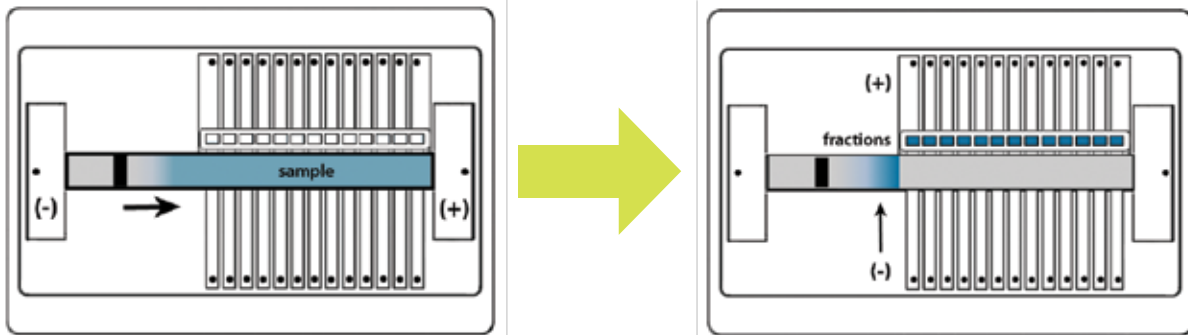# SageELF™

DNA
Fractionation
for Next Gen Sequencing

sage science

# ELF: Electrophoretic Lateral Fractionation

The SageELF is a novel tool for fractionating DNA samples for next-gen sequencing. Featuring a unique electrophoretic design, the platform slices DNA samples into 12 contiguous fractions, and collects them in separate buffer-filled sample wells. We've simplified the process to a few short steps: we provide the precast gel, software predicts the fractionation profile, and then you load your sample. After 2-3 hours, simply collect your fractions in buffer using a pipette.

The SageELF gel cassette separates DNA along an agarose gel column. At the end of a user-programmed run time, a second set of electrodes is activated. DNA fractions are then side-eluted into 12 membrane-bound wells. The cassette design includes a novel continuous buffering system which ensures DNA does not diffuse away from the gel during separation, and that fractions are evenly collected during electro-elution.

Whole Sample Fractionation for NGS:

- Construct libraries with multiple insert sizes
- Pool fractions to optimize library size and amount
- Reduce complexity of total RNA samples
- Recover and archive valuable samples
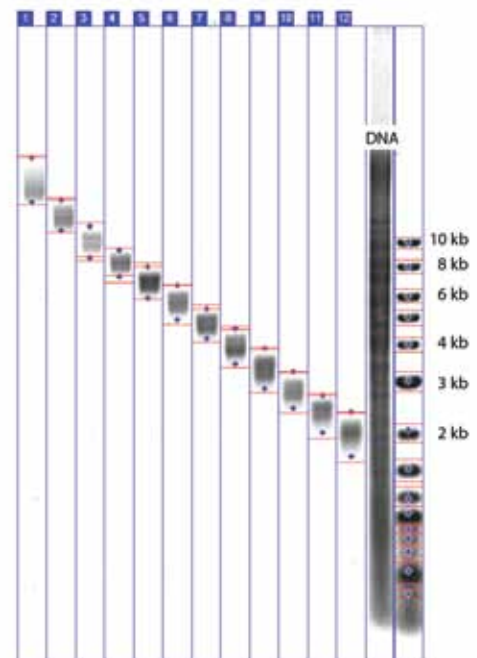
Fractions collected after 180 minutes. Analyzed by pulsed field electrophoresis (Pippin Pulse).

A New Frontier In DNA Size Selection

Multiple-size NGS libraries from a single sample provide more flexibility in addressing sequencing challenges such as structural rearrangements, splice variant discovery, closing gaps, and understanding complex genomes. The SageELF is a unique tool for serious genomic research, offering fuller utilization of DNA samples (and preservation of rare ones) and an avenue for obtaining deeper sequencing knowledge.

Finding Your Range

Using precast gel cassettes with different agarose resolutions, and electrophoresis voltage control (including pulsed-field), the SageELF offers a unique approach to DNA manipulation with minimal effort. To estimate the size of your fractions, select a target collection well and enter a size value. The software will predict the average size of DNA fragments that will be collected in the remaining wells:
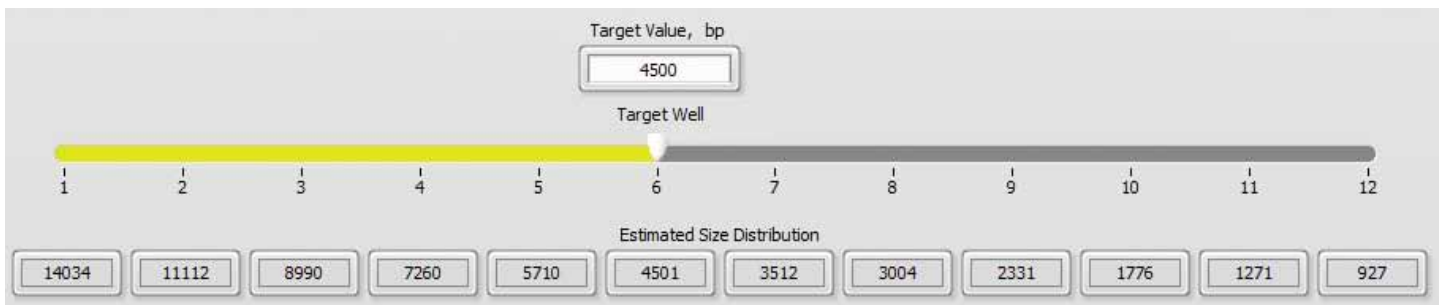
Choose between two calibrated fractionation methods, and stay informed as Sage Science releases new ones:

- 100-2300bp (2% Agarose)
- 1-18kb (0.75% Agarose, with pulsed-field)

Specifications and FAQs

## How accurate are the fraction size estimates?

An internal standard is provided to normalize the run time. Fraction sizes are typically within 15% of the software input value (within the range provided) when the internal standard is used.

How much DNA is recovered?

Between 50-80% of a sample can be recovered if the whole sample is fractionated.

How narrow are the size distributions?

This depends on the electrophoresis protocol, the position of the collection well, and the relative size of the fragments collected. For smaller fragments (100-500 bp), minimum distributions have approximately 10% CV. Larger fragments (10kb and above) will have distributions with 20-30% CV.

2% ELF 500bp w9 Nest 1
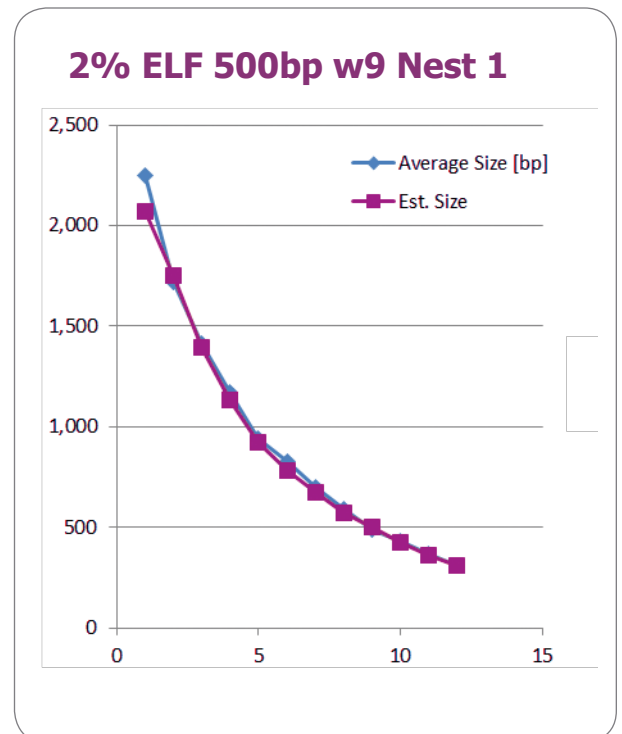
A plot of the average fraction size (bp) recovered in each collection well (1-12). A 500 bp value was entered as a target in well 9.

In the Literature:

"Of the three sizing fractionation methods tested for target recovery efficiency, throughput, and risk of cross-sample contamination, Pippin Prep, an automated optical electrophoretic system that does not require gel extraction, was the most efficient and reproducible, with the tightest, most specific sizing."

— *Extracted from Duhaime et al. "Towards quantitative metagenomics of wild viruses and other ultra-low concentration DNA samples: a rigorous assessment and optimization of the linker amplification method," Environmental Microbiology (2012) 14(9), 2526–2537.*

"Bioanalyzer results suggested that [Pippin] automated size-selection libraries were substantially more consistent than gel extraction libraries. In contrast to automated size-selected samples, gel excision samples did not appear to saturate in the range of coverage observed. This is likely because size selection was imprecise or 'leaky,' with substantial representation of fragments of lengths relatively distant from the size-selection target mean. Careful practitioners can achieve roughly 50% of the precision and repeatability of automated DNA size selection."

— *Extracted from Peterson et al. "Double Digest RADseq: An Inexpensive Method for De Novo SNP Discovery and Genotyping in Model and Non-Model Species," PLoS ONE 7(5): e37135. doi:10.1371/journal.pone.0037135*

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SageELF™

Protein Size Fractionation for Mass Spectrometry

sage science

ELF: Electrophoretic Lateral Fractionation

The SageELF is a novel tool for fractionating protein samples for proteomics studies. Featuring a unique electrophoretic design, the platform slices your protein sample into 12 contiguous fractions and collects them in separate, buffer-filled sample wells. We've simplified the process to a few short steps: we provide the precast gel, software predicts the expected fractionation profile, and you load your sample. After 2-3 hours, simply collect your fractions in buffer using a pipette.

Adjust the run time, and the software estimates the fraction size distributions
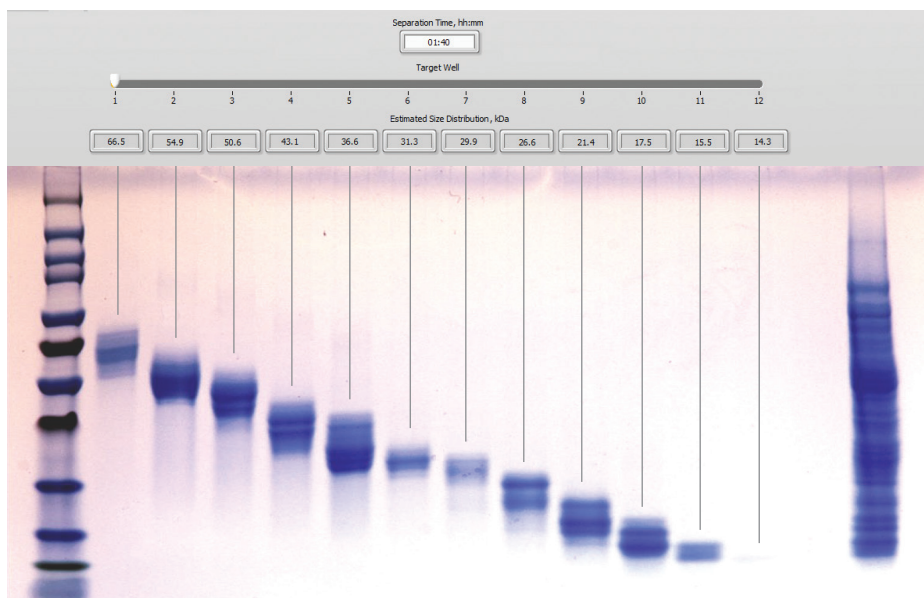
The SageELF automatically collects 12 contiguous sample fractions (*E. coli* cell lysate)

Bottom Up, Top Down, or PTMs — a great alternative to in-gel digestion

The SageELF separates solubilized proteins by size, reducing sample complexity upstream of mass spec. One sample is loaded onto a gel cassette, and two cassettes may be run at once:
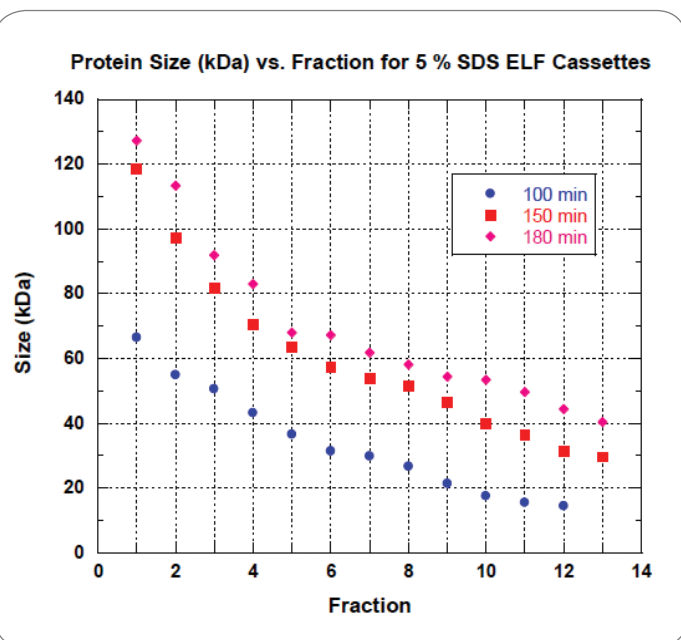
- Max input load: 350μg
- Input volume: 30μl
- Elution well vol: 30μl

Recommended fraction ranges:
- 5% SDS-Agarose for fractions 10-150 kDa
- 3% SDS-Agarose for fractions 10-300 kDa

Run times:
- Up to 3 hours

Fractionation ranges for a 5% agarose protein collections at three run times.
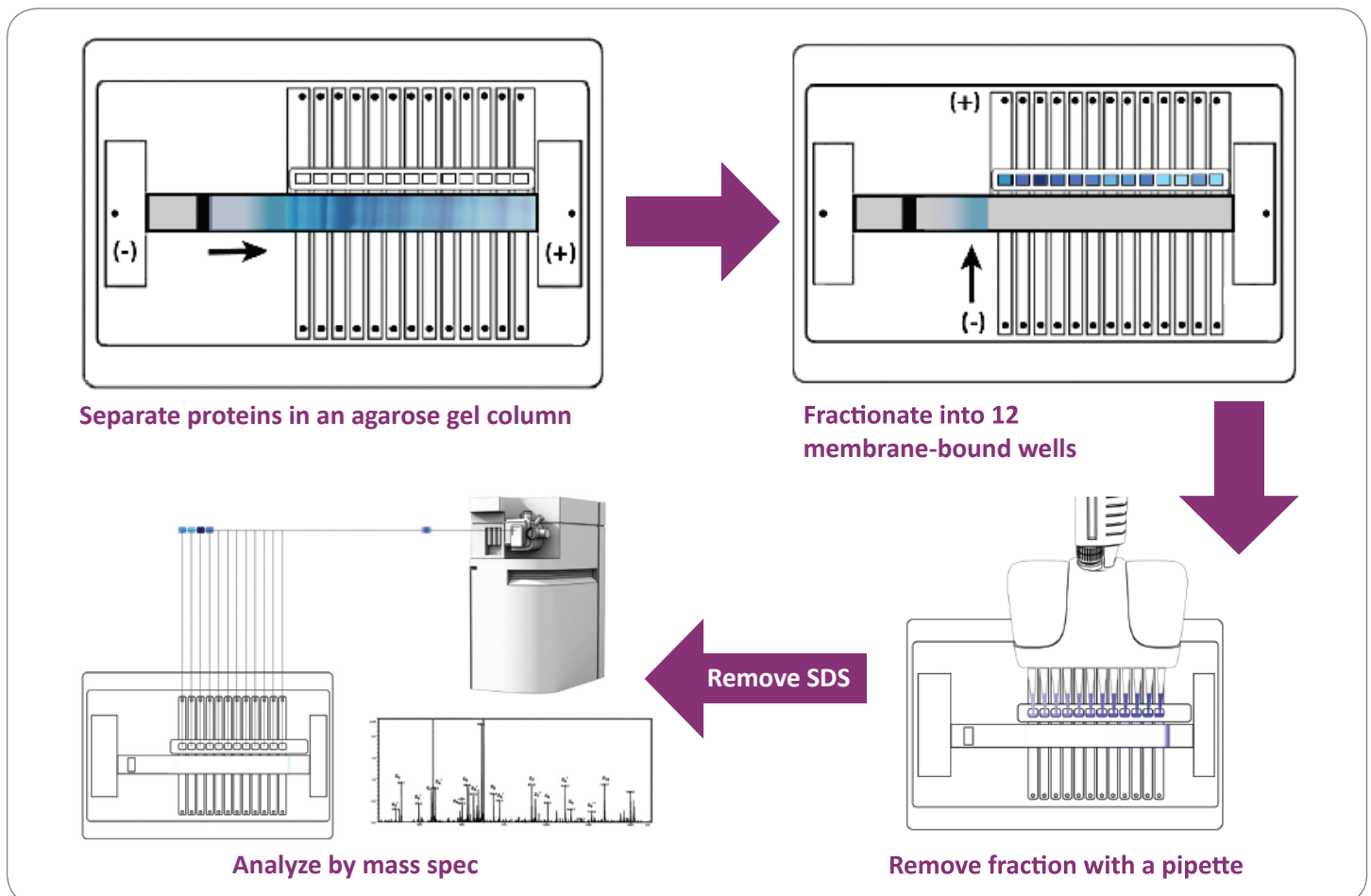
Our Technology

The SageELF gel cassette separates proteins along an agarose gel column, at the end of a user-programmed run time. As a second set of electrodes are activated, fractions are side-eluted into 12 membrane-bound wells. The cassette design includes a novel continuous buffering system which ensures the proteins do not diffuse away from the gel during separation, and that fractions are evenly collected during electro-elution.

Benefits:

- Just minutes of hands-on time
- Automated fractionation completes in a few hours
- Flexible programming estimates fractionation ranges
- >50% protein recoveries
- Reproducible collections

Separate proteins in an agarose gel column

Fractionate into 12 membrane-bound wells

Analyze by mass spec

Remove SDS

Remove fraction with a pipette

Sample Fractionation Products for Mass Spec

Sage Science has developed two systems for automated preparative electrophoresis of protein samples. These products provide increased reproducibility and ease of use for procedures that require gel isolation of proteins, including top-down and bottom-up proteomics studies and targeted protein analysis for mass spectrometry.

In both systems, the user simply loads samples into precast gel cassettes, programs desired collection ranges into instrument software, and starts the run. At run completion, the user removes the eluted protein fraction(s) from membrane-bound wells within the cassette. The fractionated samples are recovered in SDS buffer — no gel extraction is required. Instrument software controls the timing of protein fractionation using input from on-board optical detection units, which monitor the progress of fluorescently labeled molecular weight markers during electrophoresis.

The systems provide the following fractionation strategies:

The BluePippin: Targeted Protein Collection

The BluePippin allows users to enter a kDa target or single size range, and collect the proteins in that range at the end of the run. The BluePippin protein cassettes are useful for collecting one targeted protein fraction from each sample (up to five samples per run).

The Sage ELF: Multi-fractionation of Protein Samples

The Sage ELF features a cassette system designed to fractionate a protein sample into 12 contiguous size fractions. Users load a single protein sample onto a gel cassette, set a range threshold in software, and the 12 fractions are simultaneously electro-eluted from a separation gel column.

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