Miniaturization of One-Step Gene Expression using the Access™ Laboratory Workstation and the Echo® Liquid Handler

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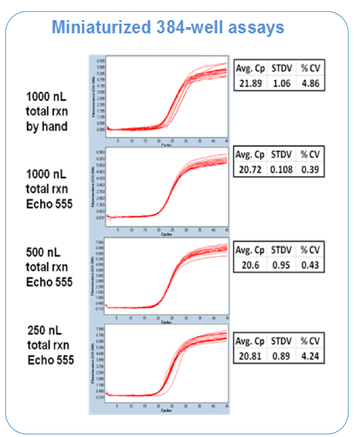
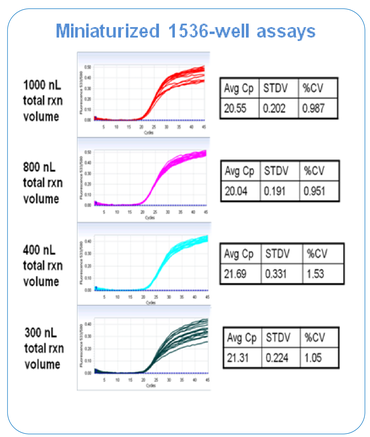
Introduction

Quantitative PCR (qPCR) is a powerful tool used for genotyping, SNP analysis, and gene-expression studies. Quantitative detection of small mRNA expression changes facilitates the characterization of early-stage cancer and infectious disease. Advances in qPCR technology to enable the use of high density 384- and 1536-well microplates have led to a demand for automation and miniaturization of qPCR preparation. With automation, researchers can generate larger sets of data quickly, while minimizing resource burden and improving reproducibility across assays. As researchers push further toward miniaturization, potential cost savings are met with high risk for cross contamination, lower precision, and poor accuracy. The Access workstation relies on the Echo liquid handler and its tipless, touchless transfer of samples and reagents to eliminate such risks—providing high quality assay-ready plates. This poster examines the ability to automate qPCR assay preparation from lysis to analysis while reducing overall reaction volumes to as little as 250 nL.

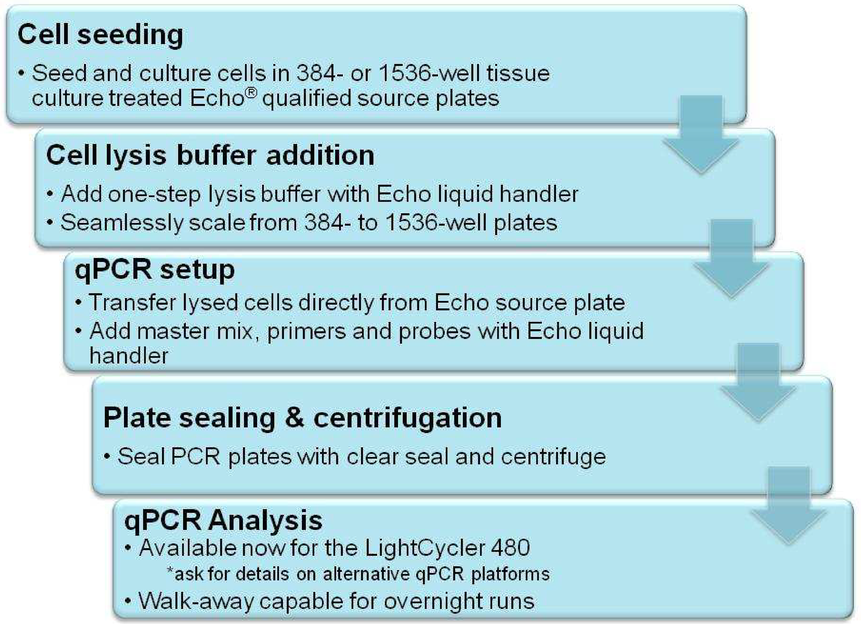
Simplified optimization with Echo® software applications

With a suite of software applications to guide protocol development and automation control, the time required to implement the Access workstation for qPCR screening is greatly reduced. For qPCR setup the Echo Plate Reformat (EPR) application was used to map transfers of master mix, primers, and DNA samples from source plates to PCR assay plates. With the freedom of any-well to any-well transfers the Echo® liquid handler accommodates any arrangement of samples and assay reagents for assay design flexibility. Data gathered from assay optimization for the Echo liquid handler shows the ability to significantly reduce volumes in both 384- and 1536-well assay plates.





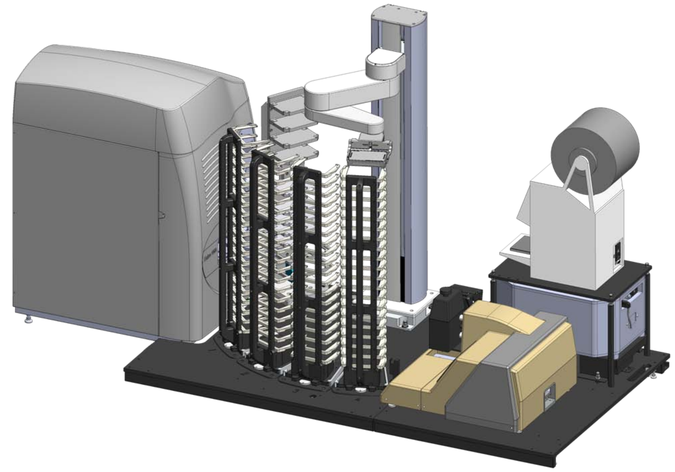
One-Step qPCR Workflow



Automation from cells to results

Once assay conditions and protocols are optimized for the Echo liquid handler, the entire workflow can be automated on the Access workstation. The automation control software imports the EPR protocol and facilitates the addition of plate handling tasks and scheduling preferences. Since every automation event is scheduled to ensure that the Echo liquid handler is given full priority, the resulting routines is guaranteed to reach maximum throughput. Echo® qualified source plates containing cells are used as destination plates to receive a transfer of lysis buffer on the Echo liquid handler. The destination plate is then used as a source plate for the transfer of lysates to the PCR plate. This is followed by the addition of master mix, primers and probes by the Echo liquid handler. The Access workstation moves the PCR plate to the sealer where a clear seal is applied, then onto the centrifuge where the contents are spun down. Plates can then be stored for analysis offline or transferred directly to an integrated qPCR platform.

The Access Workstation



Assay-ready plate automation

With the use of acoustic energy, the Echo liquid handler enables cherry-picking and reformatting of samples from any well of a source plate to any well of an assay plate with high precision, accuracy, and no risk for cross contamination.

The Access workstation seamlessly adds automated sealing, pealing, centrifugation and bulk reagent dispensing—creating a simple walk-up and walk-away solution to overcome the challenges of miniaturized, high-throughput assay plate production. With an intuitive software interface, the Access workstation is easily utilized by any scientist for a wide range of applications.

Summary

- **Acoustic transfer with the Echo liquid handler simplifies optimization of genomic assays.**
- **Reaction volumes as low as 250 nL yield excellent results.**
- **The Access workstation enables automation of low-volume qPCR assay preparation and analysis.**
- **Enables scientists to fully explore the capabilities of miniaturized genomics applications, while reducing reagent consumption and operational costs.**

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