KINDER, GENTLER CELL SYNCHRONIZATION

Synchronization of cultured cells typically involves the use of drugs to arrest the cells at a particular stage of the cell cycle followed by removal of the drugs, releasing the cells to grow in synchrony. However, these drugs can adversely affect cellular physiology. In addition, because the cells are heterogeneous with respect to parameters such as cell size, they tend to become rapidly desynchronized. As an alternative, the physical method of counter-current centrifugal elutriation produces a highly synchronized, more homogeneous cell population while minimally affecting cell physiology. In this month's issue, José A. Serrato and his colleagues describe their integrated system for cell-cycle synchronization using centrifugal elutriation. The new method dispenses with the stressful initial step of centrifugation to concentrate cells. The cells are instead gently introduced into a separation chamber by direct injection from a bioreactor into the injection loop, and a low pulsation peristaltic pump stabilizes the elutriation chamber. This allows a large number of healthy, highly synchronized cells to be collected into bioreactors for downstream analysis.

See “An integrated system for synchronous culture of animal cells under controlled conditions” on page 129.

CLEANER SELEX

For each round of selection of DNA aptamers by the systematic evolution of ligands by exponential enrichment (SELEX), the PCR-amplified double-stranded DNA (dsDNA) that is bound to streptavidin beads by biotin on the end of one of the DNA strands must be denatured in order to release the unbiotinylated single-stranded DNA (ssDNA) strand that is used for the next round of selection by binding to the target. The standard method is to use NaOH at concentrations >100 mM, but it has become clear that such high concentrations of NaOH also cause the release of the undesired bead-bound dsDNA as well as the streptavidin. In this issue of *BioTechniques*, Geoffrey K. Kilili and colleagues at the US Food and Drug Administration have carefully examined a range of lower NaOH concentrations to determine the optimal concentration that minimizes the release of dsDNA and streptavidin during SELEX. They also demonstrated that this concentration depends on the type of streptavidin beads used.

See “NaOH concentration and streptavidin bead type are key factors for optimal DNA aptamer strand separation and isolation” on page 114.

Selected and written by Patrick C.H. Lo, Ph.D.

BioTechniques 61:105 (September 2016) doi 10.2144/000114447

LOW-COST AUTOMATED SAMPLE PREP

Automated sample preparation can be too expensive for many smaller labs. The ability to automate DNA preparation has advantages, however, when it comes to consistency of yields, purity, and speed. So what is a smaller lab to do? The answer, according to Chan et al., is to buy an inexpensive 3-D printer. Chan and colleagues describe how a standard 3-D printer can be modified to enable nucleic acid extraction from up to 12 samples in less than 15 minutes. The authors replaced the extruder on the printer with a tip-comb attachment housing magnets to enable bead-based extractions. The printer was then programmed to cycle through the necessary reagents for sample extraction. As a bonus, the printer's heated bed could be used for PCR amplifications—with run times 33% shorter than standard thermocyclers. If you're looking to move into automation but don't want to tax your budget too much, a 3-D printer could be your solution.

Chan, K. et al. 2016. Low-cost 3D printers enable high-quality and automated sample preparation and molecular detection. *PLoS One*. 11(6):e0158502.

SplintR FILLS GAPS IN miRNA DETECTION

MicroRNAs (miRNAs) have a number of important biological functions in cells. However, detection and quantification of miRNAs can be challenging since they are short and therefore difficult to detect using traditional northern blot or PCR approaches. Jin et al. present a new method for miRNA detection using a DNA ligase from *Chlorella virus* called SplintR ligase. In this approach, two DNA probes initially bind each end of the miRNA of interest, and SplintR ligase then fills the gap in between, attaching the probes to one another. Primers complementary to the ends of the probes are used to amplify the target miRNA sequence, and a third probe carrying a fluorescent dye is added for detection and quantification. Using the SplintR ligase technique, as little as a few thousand molecules of miR-122 could be detected, with the assay proving to be 40 times more sensitive than other miRNA detection assays.

Jin et al. 2016. Sensitive and specific miRNA detection method using SplintR Ligase. *Nucleic Acids Research*. 44(13):e116.

Selected and written by Nathan S. Blow, Ph.D.

BioTechniques 61:105 (September 2016) doi 10.2144/000114447