H33 Forensic Microbiology: An Analysis of a Series of Cases

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Learning Overview: After attending this presentation, attendees will be able to evaluate the importance of microbiology for forensic investigations and the importance in creating a standardized protocol to improve its practical application.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by highlighting how forensic microbiology could be a useful tool to determine the cause and manner of death, especially in difficult forensic cases such as sudden unexpected death or death due to nosocomial infections.

Postmortem microbiology is a relatively novel research field with great potential concerning forensic field applications. Nevertheless, an effort is needed to solve actual controversies on the correct interpretation and statistical significance of a postmortem cultural result. To this end, a multidisciplinary approach would be useful. A large part of the issue is relative to the lack of standard procedures for the collection and analysis of samples. Relying on the studies so far produced, a correct approach requires: correct storage of the body at 4°C to prevent bacterial translocation; collection of samples within 24h and 48h from death prior to evisceration of the body; the use of appropriate collection media; sterilization of the surfaces of the body sites chosen using, for example, a hot spatula or iron; the use of sterile tools (e.g., sterile needles); and immediate transfer of the samples collected to the microbiology laboratory.

According to the Human Microbiome Project (HMP), a healthy human body contains ten times more microbes than human cells. Microbial communities colonize different organs of the body, playing fundamental roles both in human health and disease. Despite the vast scientific knowledge on the role of microbial communities in a living body, little is known at present about microbial changes occurring after death.

The study investigated 35 autopsies performed by the standard techniques in which cardiac and femoral blood, pericardial fluid, pleural fluid, urine, pieces of lung, spleen, and liver were obtained. The sampling was conducted according to the rules of asepsis indicated by Riedel et al. and according to the procedures issued by the European Congress of Clinical Microbiology & Infectious Diseases (ESCMID) Study Group for Forensic and Postmortem Microbiology (ESGFOR) study group to exclude contamination or postmortal translocation of microbes.[1]

The microbiological results showed positivity for both ubiquitous and multi drug resistance microorganisms (such as *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, and *Acinetobacter baumannii*). These results provided data to confirm infections diagnosed during care assistance and, in particular, to assess the responsible microbes in cases without pre-mortem microbiological analysis. It was also observed that in cases of health care-related infections, the microorganisms presence were found in all the examined samples (biological fluids and body tissues), supporting the clinical diagnosis of a severe septic state. Obviously, the interpretation of these results must be integrated by circumstantial, clinical, autopsy, and histological findings. Moreover, it is important to critically analyze the microbiological results considering possible bacterial contamination and a general effort is thus needed to obtain standardized protocols to demonstrate the real potential of this recent research field.

Reference(s):

1. Riedel, A. et al. Integrative Taxonomy on the Fast Track—Towards More Sustainability in Biodiversity Research. *Frontiers in Zoology*, 2013, 10:15. http://www.frontiersinzoology.com/content/10/1/15.

Postmortem Microbiology, Sepsis, Forensic Analysis