Rotor-Gene™ 6000

The Rotor-Gene™ 6000 is the first of its kind. A real-time analyzer with performance so advanced it unlocks new research possibilities.

Fully equipped for real-time amplification, end-point analysis, high-resolution melt, autocall genotyping, and nucleic acid concentration measurement. However, this is only the beginning. Uniquely flexible hardware and software let you explore new ideas, chemistries, methods, and analysis options. With it you can embrace or invent the future of real-time and thermo-optical analysis.

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Think outside the Block

When generating publication data, confidence in your results is paramount. You must have a reliable instrument that always performs to specification. A tall order for any block-based system. Thermal and optical variation is unavoidable and worsens as lamps and Peltier devices age. Furthermore, the faster a block is heated or cooled the greater the sample-to-sample variation observed.

Rotary Design

The Rotor-Gene™ is unlike any other instrument. It was designed from the ground-up for real-time thermo-optical analysis. The key difference is the unique centrifugal rotary design that ensures well-to-well variation is negligible – as it should be.

In the Rotor-Gene™, every tube spins quickly in a chamber of moving air. Thus there is no positional temperature variation such as the recognized “edge effect” observed in block-based instruments. Optically, the Rotor-Gene™ is similarly uniform because every tube moves past the identical excitation and detection optics.

Convenient

The design simplicity and robustness of the Rotor-Gene™ has many welcome benefits. For example, there’s no block to clean and maintain, no alignment or optical calibration needed and there are no lamps to change. You also don’t need a reference dye like ROX™. The centrifugal force on each sample ensures there are no condensation issues and air bubbles are automatically removed. You can swap rotors on-the-fly to change tube format (the equivalent to swapping a whole block) and even write on individual tube caps! All this adds up to maximum convenience and minimum maintenance.

Temperature

Well-to-well thermal uniformity, equilibration time uniformity (the time for each well to reach a set temperature) and accuracy (how close set temperature is to actual) are the thermal variables important to real-time analysis. The rotary design gives the Rotor-Gene™ the best thermal and equilibration time uniformity of any instrument. Thermal accuracy, on the other hand, relies on proper instrument calibration and here the Rotor-Gene™ also shines:

To ensure validated protocols are repeatable and transferable, many laboratories now require routine verification testing for the thermal accuracy. To ensure accuracy, the Rotor-Gene™ uses an Optical Temperature Verification (OTV™) Rotor that automates verification testing. A printable report documents each test and, in the unlikely event the instrument requires re-calibration, this is also automatically adjusted and reported. Each test takes only minutes and can be repeated at any time and as often as required.

Optics

The Rotor-Gene™ uses a separate high-power light-emitting diode (LED) as an excitation source for each channel. Each LED maintains a uniform output and has a lifetime guarantee. Compare this to other systems using incandescent projector lamps or lasers. Lamps fade continually, burn out unpredictably, and need regulare replacement. Lasers are expensive to repair and have only a single excitation wavelength – meaning they properly excite a very limited range of dyes.

The complex optical mechanics used by other systems (such as X-Y scanning heads and fiberoptic bundles) can be fragile, expensive to repair and cumbersome to calibrate and clean. Further, they attenuate signal down a long path to the detector. By contrast, the Rotor-Gene™ has the fewest moving parts and the shortest optic path of any system. Simple, robust, ideal.

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Optical calibration is a topic few vendors like to discuss. The Rotor-Gene™ doesn't need optical calibration because the identical optical path reaches all samples. Other systems require elaborate optical alignment and calibration. Futhermore, the Rotor-Gene™ doesn't need a reference dye (such as ROX™) for the same reasons. For performance verification, the OTV Rotor (described above) checks the optical system every time it's used. Again, peace of mind that your system is always performing at its peak.

Security

Data security is often overlooked, but vital to many laboratories. Corbett Life Science takes data integrity and security seriously. Each Rotor-Gene™ result file is given a digital signature that, when valid, ensures experiment data has not been manually altered or otherwise affected. You also have the option of identifying individual users as either an Analyzer, Operator or Administrator, each with different access privileges. Privileges are integrated with core Windows® security modules making it easy to administer and integrate with your current operating procedures. In addition, audit trails are stored along with run data to track changes made to experiment files, when they were made, and who made them.

HRM™ – High Resolution Melt

High Resolution Melt is a recent development that can greatly extend the utility of traditional DNA melting analysis. HRM™ is made possible by the combination of more advanced instrument design and changes to the type of dye used.

The Rotor-Gene™ 6000 is engineered for HRM™. It incorporates a specially tuned high-intensity optical channel, high-speed data capture (up to 1000 data collection points per °C transition), extreme thermal resolution (0,02°C) and dedicated HRM™ analysis software. Dyes such as SYTO® 9, EvaGreen™ and LC Green® provied the best results since they can be used at higher concentrations to provide increased resolution over traditional dyes like SYBR® Green 1.

HRM™ characterizes nucleic acid samples based on their disassociation (melting) behaviour. Samples can be discriminated according to their sequence, length, GC content or strand complementarity. Even single base changes such as SNPs (single nucleotide polymorphisms) can be readily identified.

HRM™ Application

HRM™ has renewed interest in the utility of DNA melting for a wide range of uses, including:

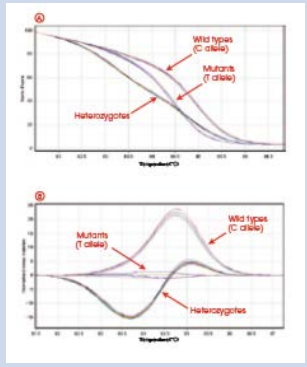
- Mutation discovery (gene scanning)
- Screening for loss of heterozygosity
- DNA fingerprinting
- SNP genotyping
- Characterization of haplotype blocks
- DNA methylation analysis
- DNA mapping
- Species identification
- Somatic acquired mutation ratios
- HLA compatibility typing
- Association (case/control) studies
- Allelic prevalence in a population
- Identification of candidate predisposition genes

With HRM™, these and other applications are done using low-cost generic dyes where previously custom labeled probes such as TaqMan® of fluorescence resonance energy transfer (FRET) probes were required. HRM™ is thus a simpler and much more cost-effective way to characterize samples.

Recently, HRM™ was the subject of a detailed and independent Technology Assessment report from the National Genetics Reference Laboratory (Wessex, UK). A wide range of sample types were tested, including examples of challenging G to C and A to T single base substitutions. The full report is availalbe for download at: http://www.ngrl.org.uk/Wessex/downloads/Word/NGRL_HRM_Web.doc

SNP genotyping by HRM™

Discrimination of human ACTN3 (R577X) SNP genotypes (C to T substitution) using SYTO® 9 intercalation dye (no probes). Homozygous wild type, mutation and heterozygote samples are shown on a standard normalized melt curve (A) and a difference plot normalized to T allele mutant samples (B). Amplification and HRM™ analysis was done using a Rotor-Gene™ 6000 instrument and genotypes were automatically assigned by the Rotor-Gene™ software. The fragment was pre-amplified using a 40-cycle fast protocol (about 40 min. run time).



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Real-Time Quantification

News applications, new dyes, new analysis methods – there's always something around the corner for real-time analysis. Don't let your instrument hold you back. The all-new Rotor-Gene™ 6000 is the most versatile real-time analyzer ever developed. With it you can work with dyes covering the entire spectrum, from infra-red to UV and up to 6-plex capability.

If throughput is important, the new Gene-Disc™ 100 supports 96 sample workflow plus extra space for controls. To maximize throughput, try a high speed run – a 40 cycle amplification can be completed in about 40 minutes without the need for special fast reagents, consumables, or hardware modifications.

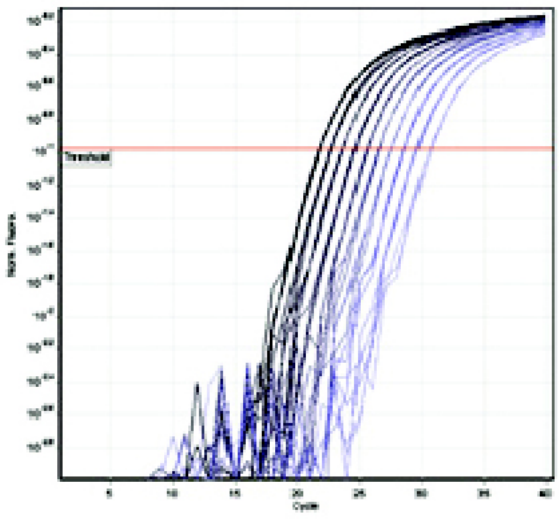
Results tell the story

So what can the most thermally and optically sophisticated instrument ever developed do? Plenty.

Shown below is data you won't see elsewhere. We simultaneously challenged the Rotor-Gene™ 6000 with:

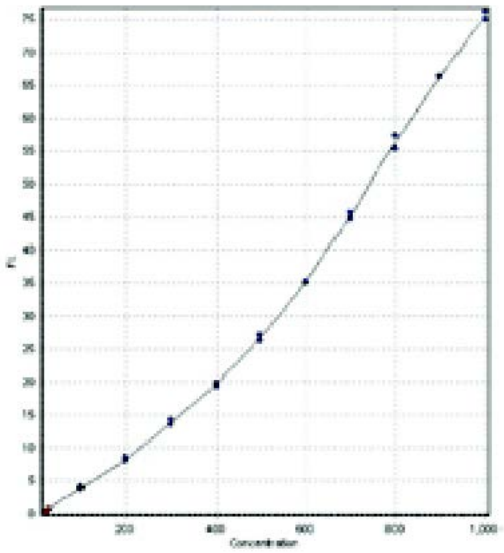
- 2-fold discrimination (1 cycle)
- 10 separate serial dilutions, each in triplicate
- Fast cycling
- Low probe concentration
- Standard commercial master-mix chemistry
- No passive reference (ROX) normalization
- Single-copy gene target amplification from a whole human genome

Notice how tight the replicates are, amplified in a third the time using a fraction of costly probe. And all achieved with standard chemistry!



Concentration Analysis

The Rotor-Gene™ is fully equipped to do DNA concentration measurement using fluorescent dyes (see below). Comprising a standard run protocal and integrated analysis software, the concentration of unknown samples is easily determined from a standard curve.



DNA concentration measurement

A DNA standard curve with replicates is shown for concentrations of 1000, 900, 800, 700, 600, 500, 400, 300, 200 and 100 pg/µL. Red data points at origin are negative controls. Curve interpolated using a spline curve fit (Rotor-Gene™ analysis software). Data was obtained using reagents in the Quant-iT™ PicoGreen® dsDNA Kit (Invitrogen Corp., Carlsbad CA/USA). Standard Rotor-Gene™ concentration analysis run protocol was used. 10 µL PicoGreen (dilluted 1/200 in 1 x TE buffer) was combined with 10 µL of each standard (dilluted in 1 x TE buffer). Final volume 20 µL.

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