

Clinical, Medical & Diagnostic Products

What to Consider when Choosing a Thermal Cycler for Clinical Diagnostics

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Polymerase chain reaction (PCR) is one of the most powerful and sensitive gene analysis techniques available, and within molecular biology, the technique is widely applicable. The continual refinement of PCR has had an enormous impact on cancer research in particular. The technique provides rapid and early diagnosis of diseases such as leukemia and lymphomas, which consequently allows prompt treatment options to be applied, and ultimately improves patient prognosis. As PCR assays can be performed directly on genomic DNA samples, the technique can detect translocation-specific malignant cells at a sensitivity that is at least 10,000 fold higher than that of other methods.

The success and popularity of PCR, has meant that the technique has become the method of choice for an abundance of diagnostic applications, not limited to cancer diagnostics. The popularity of the technique is coupled with an array of thermal cyclers, which can make choosing the most efficient and suitable instrument more challenging. Before making a purchase, it is important to consider the applications that the thermal cycler will be used for, and laboratory expectations and requirements.

Advances in Thermal Cyclers

Prior to the introduction of thermal cyclers, PCR was a long and laborious process involving the transfer of samples between three water baths of varying temperatures, coupled with the manual addition of DNA polymerase at the annealing step of the cycle. Major developments have driven the advances in the design of thermal cyclers offering faster processing and protocols. These include design considerations to cater for multiple environments, advances in instrument software, improved thermal control, and the introduction of heated lids.

How to Specify the Requirements of Your Thermal Cycler

When choosing a thermal cycler, the requirements will understandably differ from one laboratory to the next. For some laboratories bench space may be the most important consideration, whilst innovative software or suitability of the instrument for the laboratory environment may be a priority for others. Either way, there are several factors to consider in order to ensure the most appropriate instrument is sourced for the laboratory.

Technology to Suit your Laboratory Environment

Instrument flexibility

A major consideration, to factor into the purchase of a new thermal cycler is the laboratory environment that the instrument will be used within. Both early, and some current thermal cyclers have one solid heating block component, however many manufacturers offer thermal cyclers with interchangeable heating blocks, which enables testing of multiple samples. A handful of manufacturers, are further revolutionising thermal cycler instrumentation, through modular heating block systems allowing the heating blocks to be controlled independently. In this instance one researcher could run a number of different experiments at once, or alternatively a number of researchers could run single PCR reactions simultaneously. Modular systems are also space saving, as four heating blocks are contained within the one unit. Therefore if your laboratory is looking for space-saving options, alongside the opportunity to perform multiple independent runs, then a modular system may be most suitable.

Software

Innovations in thermal cycler technology have also been coupled with major advances in the accompanying software. Thermal cyclers are considered pivotal for diagnostic testing; however performing multiple runs can be time consuming with the chance of complications. Having innovative software, which is able to improve productivity as well as the quality of the results that are obtained, is invaluable for any laboratory. Some manufacturers have taken their software to new heights, further streamlining the workflow, by offering reporting features that inform users of the temperature logs of each run, completion status, and pre-empt problems before they happen. Additionally with the dramatic increase in the use of apps, manufacturers are giving users the option to download an app to their mobile device, which allows them to conveniently monitor their run remotely.

Thermal Control

Generating reproducible and meaningful PCR results is heavily reliant upon obtaining the correct temperature. Therefore, a key consideration when purchasing a thermal cycler is selecting one that is reliable and performs accurately and consistently. For a reaction to work correctly, efficient, and precise, temperature changes are required, and the ability to do this is often heavily dependent on the material used for the heating block. If fast temperature changes are crucial to your research, purchasing a thermal cycler with a silver heating block would be a suitable choice. Silver conducts heat better than some other materials that are commonly used for heating blocks, ensuring a uniform temperature is achieved rapidly throughout the heating block.

Innovative Instrumentation for Clinical Diagnostics

The Alpha Cycler 4 from PCRmax addresses all modern PCR requirements, by providing an instrument that is easy to use, efficient and accurate, and one that exceeds the high standards expected of PCR instrumentation. Combining innovative software, which includes reporting systems that find faults before they happen coupled with an app that allows the user to work remotely, the Alpha Cycler 4 is providing advanced options, to save users time within the laboratory. Alongside new technology, advanced thermal control is offered, in addition to a Program Wizard allowing users to define a protocol based off primer sequence and template source. The Alpha Cycler 4 caters for modern laboratory needs, providing outstanding performance, in a compact design that saves space within the laboratory.



Conclusion

The success of PCR for cancer diagnostics and further molecular biology applications, has led to an increase in the number of thermal cyclers available on the market. Recent advances now mean that thermal cyclers are more advanced than ever before, and with the myriad of options available, it can become a challenge to choose the most suitable thermal cycler for the laboratories application needs. Considering a multitude of factors before purchase such as instrument flexibility, thermal control and accompanying software, can ultimately eliminate the chance of you choosing a thermal cycler that doesn't perform as expected, and eradicate wasted time.