



Automated Purification of DNA from Mouse Tail Clippings Using the Maxwell® 16 Instrument

ABSTRACT The Maxwell® 16 Mouse Tail DNA Purification Kit for use with the Maxwell® 16 instrument consistently purifies high-quality DNA from mouse tails, ear punches, and other animal tissues. The system can purify up to 20 µg of DNA from 1.2 cm of mouse-tail tissue in less than 45 minutes without the need for enzymatic digestion. The design of the Maxwell® 16 system eliminates variability associated with poorly optimized methods, user variation and contaminant carryover. This automated system is ideal for those research areas where inbred, transgenic, or gene knockout mice are used, as well as for animal housing facilities where genotyping is provided as a service.

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INTRODUCTION

The Maxwell® 16 System was developed for low- to moderate-throughput users by providing automated purification of DNA, RNA or recombinant proteins. The instrument purifies DNA using MagneSil® Paramagnetic Particles (PMPs), which provide a mobile, solid phase that optimizes capture, washing and elution of the target material. The instrument efficiently preprocesses liquid and solid samples, transports the MagneSil® PMPs through purification reagents in the prefilled cartridges and mixes during processing. Magnetic particle-based methods avoid common problems such as clogged tips or partial reagent transfers that result in suboptimal purification processing by other commonly used automated systems (1). The Maxwell® 16 instrument is preprogrammed with the purification procedures designed to be used with the prefilled reagent cartridges. The instrument can process up to 16 samples in less than 45 minutes, and the purified DNA can be used in a variety of downstream applications including PCR, genotyping, restriction enzyme digestion, and agarose

The Maxwell® 16 System can save up to one full day in turn-around of genotyping results and can reduce hands-on time by more than 70%.

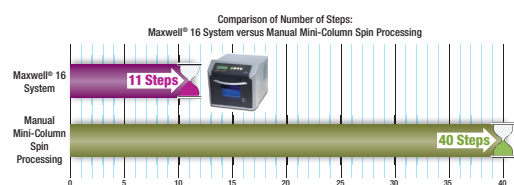


Figure 2. Time and Labor Savings with Maxwell® 16. Eliminate 29 hands-on steps and save up to one full day with Maxwell® 16 compared to manual methods for mouse-tissue DNA purification.

gel electrophoresis. The Maxwell® 16 Mouse Tail DNA Purification System^(a) used with the Maxwell® 16 Instrument provides a simple and easy method for efficient, automated purification of genomic DNA from mouse tail and other mouse tissue samples.

Traditional manual methods of mouse tail and tissue purification may require significant preprocessing, such as mechanical grinding and/or lengthy proteinase K digestion. The unique plunger design and action of the Maxwell® 16 instrument sufficiently pulverize tissue placed directly into the lysis buffer of the prefilled cartridges (Figure 1). The Maxwell® 16 System can save up to one full day in turn-around of genotyping results and can reduce hands-on time by more than 70% (Figure 2).

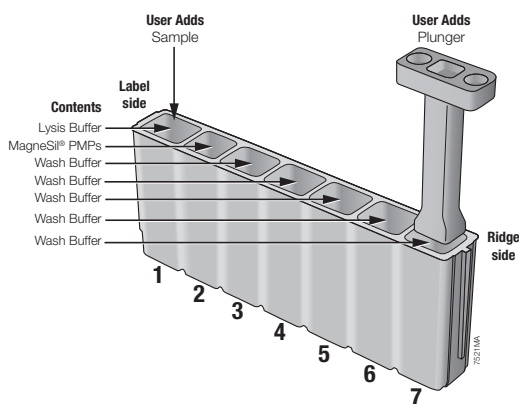


Figure 1. Maxwell® 16 SEV (standard-elution volume) Cartridge. The Maxwell® 16 cartridge is prefilled with optimized reagents.

PROCEDURE

DNA from mouse-tail clippings is efficiently and automatically purified in a series of simple steps.

1. Add mouse tissue to Well #1 of the prefilled reagent cartridge (Figure 1).
2. Add plunger to Well #7 and elution buffer to elution tubes.
3. Place the cartridges into the Maxwell® 16 instrument and press start.

PERFORMANCE

The total yield of genomic DNA from mouse-tail samples will vary with the clipping size. The maximum recommended tail clipping size for the Maxwell® Mouse Tail DNA Purification Kit is 1.2 cm per cartridge. Tails over 0.5 cm should be cut into smaller pieces to maximize DNA recovery. The data in Table 1 illustrate typical yield.

Table 1. Typical Yield of Genomic DNA from Mouse Tails.

Sample	Sample Size	Typical Yield	Typical Purity (A_{260}/A_{230})	Preprocessing Required
Mouse Tail	1.2 cm	18 µg	1.8	None

Maxwell® 16 offers flexibility when purifying mouse tissue samples. Up to 50 mg of mouse tissue or mouse-tail clippings were purified with the Maxwell® 16 system and analyzed by gel electrophoresis. The system produced intact, high-molecular weight DNA from a variety of mouse tissue types, and targets were then amplified successfully by PCR and analyzed by gel electrophoresis (Figure 3).

The Maxwell® 16 system also provides high-quality DNA for applications such as restriction enzyme digests (Figure 4), which can then be used in applications like Southern blotting.

The DNA quality and absence of contaminants were also demonstrated by comparing the amplification of DNA extracted using Maxwell® 16 to DNA prepared using other common methods (Figure 6). Primer sets known to be problematic in amplification were used to test the performance of mouse-tail DNA isolated by the various methods. A fixed volume of DNA (10% total volume) was used in PCR under conditions optimized for each primer set.

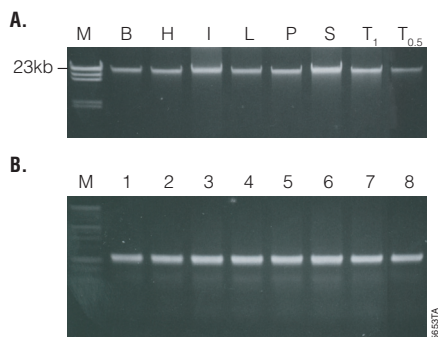


Figure 3. Isolation and analysis of DNA from various mouse tissues. Panel A. DNA isolated from various mouse tissues, including 50 mg of brain (B), heart (H), liver (L), pancreas (P), spleen (S) and mouse Tail (T₁: 1 cm tail snip; T_{0.5}: a 0.5 cm tail snip). **Panel B.** Aliquots (1 µl) of each sample were added to a PCR, and then the targets were amplified using a primer pair specific for a portion of the IL-1β gene.

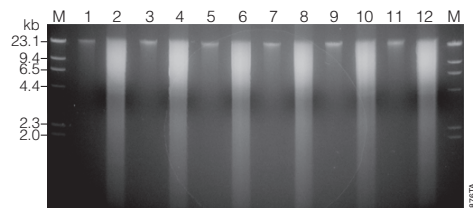


Figure 4. Restriction enzyme digest. Alternating lanes of purified mouse-tail clippings (1.2 cm). Undigested DNA (odd lanes) and BamHI-digested DNA (even lanes) are shown here.

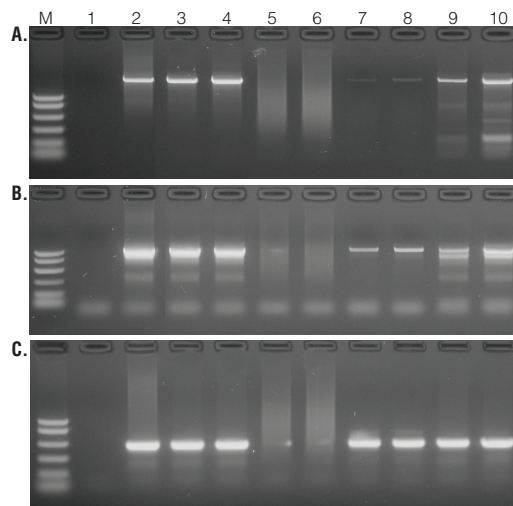


Figure 6. PCR of DNA extracted by various methods. Target genes were (A) ILK (1.9 kb), (B) IL-1β (1.1kb), and (C) p95 (440 bp). For each lane: M, BenchTop PCR Marker (Cat.#G7531); 1, No template control; 2, Mouse Genomic DNA (Cat.#G3091); 3 and 4, Maxwell® 16 Mouse Tail DNA Purification; 5 and 6, Gentra® Puregene® DNA Purification Kit (Qiagen); 7 and 8, NaOH extraction; 9 and 10, Wizard® SV Genomic DNA Purification System.

In all of the reactions, Maxwell® purified DNA performed as well as or better than the other methods.

CONCLUSIONS

The Maxwell® 16 Mouse Tail DNA Purification Kit consistently purifies high-quality DNA from mouse tails, ear punches, and other mouse tissues while saving considerable amounts of time. The DNA is suitable for a number of downstream applications, including genotyping by PCR. Consistent DNA purification from mouse-tail samples is crucial for those areas of research such as immunology, oncology/cancer and developmental biology where labs use transgenic or knockout mice. The time savings of up to one full day for genotyping results combined with the yield and consistency of Maxwell®-purified DNA make this system an ideal choice for laboratories using mouse models for research.

REFERENCES

1. Kephardt, D. *et al.* (2006) *Promega Notes* 92, 20–3.

PROTOCOL

- Maxwell® 16 Mouse Tail DNA Purification Kit Technical Manual, #TM309, Promega Corporation
www.promega.com/tbs/tm309/tm309.html

ORDERING INFORMATION

Product	Size	Cat.#
Maxwell® 16 Mouse Tail DNA Purification Kit	48 preps	ASI120

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