**ESKAPE pathogens in Croatian soil**

**Jasna Hrenovic**, Goran Durm, Martina Seruga Music, Svetlana Dekic

1 University of Zagreb, Faculty of Science, Division of Biology, Zagreb, Croatia.
2 University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering, Zagreb, Croatia.

### Introduction

The Infectious Diseases Society of America in 2009 summarized the highly problematic bacteria by the "ESKAPE" mnemonic: Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa, Enterobacter spp. [1]. The ESKAPE pathogens developed mechanisms to escape the biocidal action of available antibiotics, and cause emerging human infections worldwide.

Bacterial resistance to carbapenems has received special attention, because carbapenems are used as last-resort antibiotics to treat infections caused by antibiotic-resistant bacteria. Among the ESKAPE pathogens, carbapenem-resistant Acinetobacter baumannii has been positioned in 2017 at the top of the World Health Organization priority list, for which new antibiotics are urgently needed.

Nowadays, A. baumannii is a leading cause of hospital outbreaks, but community-acquired infections outside hospital environment also have been recorded [2]. Little is known about the presence of this ESKAPE pathogen outside hospital settings, and the role of environmental isolates in the epidemiology of A. baumannii is not elucidated. A. baumannii has been unsuccessfully searched in soils as a source of infection among US service members injured during Operation Iraqi Freedom, probable due to the long storage duration of archived soils [3].

Here we report the finding of three carbapenem-resistant isolates of A. baumannii in technosol at an illegal dumpsite in Croatia.

### Results

Three isolates of A. baumannii shared features with the widespread human clinical isolates (Table 1):

- affiliation to the international clonal lineage IC1 (sequence type ST-231) or IC2 (ST-195);
- multi-drug resistance (non-susceptible to ≥1 agent in ≥3 antimicrobial categories);
- carbapenem-resistance mediated by acquired blaOXA-2 and blaOXA-23 genes.

These features classified three isolates of A. baumannii as ESKAPE pathogens. Close relatedness of environmental and clinical isolates suggest the illegally disposed hospital waste as the most probable source of A. baumannii in technosol.

### Conclusions

- ESKAPE pathogens are present in soil influenced by illegally disposed human waste in Croatia.
- Proper management and disposal of human waste is mandatory to prevent the spread of ESKAPE pathogens in nature.

### References