The value of morphological characterisation of bacterial colonies in microbial diagnosis and clinical decision-making

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During the course of infection, microorganisms go through genetic and physiological changes to survive the selective pressures imposed by the human immune system and the antibiotic treatments. Colony morphological manifestations of such antimicrobial responses are fairly immediate and inexpensive to obtain experimentally, and can be a very useful tool in clinical decision making. Several morphotypes have already been associated to chronic infections and device-associated infections. For example, *P. aeruginosa* mucoid variants are typically isolated from cystic fibrosis lungs at chronic stages. These colony variants are markedly resistant to common antibiotics, such as gentamicin, aminoglycosides, ciprofloxacin and imipenem. Likewise, *S. aureus* small colony variants, often isolated from several chronic device-associated infections, display augmented resistance to several classes of antibiotics and, able to live intracellularly, and therefore surviving the action of both antibiotics and host immune defences.

Therefore, the aim of this work is to introduce a novel computer-assisted microbial morphotyping platform in support of microbial diagnosis and further clinical decision-making. A dataset of morphotypes, extracted from the publicly available at MorphoCol database (http://morphocol.org), exemplifies how the platform assists in the manual morphological characterisation, collects data from automatic image processing tools, clusters colonies that show observable similar morphologies and describes the antibiotic susceptibility of the individual groups. Results show that key colony features, such as size, consistency and texture, can be in fact predictors of pathogenic potential of bacteria. Therefore, new colonies may be matched against the described groups, enabling the formulation of a preliminary diagnosis and therapeutics based on the previous reports..

Keywords: clinical decision making; data mining; colony morphology; antibiotic susceptibility

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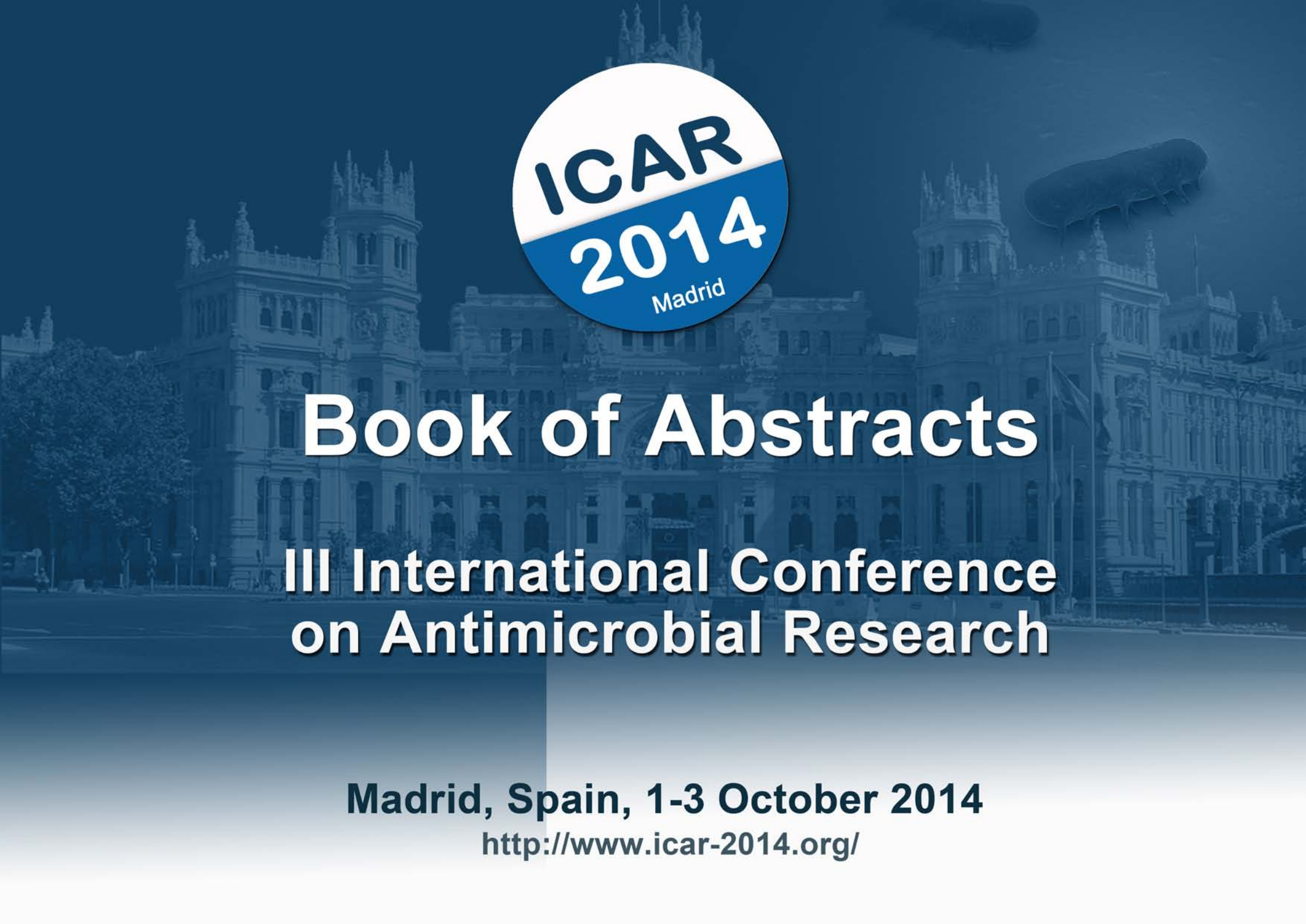

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