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FT-IR spectroscopy and chemometrics in microbiological applications

Preisner, O.[1], Gonçalves Vaz, M.[2], Lopes, J. A.[3], Machado, J.[3], Guiomar, R.[1], Menezes, J. C.[4] and Meirinhos-Soares, L.[4]
1. IBB-Institute for Biotechnology and Bioengineering, Centre for Biological and Chemical Engineering, Instituto Superior Técnico, Technical University of Lisbon, Lisbon, Portugal,
2. Requimte, Faculty of Pharmacy, University of Porto, Porto, Portugal
3. Enterobacteriaceae Unit, Bacteriology Centre, National Health Institute Ricardo Jorge, Lisbon, Portugal
ornella.preisner@ist.utl.pt

Clinical microbiology deals with the laboratory diagnosis of infectious diseases trying to elucidate spreading routes of given bacterial strains and further characterise the microbial species and their resistance to antimicrobial agents. Most clinical laboratories rely on the phenotype-based or molecularly oriented methods for straightforward microbial typing at the different taxonomic levels. Although precise, these methods are expensive, time consuming, and they require a highly trained staff, which limits their applicability on the routine basis. The Fourier Transform Infrared (FT-IR) spectroscopy has been by now successfully applied for rapid, accurate and cost-effective identification of pathogenic microorganisms. It is considered to be a powerful and versatile technique in microbiology that can assess the overall molecular composition (spectral fingerprints) of microbial cells in a non-destructive manner. Still a major concern in using FT-IR for pathogens discrimination are spectral pre-processing procedures and their impact on the increase of chemometrics models robustness. Unsupervised and supervised pattern recognition methods together with different variable selection strategies were investigated and relative merit for pathogens discrimination was reported. In this presentation, the general contribution of FT-IR spectroscopy and chemometrics to pathogenic microorganisms' discrimination at different taxonomic levels will be discussed.

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Comparison of two methods for *Streptococcus agalactiae* clinical diagnosis: growth on Granada and polymerase chain reaction detection

Corrêa, K.[1], Fernandes, R.[1,2], Gomes, A.[3], Vieira, M.[1,4], Ferraz, R.[1,4] and Prudêncio, C.[1]
1. Ciências Químicas e das Biomoléculas, Escola Superior de Tecnologia da Saúde do Porto, Instituto Politécnico do Porto, Porto
2. Dep. Bioquímica, Genética e Imunologia, Faculdade de Ciências, Universidade de Vigo, Vigo, Spain
3. Serviço de Patologia Clínica (Microbiologia), Hospital Pedro Hispano, Matosinhos
4. Departamento de Química, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Caparica
lalakc@hotmail.com

Group B *Streptococcus* (GBS) or *Streptococcus agalactiae* is one of the most common causes of life-threatening infections in newborns such as sepsis, pneumonia or meningitis due to its vertical transmission mother-child mechanism. Since the emergence of this pathogen in the 1970s, the increased use of intrapartum prophylaxis, using antibiotics, the infection rate has decreased by 70 %. Because only 0.5-1 % of mothers who carry GBS develops signs and symptoms of disease, clinical diagnosis of GBS can be problematic, once 20-25 % of pregnant woman carries GBS asymptomatically. Controversy remains about the optimal strategy for prevention, since blind administration of antibiotics may lead to emerge of resistant bacterial strains and serious public health problems. The current methods for bacteriological examination of *S. agalactiae* are based on biochemical identification using general and differential agar media and serological methods based on surface polysaccharide antigens which may be both expensive and time consuming. In present work, we have studied the contribution of molecular diagnosis by a polymerase chain reaction (PCR) method comparing with the standard bacteriological procedures among clinical pathology laboratories (CPL). Our results show the reliability of the PCR method, contributing for a faster diagnosis and for a correct and conscientious administration of prophylactic therapeutics.