



# Phenotypic and Genotypic characterization of *Staphylococcus aureus* isolated from food industry workers

Carla Santos, Helena Meireles, Bárbara Ramos, Ana Castro, Joana Silva and Paula Teixeira\*

CBQF/Escola Superior de Biotecnologia, Universidade Católica Portuguesa,

Porto, Portugal

\* e-mail: pteixeira@esb.ucp.pt

## Objective

The main objective of the present work was to evaluate the presence of *Staphylococcus aureus* in the nose and in the hands of 162 food industry workers. Isolates of *S. aureus* were characterized according to i) the presence of some virulence factors and ii) the susceptibility to antibiotics.



## Methods

Nasal swab samples were collected from anterior nares and hands of 162 volunteers. Swabs were spread onto Baird-Parker Egg Yolk Tellurite Medium and incubated at 48 h for 37 °C.

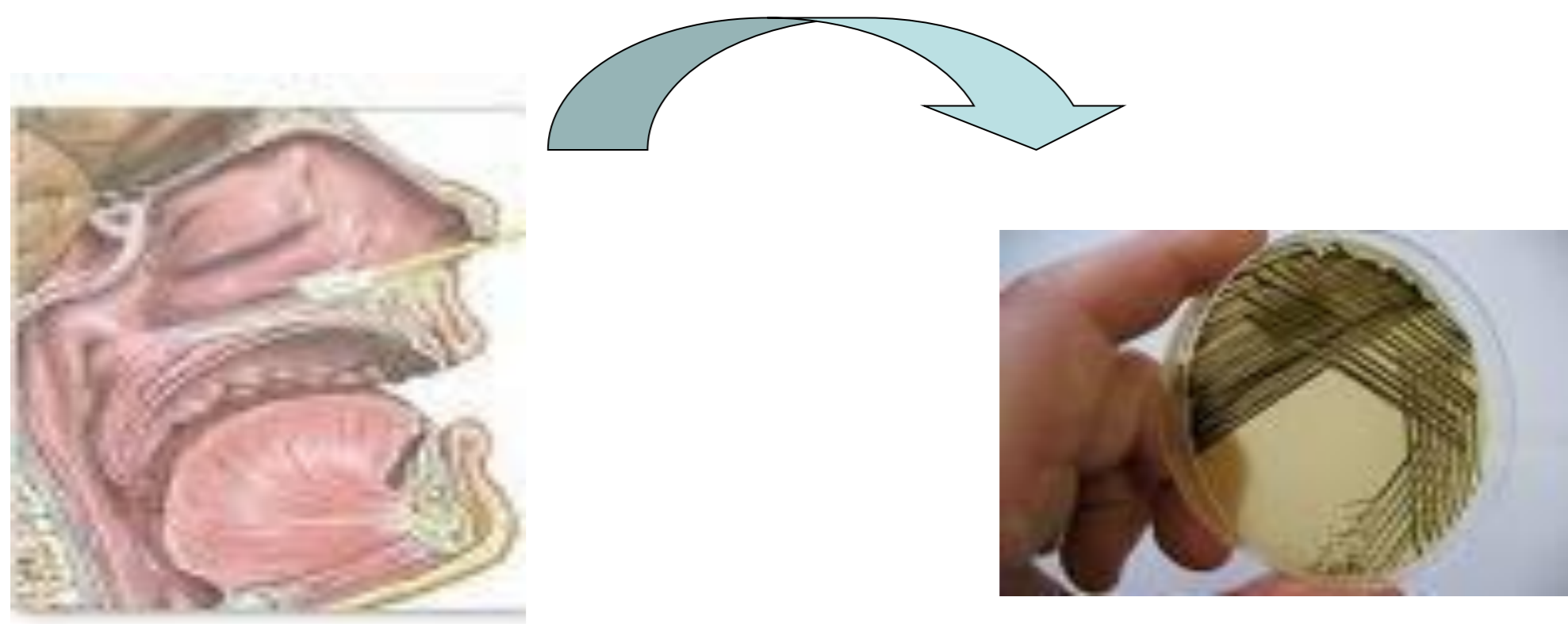


Figure 1: Isolation of *S. aureus* on BPA egg-yolk tellurite from anterior nares with sterile cotton swabs.

Characteristic colonies were isolated on Trypton Soy Agar (TSA) and then frozen at -80 °C in BHI + 30% glycerol for future use. Isolates were tested by Gram staining, presence of catalase and coagulase. Additional tests such as growth on Mannitol Salt Agar (MSA) with formation of yellow coloration after 48h at 37 °C and DNase test were also performed.

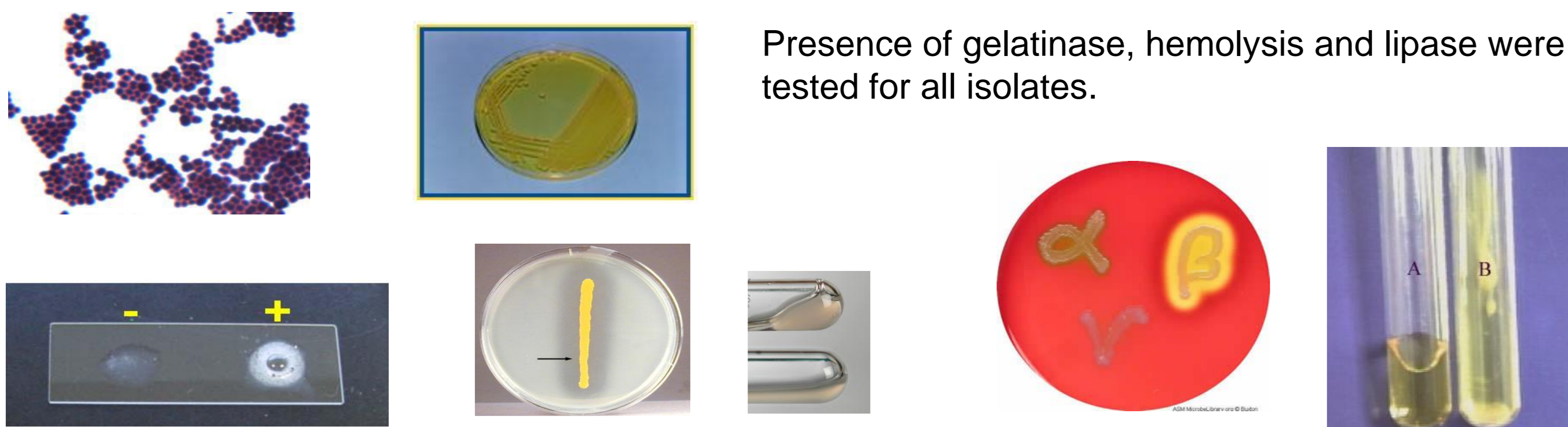


Figure 2: Results obtained for the performed phenotypic confirmation tests of characteristic colonies of *S. aureus*; Gram test (A); catalase (B), coagulase (C), DNase (D) and manitol fermentation (E).

The antimicrobial susceptibility to antibiotics was tested according to the CLSI guidelines (5). The tested antibiotics were: ampicillin, vancomycin, gentamicin, nitrofurantoin, penicillin, oxacillin, erythromycin, ciprofloxacin, rifampicin, tetracycline and chloranphenicol.

## References

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## Introduction

*S. aureus* is one of the most important species concerning food safety, being considered for long time a public health hazard. It can colonise the skin and the nasal cavity of the normal population; up to 20% carry *S. aureus* in their nose, with no symptoms and are considered to be colonised (1, 2, 3). The presence of *S. aureus* in foods is often due to cross-contamination from food handlers. Moreover, *S. aureus* food poisoning outbreaks caused by the consumption of processed foods are in many situations caused by post-processing contamination by foods handlers who carry enterotoxigenic staphylococci in their nares or in their skin.

In the last decades, the percentage of infections caused by methicillin resistant *S. aureus* (MRSA) has increased worldwide (3). Moreover, MRSA isolates that are resistant to other antibiotics i.e. vancomycin are emerging (4).

## Results

Globally, 35,8% of the sampled individuals carried *S. aureus* (Figure 4). Table 1 illustrates the carriage of *S. aureus* in hands, nose and both.

Concerning the gelatinase, hemolysis and lipase tests, 78.8%, 78.8% and 81.8% of the isolates, respectively, were considered positive.

Sixth per cent of the tested isolates were considered to be multidrug resistant since they were resistant to 3 or more non-lactam antibiotics (Table 2).

Table 1 – Carriage of *Staphylococcus aureus* in hands, nose and both.

Hands	Nose	Hands +Nose
9.3%	21.6%	4.9%

Figure 4: Carriage of *Staphylococcus aureus* in the 162 workers from the food industry.

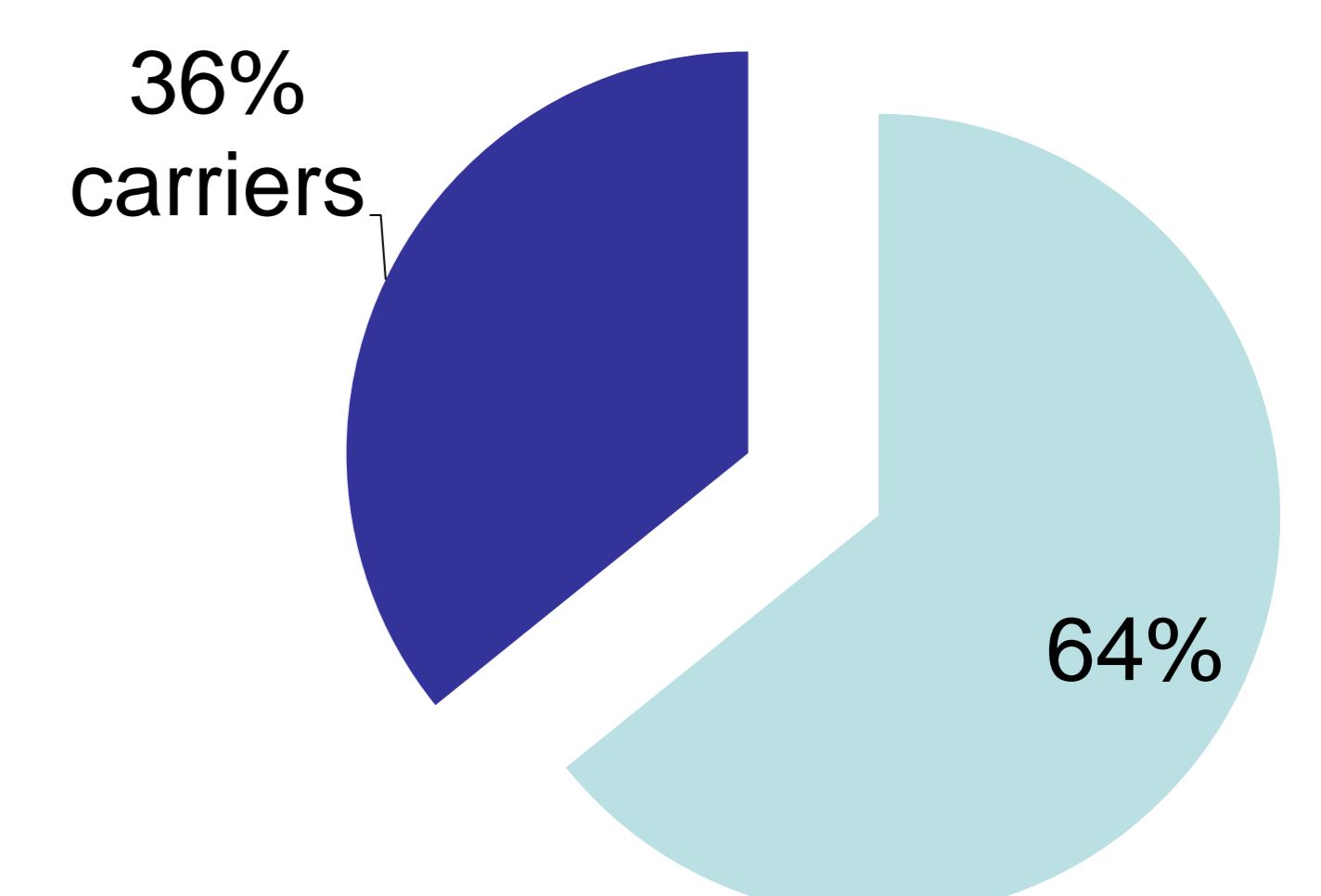


Table 2 – Antimicrobial susceptibility of *S. aureus*.

Antibiotic	S <sup>a</sup> (%)	R <sup>b</sup> (%)
ampicillin	-	100
vancomycin	100	-
gentamicin	100	-
nitrofurantoin	18.8	81.2
penicillin	33.3	66.7
oxacillin	65.2	34.8
erythromycin	68.2	31.8
ciprofloxacin	86.4	13.6
rifampicin	87.9	12.1
tetracycline	95.4	4.6
Chloranphenicol	98.5	1.5

## Conclusion

The presence of *S. aureus* on the nose or hands or even on both of food industry workers emphasizes the need to use strict hygienic conditions during the manipulation of foods, specially those that are ready-to-eat and support the growth/enterotoxins production by this pathogen