

FTIR spectroscopy as a tool for typing microorganisms

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FTIR spectroscopy is employed to study molecular structure of complex biological systems such as macromolecules or whole cells. It has been used for the characterization of microorganisms, mainly at the genus and species levels (Naumann 1991). FTIR sensitivity is high enough that it can discriminate between closely related strains that express only a few different genes (Sockalingum 1998). In addition, FTIR spectroscopy is simple to implement, can be automated, allows quick and non-destructive analysis of the sample, and requires no specific consumable or reagent. This could make FTIR spectroscopy an interesting alternative or complementary technique for the epidemiology of microorganisms in clinical environment. Epidemiology is critical in a clinical setting. Nosocomial infections result from the acquisition of pathogens during hospital stay. Patient to patient or health care worker to patient transmission is frequently involved. Nosocomial infections cause increased mortality and duration of the hospital stay. Microorganisms implicated in nosocomial infections are predominantly resistant to antibiotics since strains surviving in hospital environment are confronted to high antibiotic concentrations. *Candida albicans* is the single most frequent fungal agent causing nosocomial infection. In case of an outbreak, it is of crucial importance to determine if infection is caused by contamination from an exogenous source or by the patient endogenous strain. This epidemiological investigation is essential in order to elucidate the reservoir of infectious agents, the mode of transmission and to take appropriate measures to treat patients and stop the contamination process: isolation, disinfection. So far, genetic techniques have been preferred in the typing of microorganisms. To be effective as a typing technique, FTIR spectroscopy must distinguish between genetically unrelated strains, identify the same strain in separate samples and this in a reproducible manner. We have already shown that FTIR could differentiate between several strains of *C. albicans* (Sockalingum 2002). In this study, we have investigated the potential of FTIR spectroscopy as an epidemiological tool. To do so we have recorded spectra of *Candida albicans* isolated from longitudinally followed patients in 2 intensive care units. Spectral signatures in combination with multivariate analysis allowed to cluster strains according to patient. Results were in good agreement with RAPD analysis of the same isolates and allowed to confirm that no cross-contamination occurred through the duration of this study.

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