Disposable Device for the Isolation of DNA from Agarose Gels

A problem that arises when cloning DNA is the isolation of specific DNA molecules following restriction enzyme digestion or PCR amplification. Typically, a mixture of DNA fragments is electrophoretically separated by agarose gel electrophoresis, the gel is stained with ethidium bromide, and the DNA is visualized by UV transillumination. The DNA fragments of interest are excised from the gel using a scalpel, and the DNA is subsequently extracted from the gel slice. A drawback of this procedure is that it takes significant amounts of time to identify the DNA band of interest and make the necessary scalpel cuts to free the gel slice. The procedure must be performed quickly because UV light exposure damages DNA.

To circumvent these inherent problems and simplify this process, we have developed a simple, disposable device made from common laboratory materials that permits the rapid isolation of DNA from agarose gels and does not require the use of a scalpel or ethidium bromide, which is a carcinogen. We simply cut a 1-mL blue pipet tip in half and discard the lower portion. The upper portion of the cut tip is held, and the lower portion is used as a coring device to isolate the gel slice containing the DNA fragment of interest. Because the gel slice adheres to the lumen of the blue pipet tip, it can be directly transferred to a sterile 1.5-mL microcentrifuge tube (Figure 1). A yellow 200-µL pipet tip is then used as a plunger to dislodge the gel slice and transfer it to the microcentrifuge tube. The device can be modified to accommodate the particular lane size by simply cutting the blue pipet tip higher or lower. If multiple bands of the same DNA molecule need to be isolated, we repeatedly use the same blue pipet tip and allow the isolated gel slices to stack up. To isolate DNA from the gel slice, we use a modified version of the procedure of Heyd et al. (1), in which silicon dioxide (Catalog No. S5631; Sigma Chemical, St. Louis, MO, USA) is substituted for the pumice. The silicon dioxide has a high DNA-binding capacity, it is inexpensive, and DNA is efficiently eluted from this matrix.

In conclusion, we find the described gel excision device to be a simple, safe, inexpensive alternative to commercial gel elution devices or the use of a scalpel for the routine isolation of DNA from agarose gel.

REFERENCE


Received 4 March 1998; accepted 13 March 1998.

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