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## Methicillin resistant *Staphylococcus aureus* (MRSA) ST 398 and gut microbiota: Interspecies interactions into the mucus layer of ascendant colon

Elisa Spinelli<sup>1</sup>, Marta Caruso<sup>2</sup>, Matera Antonio Parisi<sup>2</sup>, Carmen Peláez<sup>3</sup>, Carmen Martínez-Cuesta<sup>3</sup>, Alessandra Barlaam<sup>1</sup>, Giovanni Normanno<sup>1</sup> and Teresa Requena<sup>3</sup>

<sup>1</sup>University of Foggia, Italy

<sup>2</sup>Experimental Zooprophyllactic Institute of Apulia and Basilicata, Italy

<sup>3</sup>Research Institute of Food Science (CIAL-CSIC), Spain

**Statement of the Problem:** Intestinal mucus layer may provide a niche for many nosocomial pathogens, including *S. aureus* which can occasionally cause a *Staphylococcal enterocolitis*. Recent exciting researches support the notion that a healthy intestinal microbiota composition can promote resistance to invading pathogenic bacterial species.

**Purpose:** The purpose of this study was to evaluate the survival of MRSA in simulated human ascendant colon conditions and its interaction with gut microbiota into the mucus layer.

**Methodology & Theoretical Orientation:** The study was performed at ascendant colon environment: body-like temperature (37°C), anaerobiosis (N<sub>2</sub>), pH 5.7, constant slow shaking (40 RPM). Mucin agar carriers stand for the intestinal mucus layer and a basic feed medium represented the intestinal lumen contents. A three-days long in vitro study was performed by using microbiota from pooled faeces of healthy individuals that were stabilized simulating ascendant colon conditions and a MRSA strain of animal origin (ST398-t011-SCC*mecV*; 10<sup>7</sup> UFC/mL). Each day we checked the viability of MRSA both into the mucin agar carriers and in the feed medium by using MRSA-SELECT® plates (BioRad). The results were confirmed by quantitative PCR.

**Findings:** MRSA population decreased as a function of time during the incubation with luminal colon microbiota where it was not viable after 24 h. Counts of 4 log cfu/g were still obtained in the mucin agar carriers after 72 h of incubation. On the other hand, counts of *Bifidobacterium* and *Akkermansia* increased in the mucin agar carriers as a function of time.

**Conclusion & Significance:** The results support the hypothesis that a competitive microbiota may control MRSA intestinal colonization empathize the important role of specific groups which can inhibit the adhesion of/displace MRSA from the intestinal mucus layer.

### Recent Publications

1. Baumler A J and Sperandio V (2016) Interactions between the microbiota and pathogenic bacteria in the gut. *Nature* 535(7610):85-93.
2. Barroso E, Cueva C, Peláez C, Martínez-Cuesta M and Requena T (2015) Development of human colonic microbiota in the computer-controlled dynamic SIMulator of the GastroIntestinal tract SIMGI. *LWT-Food Science Technology* 61(2):283-289
3. Jakobsson H E, Rodríguez-Piñeiro A M, Schütte A, Ermun A, Boysen P, Bemark M, Somme F, Bäckhed F, Hansson GC and Johansson MAV (2014) The composition of the gut microbiota shapes the colon mucus barrier. *EMBO report* 16(2):164-177.

4. Gries D M, Pultz N J and Donskey C J (2005) Growth in cecal mucus facilitates colonization of the mouse intestinal tract by methicillin resistant *Staphylococcus aureus*. *Journal of Infectious Diseases* 192(9):1621-1627.
5. Vesterlund S, Karp M, Salminen S and Ouwehand A C (2005) *Staphylococcus aureus* adheres to human intestinal mucus but can be displaced by certain lactic acid bacteria. *Microbiology*. 152:1819-1826.

### **Biography**

Elisa Spinelli is a Veterinarian with a Postgraduate qualification in Food safety, Certification and Food Risk Communication. She is a PhD student at University of Foggia (Italy) where she is working on the main topic of antimicrobial resistant bacteria from a food safety perspective, focusing on the detection and prevalence of Methicillin resistant *Staphylococcus aureus* (MRSA) in new ecological niches. She has worked over the last six months as a Visiting PhD student at The Research Institute of Food Science (CIAL-CSIC), Madrid (Spain) on the fate of MRSA along the human gastrointestinal tract and its interaction with gut microbiota.

e.spinelli1991@gmail.com

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