TITLE: FAST DETECTION OF FOODBORNE PATHOGENS: AN INTERDISCIPLINARY APPROACH

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ABSTRACT

The development of a fast, reliable and efficient diagnostic test for qualitative assays and determination of microorganisms genus and/or species is one of the main challenges for human and animal medicine, food, pharmaceuticals, and personal care products industries. An electronic nose (e-nose) is a device capable of performing discrimination of gases profiles (e.g., metabolites derived from microbial growth) through the conductivity modulation according to the composition of the analyzed atmosphere to which the sensors are exposed. It is a fast and simple technique and does not require previous treatment of the sample. The aim of this study was to assess the ability of the e-nose in the discrimination of pathogenic microorganisms cultured in different media. A suspension of 2 log CFU of *Salmonella* Typhimurium (ATCC 14028), *Escherichia coli* (ATCC 8739), and *Pseudomonas fluorescens* (ATCC 13525) were inoculated individually in Falcon tubes with brain heart infusion broth (BHI), trypticase soy agar (TSA), xylose lysine deoxycholate agar (XLD), bismuth sulfite agar (BS), and brilliant green agar (BG). The inoculated samples were incubated at 35 °C and analyzed after 24 h. Gases released by the bacterial growth during incubation were loaded by an air stream and targeted to a chamber containing 4 modified-interdigitated-gold-electrodes with thin films of ionogel (EMIMDCA confined in bovine skin collagen) doped with different concentrations of Fe_3O_4 particles. Pump system and conductivity recording were conducted with specific software. All data were tabulated and analyzed through linear discrimination analysis (LDA). Via clusters formation in LDA analysis plots, it was observed that e-nose is able to differentiate pathogens used here. Results were suitable in both non-selective media, whereas in the selective group media best results were obtained from BS and XLD. BG media had the worst outcome, although species discrimination was also possible. Thus, our results indicate that e-nose combined with a short incubation in culture media can reduce the time of analysis and collaborate in microbiological analysis of foodborne pathogens. However, further trials are required to achieve optimum results.

Keywords: Alternative analysis; conductivity; food; pathogen discrimination.

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