

**Extracellular matrix in *Staphylococcus epidermidis* biofilms: a consequence of bacterial production or cell wall degradation?**

Filipe Cerca<sup>a, b</sup>, Filipa Andrade<sup>a</sup>, Alexandra Correia<sup>c</sup>, Luzia Teixeira<sup>a,b</sup>, Ângela Magalhães<sup>a</sup>, Mariana Hinzmann<sup>a</sup>, Íris Ferreira<sup>a</sup>, Adília Ribeiro<sup>a</sup>, Alexandre Lobo-da-Cunha<sup>a</sup>, Paula Sampaio<sup>d</sup>, Nuno Cerca<sup>d</sup>, Joana Azeredo<sup>d</sup>, Manuel Vilanova<sup>a,b,\*</sup>

<sup>a</sup> ICBAS - Instituto de Ciências Biomédicas de Abel Salazar, Largo do Professor Abel Salazar 2, 4099-003, Porto, Portugal. <sup>b</sup> IBMC - Instituto de Biologia Molecular e Celular, Rua do Campo Alegre 83, Porto, Portugal. <sup>c</sup> Centro de Biologia Molecular e Ambiental da Universidade do Minho, Departamento de Biologia, Universidade do Minho, Braga, Portugal. <sup>d</sup> Departamento de Engenharia Biológica. Universidade do Minho, Braga, Portugal

\* Corresponding author: Tel: 351-222062250; fax: 351-222062232.

*E-mail address:* vilanova@icbas.up.pt.

## **Abstract**

*Staphylococcus epidermidis* is a leading pathogen accounting for nosocomial infections. The ability to form biofilms is considered the major virulence factor of this bacterium. The hallmark of this type of infection is the presence of an extracellular polymeric matrix that, in the case of *S. epidermidis* biofilms, is mainly constituted by an *N*-acetylglucosamine polymer.

We have identified a subpopulation of bacteria that we believe to be the responsible for the extracellular matrix accumulation in *S. epidermidis* biofilms as they have comparative significant higher amount of surface *N*-acetylglucosamine. Flow cytometric evaluation of cell wall permeability and transmission electronic microscopy are highly suggestive of primary wall degradation in these bacteria.

In overall, these results suggest that the extracellular matrix in *S. epidermidis* biofilms is a consequence of the degradation of the bacteria cell wall and that propidium iodide should be used with care when used as a marker for bacteria dead in biofilms.