NGS Methylation Detection System

Unparalleled efficiency in NGS methylation profiling

The Twist NGS Methylation Detection System provides a robust, end-to-end sample preparation solution for identifying methylated regions in the human genome. Library preparation employs a unique, enzymatic process that is much less damaging to DNA, requiring less sample input and resulting in higher quality, better performing libraries. Subsequently, Twist Custom Methylation Panel design provides exceptionally efficient probes for target enrichment for CpG detection. Optimized hybridization reagents add flexibility to the timing of the workflow and improve on-target rates. Whether you are investigating cellular differentiation or screening liquid biopsies for cancer, the system offers the most efficient methylation detection available.

KEY HIGHLIGHTS

An end-to-end solution

- Convert unmethylated cytosines using a state-of-the-art, enzymatic process
- Capture with high-performance Twist probes and optimized reagents

Innovative library preparation

- Easily dropped into existing bisulfite sequencing analysis pipelines
- Superior mapping efficiency, GC uniformity, and sequencing metrics
- Detects 15% more CpGs than bisulfite method
- Less sample damage enables challenging sample inputs

Highly efficient Custom Panels*

- Sophisticated design, accurate synthesis, and detailed QC maximize capture uniformity and reproducibility
- Outstanding performance across panel sizes, target regions, and multiplexing requirements
- Easily add or enhance panel content

Optimized hybridization reagents

- Adjust hybridization timing without sacrificing performance
- Improved on-target rates with Methylation Enhancer

*Sold separately

NEBNext® EM-seq™ Kit for Twist Targeted Methylation Sequencing

In partnership with New England Biolabs (NEB®), Twist Bioscience offers a new methylation sequencing workflow that improves the quality of libraries and removes the need for damaging bisulfite treatment during prep. The workflow features enzymatic conversion of unmethylated cytosines (Figure 1) to identify sites of 5-methyl-cytosine (5mC) and 5-hydroxymethyl-cytosine (5hmC).

Enzymatic conversion produces more intact libraries with better representation, and ultimately achieves more sensitive methylation detection. The library preparation system is suitable for downstream enrichment with Twist Methylation Panels for targeted methylome sequecing.

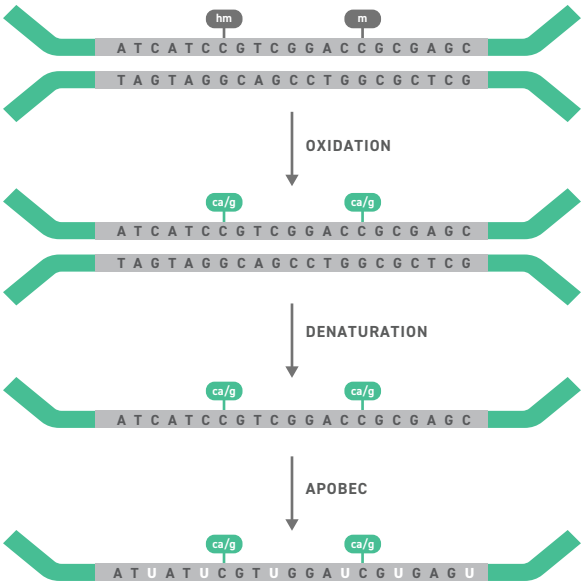

Figure 1. EM-seq conversion involves a series of enzymatic reactions to identify unmethylated cytosines. During the first reaction, ten-eleven translocation dioxygenase 2 (TET2) converts methylated cytosines (5mC and 5hmC) to 5-carboxycytosine (5caC) and the Oxidation Enhancer glucosylates 5hmC (5ghmC). These reactions protect 5mC and 5hmC from downstream deamination. The DNA is then denatured before APOBEC deaminates cytosines to uracils. Subsequent PCR amplification converts the modified 5mC or 5hmC into cytosines and uracils into thymines. After PCR, nucleotide representation is the same as observed for bisulfite converted DNA, making EM-seq compatible with existing analysis pipelines, for example Bismark and bwa-meth.

Twist Fast Hybridization System and Custom Methylation Panels

The Twist Fast Hybridization and Wash Kit provides optimal performance and maximum flexibility. Reagents and steps can be optimized to tune downstream sequencing metrics and to reduce hands-on time and pipette use. Designed with a highly sophisticated algorithm, Twist Custom Methylation Panels capture targets with exceptional efficiency across a wide range of target sizes. Together, these components ensure best-in-class hybrid capture of custom regions of interest.

Twist Methylation Enhancer

Off-target capture frequently occurs in targeted methylation sequencing workflows because the conversion process reduces the sequence complexity of the sample during library preparation. To maximize the capture of post-conversion samples, the Twist Methylation Detection System features a proprietary blocker designed specifically for methylation detection. Called Methylation Enhancer, this reagent reduces off-target capture by as much as half without affecting other performance metrics (Figure 2).

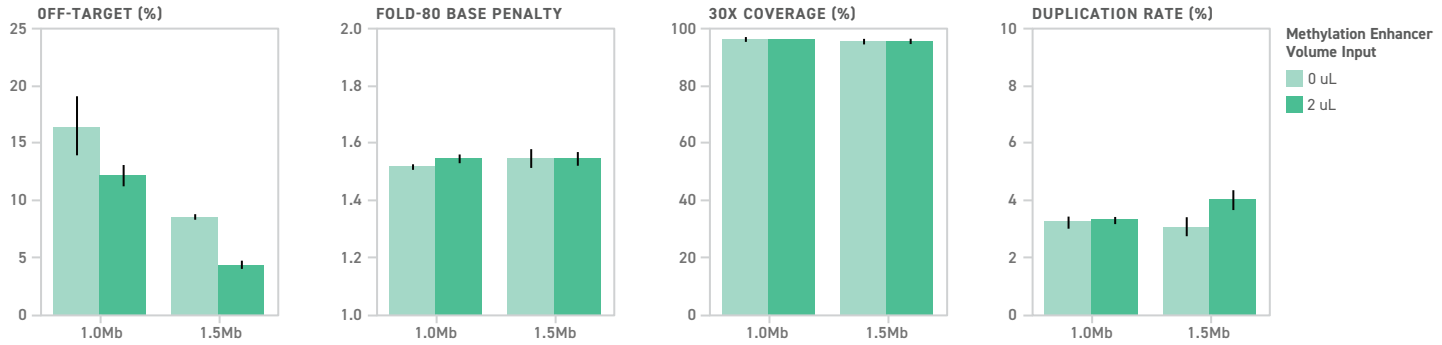

Figure 2. Performance of Methylation Enhancer. Addition of Methylation Enhancer effectively reduced off-target capture by 1.0Mb and 1.5Mb Custom Methylation Panels.

Highly Sensitive Detection of Differentially Methylated Regions

Methylation levels vary substantially across the human genome, and differentially methylated regions (DMRs) can be used to identify certain cancers. To test the effects of methylation levels on the performance of the Twist Methylation Detection System, libraries of varying methylation levels (0–100% methylation) were generated by combining hypo- and hypermethylated genomic DNA in defined ratios. This analysis showed minimal effects of methylation level on final sequencing metrics (Figure 3).

The Twist Methylation Detection System also captures hypo- and hypermethylated regions with high sensitivity. Figure 4 illustrates methylation detection in the *CCND2* locus. The Twist Methylation Detection System demonstrated highly sensitive detection of methylation, even at low input levels.

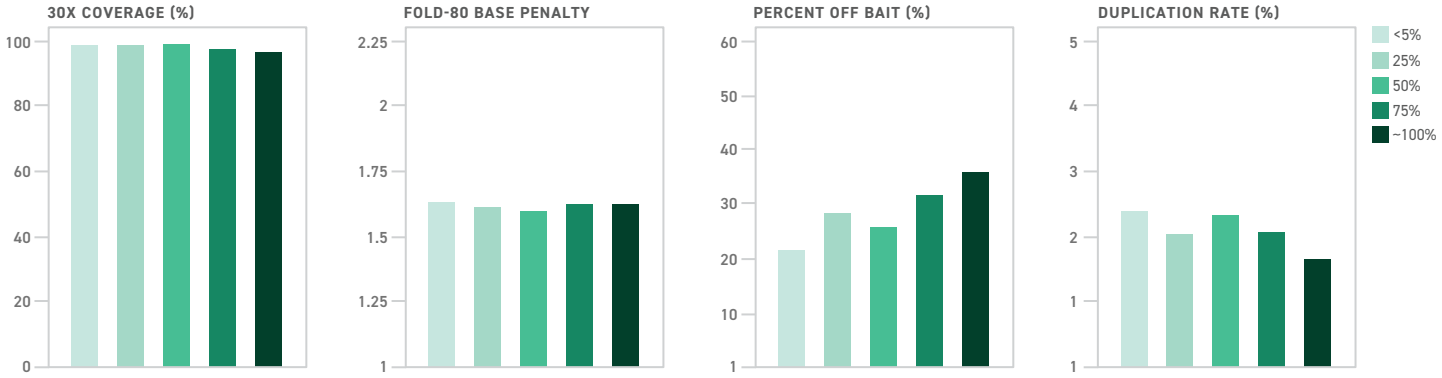

Figure 3. Detection of DMRs. The Twist Methylation Detection System efficiently captures differentially methylated regions of input DNA from 0 to 100% methylation, with minimal or no impact on sequencing metrics, including 30x coverage and uniformity (fold-80 base penalty).

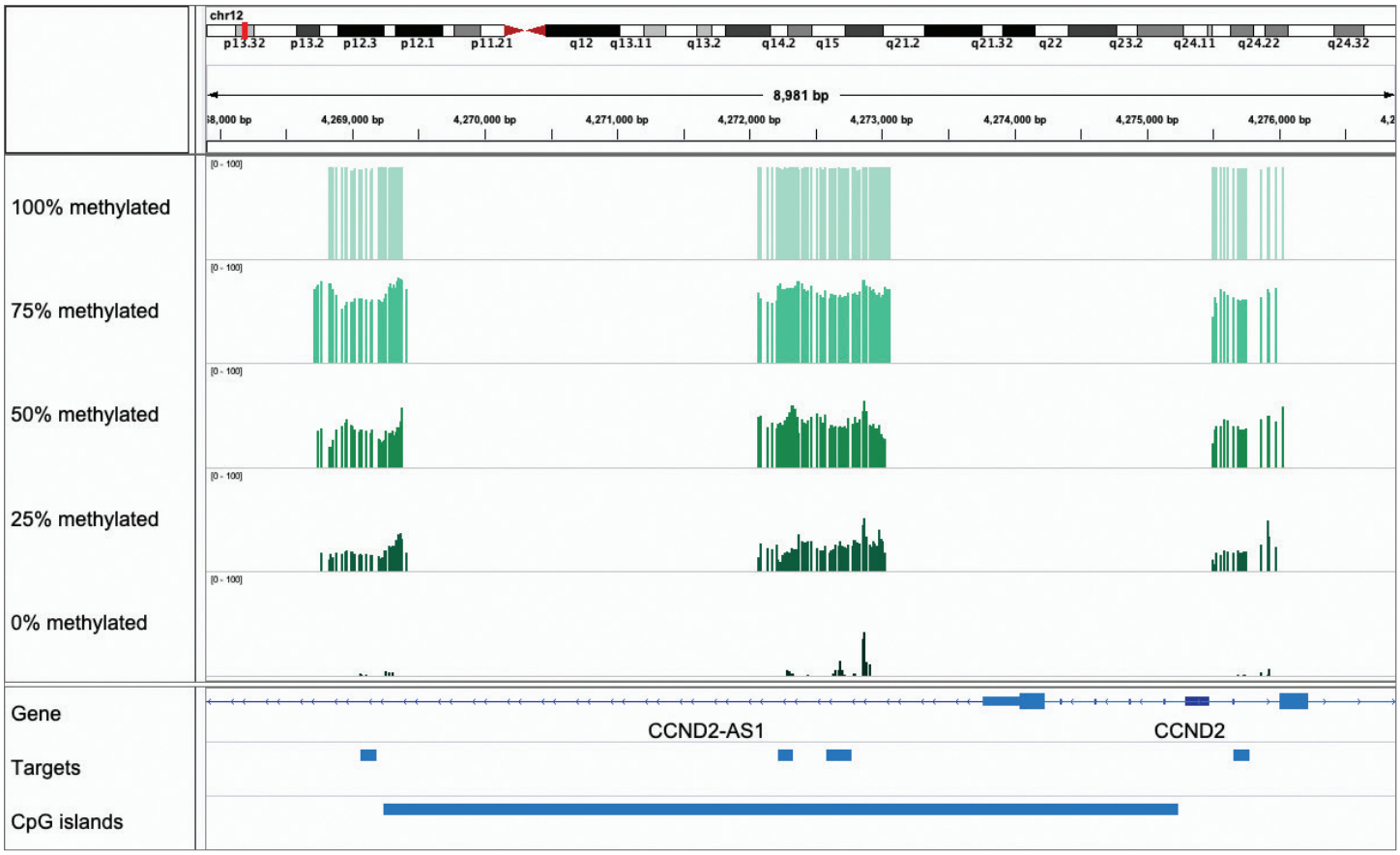

Figure 4. Highly sensitive methylation detection. Detection of methylation is possible across a wide range of methylation levels and targets.

LEARN MORE

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ORDERING INFORMATION

101976: NEBNext® EM-Seq Kit™ for Twist Targeted Methylation Sequencing, 96 Samples

103558: Twist Methylation Enhancer, 96 Reactions

100767: Twist Universal Blocker, 96 Reactions

100984: Twist Binding and Purification Beads Kit, 96 Reactions

101175: Twist Fast Hybridization and Wash Kit, 96 Reactions

2 reaction and 12 reaction sizes also available for enrichment.

Twist Custom Panels can be ordered separately. Please contact your sales representative for more information.