

Rapid and cost-efficient DNA extraction from bacteria

The growing demand for molecular diagnostics in clinical and research laboratories requires efficient methods for the extraction of DNA from target organisms.

The new method for nucleic acid extraction uses standard laboratory equipment and non-toxic materials. The easy two-step process needs only five minutes time and achieves good DNA extraction yields for Gram-positive and Gram-negative bacterial cells. Applications range from the pathogen diagnostics to genetic characterisation (e.g. antibiotic resistance genes or virulence factors).

BACKGROUND

Rapid DNA extraction is a critical component for future point-of-care molecular diagnostics. In case of bacteria the process hinges on efficient lysis of bacterial cell walls. Conventional extraction procedures for microorganisms either employ hazardous chemicals such as phenol and chloroform, or commercial kits are used, depending on the area of application and the matrix in which the cells are investigated. These methods are well established and result in high quality DNA or RNA, but they are often very laborious, time-consuming and cost-intensive, or suffer from insufficient or inconsistent yields of analyte. These disadvantages are even more significant when considering applications of molecular diagnostics at point-of-care or in low-resource settings, e.g. developing countries.



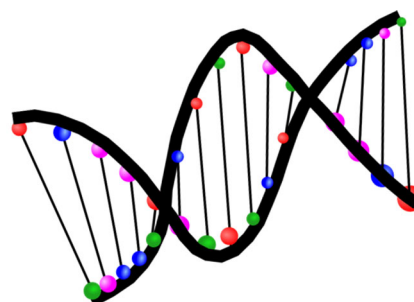
TECHNOLOGY

The new timesaving and automatable method for nucleic acid extraction needs no specific enzymes or high temperatures. Tailored ionic liquids are applied in an easy two-step process and allow cost-efficient lysis of Gram-positive and Gram-negative bacterial cells. Magnetic bead clean-up is possible directly from cell lysate resulting in pure and high quality extracts. The extracted DNA and RNA can be subsequently used in molecular detection methods such as quantitative (RT-)PCR or genome sequencing using NGS.

The inventive method and kit find their use in many different fields of application, e.g. clinical microbiology, food and water hygiene, environmental diagnostics or microbiological and pharmaceutical research. Therefore, extraction kits can be designed for clinical use (suitable for point-of-care), laboratory use (for high throughput), or in-field use (portable).

ADVANTAGES

- duration only five minutes
- automatable
- no laboratory required
- non-toxic waste
- cost <1€ per sample



REFERENCE:
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APPLICATIONS:
clinical microbiology,
microbiological and
pharmaceutical research,
food and water hygiene,
environmental hygiene

DEVELOPMENT STATUS:
TRL 4, basic technology
mature, overall process in
optimization phase

KEYWORDS:
bacterial cell lysis
DNA extraction
Gram-positive

IPR:
EP and US filings

OPTIONS:
R&D co-operation
License agreement

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