

Bioruptor® NGS System – Designed Exclusively for Fast & Accurate DNA Shearing

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Introduction

The Bioruptor® NGS is the DNA shearing device of choice for sequencing applications, providing optimal yields, lengths, and consistency. Different fragment size ranges are frequently required for downstream applications (e.g. bridge amplification) for sequencing.

The Bioruptor® NGS can be easily programmed to modify duration of sonication for optimal fragmentation and produces:

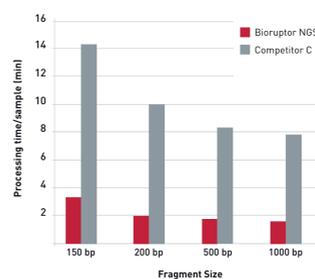
- Simultaneous sonication of 12 samples
- Cost effective solution
- Compatible with all current Next-Generation Sequencing Systems
- Desired narrow size distribution crucial for sequencing accuracy

Target size	Time	Cycle condition (On/Off cycle time)	Cycle number
150 bp	30 min	30"/30"	30
200 bp	13 min	30"/30"	13
450 bp	10.5 min	15"/90"	6



Results

5 x faster than Competitor C

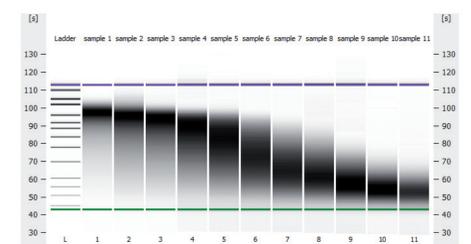
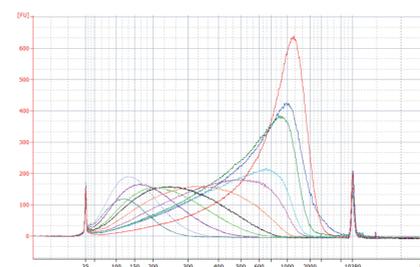


The Bioruptor® NGS efficiently processes up to 12 samples at the same time. Compared to Competitor C, the Bioruptor® NGS requires only 23 minutes to sonicate 12 samples (200 bp), for a time savings of more than 1.5 hrs.

Bioruptor® NGS (12-tube holder): For 150 bp: shearing time, 30 min (30x 30" On/30" Off cycles); hands-on time, 10 min. For 200 bp: shearing time, 13 min (13x 30" On/30" Off cycles); hands-on time, 10 min. For 500 bp: shearing time, 10.5 min (6x 15" On/90" Off cycles); hands-on time, 10 min. For 1000 bp: shearing time, 9.5 min (6x 5" On/90" Off cycles); hands-on time, 10 min.

Competitor C (single tube only): For 150 bp (condition 1 from Competitor C's manual): shearing time, 430 sec; hands-on time, 7 min. For 200 bp (condition 2): shearing time, 180 sec; hands-on time, 7 min. For 500 bp (condition 5): shearing time, 80 sec; hands-on time, 7 min. For 1000 bp (condition 7): shearing time, 40 sec; hands-on time, 7 min.

High precision with Bioruptor® technology



Panel A and B show different DNA size distributions of sheared genomic DNA produced by varying the duration of sonication at HIGH power setting.

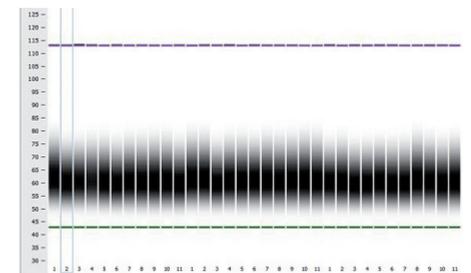
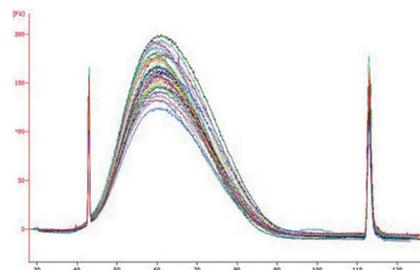
The different colored curves depict a specific Bioruptor® NGS run, optimized to produce specific mean sizes and size ranges for Next-Generation Sequencing. For example, a typical range for library generation of 150-300 bp can be obtained after just 10'. Even very small fragments (as low as 125 bp average size, sample 1) can be obtained using Bioruptor® NGS.

All samples were analysed on Bioanalyzer 2100 using DNA High Sensitivity chip.

Panel A: peak electropherogram view

Panel B: gel virtual view

Reproducibility & Tight Size Distribution



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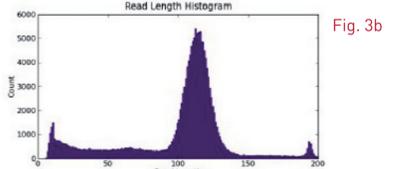
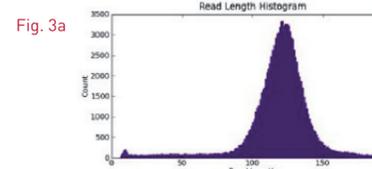
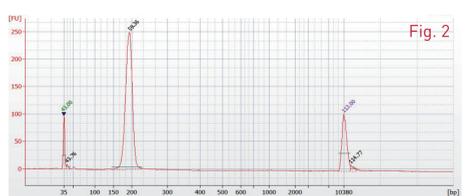
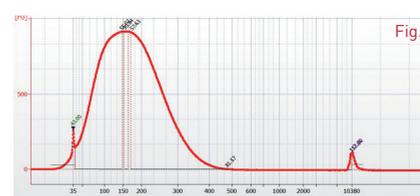
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Successful use of the Bioruptor® NGS for sequencing using Ion Personal Genome Machine (PGM™)



Sequencing of *E. coli* genomic DNA was performed using the Ion Personal Genome Machine (PGM™)

Genomic DNA of *E. coli* strain ATCC 8739 was extracted using Qiagen column. The Bioruptor® NGS and Bioruptor® NGS 0.65 ml Microtubes for DNA Shearing were used to sonicate 5µg of sample DNA (100µl final sonication volume in low TE buffer) during 30 min (30"/30" on/off cycles) at 4°C. The sheared fragments were analyzed on Bioanalyzer High Sensitivity chips (expected = observed mean size of 150 bp; CV% = 7%; Fig 1). Sequencing library was prepared with the Ion Fragment Library Kit and chip 314 according to the manufacturer protocols. Figure 2 shows the result of a Bioanalyzer HS DNA chip analysis of the obtained sequencing library prepared using the Bioruptor® NGS. Enriched ISPs were prepared for sequencing as described in the protocol and deposited on the 314-chip. All experiments were done at Diagenode (Liège, Belgium). Figure 3 a, b show Read Length histograms of the trimmed library reads from two sequencing runs. These results confirm that Bioruptor® DNA shearing is perfectly compatible with PGM™ sequencing flowchart.

Conclusion

The Bioruptor® NGS has been exclusively designed for fast and accurate DNA shearing for Next-Generation Sequencing library preparation. Our results show that the Bioruptor® NGS cutting-edge ACT technology provides excellent shearing reproducibility from individual shearing experiments and considerable time savings over competing systems with its true high-throughput processing. By offering simple processing and flexibility in shearing control, DNA fragments compatible with library preparation can be obtained for all second-generation Next-Gen platforms. Now we demonstrate that the Bioruptor® NGS also provides suitable DNA for unbiased library preparation suitable for Ion Personal Genome Machine (PGM™) sequencing.

Choosing the right sonicator

The Bioruptor® is the industry's most versatile sonicator. Tip/probe sonicators typically deliver focused energy, and the resulting heat generation may degrade the sample, leading to undesirable effects for ChIP such as chromatin disaggregation or low yields of double-stranded DNA in Next-Generation Sequencing.

Other sonication instruments are not recommended for biological uses given the issues with low-throughput, high set-up costs, and variable sample quality.

	Bioruptor® Sonicator	Competitor C Sonicator	Tip/Probe Sonicators
Desirable fragment sizes for sequencing	Yes	Yes	No
Consistent fragment sizes from 100bp - 1500 bp	Yes	Yes	No
Compatible with Chromatin and Cell lysis	Yes	Yes	Yes
Highest available yields of dsDNA per run	Yes	No	No
Multiplexing capability	Yes	No	No
High-throughput	Yes	No	No
Simple operation	Yes	Yes	Yes
Consistency between samples within runs	Yes	Yes	No
Perform DNA Shearing of 18 samples/hour	Yes	No	No
100% recovery of DNA sample	Yes	No	No
Cost of operation	Low	High	Low

* Comparison made between the Bioruptor®, Competitor C and Tip/Probe sonicators