Modern, “open” societies are vulnerable from inside and outside and from many angles, one of them being summarized as bioterrorism (BT). BT is defined as intentional release of a health-threatening agent, e.g. smallpox, anthrax, or a deadly toxin, e.g. Clostridium botulinum toxin. BT agents are easily transferred from human to human, pose severe health risks and are associated with a high panic potential. According to the inherent health risk and the likelihood, that the agent can be effectively “weaponized”, BT agents are grouped into three categories A–C (5, 8). The highest Category A contains e.g. anthrax, smallpox, hemorrhagic fevers and the botulinum toxin, all of them difficult to detect, contain or treat.

BT for a number of reasons appears not very likely: e.g. to “weaponize” anthrax spores requires technically demanding methods, and variola major, the etiological agent of smallpox, is thought not available outside the two WHO Smallpox Collaborating Centres. Nevertheless, the risk of an attack must not be neglected. The damage following a reintroduction of smallpox appears disastrously high considering that the virus would hit an immunologically naive population. Therefore preparations assuming worst-case scenarios are required, including education in clinical and laboratory diagnostics, vaccination policy, and case management. Besides the Cat A – C agents, other more “common” microbes, like influenza, and plant or animal pathogens should be considered as candidate agents for bio- or agriterrorism (3, 6). A distinction between a man-made and a natural incident, however, will become more difficult with these ubiquitous agents.

To cope with a BT attack requires rapid and accurate diagnostics. The detection of an initial BT aerosol will be difficult - the attack will be more likely recognized after first patients are suffering from “unusual” conditions. The potential of electron microscopy (EM) in the rapid lab diagnosis of infectious agents will be discussed (1, 2, 4). Negative staining, a simple preparation method in EM, allows the rapid detection of agents from bacteria down to the smallest virus using the unbiased, “open view” of EM (2, 4, 7, 8). Samples are prepared directly from the patient, after culturing or as “environmental probes”, e.g. the contents of an “anthrax letter”. EM works as a catch-all-method, is able to detect also multiple infections and agents not considered before, and should be used in front-line diagnostics.
References
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