

## 论文

### 艾滋病检测实验室意外事故风险模拟效果评价

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#### 摘要:

目的 探讨生物安全实验室意外事故发生情况下的主要污染风险,为艾滋病检测实验室建立风险评价及风险控制指标提供参考依据。方法 采用墨汁模拟样本初步确定污染扩散范围及程度,运用假病毒作为模式病毒模拟实验室意外事故,通过 RT-PCR-荧光探针法定量检测样本中人类免疫缺陷病毒-1(HIV-1)的核酸含量,同时对污染部位进行现场消毒。结果 在生物安全柜内发生意外事故时,重点污染部位主要位于以样本与台面的直接接触点为中心,半径15 cm 范围内;手套表面是个人防护装备中污染最严重的部位;实验室内不同容器脱落时造成的污染多集中于实验员正前方60度角范围内,且溅撒范围、溅撒高度与样本量均呈正相关;现场消毒效果显示污染部位经75%酒精和/或500 mg/L 含氯消毒剂消毒后,核酸检测结果均为阴性。结论 初步确定了艾滋病检测实验室发生意外事故时污染扩散范围及程度,用常规消毒剂能够有效地杀灭HIV病毒。

关键词: 人类免疫缺陷病毒(HIV) 生物安全 实验室 意外事故

### Accident risk simulation and assessment for bio-safety level-III HIV laboratory

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#### Abstract:

Objective To explore contamination risk while conducting human immunodeficiency virus(HIV) etiologic study in bio-safety level-III laboratory(BSL-3) in case of accidents, and to establish risk evaluation index for bio-safety management system in BSL-3 laboratory for HIV study. Methods Ink and pseudo-virus solution were used as samples to simulate laboratory accident to determine contamination extent. Swab samples taken from different contaminated spots were collected and tested for human immunodeficiency virus type 1(HIV-1) with quantitative real-time PCR. After disinfection procedures, swab samples from various spots were collected again and tested for HIV-1 to evaluate effectiveness of disinfection. Results While accidents occurred in bio-safety cabinet, the major contaminated sites were located in table surface of the cabinet where samples directly contacting with the surface in the radius of 15 cm, and its lateral walls and front as well. Glove surface was the most seriously contaminated. When different laboratory containers fell off to laboratory floor, major contamination was located in the places in front of the experimenter with a range of 60-degree of angle. The range of splash was positively correlated with sample size and its height. After on-site disinfection with 75% ethanol or/and 500 mg/L chlorine disinfectants, HIV-1 nucleic acid tests for samples taken from accident sites were all negative. Conclusion The study primarily determined the range and degree of contamination diffusion when laboratory accidents happened and common disinfectants can effectively kill HIV.

Keywords: HIV biological safety laboratory accident

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