

Post-mortem Microbial Biodiversity and Forensic Pathology: Intelligent Modeling

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Aim of the study: The necrobioma which characterizes all the bacteria that conceals a corpse. To analyze the necrobioma, would offer the opportunity to answer a question that is essential for criminal investigations: when was death dead? What are the bacteria to first desert a dead organism? Which bodies are the first to be affected by this depletion? What micro-organisms will tend to multiply post-mortem? How to establish a dynamics of bacterial dissemination and a gradient of occupation according to the time of death? To avoid widening the whole intestinal microbiome, we limit ourselves to a single organ (nasal cavity, under the tongue...etc.) and study the dynamics of these post-mortem colonies. Several factors are involved in this dynamic. Mathematical modeling becomes very complex. In this study, we propose a fuzzy intelligent system to predict the exact date of death from the number and species found at time (t).

Material and Methods: This is to list the bacterial colonies in the study organ. Establish bacterial dynamics as a function of time. As several factors intervene in the process, it becomes very difficult if it is not possible to model them mathematically. In this study, we consider these data to be uncertain and imprecise and therefore to be fuzzy variables. These factors constitute the input of the system. The date of death is considered as an output variable. A rule base is established that links the input variables to the output.

Results: Since the input variables are considered fuzzy, this takes into account the uncertainties inherent in their natures. The output variable is also considered fuzzy. The basis of the established rules must take into consideration all the possible combinations linking the inputs to the output. After defuzzification, the time of death is directly read from the introduction of the random values at the input with the maximum accuracy. The proposed system remains extensible to input variables that can have an effect on output.

Keywords: Necrobiome, Microbial dynamics, post mortem, intelligent systems, fuzzy logic.