

Endotoxin Free Quanta Maxi Kit



User Guide



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1. Introduction

mdi Endotoxin Free Quanta Maxi Kit is uniquely designed to facilitate ultrapure pDNA free from endotoxins ($<0.1\text{EU}/\mu\text{g}$), ideal for transfection even into highly sensitive mammalian cells. These kits offer high yields from both low copy as well as high copy number plasmid. The innovative buffer system and filter device provides efficient binding of pDNA onto the spin column.

Washing is done with the help of provided wash buffers in order to remove endotoxins, RNA, proteins and polysaccharides. The technology also does away with hasselsome gravitational waiting, phenol extraction (associated with desalting) and ethanol precipitation (associated with anion exchange based purification).

2. Downstream Applications

1. Automated Fluorescent Sequencing
2. Radioactive Sequencing
3. Restriction Digestion
4. Transfection (with highly sensitive mammalian cell lines)
5. Cloning
6. PCR

3. Storage Conditions

mdi Endotoxin Free Quanta Maxi Kit should be stored at room temperature. The kit is stable for one year at room temperature without showing any reduction in performance and quality.

For longer storage, the entire kit can be stored at $2-8^{\circ}\text{C}$. In case precipitates are observed in buffer, re-dissolve all buffers before use at 37°C for few minutes. All buffers should be at room temperature before starting the protocol.

Important

After adding RNase A to buffer 'M1', it should be stored at $2-8^{\circ}\text{C}$ and is stable for 6 months.

In case of any precipitation, re-dissolve the buffer by warming to 37°C

4. Quality Assurance

mdi Endotoxin Free Quanta Maxi Kit is designed for various pre-determined specifications and user requirements such as yield, purity, ruggedness, shelf life and functional convenience.

These are produced through a well defined quality management system certified by Underwriters Laboratories, USA for ISO 9001 which ensures intra lot as well as lot to lot consistency.

5. Safety Information

The buffers and the reagents may contain irritants, so wear lab coat, disposable gloves and protective goggles while working with the **mdi** Endotoxin Free Quanta Maxi Kit.

6. Lot Release Criteria

Each lot of **mdi** Endotoxin Free Quanta Maxi Kit is tested against predetermined specifications to ensure consistent product quality.

7. Technical Support

At **mdi**, customers are our priority. We will share our experiences to assist you to overcome problems in general product usage as well as offers customize products for special applications. We will

- * Stimulate problems, and suggest alternative methods to solve them.

- * Make changes/ improvements in our existing products/protocols.

- * Develop special new products and system especially to satisfy your needs.

We welcome your feedback to improve our products.

8. Kit Contents

| Pack Size | Quanta Maxi Kit-10 | Quanta Maxi Kit-25 | Storage Temperature |
|---|--------------------|--------------------|---------------------|
| mdi Quanta Maxi Spin Columns | 10 | 25 | RT |
| mdi Quanta Maxi Filter Device (with Red Stopper) | 10 | 25 | RT |
| Tube Extender | 10 | 25 | RT |
| mdi Green Adaptor for 45mm Neck Bottle | 1 | 1 | RT |
| Collection Tube | 10 | 25 | RT |
| Buffer M1 | 125ml | 310ml | RT |
| Buffer M2 | 125ml | 310ml | RT |
| Buffer M3 | 125ml | 310ml | RT |
| Buffer MB | 125ml | 310ml | RT |
| Buffer EF | 20ml | 50ml | RT |
| Buffer MPW | 125ml | 310ml | RT |
| Buffer MW | 15ml | 30ml | RT |
| Buffer ME | 15ml | 30ml | RT |
| RNase A (2.3 units/ μ l) | 500 μ l | 1240 μ l | 2-8 °C |
| Handbook | 1 | 1 | -- |
| Certificate of Quality | 1 | 1 | -- |

Components to be arranged by user

| | | | |
|---------------------------------|----|----|----|
| 45mm Neck Bottle (250 or 500ml) | 1 | 1 | RT |
| 50ml Syringe | 10 | 25 | RT |
| 50ml Sterile Tube | 10 | 25 | RT |
| 2ml Centrifuge Tube | 10 | 25 | RT |

Note: After adding RNase A, buffer M1 should be stored at 2-8 °C.

9. Specifications

| Features | High Yield Protocol | |
|--|--------------------------|-------------------------|
| | High Copy Number Plasmid | Low Copy Number Plasmid |
| Type of Plasmid | | |
| Capacity of Tube Extender (ml) | 35 | 35 |
| Binding Capacity of Spin Column (μ g) | 1200 | 1200 |
| Maximum Culture Volume (ml) | 100-130 | 200 |
| Expected (μ g) Yield of Plasmid | upto 1000 | 50-250 |

10. Principle

The **mdi** Endotoxin Free Quanta Maxi kit allows the isolation of ultra pure pDNA which involves:

1. Lysis and Neutralization of Bacterial Culture
2. Capturing pDNA on spin column
3. Removal of Endotoxins
4. Washing
5. Elution

1. Lysis and Neutralization of Bacterial Culture

To efficiently lyse the bacterial culture, centrifuge it properly before addition of buffer 'M1' & 'M2'. The lysed culture is then neutralized with the help of buffer 'M3'.

2. Capturing pDNA on Spin Column

In order to facilitate adsorption of pDNA onto the spin columns, suitable conditions of salt concentration and pH are required which is achieved by addition of binding buffer 'MB'.

3. Removal of Endotoxins

Wash with buffer 'EF' to remove bacterial endotoxins and to achieve <0.1 EU (Endotoxin Units) per µg of plasmid DNA in the final eluate.

4. Washing

Subsequent to pDNA binding onto the spin column, unwanted components like RNA, proteins and polysaccharides are washed away. Washing is done by buffer 'MPW' & 'MW'.

5. Elution

Salt concentration and pH of elution buffer is important for elution efficiency, elution occurs at basic conditions and low salt concentration. Elution is done with buffer 'ME'.

11. Important Points to be Considered

Optimization of Operating Conditions

All parameters regarding pDNA yield needs to be monitored like plasmid copy number, host strains, culture media, culture volume for obtaining expected high yields.

Centrifugation

All centrifugation steps should be carried out at room temperature at $\geq 10,000$ rpm

In case of choking of spin column, increase centrifugation time.

Lysis

After adding buffer 'M2' invert 4-6 times and incubate at room temperature for 3 minutes.

Washing

To remove residual wash buffer, spin the column for 1-2 minutes extra at $\geq 10,000$ rpm.

Elution

Elution buffer must be dispensed on to the center of the spin column for maximum elution efficiency. Incubation time should be increased by 2-3 minutes.

For obtaining highly concentrated pDNA, elution should be done in low salt concentration buffer 'ME'.

Yield

pDNA yield can be determined by spectrophotometer at 260nm and by Agarose gel electrophoresis. Purity is detected by A_{260}/A_{280} ratio lying between 1.8-2.0.

12. mdi Endotoxin Free Quanta Maxi Procedure

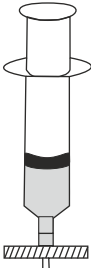
Pelleted Bacteria



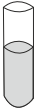
Alkaline Lysis



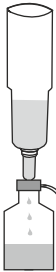
Clear Lysate



By Filtration

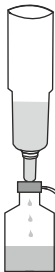


Add MB Buffer



Bind and Wash
with Buffer EF

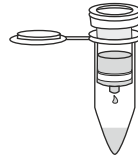
Vacuum
Pump



Wash with Buffer
MPW and MW

Vacuum
Pump

Ultra Pure Endotoxin Free
Plasmid DNA



Elute



Dry



13. Protocol

Plasmid DNA purification using **mdi** Endotoxin Free Quanta Maxi Kit

Important: This protocol is designed for the preparation of upto 1000 µg of Endotoxin free (<0.1 EU/µg) plasmid DNA using the **mdi** Endotoxin Free Quanta Maxi Kit with a maximum culture volume of 200ml.

Maximum recommended culture volumes:

| Copy Number | High-Yield Protocol |
|-------------------|---------------------|
| High Copy Plasmid | 100-130ml |
| Low Copy Plasmid | 200ml |

Ensure that RNase A has been added to buffer 'M1' before starting the protocol

Procedure:

1. Centrifuge 100-130ml of bacterial culture for high copy number and 200ml for low copy number plasmids of OD_{600nm} 2.5 - 3.5 at 8,000 rpm for 15 minutes.
2. Resuspend pelleted bacteria in buffer M1 (8ml for high copy number and 12ml for low copy number plasmid).

Note: For efficient lysis, it is important to use a vessel that is large enough to allow complete mixing of the lysis buffers. The bacteria should be resuspended completely by vortexing or pipetting up and down until no cell clumps remain.

3. Add buffer 'M2' (8ml for high copy number and 12ml for low copy number plasmid). Gently mix by inverting 4-6 times and incubate at room temperature for 3 minutes.

During incubation, prepare the **mdi** filter device with 'RED STOPPER'. Place the **mdi** filter device into a convenient tube or a rack, after attaching it to outlet of the 50ml syringe without plunger.

4. Add buffer 'M3' (8ml for high copy number and 12ml for low copy number plasmid) to the above lysate, mix immediately by inverting 4-6 times. Proceed directly to next step. Do not incubate lysate on ice.

5. Pour the lysate into the barrel of the 50ml syringe with the **mdi** filter device attached to it. **Incubate at room temperature for 5 minutes.**
6. Remove the 'RED STOPPER' from the **mdi** filter device outlet nozzle. Gently insert the plunger into the 50ml syringe having lysate and filter the cell lysate into a new sterile tube allowing space for the addition of buffer 'MB'.

Filter until all the lysate has passed through the **mdi** filter device, but do not apply extreme force, as it may push debris through the filter and choke it (Approximately the amount of lysate that can be recovered after filtration through the **mdi** filter device is 20 - 22ml for high copy number plasmids and 32 - 34ml for low copy number plasmids).

7. Add buffer 'MB' (8ml for high copy number and 12ml for low copy number plasmid) to the cleared lysate and mix by inverting 4-6 times. **Incubate at room temperature for 5 minutes.**
8. Attach the **mdi** Quanta Maxi spin column with tube extender to the 45mm neck bottle with the help of 'GREEN ADAPTOR' .
9. Transfer the lysate to the **mdi** Quanta Maxi spin column and pass the lysate through **mdi** Quanta Maxi Spin Column by applying vacuum (approx - 300mmHg) using a vacuum pump. For this, attach the vacuum pump to the outlet of the green adaptor attached to the 45mm neck bottle.
10. To achieve extremely low endotoxin level, add 1600µl of buffer EF to the Quanta Maxi spin column and apply vacuum to pass half of the volume. Switch off the vacuum pump, disconnect the tubing and incubate at room temperature for 5 minutes. Reconnect the vacuum source and again apply vacuum to pass the remaining buffer through the column.
11. Wash the **mdi** Quanta Maxi spin column with buffer 'MPW' (8ml for high copy number and 12ml for low copy number plasmid) by applying vacuum.

Note: Switch off vacuum pump when all the sample has passed through the spin column.

12. Remove the tube extender and wash the **mdi** Quanta Maxi spin column with 750µl of buffer 'MW' by applying vacuum.
13. Remove **mdi** Quanta Maxi spin column from the 'GREEN ADAPTOR'.
14. Place the **mdi** Quanta Maxi spin column in a 2ml collection tube(provided) and centrifuge for 1 minute at $\geq 10,000$ rpm.

Important: This spin is necessary to remove residual wash buffer.

15. Place the **mdi** Endotoxin Free Quanta Maxi spin column in a fresh 2ml microcentrifuge tube (not provided). To elute the DNA, add 400µl of buffer 'ME' to the center of the spin column, let it stand for at least 1 minute and then centrifuge for 1 minute at $\geq 10,000$ rpm.
16. **Optional:** For higher concentration. Reload the above eluate in the same **mdi** Quanta Maxi spin column, incubate for 1 minute and elute in the same microcentrifuge tube by centrifuging at $\geq 10,000$ rpm for 1 minute.

(Repeat step 16 once more to get high concentration of pDNA. Average eluate volume is 390µl from 400µl).

14. Trouble Shooting Guide

A. Poor or no DNA Yield

- | | |
|--|---|
| 1. Plasmid did not propagate | Please check that the conditions for optimal culture growth were met. |
| 2. Poor bacterial growth | Inoculate the culture under optimum conditions and ensure that all conditions are adequately met. |
| 3. Lysis was not efficient | If larger than recommended culture volume was used or cell density was very high (usually occurs if the culture is grown more than 16 hours). Reduce the culture volume and use culture grown between 12-16 hours. |
| 4. Insufficient lysis for low copy plasmid | For low copy plasmid preparations, increasing the volumes of buffers M1, M2, M3, MB and MPW by 2ml may help to increase plasmid yield and quality. |
| 5. Buffer M2 and MB Precipitated | Redissolve by warming to 37°C. |
| 6. Insufficient cell resuspension | The bacterial pellet formed after 15 minutes centrifugation should be resuspended completely in buffer 'M1' by pipetting up and down. |

- | | |
|--|--|
| 7. Column was overloaded | Can happen if larger than recommended culture volumes are used. |
| 8. Improper dispensing of elution buffer | The elution buffer must be dispensed properly onto the center of the column membrane for maximum elution efficiency. Increase incubation time by 2-3 minutes. |

B: Low quality DNA

- | | |
|---------------------------|--|
| 1. Nuclease Contamination | Use autoclaved plastic and glass wares. |
| 2. RNA Contamination | RNase A digestion is insufficient. Check that RNase A is added to buffer 'M1'. If buffer 'M1' is older than 6 months, add more RNaseA. |
| 3. Genomic DNA in eluate | Avoid excessive vortexing or vigorous mixing. |
| 4. Plasmid Degradation | Do not incubate in buffer 'M2' for more than the prescribed time. |

C: DNA does not perform well

- | | |
|-----------------------------------|---|
| 1. Residual wash buffer in eluate | Spin the column for 2-3 minutes extra at $\geq 10,000$ rpm to remove residual wash buffer completely. |
|-----------------------------------|---|

D: **mdi** Filter Device Clogs During Filtration of Lysate

- | | |
|--|---|
| 1. Too large culture volume used | Do not exceed the culture volume recommended in the protocol. |
| 2. Inefficient mixing after addition of buffer 'M3' | Mix well until a fluffy white material has formed. |
| 3. Mixing too vigorous after addition of buffer 'M3' | After addition of buffer 'M3', the lysate should be mixed immediately but gently. Vigorous mixing disrupts the precipitate into tiny particles which may clog the mdi filter devices. |
| 4. Lysate was not loaded immediately into the barrel of syringe having attached mdi filter device after addition or mixing of buffer 'M3' | Load the lysate immediately after addition and mixing of buffer 'M3'. Decanting after incubation may disrupt the precipitate into tiny particles which may clog the mdi filter device. |
| 5. Old pellet was used | Use fresh pellet. |
| 6. Extreme force was applied during filtration | Do not apply extreme force as it may push tiny particles into the mdi filter device. |

E: **mdi** Quanta Maxi Spin Column Choked

- | | |
|---|---|
| 1. Lysate was not clear after filtration through mdi filter device | Do not apply extreme force as it may push tiny particles into the downstream of mdi filter device. |
|---|---|

15. Product Use Limitations

mdi kits are developed and manufactured for research purpose only. The products are not recommended to be used for human, diagnostics or drug purposes for which these should be cleared by the concerned regulatory bodies in the country of use.

16. Product Warranty and Satisfaction Guarantee

All **mdi** products are guaranteed and are backed by our

- a. Technical expertise and experience of over 30 years.
- b. Special **mdi** process for consistency and repeatability.
- c. Strict quality control and quality assurance regimen.
- d. Certificate of analysis accompanied with each product.

mdi provides an unconditional guarantee to replace the kit if it does not perform for any reasons other than misuse. However, the user needs to validate the performance of the kit for its specific use.

17. Ordering Information

To order please specify as below:

| Type | |
|------|------|
| Type | Code |
| QXEK | QXEK |

| |
|----|
| XX |
|----|

| |
|----|
| XX |
|----|

| |
|----|
| XX |
|----|

| |
|---|
| X |
|---|

| Pack Size | |
|-----------|------|
| Pack Size | Code |
| 10 | 0010 |
| 25 | 0025 |

Example:

| | | | | | |
|------|----|----|----|---|------|
| QXEK | XX | XX | XX | X | 0025 |
|------|----|----|----|---|------|

