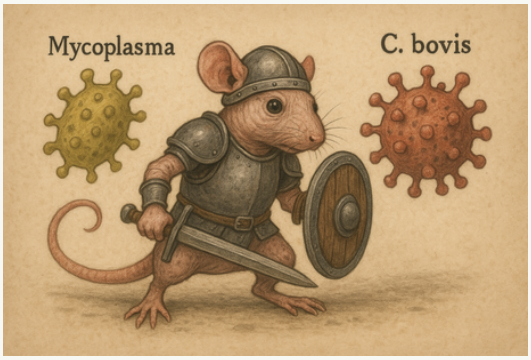
TMU實驗動物中心
Laboratory Animal Center

動物中心-現場快報

Charles River: 研究用生物樣本的微生物汙染PCR篩檢報告 (2011-2022)



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文：動物中心主任兼首席獸醫師 張薰文博士、 動物中心獸醫師 劉光祐

Charles River，成立於1947 年，總部位於美國麻州，提供製藥、生技及學術領域從藥物發現、臨床前測試到製造支援的一站式服務，在 實驗動物供應、毒理學測試、細胞庫檢測領域有極高國際聲譽的一間上市櫃公司。

該機構於2011-2022年間透過PCR技術檢測鼠源與人源研究生物樣本之微生物汙染分析中，發現生物樣本（如細胞株、腫瘤、血清等）常被病毒、細菌（尤其是黴漿菌）污染，可能干擾生物醫學研究結果，甚至對實驗人員造成健康風險，而提出這份系統性篩檢報告。報告指出，常用於腫瘤移植研究的免疫缺陷鼠（如裸鼠）容易成為病毒的宿主，導致人源腫瘤株（PDX）被鼠源病毒污染。

此外，黴漿菌(Mycoplasma ssp.)也是動物房常見的伺機性病原，尤其是 M. pulmonis常在齧齒類動物造成慢性呼吸道症狀，污染率在整個研究期間穩定維持約 5%，顯示其普遍性與持續性；而牛棒狀桿菌(Cornybacterium bovis)自 2017 年才納入常規篩檢，該株菌常造成裸鼠皮膚過度角化(hyperkeratosis)，也會使動物攝食量降低進而造成體重下降，對腫瘤接種與移植等存活性實驗有明顯的影響。

為避免受汙染的生物材料影響實驗動物健康狀況與實驗結果，該篇報告指出，建議使用者應建立無污染的主細胞庫（Master Cell Bank），再由其衍生出工作細胞庫（Working Cell Bank）用於實際製程與產品生產，以確保研究一致性。不僅如此，實驗使用之生物材料，應附有微生物檢驗合格證明，也應針對生物材料定期 PCR 篩檢以維持研究品質。

本校動物中心為落實生物安全管控，獸醫師已針進入2F SPF動物房的裸鼠，於檢疫期間以碘液進行預防性塗抹，避免牛棒狀桿菌造成裸鼠鱗狀皮膚炎(皮屑)的發生。至於現場管理，則依賴飼育人員定期清潔，噴灑消毒水消毒。獸醫師也會於每月底進行環境監測，每季將衛兵鼠送檢於第三方驗證機構，取得監測報告，監控飼養管理。最後，良好的飼養環境也有賴於每位使用者的愛護，敦請各位實驗人員，每次進入動物房時，注意攜入之隨身物品與實驗用具、器械之清潔，避免交叉汙染，和我們一起共同維護動物中心的飼育品質。

參考文獻 ：
1."PCR Screening of Research Biologics for Microbial Contaminants That Confound Biomedical Research"(Cheryl L et al., 2024)

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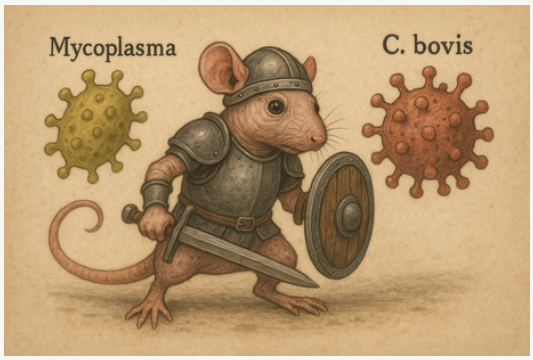
TMU LAC - NEWSLETTER

Charles River: PCR Screening Report on Microbial Contamination of Research Biological Materials



Picture generated by ChatGPT

By Dr. Chang H. W., Chairwoman and Attending Vet of TMU LAC, Liu, K. Y., Vet of TMU LAC

Charles River, founded in 1947 and headquartered in Massachusetts, USA, is a company with a strong international reputation in laboratory animal supply, toxicology testing, and cell bank characterization. The company provides services range from drug discovery, preclinical testing to manufacturing support.

Between 2011 and 2022, Charles River conducted microbial contamination analyses of rodent- and human-derived research biologics by PCR. The results revealed that biological materials (such as cell lines, tumors, sera, etc.) were frequently contaminated by viruses and bacteria—particularly mycoplasma—which could interfere with biomedical research outcomes and even pose health risks to laboratory personnel. The report highlighted that immunodeficient mice commonly used in tumor transplantation studies (e.g., nude mice) were prone to becoming virus hosts, leading to contamination of patient-derived xenografts (PDX) with rodent viruses.

In addition, *Mycoplasma spp.* are also common opportunistic pathogens in animal facilities, with a contamination rate consistently around 5% throughout the study period, indicating its prevalence and persistence. *Corynebacterium bovis*, which is known to induce skin hyperkeratosis in nude mice , will cause reducing food intake and weight loss, significantly affecting tumor inoculation, transplantation, and survival studies.

To prevent contaminated biological materials from compromising laboratory animal health and research results, the report recommends that users establish contamination-free Master Cell Banks (MCB), thereby ensuring research consistency. Furthermore, all biological materials used in experiments should be accompanied by certificates of microbial testing, and regular PCR screening should be conducted to maintain research quality.

At TMU LAC, to prevent *C. bovis*, veterinarians will apply povidone-iodine solution on nude mice once they arrive at 2F SPF animal facility. For facility management, keepers will clean the animal rooms and spray hypochlorous acid disinfectant regularly. Our vets also conduct environmental monitoring monthly and send sentinel animals to third-party verification laboratories quarterly to ensure a high-quality housing environment. Last but not least, all research personnel are kindly reminded to carefully inspect and clean personal belongings, experimental materials, and equipment before entering the animal facility to avoid cross-contamination. Many thanks!

References :
1."PCR Screening of Research Biologics for Microbial Contaminants That Confound Biomedical Research"(Cheryl L et al., 2024)