基于数字微流控技术的病原微生物检测

摘要

众所周知，病原微生物广泛存在于自然界中，具有种类繁多、变异迅速等特点，并且是人类致病的一大重要因素。为了对人类的一些难以攻克的疾病进行进一步研究，病原微生物快速检测技术的开发成为了重中之重。现如今科学技术迅猛发展，通过全基因组测序（WGS）来检测病原微生物是否存在的方法已被广泛使用。其中，聚合酶链式反应（PCR）是 DNA 文库构建流程中的步骤之一。但是，此流程具有费时费力、试剂成本高、仪器沉重等缺点。在新的科技革命中，数字微流控技术登上了舞台。通过对基于数字微流控技术的病原检测应用的研究，发现基于数字微流控技术的建库流程与传统建库流程相比具有建库时间减半、反应体系可小于 10 微升、节省人力物力成本、减少外源核酸对样本污染的几率等优点。同时，此建库流程在微小反应体系的情况下与传统建库流程的反应效率相当。因此，将数字微流控技术运用到病原检测技术中是生物界乃至医学界的一大进步。

关键词　病原微生物　病原检测方法　PCR　WGS　数字微流控

Abstract

As is known to all, pathogenic microorganisms exist widely in nature, with a wide variety of species, rapid variation and other

characteristics. And it can be a key factor result in some human disease. In order to further study some of the intricate human diseases, rapid detection of pathogenic microorganisms testing technology is developing. Nowadays science and technology are developing rapidly, pathogen detection technology has used whole genome sequencing (WGS). And polymerase chain reaction (PCR) is one of the step of DNA library preparation. However, this process has many disadvantages. For example, it is time-consuming and laborious. And it has high reagent cost and heavy instrument. In the new scientific and technological revolution, digital microfluidic technology is developing. Through the research of pathogen detection which uses digital microfluidic technology, it is found that compared with the traditional database construction process, the database construction process using digital microfluidic technology has the advantages of half the time of database construction, reaction system can be less than 10 microliters, saving manpower and material cost, and reducing the chance of contamination of samples by foreign nucleic acid. At the same time, the reaction efficiency of this database construction process is similar to that of traditional database construction process in the case of micro-reaction system. Therefore, the application of digital microfluidic control technology to pathogen detection technology is a great progress in the field of biology and even medicine.

Keywords Pathogenic microorganisms Pathogen detection method