured OXA-23 oxacillinases, as a second confirmed mechanism of carbapenem resistance in *A. baumannii*
- the relatedness of collected *A. baumannii* isolates was assessed by using pulsed-field gel electrophoresis (PFGE) and displayed diversity of genotyping profiles
- MLST is going on....

# ECCMID Amsterdam 2019



# Thank you

- Ana Kovačić
- Marijo Pirija
- Deana Medić
- Sanja Jakovac
- Tanja Petrović
- Marija Tonkić
- Jasna Hrenović



University of Split  
School of Medicine

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Facultas Medica

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