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Identification of foodborne bacterial pathogen strains using colorimetric "chemical nose" gold nanoparticles - Proof-of-concept study

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Molecular typing and whole genome sequencing are commonly used procedures to determine the sources of causative agents responsible for sporadic infections or outbreaks. Multiple strains of the same type of bacterium can appear in a single sample, which may lead to difficulty to distinguish colonies of different bacterial strains with similar morphologies and a delay or incapability to identify a causative strain(s) and responsible source(s). This study investigated the potential use of a colorimetric chemical nose gold nanoparticle biosensor to rapidly screen the isolates from agar plates before further expensive and labour intensive typing and sequencing. The reaction is based on the color change of gold nanoparticles in nanoparticle aggregation states when interacting with differently charged bacteria. The nanoparticles were incubated with bacteria at 108 colony forming unit at ambient temperature for under 24 hours depending on experiments. The reaction was observed by color change or absorbance of optical density at wavelengths from 300 to 900 nm with 1 nm increment after 10 minutes incubation with the maximum resolution obtained in 24 hours. The absorbance data were analysed using principal component analyses. The biosensor differentiated a) 23 bacterial strains representing 10 different families and genera, and b) 9 strains of 7 Listeria species, and 3) 18 closely related strains of *Listeria monocytogenes*. The results from this study highlighted that the colorimetric gold nanoparticles have a potential use for rapid preliminary screening of bacterial isolates for comprehensive source attribution and epidemiological studies.

Biography

Hongsheng Huang completed his PhD from University of Saskatchewan, Canada.Currently he is a research scientist at Ottawa Laboratory – Fallowfield, Canadian Food Inspection Agency. His current research is focused on the development of methods to isolation, detection and characterization of foodborne bacterial pathogens.

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