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Combination of nucleic acid mimics and fluorescence *in situ* hybridization (FISH) for an improved diagnosis of microbial infectionsc

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For many years now, the methods of choice for the rapid identification of microorganisms involved in clinical infections have been those based on PCR or on immunoassays. Implementation of fluorescence *in situ* hybridization (FISH), other well-known molecular technique, has been hindered by the general lack of robustness of the method. With the introduction of peptide nucleic acids (PNA) and other nucleic acid mimics, such as locked nucleic acids or 2'-O-methyl-RNA, the outlook for FISH-based methods is starting to change. These mimics enable FISH to be more advantageous due to several factors: 1) the synthetic nature prevents them from being degraded by proteases or endonucleases; 2) different affinities towards the formation of duplexes with rRNA hybridization implies that a better control of the FISH process can be achieved; and 3) smaller oligonucleotides imply a simpler diffusion through the cell wall and better mismatch discrimination.

PNA-FISH is now being implemented in several hospitals and several methods have been FDA-cleared. Because FISH does not require nucleic acid amplification steps, it is in theory simpler to employ than PCR. Because it retains the specificity and sensitivity associated to nucleic acid-based techniques, it is likely to be more accurate than immunoassays. If remaining drawbacks such as automation are surpassed, FISH-based diagnostics might be the technique of choice in clinical microbiology.

Biography

Nuno F. Azevedo obtained his degree in Biological Engineering in 2001 at the University of Minho, Portugal and presently holds a faculty research fellow position at the Faculty of Engineering of the University of Porto, Portugal. During his research career, he has authored or co-authored 40 papers in peer-reviewed international journals, more than 15 book chapters and given more than 20 oral presentations in international conferences and workshops. He is regularly part of the scientific advisory committee of three international conferences and is currently supervising several Ph.D. and M.Sc. students in different research areas. His main research interests are to explore the potential of peptide nucleic acids (PNA) and other nucleic acid mimics for the rapid diagnosis of microorganisms. This interest has led him to be the co-founder of Biomode SA, a start-up company that develops PNA-FISH methods for the detection of pathogens in the clinical and agro-food areas.

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