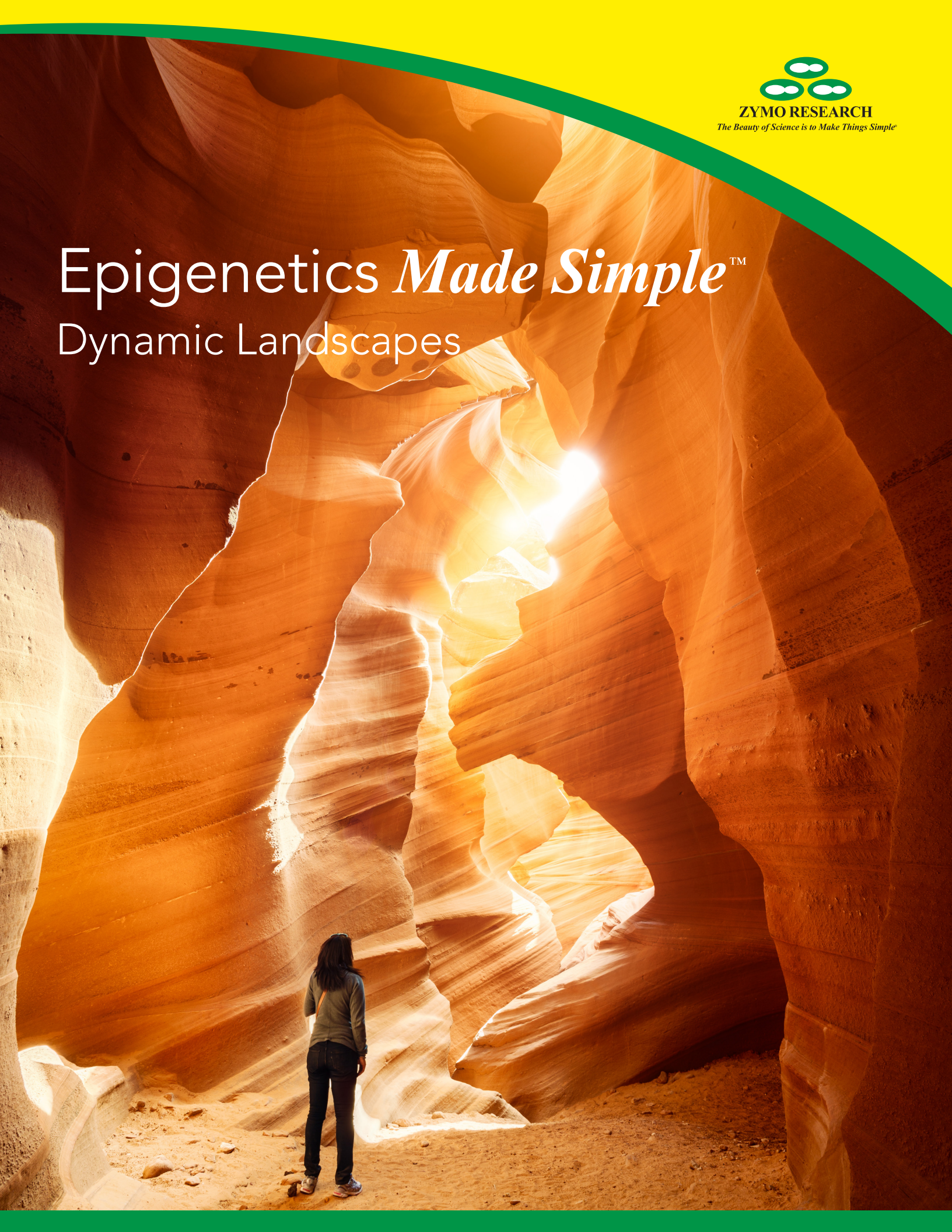




ZYMO RESEARCH  
The Beauty of Science is to Make Things Simple

# Epigenetics *Made Simple*<sup>™</sup>

## Dynamic Landscapes

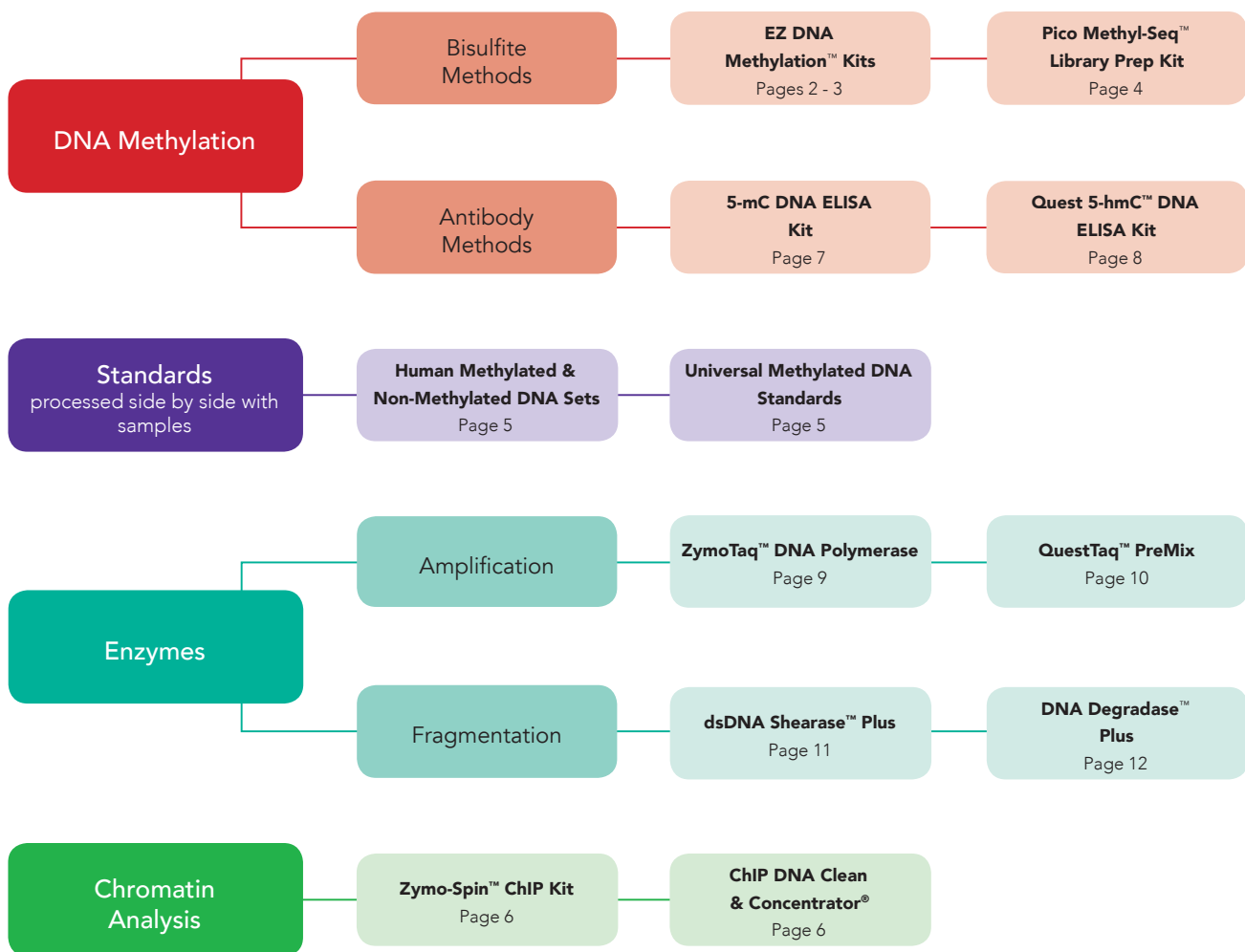


# Overview

Zymo Research, The Epigenetics Company™, is the industry leader in DNA methylation research products including bisulfite conversion kits, bisulfite-free methods, locus-specific analysis, library preparation kits, and services for Next-Gen Sequencing applications. In addition, Zymo Research's suite of EZ DNA Methylation™ products are the highest quality, most trusted, and most cited technologies for bisulfite conversion.

Zymo Research also offers comprehensive products and services to investigate other areas of epigenetics, including DNA hydroxymethylation, protein-DNA interactions, histone modifications, RNA modifications, and RNA Sequencing. Zymo Research is committed to enhancing the study of epigenetics by providing researchers of every discipline with quality products needed to answer the big questions in molecular biology research today.

## Quick Guide for the Most Popular Epigenetics Products from Zymo Research

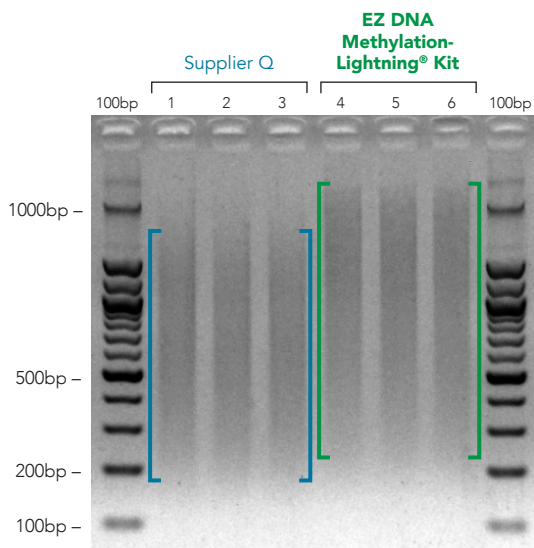


Learn more at [www.zymoresearch.com/products/epigenetics](http://www.zymoresearch.com/products/epigenetics)

# EZ DNA Methylation-Lightning® Kits

- **Streamlined Process:** Ready-to-use conversion reagent is added directly to DNA. Purified bisulfite-converted DNA in < 1.5 hours.
- **High-Quality:** Bisulfite-converted DNA has > 99.5% conversion efficiency with reduced fragmentation.
- **NGS-Ready:** Ability to accommodate low DNA input makes it possible to prepare whole genome or targeted enrichment bisulfite libraries for methylation analysis.

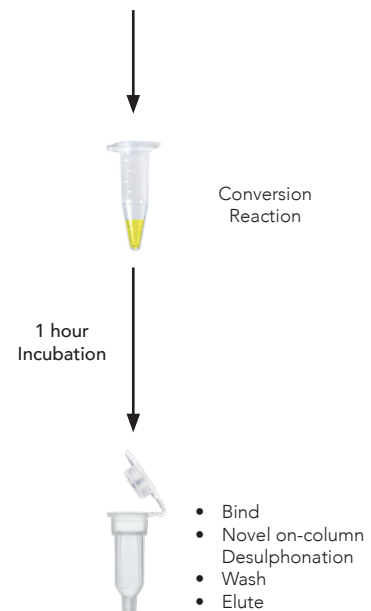
## High-quality DNA That is More Intact



The EZ DNA Methylation-Lightning® Kit yields more intact DNA after bisulfite conversion than the comparable kit from Supplier Q.

## Bisulfite-converted DNA in only 1.5 Hours!

Purified DNA from Cells, Blood, Tissue, FFPE, etc.



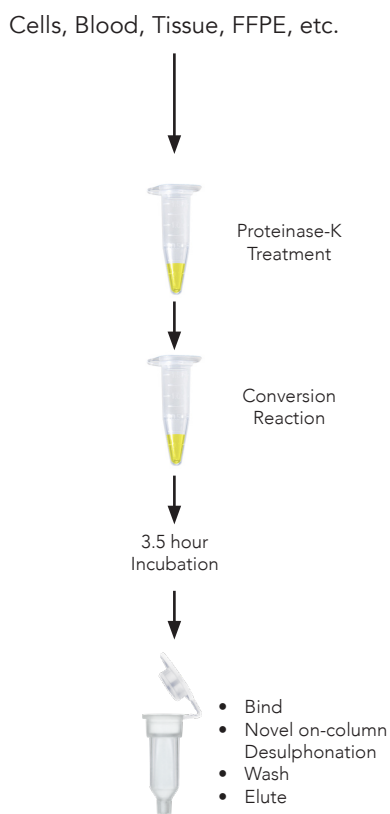
Ready for PCR or other sensitive downstream applications

Product	Cat. No.	Size
EZ DNA Methylation-Lightning® Kit	D5030T	10 rxns
	D5030	50 rxns
	D5031	200 rxns
EZ-96 DNA Methylation-Lightning® Kit (shallow-well)	D5032	2 x 96 rxns
EZ-96 DNA Methylation-Lightning® Kit (deep-well)	D5033	2 x 96 rxns
EZ-96 DNA Methylation-Lightning® MagPrep Kit	D5046	4 x 96 rxns
	D5047	8 x 96 rxns

# EZ DNA Methylation-Direct™ Kits

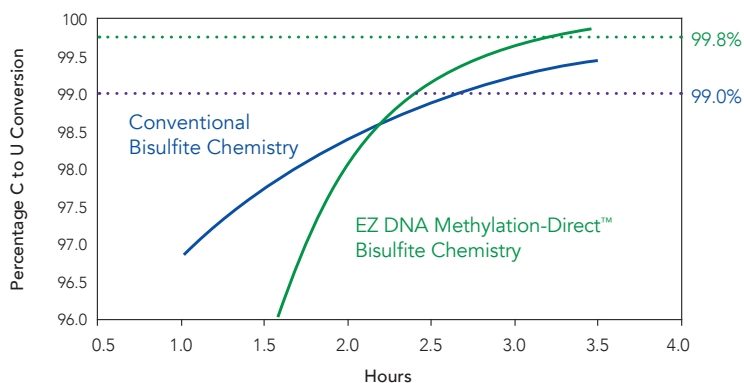
- **No Purification Necessary:** Complete bisulfite conversion of DNA directly from blood, soft tissue, cells, FFPE, and LCM samples.
- **Low Input:** Compatible with small sample inputs, as few as 10 cells or 50 pg DNA.
- **High Quality DNA:** Converted DNA is ready for PCR, Next-Gen Sequencing, and MSP.

## Streamlined, Innovative Workflow



Ready for PCR or other sensitive downstream applications

## Significantly Improved Conversion Kinetics



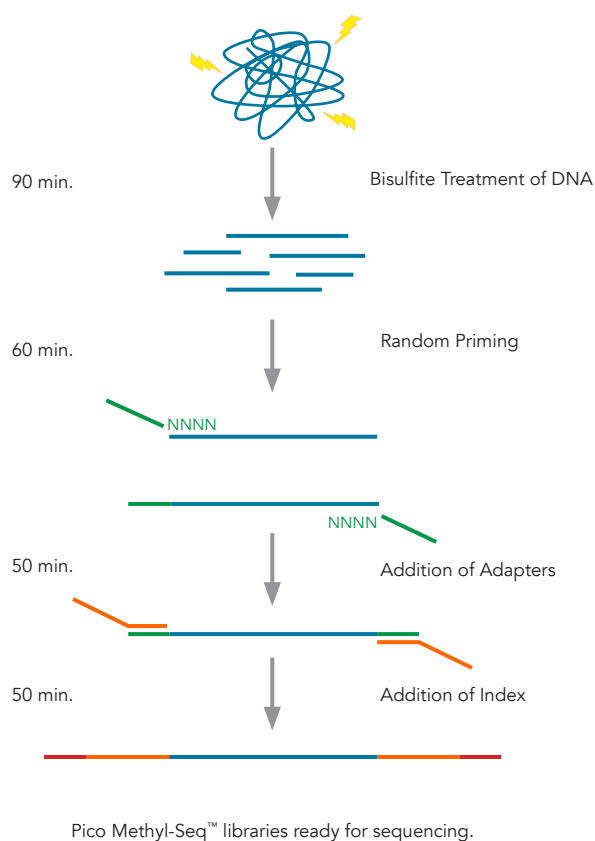
EZ DNA Methylation-Direct™ Kit bisulfite chemistry significantly improves C to U conversion kinetics. DNA was converted using either EZ DNA Methylation-Direct™ or conventional bisulfite chemistries. Recovered DNA was amplified by PCR, then cloned. Sequences from individual clones were analyzed and quantitated. This data shows that EZ DNA Methylation-Direct™ bisulfite chemistry improves the rate and extent (> 99.8%) of C to U conversion of DNA as compared to conventional bisulfite chemistry.

Product	Cat. No.	Size
EZ DNA Methylation-Direct™ Kit	D5020 D5021	50 rxns 200 rxns
EZ-96 DNA Methylation-Direct™ Kit (shallow-well)	D5022	2 x 96 rxns
EZ-96 DNA Methylation-Direct™ Kit (deep-well)	D5023	2 x 96 rxns
EZ-96 DNA Methylation-Direct™ MagPrep Kit	D5044 D5045	4 x 96 rxns 8 x 96 rxns

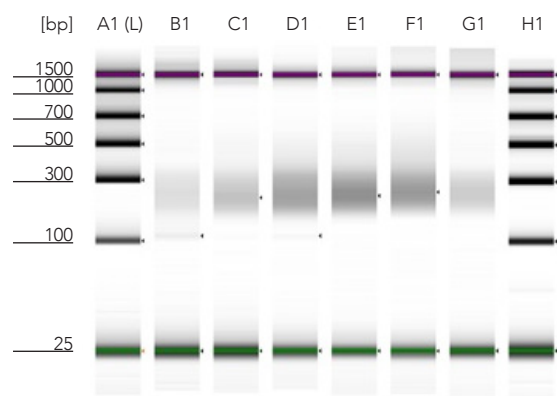
# Pico Methyl-Seq™ Library Prep Kit

- **All-inclusive:** Complete solution for bisulfite conversion followed by Whole Genome Bisulfite Sequencing (WGBS) library preparation.
- **Low input:** Accommodates ultra-low DNA input (down to 10 pg) and is compatible with FFPE samples.
- **Simple:** Ligation- and gel-free workflow can be completed in a few hours.

## Streamlined, Innovative Workflow



## High-quality Library Preparation



Agilent 2200 TapeStation® D1K gel of libraries prepared (from B1-G1) using 10 pg, 20 pg, 100 pg, 1 ng, 10 ng, and 100 ng, respectively.

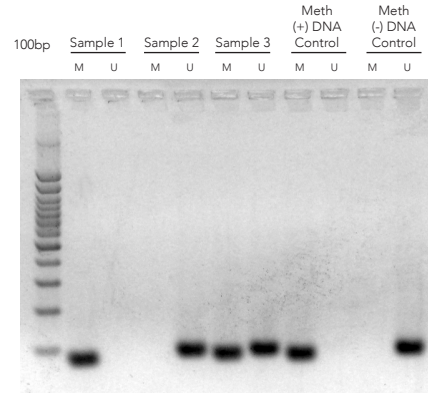
Product	Cat. No.	Size
Pico Methyl-Seq™ Library Prep Kit	D5455	10 preps
	D5456	25 preps

# Human Methylated & Non-Methylated DNA Set

- **Ideal Positive and Negative Controls:** DNA standards, purified from HCT116 DKO cell line, for use as positive and negative controls in methylation-detection applications including bisulfite PCR (BSP) and methylation-specific PCR (MSP) experiments.
- **Standard Curve Generation:** Completely methylated and non-methylated DNA can be mixed together in various proportions to generate a standard curve for suitable quantitation of DNA methylation in experimental samples.
- **Convenient:** Provided with control primers to amplify a fragment of DNA after bisulfite conversion.

## Ideal Controls for BSP and MSP Analysis

**Example MSP experiment using MSP designed primers for RASSF1.** Sample 1 is positive for a Methylated Template. Sample 2 is positive for a Non-Methylated Template and Sample 3 contains Methylated and Non-Methylated Templates. MSP experiment also shows proper controls: Meth (+) DNA Control D5014-2 Human Methylated DNA, Meth (-) DNA Control D5014-1 Human Non-methylated DNA. 2% Agarose Gel, 130V for 35 mins. M = Methylated specific primers, U = Non-Methylated specific primers

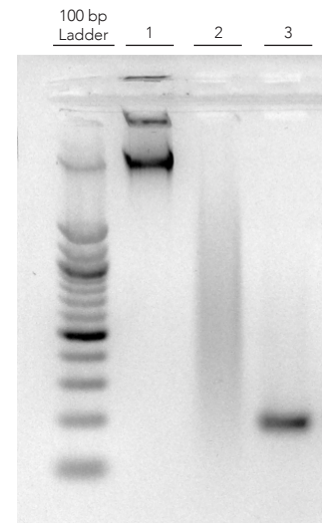


# Universal Methylated DNA Standards

- **Ideal Highly-Methylated Controls:** Purified DNA from normal human or mouse tissue that is enzymatically methylated at all CpG sites for use as a positive control.
- **Side-by-Side Processing:** Standards can be processed in parallel with experimental samples to monitor bisulfite conversion efficiency.
- **Convenient:** Provided with control primers to amplify a fragment of DNA after bisulfite conversion.

## Assess Bisulfite Conversion Efficiency and Primer Design

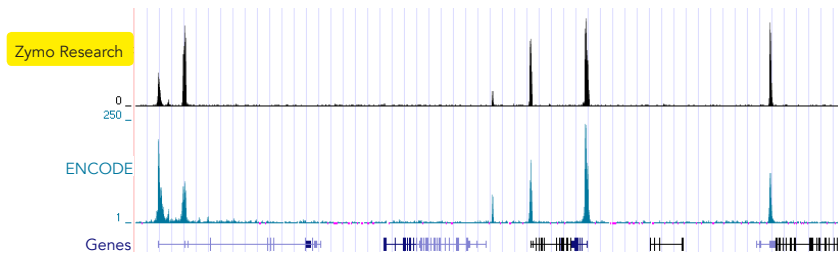
Gel electrophoresis depicting genomic DNA, bisulfite-converted genomic DNA, and genomic DNA amplified with bisulfite-specific primers. Lane 1 – Input DNA: Universal Methylated Human DNA Standard (D5011). Lane 2 – Bisulfite-converted Universal Methylated Human DNA (D5011) using EZ DNA Methylation-Direct™ Kit (D5020). Lane 3 – Universal Methylated Human DNA (D5011) bisulfite converted and amplified with supplied hMLH1 control primers.



Product	Cat. No.	Size
Human WGA Methylated & Non-methylated DNA Set	D5013	1 set
Human Methylated & Non-methylated DNA Set	D5014	1 set
Universal Methylated Human DNA Standard	D5011	1 set
Universal Methylated Mouse DNA Standard	D5012	1 set

# Zymo-Spin™ ChIP Kit

- **Simplified Workflow:** Streamlined protocol for chromatin immunoprecipitation and purification of ChIP DNA.
- **High-Quality:** Ultra-pure, concentrated ChIP DNA can be eluted in as little as 6 µl.
- **NGS-Ready:** ChIP DNA is suitable for ChIP-Seq, ChIP-qPCR, and other sensitive molecular applications.

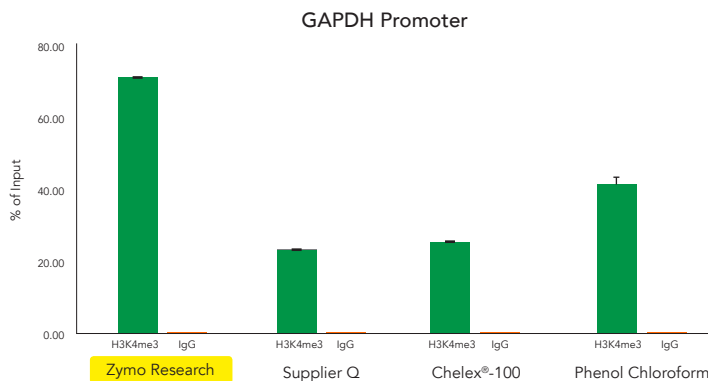


## High-Quality ChIP DNA Recovery

**ENCODE Quality ChIP Workflow:** Browser tracks depicting H3K4me3 ChIP-Seq assay using the Zymo-Spin™ ChIP Kit. Peaks overlap the same sites identified at the Broad Institute of MIT and Harvard as part of the ENCODE project.

# ChIP DNA Clean & Concentrator® Kits

- **Fast:** Two-minute DNA clean-up from any step in a standard ChIP protocol.
- **High-Quality:** Ultra-pure, concentrated ChIP DNA can be eluted in as little as 6 µl.
- **Ready to Use:** DNA is ideal for PCR, arrays, DNA quantification, Southern blot analysis, sequencing, and other molecular applications.



## Efficient DNA Clean-up from ChIP Protocols

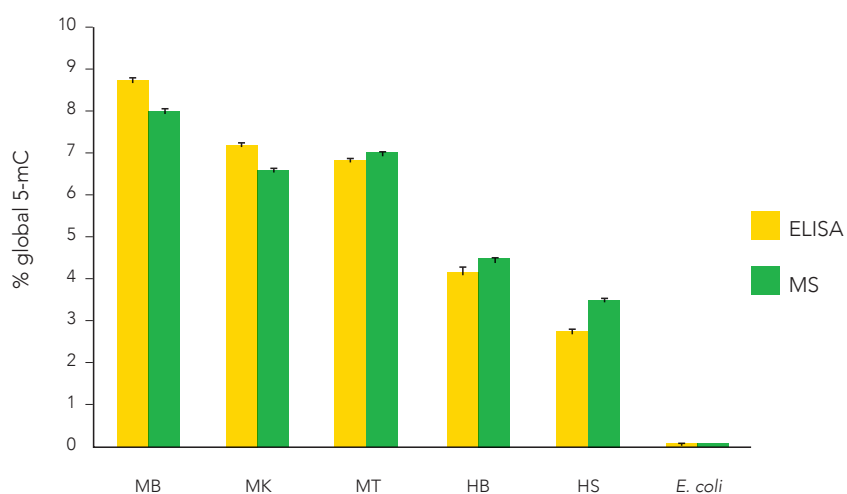
**ChIP DNA Purification Comparison:** ChIP assays were performed with HeLa cells using ChIP-grade anti-H3K4me3 and rabbit IgG antibodies. Both total and immunoprecipitated chromatin were reverse cross-linked and recovered using either the ChIP DNA Clean & Concentrator® (included in the Zymo-Spin™ ChIP Kit), DNA recovery kit from Supplier Q, Chelex®-100 protocol or phenol-chloroform extraction. The amount of ChIP DNA was determined using qPCR with primers specific to the GAPDH promoter. ChIP DNA enrichment is graphed as % input.

Product	Cat. No.	Size
Zymo-Spin™ ChIP Kit	D5209 D5210	10 preps 25 preps
ChIP DNA Clean & Concentrator® (uncapped columns)	D5201	50 preps
ChIP DNA Clean & Concentrator® (capped columns)	D5205	50 preps

# 5-mC DNA ELISA Kit

- **Accurate Quantification:** Sensitive and specific quantification of 5-methylcytosine (5-mC) DNA from a variety of samples.
- **High-Throughput:** 96-well format is ideal for processing just a few samples to a large number of samples.
- **Simple:** The streamlined workflows can be completed in 4 hours or less.

Specific Quantitation of 5-mC



**The 5-mC DNA ELISA Kit can quantify 5-mC in numerous DNA samples with close correlation to LC-MS.** 100 ng of genomic DNA from mouse brain (MB), mouse kidney (MK), mouse thymus (MT), human brain (HB), human spleen (HS), and *E. coli* ER2925 were used to coat wells, in triplicate. Percent 5-mC was calculated using the logarithmic equation of the line from the standard curve that was constructed with the Negative Control and the Positive Control. The percent 5-mC calculated in DNA samples using the 5-mC DNA ELISA Kit (ELISA) strongly correlates to mass spectrometry (MS) data of 5-mC found in the respective gDNA sample.

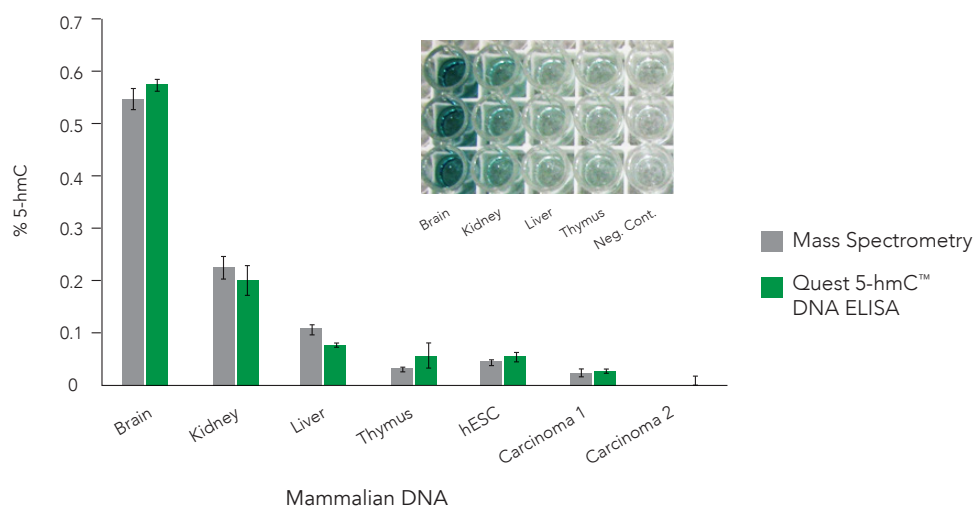
Product	Cat. No.	Size
5-mC DNA ELISA Kit	D5325 D5326	1 x 96 rxns 2 x 96 rxns



# Quest 5-hmC™ DNA ELISA Kit

- **Accurate Quantification:** Sensitive and specific quantification of 5-hydroxymethylcytosine (5-hmC) DNA from a variety of samples.
- **High-Throughput:** 96-well format is ideal for processing just a few samples to a large number of samples.
- **Simple:** The streamlined workflows can be completed in 4 hours or less.

## Specific Quantitation of 5-hmC



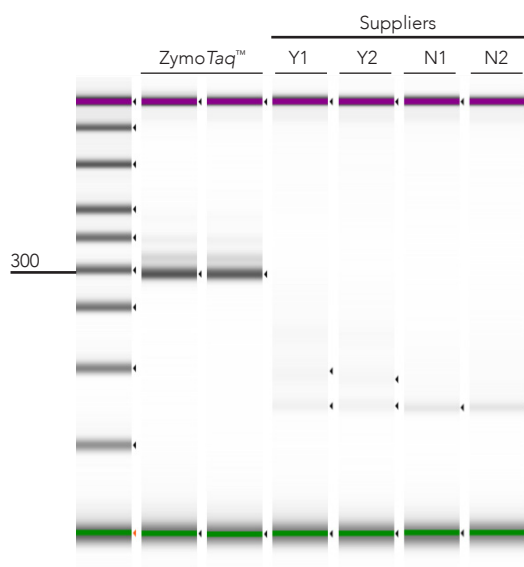
**The Quest 5-hmC™ DNA ELISA Kit can be used to detect 5-hmC in numerous DNA samples with high specificity as evidenced by comparison with LC-MS.** 5-hmC pAb (100 ng/well) was used to quantitate the amount 5-hmC in 100 ng of single-stranded DNA. % 5-hmC was calculated from a standard curve generated using the Control DNA Set. The figure shows a correlation between the % 5-hmC in DNA samples calculated using the Quest 5-hmC™ DNA ELISA Kit (ELISA) and mass spectrometry (MS).

Product	Cat. No.	Size
Quest 5-hmC™ DNA ELISA Kit	D5425	1 x 96 rxns
	D5426	2 x 96 rxns

# ZymoTaq™ DNA Polymerase

- **Reliable:** Hot-start DNA polymerase robustly amplifies DNA, including bisulfite-treated samples.
- **Specific:** Reduces non-specific PCR product formation from difficult templates.
- **Versatile:** Compatible with real-time, quantitative PCR and suitable for TA-cloning.

## Reduce Non-specific PCR Product Formation



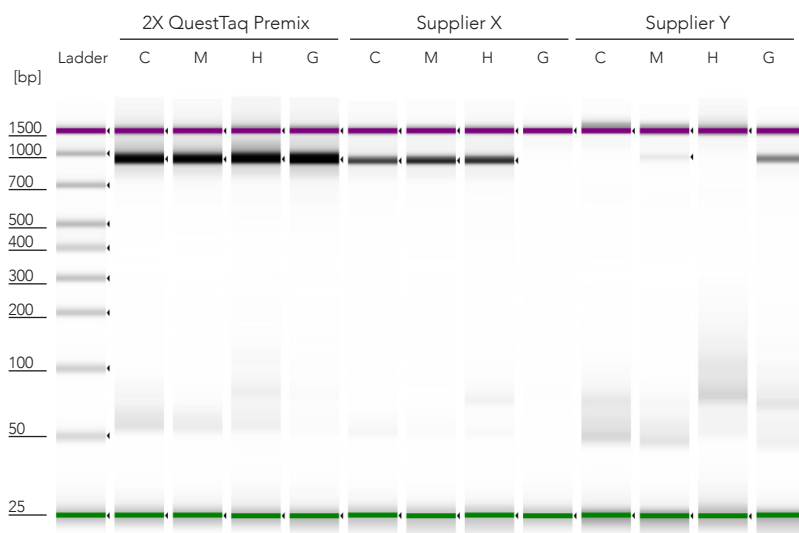
**Efficient PCR amplification of bisulfite-treated DNA for methylation detection.** The figure shows a 274 bp product amplified from bisulfite-treated DNA using ZymoTaq™ DNA Polymerase vs. polymerases from Suppliers Y and N. In each case, equal amounts of bisulfite-treated DNA (EZ DNA Methylation®-Lightning Kit from Zymo Research) were used for each duplicate PCR reaction, and the products were visualized using the Agilent 2200 TapeStation® system.

Product	Cat. No.	Size
ZymoTaq™ DNA Polymerase	E2001	50 rxns
	E2002	200 rxns
ZymoTaq™ PreMix	E2003	50 rxns
	E2004	200 rxns
ZymoTaq™ qPCR PreMix	E2054	50 rxns
	E2055	200 rxns

# QuestTaq™ PreMix

- **Convenient Setup:** Premixed reagent containing all necessary components.
- **Robust Amplification:** Ideal for amplification of 5mC, 5hmC, and glucosyl-5hmC modified DNA.
- **Versatile:** Can be used for end-point analyses or with a range of fluorescent dyes in real-time PCR.

## Unbiased Amplification of Modified Cytosine



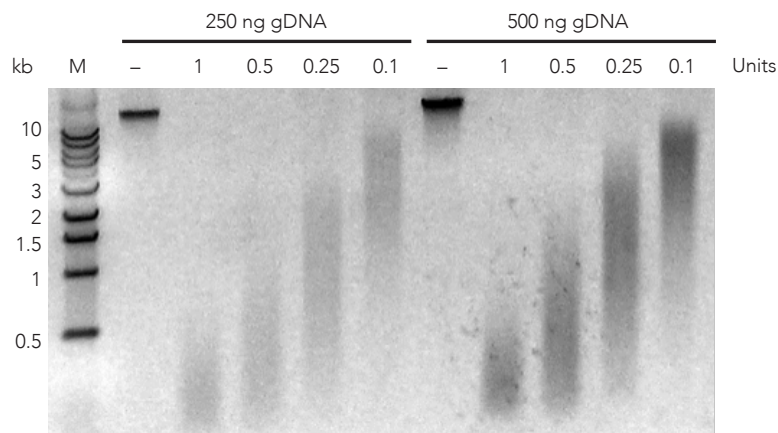
**2X QuestTaq Premix unbiasedly amplifies modified DNA.** Cytosine (C), methylcytosine (M), hydroxymethylcytosine (H), and glucosylated hydroxymethylated (G) modified DNA templates (900 bp) were amplified with either QuestTaq™ PreMix or premixes from Suppliers X and Y. The products were visualized using the Agilent 2200 TapeStation® system.

Product	Cat. No.	Size
QuestTaq™ PreMix	E2050	50 rxns
	E2051	200 rxns
QuestTaq™ qPCR PreMix	E2052	50 rxns
	E2053	200 rxns

# dsDNA Shearase™ Plus

- **Simple:** The simplest method for generating random-end dsDNA fragments.
- **Tunable:** Fragment size is easily controlled by adjusting enzyme concentration.
- **NGS-Ready:** dsDNA Shearase™ Plus-generated fragments are ideal for library construction, Next-Gen Sequencing, and DNA immunoprecipitation (i.e. MeDIP, MeDIP-Seq).

## Fragmentation of DNA Using dsDNA Shearase™ Plus



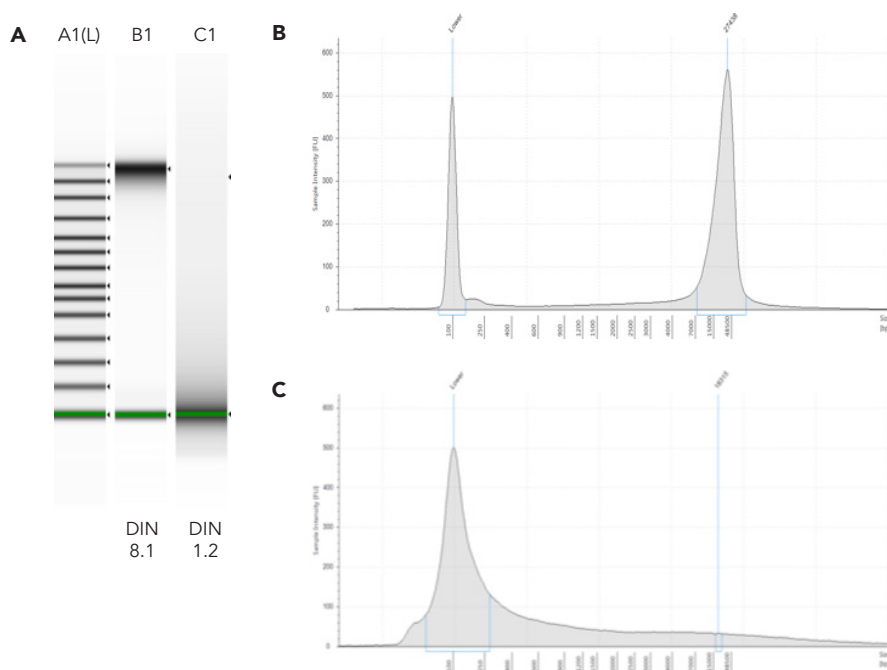
**DNA is effectively fragmented using dsDNA Shearase™ Plus.** 250 ng or 500 ng of HCT116 cell genomic DNA was incubated with 1, 0.5, 0.25, or 0.1 U dsDNA Shearase™ Plus for 20 min at 42°C. The reaction was stopped by incubating at 65°C for 5 min. Fragmented DNA was purified using the DNA Clean & Concentrator™ kit and subsequently resolved in a 1% agarose gel. The amount of DNA fragmentation observed was directly correlated to the amount of enzyme used.

Product	Cat. No.	Size
dsDNA Shearase™ Plus	E2018-50	50 U
	E2018-200	200 U

# DNA Degradase™ & DNA Degradase Plus™

- **Fast:** One hour, single-enzyme digestion vs. conventional 6–16-hour multi-step enzyme digestion protocols.
- **Streamlined Workflow:** Quick, simple procedure for completely degrading DNA into individual nucleotides (DNA Degradase™) or nucleosides (DNA Degradase Plus™).
- **No Clean-Up Necessary:** Digested DNA products are immediately ready for downstream analysis by global quantitative methods including HPLC, TLC, and LC-MS.

## Enzymes for Effective DNA Degradation



**DNA Degradase Plus™ efficiently degrades DNA.** Mouse brain genomic DNA (1 µg) was digested with 5 U of DNA Degradase Plus™ for 1 hr at 37°C and analyzed using Agilent 2200 TapeStation® system. a) TapeStation® gel image (A1- genomic ladder, B1- control DNA, C1- DNA Degradase Plus™ digested DNA). Electropherogram of control DNA (b) and DNA Degradase Plus digested DNA (c).

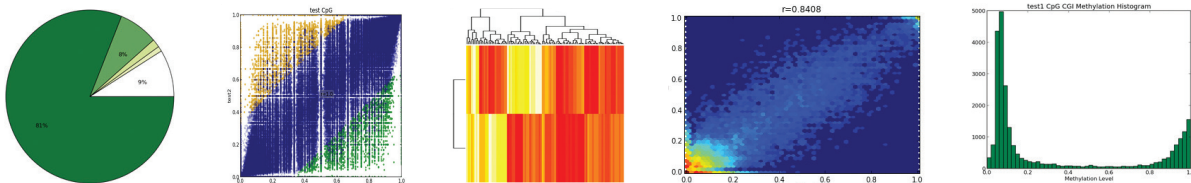
Product	Cat. No.	Size
DNA Degradase™	E2016	500 U
	E2017	2,000 U
DNA Degradase Plus™	E2020	250 U
	E2021	1,000 U

# Epigenetic Services

The scientists at Zymo Research have been developing industry leading epigenetic technologies and workflows for more than a decade. Zymo Research remains committed to pioneering new research tools and services to meet the future challenges of the rapidly growing field of epigenetics. Explore epigenomics with Zymo Research today!

## Genome-wide DNA Methylation Analysis

**Methyl-Seq services** utilize the latest sequencing technologies and outperform popular array-based platforms



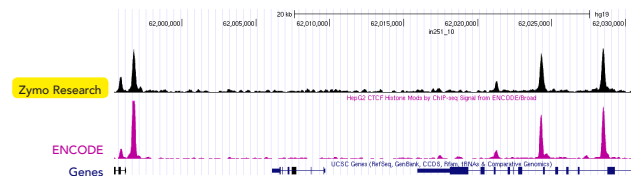
### Methyl-Check™

DNA Methylation Validation Platform

Service Option	Targeted Sequencing from Zymo Research	Pyrosequencing
≥100 - 1,000X coverage per locus?	Yes	No
Analyze 1,000's of loci per sequencing run?	Yes	No
Multiplex Compatibility	Yes	No

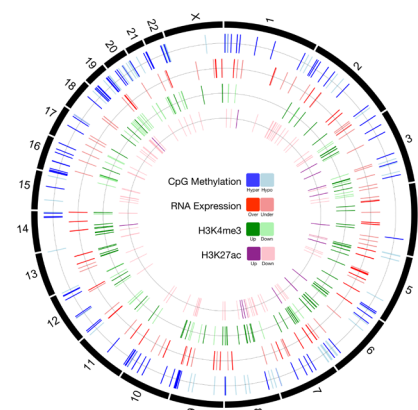
### ChIP-Seq

Fully customizable services for **chromatin immunoprecipitation** followed by next-generation sequencing



## Integrated Sequence Data Analysis

Get the Whole Picture!  
Simultaneously visualize epigenetic and gene expression data



**Additional Services:**



ChIP-Seq



RNA-Seq



Microbiomics ...and more!

Learn more at [www.zymoresearch.com/services](http://www.zymoresearch.com/services)

# Epigenetics Products

Product	Cat. No.	Size
EZ DNA Methylation-Lightning® Kit	D5030T	10 rxns
	D5030	50 rxns
	D5031	200 rxns
EZ-96 DNA Methylation-Lightning® Kit (shallow-well)	D5032	2 x 96 rxns
EZ-96 DNA Methylation-Lightning® Kit (deep-well)	D5033	2 x 96 rxns
EZ-96 DNA Methylation-Lightning® MagPrep Kit	D5046	4 x 96 rxns
	D5047	8 x 96 rxns
EZ DNA Methylation-Direct™ Kit	D5020	50 rxns
	D5021	200 rxns
EZ-96 DNA Methylation-Direct™ Kit (shallow-well)	D5022	2 x 96 rxns
EZ-96 DNA Methylation-Direct™ Kit (deep-well)	D5023	2 x 96 rxns
EZ-96 DNA Methylation-Direct™ MagPrep Kit	D5044	4 x 96 rxns
	D5045	8 x 96 rxns
Pico Methyl-Seq™ Library Prep Kit	D5455	10 preps
	D5456	25 preps
Human WGA Methylated & Non-methylated DNA Set	D5013	1 set
Human Methylated & Non-methylated DNA Set	D5014	1 set
Universal Methylated Human DNA Standard	D5011	1 set
Universal Methylated Mouse DNA Standard	D5012	1 set
Zymo-Spin™ ChIP Kit	D5209	10 preps
	D5210	25 preps
ChIP DNA Clean & Concentrator® (uncapped columns)	D5201	50 preps
ChIP DNA Clean & Concentrator® (capped columns)	D5205	50 preps
5-mC DNA ELISA Kit	D5325	1 x 96 rxns
	D5326	2 x 96 rxns
Quest 5-hmC™ DNA ELISA Kit	D5425	1 x 96 rxns
	D5426	2 x 96 rxns
ZymoTaq™ DNA Polymerase	E2001	50 rxns
	E2002	200 rxns
ZymoTaq™ PreMix	E2003	50 rxns
	E2004	200 rxns
ZymoTaq™ qPCR PreMix	E2054	50 rxns
	E2055	200 rxns
QuestTaq™ PreMix	E2050	50 rxns
	E2051	200 rxns
QuestTaq™ qPCR PreMix	E2052	50 rxns
	E2053	200 rxns
dsDNA Shearase™ Plus	E2018-50	50 U
	E2018-200	200 U
DNA Degradase™	E2016	500 U
	E2017	2,000 U
DNA Degradase Plus™	E2020	250 U
	E2021	1,000 U



**ZYMO RESEARCH**

*The Beauty of Science is to Make Things Simple®*

Cat. No. B1005 Version 03

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