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C-SOP-901: Preparation of DNA Isolates for Domestic and Overseas Transport

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1 *Works for me* This protocol is published without a DOI.

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ABSTRACT

DNA eluted in nuclease-free water or low-TE solution is stable enough to be shipped at ambient temperatures overseas. This characteristic of DNA becomes vital when dealing with logistics and finances of research in low- and middle-income regions with limited access to dedicated shipment carriers and bespoke courier services, not to mention door-to-door delivery delays. Here we describe an efficient and inexpensive method of transporting DNA isolates in a high-throughput format on 96-well PCR microplates.

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KEYWORDS

DNA transport, DNA shipment, packaging DNA, DNA import, DNA export, sample transport

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MATERIALS TEXT

1. DNA sample aliquot(s)

2. Single-channel pipettes (P2, P10, P200) with sterile, filtered pipette tips

3. 96-well PCR-plate, low-profile, full skirted (ThermoFisher Scientific, Cat no. AB0800)

4. 8-cap strips, domed (Fisherbrand, Cat no. 14230231)

5. Cap-It tool, strip-cap applicator (Fisherbrand, Cat no. AB0536)

6. Flat cardboard

7. Bubble wrap

8. Absorbent tissue paper roll

9. High-strength packaging tape

10. Consignment containers (provided by local courier provider, in this case FedEx)

ABSTRACT

DNA eluted in nuclease-free water or low-TE solution is stable enough to be shipped at ambient temperatures overseas. This characteristic of DNA becomes vital when dealing with logistics and finances of research in low- and middle-income regions with limited access to dedicated shipment carriers and bespoke courier services, not to mention door-to-door delivery delays. Here we describe an efficient and inexpensive method of transporting DNA isolates in a high-throughput format on 96-well PCR microplates.

Before Starting

1 Ensure that all of the materials listed are available before you begin aliquoting and packaging DNA samples for transport. Contact your local courier provider to obtain consignment containers.

Optional project (or site) specific items include sample manifests and unique plate IDs (barcodes) that enable the recipient to identify the isolates being sent.

Figure 1

Aliquoting DNA into a 96-well plate

2 Using filter tips, transfer the required amount of each DNA sample into the 96-well plate (one well per sample).

i. Always aliquot samples in a vertical format (Fig. 2a).

ii. Positions A1 to G11 are available for DNA (sample) while H12 is generally left empty for controls in downstream assays (Fig. 2b).

Record the aliquoted positions on a sheet alongside isolate/sample ID and estimated DNA concentration (in ng/ul) and yield (ng or ug).

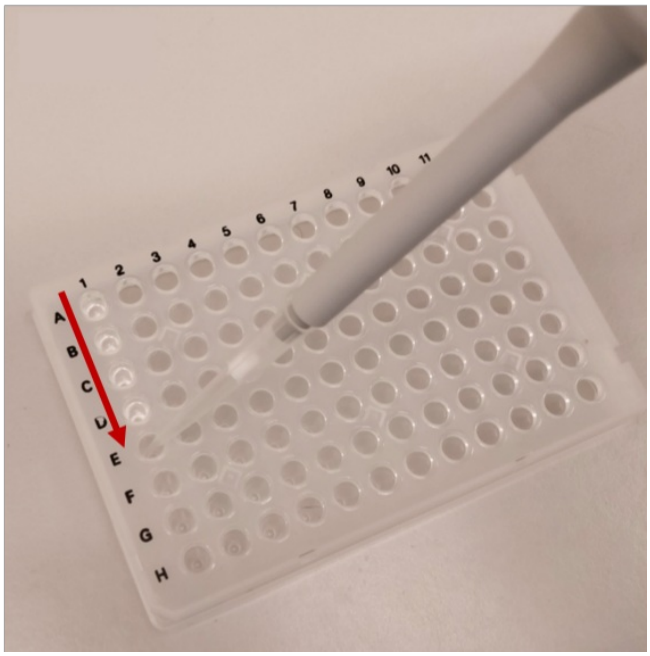


Figure 2a

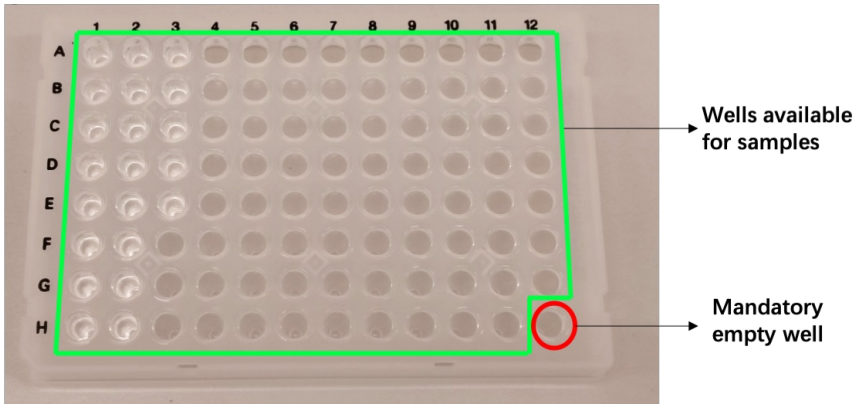


Figure 2b

Sealing the 96-well plate

3 Gather the number of 8-cap strips as fully and partly-filled plate columns (Fig. 3a) and place them on a clean, sterile surface, domes facing downwards (Fig. 3b).

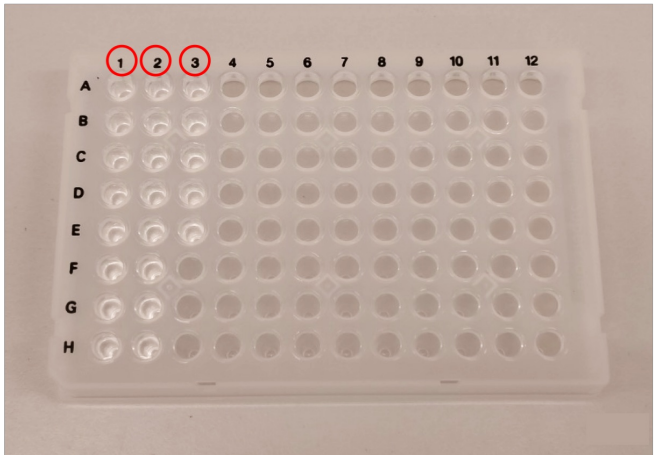


Figure 3a

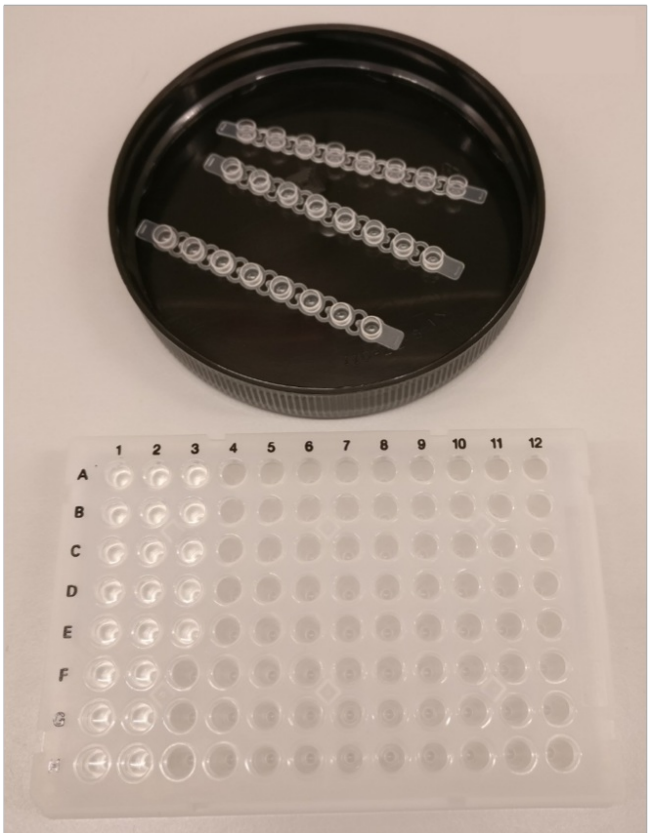


Figure 3b

4 Gently line the cap strip along the wells of a single column (domes now facing upwards). Using your thumb, press down on each of the circular domes, one at a time, until they click and lock into the wells (Fig. 4).

Be gentle with thumb pressure to avoid spillage and cross-contamination of DNA. When fastening the caps, grip the plate tightly with your other hand to make it easier to press down.

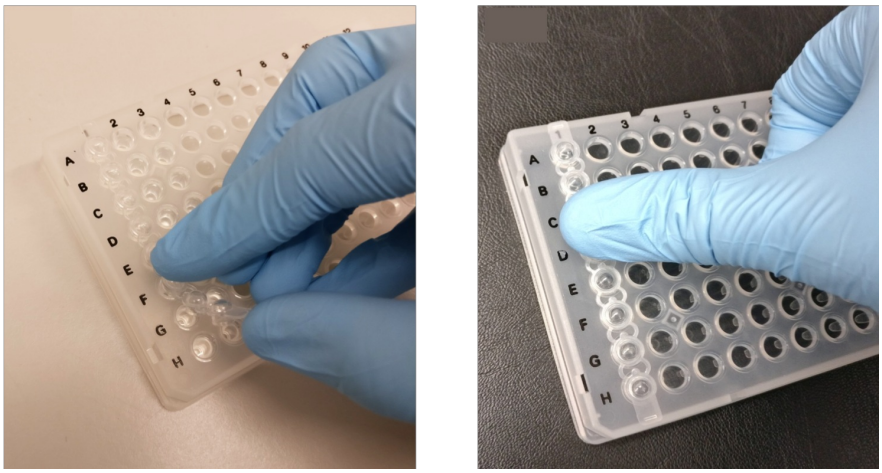


Figure 4

5 Gripping the strip cap applicator as shown, gently roll it back and forth about 10 times along the dome strip in a vertical line (Fig. 5). This will help to lock the caps in with an even amount of pressure across all of them.

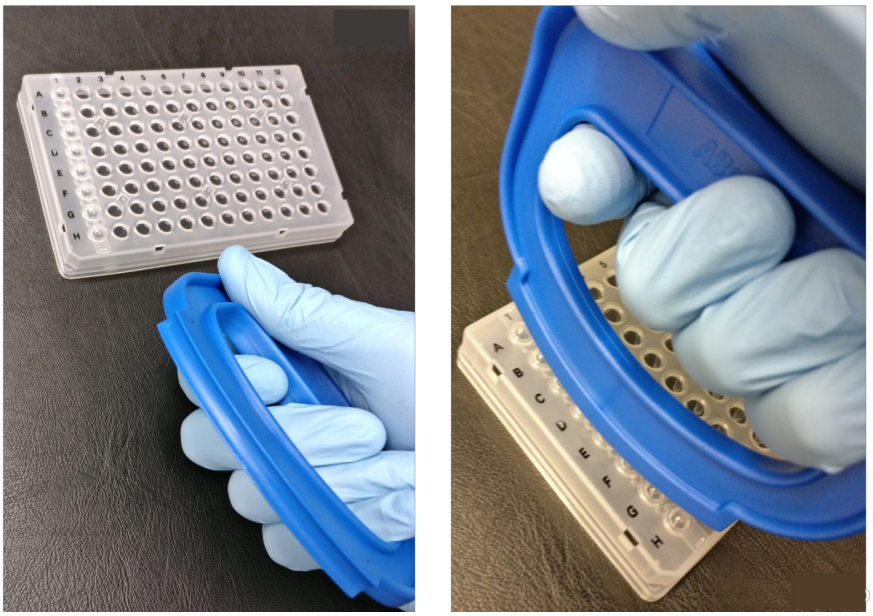


Figure 5

6 ⚠

Hold the plate up at your eye level and carefully check that all of the strip caps are locked flat into each well (Fig. 6). Loose caps could cause sample leakage and cross-contamination during transport.

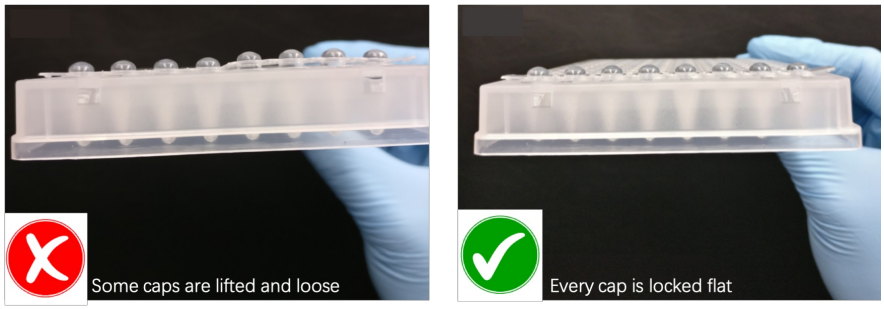


Figure 6

7 Repeat steps 3-7 for each of the other columns filled with samples (Fig. 7).

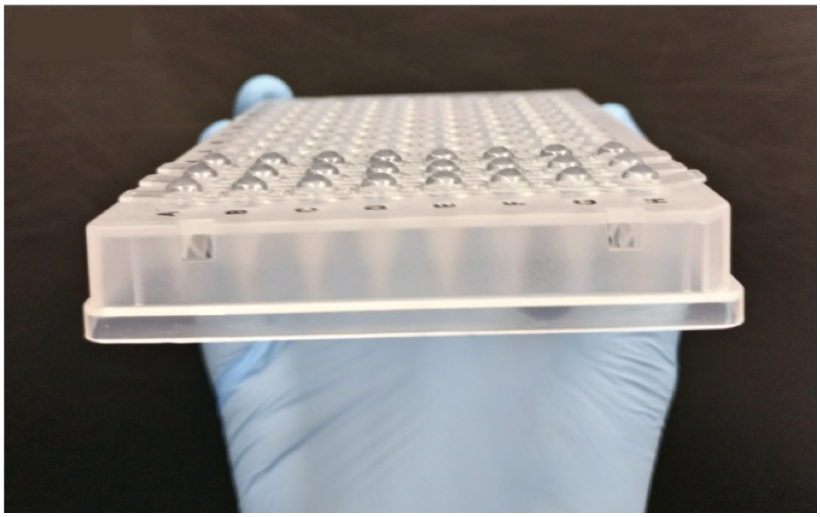


Figure 7

Securing the 96-well plate for transport

8 Place the sealed plate on a piece of flat sheet cardboard. Using a pencil, trace the outline of the 96-plate (Fig. 8a).

Cut out two such outlines. You will now have two rectangular pieces of cardboard roughly 128 x 86 mm each (Fig. 8b)

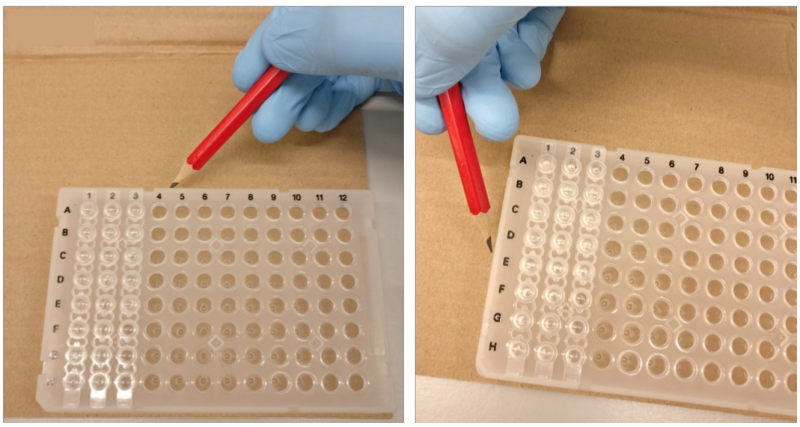
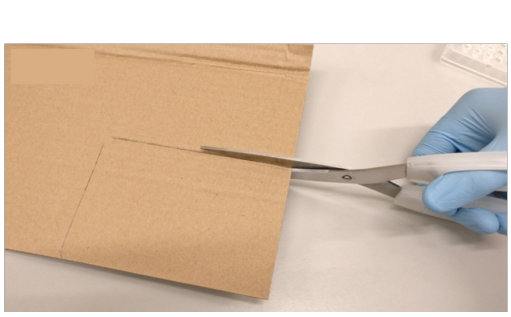


Figure 8a



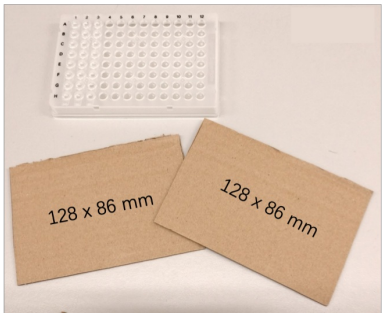


Figure 8b

9 Place one piece of cardboard below and the other above such that the plate is sandwiched between them (Fig. 9).

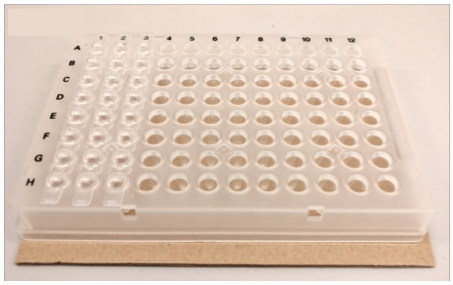


Figure 9

10 Bind the sandwich together using packaging tape by winding it tightly around the bundle several times (Fig. 10).

Figure 10

11 Wrap the taped bundle in a double layer of absorbent tissue (Fig. 11).


Figure 11

12 Using a large sheet of bubble paper, wrap the bundle within several layers. Next, secure the bubble-wrapped bundle with more packaging tape going all the way around as shown (Fig. 12).


Figure 12

Ensure that no part of the tissue wrapping remains exposed or unprotected.

13 ⚠

Label the plate bundle as shown below.

Avoid handwritten labels as they can sometimes be illegible or wash away during transit.

Figure 13

14 Repeat steps 2-13 for each new 96-well plate of samples you intend to ship.

Boxing the secured 96-well plate

15 ⚠

Carefully place each wrapped plate bundle into the courier container (Fig. 14). If you choose to use a FedEx Small Box, then you can fit a maximum of SIX wrapped 96-plate bundles.

Include a printed paper copy of the sample manifest indicating the positional layout of DNA samples on each plate.

Figure 14

i. Do not overload the box as it could rip apart during transport. In most cases, extra boxes should be issued free of charge by your local courier office.

ii. Place a few cut pieces of bubble wrap as extra cushioning in-between the plates inside the box.

iii. Contact your local courier office to ensure you have the necessary export/customs paperwork in place to ship biological material such as DNA.

16 Seal the FedEx box by peeling off the adhesive strip, folding the flaps and firmly pressing down on the upper lip of the box (Fig. 15).

Figure 15

17 ⚠

Place the box into a UN3373 Pak (Fig. 16), also provided by your local courier. Upon sealing the bag, record the weight of the entire package.

Ensure you have included all of the necessary contents and paperwork prior to sealing and weighing the package.

In most cases, **the following documents are mandatory**:
i. Proforma invoice
ii. AWB (Airway Bill)
iii. Shipping labels (with barcoded tracking ID)
iv. Commercial invoice (describing the package contents and sender/recipient details)
For more details, contact your chosen courier service.

Figure 16

18 ⚠

Contact your chosen courier to arrange payment and a collection date/time.

Place the package in the freezer **-20 °C** until it is ready to be collected for transport.