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Towards rapid detection of *Staphylococcus aureus* during blood culture

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The presence of viable bacteria in the blood is commonly known as bacteremia. It can be a very localized and transient event with no consequences but for the immune-suppressed or seriously wounded people. The most severe cases can develop into sepsis, septic shock and sometimes death. Faced with suspected bacteremia, a practitioner is forced to use a broad spectrum antibiotic treatment while awaiting the results of microbiological analyses of blood samples which can last for 24 hours to 72 hours. Despite numerous efforts to shorten the time required for diagnosis, in most techniques the organism identification begins only after the blood culture turns positive. *Staphylococcus aureus* is one of the most frequent strains causing bacteremia. For this reason, its detection is a major challenge for health issues. We propose here to carry out the microorganism identification directly from blood culture phase. To achieve this, live bacteria are detected on an antibody based biochip without any labeling. This approach relies on a simple to operate optical technique named Surface Plasmon Resonance imaging (SPRi), recently described for pathogen detection in complex samples (ground meat, milk). Biological samples are diluted in a media specifically dedicated to this application and in accordance with the recommendations for blood cultures. Then, samples are spiked with a known amount of *S. aureus* and loaded on the biochip. Interactions are then recorded in real time until a positive signal appears on specific antibody due to antibody-antigen recognition. In general, a few dozens of bacteria are detected in less than ten hours in human serum. We are now focusing on the methicillin-resistant strain (MRSA versus MSSA), by the identification of the PBP2a protein, which is anchored at the cell surface and therefore, is accessible to antibodies, using the recognition capability of this antibiotic resistance marker.

Biography

V Templier completed his engineering studies at Institut National des Sciences Appliquées de Toulouse as a biochemical engineer. He is currently a PhD student in the CEA Grenoble (Institut Nanosciences et Cryogénie). His research interests include biosensors with focus on pathogenic bacteria detection.

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