

Silvia Corcione
 Ilaria Motta
 Lucina Fossati
 Floriana Campanile
 Stefania Stefani
 Rossana Cavallo
 Giovanni Di Perri
 V. Marco Ranieri
 Francesco G. De Rosa

Molecular epidemiology of methicillin-resistant *S. aureus* in the ICU setting

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Dear Editor,
 Methicillin-resistant *Staphylococcus aureus* (MRSA) is widespread in intensive care units (ICUs) [1]. Several molecular components are important for the definition and genotyping of MRSA, such as staphylococcal chromosome cassette *mec* (*SCCmec*) type, Panton-Valentine leukocidin toxin (PVL), or staphylococcal protein A (*spa*) production. The genotypic characteristics of hospital-acquired strains (HA-MRSA) are consistent with *SCCmec* type I, II, and III, without PVL production whilst community-acquired strains (CA-MRSA) often produce PVL with type IV or V *SCCmec*.

We report here the molecular characteristics of ICU MRSA strains between 2011 and 2013 isolated from blood cultures or respiratory samples. Sensitivity to vancomycin, daptomycin and linezolid was tested with E-test and results were interpreted according to European Committee on Antimicrobial Susceptibility Testing (EUCAST) breakpoints [2]. All samples were studied by *SCCmec* typing, PVL typing, and *spa* typing.

There were 62 MRSA strains from respiratory samples (57; 92 %) or blood (5; 8 %): overall 54 (87 %) HA-MRSA and 8 (13 %) CA-MRSA; respiratory samples accounted for 50 (93 %) and 7 (87.5 %) of HA-MRSA and CA-MRSA strains, respectively. The molecular characterization and *spa* typing analysis are reported in Table 1: most MRSA had *SCCmec* II (35 cases, 56.4 %), of which 31 were HA-MRSA. The most common clone was t242 (50 %) and it was associated with *SCCmec* type II (87 %) and HA-MRSA (89 %). All isolates were susceptible to linezolid, whilst 13 and 6 isolates had a minimum inhibitory concentration (MIC) for vancomycin or daptomycin, respectively, above the EUCAST breakpoints for sensitivity. Ten of the t242 strains (32 %) had a vancomycin MIC greater than 2 mg/L, including one with a daptomycin MIC greater than 1 mg/L. The t242 strain represented 77 % (10 out of 13) of MRSA non-sensitive to vancomycin. These strains were further analyzed in order to confirm the high MIC value for vancomycin in a referral microbiology laboratory (MMARL—<http://www.labmicrobiologia.unict.it/>).

This is the first epidemiological report with t242 as the predominant

strain (50 %) in Italy, with a higher frequency amongst HA-MRSA cases and associated with lower susceptibility to vancomycin. A European study in 2005–2006 of MRSA epidemiology from 19 laboratories showed that the prevalent *spa* types in Italy were t041 (35.8 %) and t008 (28.4 %) [3].

All the MRSA isolates were sensitive to linezolid, the most effective drug in treating ventilator-associated pneumonia caused by MRSA. The characterization of MRSA strains with high MICs for vancomycin is important because vancomycin should be limited to selected cases, perhaps with low MICs, thereby questioning the empiric use in special settings. All the isolates were sensitive to daptomycin, confirming the microbiological activity against MRSA isolated from blood [4, 5], even if it has no role in pneumonia.

This is the first Italian report where t242 strains are predominant in the ICU setting, are mainly hospital-acquired, and associated with *SCCmec* II genes. These strains are characterized by an increased MIC for vancomycin, whilst susceptibility to linezolid and daptomycin is preserved.

Table 1 Molecular characterization of MRSA strains and genetic clusters identified by *spa* typing

	N	Esotoxin PVL
<i>SCCmec</i>		
I	11 (17.7 %)	NEG
II	35 (56.4 %)	NEG
III	0	NEG
IV	16 (25.8 %)	NEG
<i>Spa</i> typing		
t242	31 (50 %)	
t001	7 (11.3 %)	
t008	8 (12.9 %)	
t514	4 (6.4 %)	
t223	2 (3.2 %)	
Others		
(one each): t025, t041, t622, t2688, t2731, t3178, t5713, t6731, t8334, t9553	10	

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Conflicts of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical standards Ethical Committee, Molinette S. Giovanni Battista Hospital, Turin, Italy: Collection of data was approved within ASPIRE 2010 and it was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

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S. Corcione · I. Motta · G. Di Perri · F. G. De Rosa (✉)
Department of Medical Sciences, Infectious Diseases, Amedeo di Savoia Hospital, University of Turin, Corso Svizzera 164, 10149 Turin, Italy
e-mail: francescogiuseppe.derosa@unito.it
Tel.: +39-11-4393979
Fax: +39-11-4393996

L. Fossati · R. Cavallo
Laboratory of Microbiology and Virology, Department of Public Health, University of Turin, Turin, Italy

F. Campanile · S. Stefani
University of Catania, Catania, Italy

V. M. Ranieri
Division of Anesthesia and Critical Care, Department of Surgical Sciences, University of Turin, Turin, Italy