DATA SHEET

Infinium™ HTS iSelect™ Methyl Custom BeadChip

A high-throughput solution for commercial and academic epigenetic applications

- Custom content with up to 100K markers for specialty research projects and commercial offerings
- Highly accurate, quantitative measurement of DNA methylation delivered using Infinium assay chemistry
- Rapid turnaround time with an option for automated bisulfite conversion

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Introduction

Epigenetics research has significantly advanced our understanding of important biological processes, including aging, common disease, and cancer. Over the past decade, Infinium methylation arrays have powered groundbreaking studies relating differential DNA methylation to distinct phenotypes. These discoveries have increased interest in using DNA methylation biomarkers in population studies and commercial screening.

The Infinium HTS iSelect Methyl Custom BeadChip is a versatile addition to the proven Illumina methylation array portfolio. It allows users to create custom high-throughput assays to measure DNA methylation in targeted regions of the genome. The flexibility and features of this custom methylation BeadChip make it a powerful tool for a wide range of applications (Figure 1, Table 1).

Table 1: Infinium HTS iSelect Methyl Custom BeadChip key information

Feature	Description
Species	Human and mouse[a]
No. of samples	24 per BeadChip
Minimum DNA input	250 ng
No. of ABTs	From 3K up to 100K custom ABTs[b]
Sample commitment	2000 samples, minimum
Instrument support	iScan system
Weekly iScan throughput	5670 samples[c]

a. Human and mouse are supported at launch, for other species, inquire with your local Illumina sales representative
b. Each marker equals an ABT, either one or two ABTs is required to target a given base depending on the genomic context
c. Assuming one iScan and sufficient automation for bisulfite conversion

ABT, attempted bead types

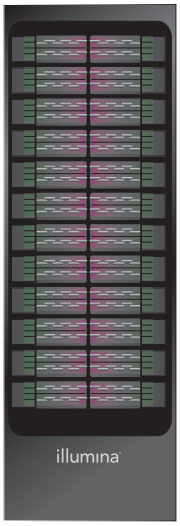

Figure 1: Infinium HTS iSelect Methyl Custom BeadChip—Custom 24-sample methylation BeadChip with probes for analyzing up to 100K CpG sites.

Broad application utility

The Infinium HTS iSelect Methyl Custom BeadChip allows researchers to use the most updated information to develop groundbreaking assays for critical research applications, including:

- Common disease research—relate epigenetic signatures in peripheral blood, or other accessible DNA specimens to disease phenotypes
- Cancer research—create custom content beyond what is available on the Infinium MethylationEPIC BeadChip for the focused analysis of different cancer types
- Epigenetic aging—relate epigenetic aging of individuals to behavior, genetics, and environmental exposures to find the links between lifestyle and wellness
- Nutriepigenomics—connect nutrition to chronic diseases and inform the precision management of obesity and other nutrition-related conditions

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Proven chemistry for measuring DNA methylation

Infinium methylation arrays enable high-throughput, quantitative measurement of DNA methylation at the single-CpG–site level, offering powerful resolution for understanding epigenetic changes. Unlike sequencing, the accuracy and precision of methylation measurements obtained through Infinium methylation chemistry is independent of read depth. Illumina Infinium BeadChip design enables a high degree of methylation probe replication, resulting in high reproducibility, comparable to 100× coverage in methylation sequencing experiments.[1]

The Infinium HTS iSelect Methyl Custom BeadChip applies both Infinium I and II assay chemistries to expand the genomic contexts that can be included for methylation analysis. Infinium I and Infinium II chemistry differ in the number of probes needed to query a single CpG locus. The Infinium I assay uses two probes per CpG: one probe for the unmethylated state and one probe for the methylated state, whereas the Infinium II assay requires only one probe per CpG locus due to its ability to measure both unmethylated and methylated DNA states (Figure 2).[2] Usually, a mixture of Type I and Type II probes is used on Infinium iSelect Methyl Custom BeadChips to provide the best performance across diverse selections of CpG targets.

High-throughput workflow

The Infinium HTS iSelect Methyl Custom BeadChip uses the proven Infinium 24-sample BeadChip format to enable laboratories to scale efficiently. Bisulfite conversion is carried out using one-hour EZ DNA Methylation-Lightning MagPrep kits (Zymo Research, Catalog no. D5046 and D5049). Two workflow options are possible: manual conversion and an automated technique using the Hamilton Microlab STAR Liquid Handling System. When combined with Illumina Infinium Automation Kits, these components make the Infinium HTS iSelect Methyl Custom BeadChip the highest throughput methylation array to date, allowing users to process over 100,000 samples per year.

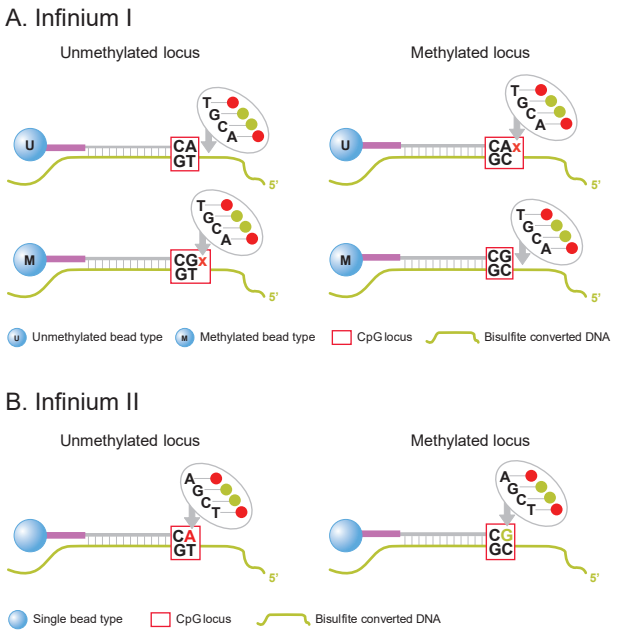

Figure 2: Infinium I and II assay designs allow for broader coverage of methylated CpG sites—Illumina methylation BeadChips employ both Infinium I and Infinium II assays, enhancing the overall breadth of coverage. (A) Infinium I probe designs use two bead types per CpG locus, one each for the methylated and unmethylated states. (B) Infinium II probe designs use a single bead type for both methylated and unmethylated DNA states.

Flexible assay design

The Infinium HTS iSelect Methyl Custom BeadChip design process begins with selecting CpG sites from current commercial arrays (eg, Infinium MethylationEPIC, Infinium Mouse Methylation) and from existing CG databases such as the Epigenome-wide Association studies (EWAS) Data Hub.[3] The Illumina technical design and customer service teams will work with you to refine the BeadChip marker content and coordinate the ordering and production process until your custom BeadChip is delivered (Figure 3).

Completed custom BeadChips are provided with GenomeStudio™ software and SeSAMe* manifests to support analysis using the GenomeStudio Methylation Module, or the R package SeSAMe. Descriptions of the

* SEnsible Step-wise Analysis of Methylation data (SeSAMe) is an R package for the analysis of Illumina methylation array data.[5]

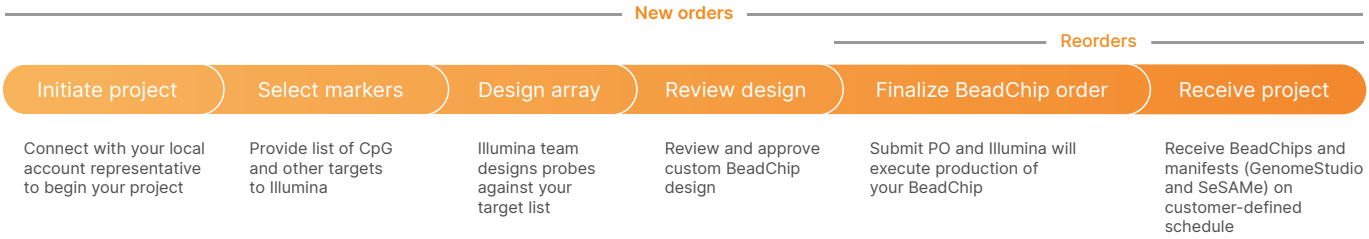

Figure 3: Infinium HTS iSelect Methyl Custom BeadChip design and manufacturing process—Researchers work with Illumina technical design and customer service teams to refine the BeadChip marker content and coordinate the ordering and production process.

information provided in the GenomeStudio and SeSAMe product manifests for the iSelect Methyl Custom BeadChip can be found on the Product Support Site.

The Infinium HTS iSelect Methyl Custom BeadChip is run on the iScan™ System and can be used in an automated workflow with additional equipment.

Summary

The Infinium HTS iSelect Methyl Custom BeadChip is a highly flexible option for epigenetic studies. Custom probes allow researchers to get the content they need to support a wide range of applications. Compatibility with automation also makes it an ideal choice for laboratories looking for a cost-effective, high-throughput solution for large studies.

Learn more

Custom methylation projects, visit www.illumina.com/products/by-type/microarray-kits/infinium-custom-methylation.html

Infinium Methylation BeadChips, visit www.illumina.com/science/technology/microarray/infinium-methylation-assay.html

References

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4. University of Bristol Integrative Epidemiology Unit. The MRC-IEU catalog of epigenome-wide association studies. www.ewascatalog.org. Accessed February 23, 2021.
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