

Comparison of DNA band separation between a conventional gel electrophoresis system and the Mupid™-One

Abstract

Mupid™-One ([→ Lubio Shop](#)) is an inexpensive, compact agarose gel electrophoresis system with an integrated smart power supply. In this study, we show that, despite its small footprint, the Mupid™-One system is just as suitable for separating small DNA bands as a standard benchtop gel electrophoresis system.

Introduction

Gel electrophoresis is commonly used for separating DNA fragments based on their size. DNA samples are loaded into wells and an electric current is applied to move them through the gel. Because all DNA fragments have the same amount of charge per mass, small fragments move through the gel faster than large ones. When a gel is stained with a DNA-binding dye, the DNA fragments can be observed as discrete bands, each representing a group of same-sized DNA fragments.

Mupid™-One is an agarose gel electrophoresis system featuring a compact footprint (183 mm × 162 mm) and several convenient features, including an integrated power supply, multi-channel pipet compatible combs, a simple buffer drainage system and seven output voltage settings (18, 25, 35, 50, 70, 100, 135V), as well as a timer function. In addition, the Mupid™-One gel trays are heat resistant which allows direct pouring of hot (100 °C) agarose gel solutions.



Figure 1: The Mupid™-One Electrophoresis System.

In addition, the Mupid™-One LED Illuminator lid can be used instead of the standard lid to follow separation of the DNA fragments in real time.



Figure 2: The Mupid™-One LED Illuminator allows live imaging of DNA or RNA fragments during agarose gel electrophoresis.

A common worry of first-time Mupid™-One users is whether an electrophoresis system with such a small footprint is indeed capable of adequately resolving DNA bands, in particular those of small size. Here, we have compared electrophoresis of small size genotyping fragments on a standard benchtop electrophoresis device and the Mupid™-One. We find that there is no difference in resolving power between the two systems and that the Mupid™-One is indeed capable of resolving closely spaced DNA bands < 200 bp in size.

Methods

DNA was collected from mouse tails. After DNA extraction using a standard genomic DNA extraction kit, 1 µl of the DNA extract was used for PCR amplification of diagnostic bands. AluI enzyme (NEB BioLabs, R0137S) was used to digest Ala24Glu mutated DNA. Agarose gel electrophoresis was performed with either a Mupid™-One or a standard horizontal gel electrophoresis system from Cleaver Scientific. For the gel electrophoresis, conditions were the same for both systems. A 1.5% agarose gel with TBE buffer and a 26 well comb was used. For DNA staining, Midori Green Advance safe DNA stain from Nippon Genetics ([→ Lubio shop](#)) was used. Both gels were run at 110 V for 40 minutes.

Results

PCR-amplified diagnostic DNA fragments from mouse genotyping were digested with AluI and subjected to gel electrophoresis on either a standard benchtop system or on the Mupid™-One. The spacing and separation of bands was compared to determine whether the Mupid™-One with its relatively small footprint can resolve small DNA bands as cleanly as the larger-sized benchtop system.

Figure 3 shows the results of the genotyping and separation experiment. Bands of 300 bp, 200 bp and 100 bp size were used for comparison. Wild type mice show a single band of 300 bp, whereas heterozygous PKCγ-A24E mice show a 300 bp band and two digested bands (200 bp and 100 bp). Homozygous PKCγ-A24E mice show only two digested bands (200 bp and 100 bp). As shown in Figure 3, both the standard benchtop system and the Mupid™-One are able to resolve the three bands clearly, with the Mupid™-One delivering slightly

sharper resolution at the level of the 200 bp and 100 bp bands. Thus, both devices are well suited to separating smaller bands in DNA electrophoresis applications, such as genotyping assays.

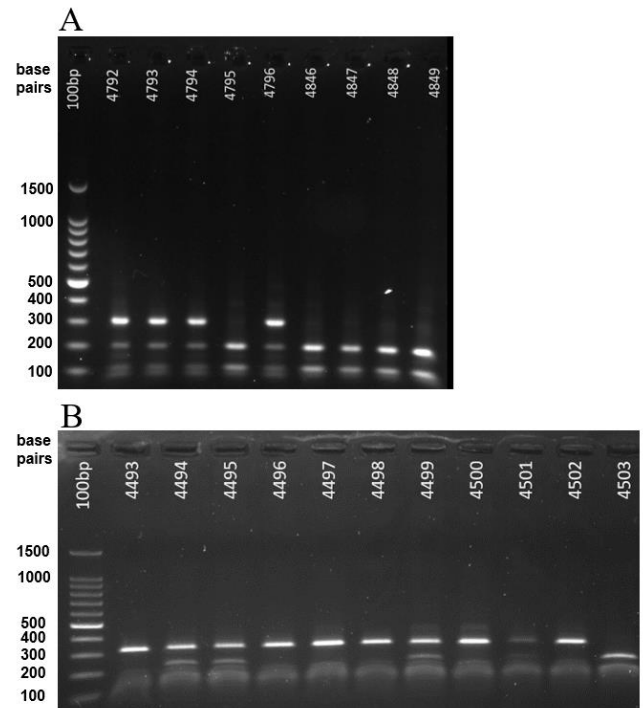


Figure 3: 1.5% agarose gel electrophoresis using either a Mupid™-One (A) or a standard gel electrophoresis system from CleaverScientific (B).

Conclusion

DNA fragment separation was carried out on a Mupid™-One system and a standard horizontal gel electrophoresis system from Cleaver Scientific. Results show that despite its small footprint the Mupid™-One system can separate small DNA fragments as efficiently as a larger-sized standard gel electrophoresis system. Thus, the Mupid™-One is an affordable, small-sized alternative to classical benchtop systems, with at least equal resolution power.

Author information

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