SEMINAR

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microflora-DNA (mfDNA), new perspectives in forensic and public health applications

Speaker

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Abstract

The discrimination of body fluids in forensic examinations can play an important role in crime scene reconstruction. Conventional methods rely on the detection of antigens or enzymatic activity, limiting detection sensitivity and specificity, particularly on old forensic samples. Methods based on human RNA analysis are not easily applicable to samples exposed to harsh and degrading environments. An alternative approach based on the identification of prokaryotic genomes was developed. Specific bacterial communities are characteristic typical of different human non-sterile body fluids: the molecular characterization of a microbial signature, and not the typing of single bacterial species, can effectively lead to univocal identification of these fluids. A multiplex real time PCR assay was developed using oligonucleotide mixtures targeting genomes specific for a selected group of bacteria.
Microflora DNA (mfDNA) was extracted from vaginal, oral and fecal clinical swabs. In addition forensic samples were processed. Forensic casework samples showed results comparable to freshly collected ones; moreover the DNA extracted was successfully used for STR typing. Also mixtures of body fluids were analyzed, providing a microbiological signature compatible with the presence of microbes of oral, fecal and vaginal origin. The presented method can be useful in identifying biological fluids, and it is based on DNA technologies already available in forensic laboratories and feasible for further high throughput automation.

The definition of a new type of DNA: mfDNA, the development of protocols for its sampling and analysis has led to the acquisition of useful knowledge in other areas in addition to the forensic one, these include biotechnology, preventive medicine, public health as well as environmental hygiene. This new window on the human microbiota and metagenomics can benefit from the development of bioinformatics and modern genome analysis techniques as well as the integration of traditional and molecular protocols.
Modern research needs to return to a leadership role in technology and knowledge, the modern discoveries lead to multi-disciplinary skills of immense importance not only for science and culture, but also for applications in different areas.

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