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Low temperature PCR facilitates DNA sequencing at the point of care-a prerequisite for personalized medicine

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Abstract

In personalized medicine, health care providers must incorporate an individual's genetic information into a customized prevention or treatment plan. In practice, a person will submit a DNA sample to be tested for possible association with a set of specific risks by analyzing the DNA sequences of certain target segments in the human genome. Aimlessly mapping a total genetic makeup or performing whole genome sequencing of every person will create mountains of data which are difficult to interpret. Although the cost of DNA sequencing has been reduced over the past 15 years, DNA sequencing-based diagnostic tests on clinical specimens have hardly been implemented in any community hospital laboratories primarily due to difficulties and high costs in preparing the templates suitable for direct DNA sequencing from complex human samples. Implementation of a financially sustainable target DNA sequencing technology in community hospital laboratories at the point of care is the first step to practice good personalized medicine.

High-fidelity amplification of a target DNA in complex samples by primer-defined polymerase chain reaction (PCR) is the key step in preparing the template for direct DNA sequencing. The author describes a novel low temperature (LoTemp) PCR catalyzed by a moderately heat-resistant (MHR) DNA polymerase with a denaturation temperature set at 85 °C instead of the conventional 94–96 °C for this key step based on a recent publication in the International Journal of Molecular Sciences(http://www.mdpi.com/1422-0067/14/6/12853), using DNA sequencing-based molecular diagnosis of infection caused by Borreliaburgdorferi, human papilloma virus (HPV), Neisseria gonorrhoeae and Chlamydia trachomatis, as examples.

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