

## Effectiveness of Filter Protected Pipet Tips

### ABSTRACT

Five brands of filter tips were tested for their ability to prevent carryover contamination by over pipetting PCR\* product through the filters and running the recovered sample on 1% agarose gel. Filter protection was shown to be nonexistent in Oxford, LabCon, USA Scientific and Continental Laboratory Products, Inc., (CLP) filter tips. Only ART® tips manufactured by Molecular Bio-Products, inc., completely blocked the passage of liquids and DNA. Of the five filter tips tested, only ART tips provided complete and consistent protection against pipettor contamination.

### INTRODUCTION

Filter protected pipet tips are specifically designed to prevent carryover contamination from liquids and aerosols that may come in contact with the pipettor. For example, PCR product contains DNA molecules which will spread through direct contact with the pipettor barrel, or by aerosols generated by the action of pipetting. The resulting contamination can adversely affect subsequent reactions and lead to inaccurate results. This potential for error illustrates the importance of an effective filter barrier.

### OBJECTIVE

Various filter technologies have been developed, each claiming to prevent the passage of DNA molecules to the pipettor. The seemingly subtle differences between filters will result in error prone PCR because not all filter tips are capable of providing consistent protection against pipettor contamination. Therefore, this study was designed to test the true effectiveness of filtered pipet tips from Oxford, LabCon, CLP, USA Scientific

and ART® tips from Molecular Bio-Products, inc.

### MATERIALS AND METHODS

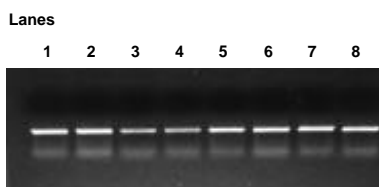
Five conventional PCR reactions were carried out in HotStart 50® storage and reaction tubes using primers for mitochondrial D-loop DNA at 0.2 mM concentration and template consisting of 0.02 µg total human liver DNA (Life Technologies). MgCl<sub>2</sub> concentration was 2mM, was 2 mM, dNTP concentrations were 2 mM and 1X PCR buffer was used. Thirty thermal cycles consisted of 56° C for 30 seconds, 72° C for 60 seconds and 94° C for 60 seconds.

Each filter tip was then used to intentionally overdraw 20 µl of PCR product using a pipettor deliberately set at 200 µl. 15 µl of any liquid that passed through the filters was then collected and run on a 1% agarose gel paired with 15 µl of the same product taken from the respective original reaction tubes.

### RESULTS

Only ART's patented filter prevented fluid from passing beyond the filter. LabCon and USA filters were penetrated almost immediately and both Oxford and CLP filters failed within two - three seconds. Every filter that failed allowed 18 - 20 µl of liquid to pass through freely, creating the potential for pipettor contamination.

The 15 µl aliquots recovered from behind the filters and the positive controls consisting of "unfiltered" samples were run on a 1% agarose gel containing ethidium bromide at V=100 for 25 minutes. (Fig. 1)



Lanes 1, 3, 5 and 7 are aliquots recovered from behind the filters of Oxford, LabCon, USA and CLP tips respectively. Lanes 2, 4, 6 and 8 are "unfiltered" control aliquots from the respective original microfuge tubes.

No visible or quantifiable differences existed between the "filtered" and control aliquots indicating that all but ART filter tips permitted liquid sample containing DNA to pass freely through the filter. It was therefore concluded that ART filter tips have the only effective barriers that protect against carryover contamination.

### DISCUSSION

Filter protected tips have been designed to specifically prevent carryover contamination. It is clear from this study, however, that not all filter technology is as effective as that which is patented by Molecular Bio-Products, inc.

Additional evidence of ART's effectiveness is discussed in the article "Use of Filtered Pipet Tips to Elute DNA from Agarose Gels" *BioTechniques*, June 1995. The article describes the process of drawing DNA through the filters of Costar and Bio-Rad filter tips. DNA passes through the filters freely "without apparent effect to its integrity." It was further determined that "ART tips, which are designed to seal when exposed to liquids, could not be used for this method of eluting DNA." ART tips permitted no visible or measurable penetration of DNA and are the only filters proven to offer complete protection against pipettor contamination.

\*PCR process is covered by patents owned by Hoffmann-La Roche, Inc. ART is a registered trademark of MBP and is protected by U.S. Patent Number 5,156,811; HotStart 50 is a registered trademark of MBP; MBP is a registered trademark of Molecular BioProducts, Inc., San Diego, CA. ©MBP, 2000.