

**EpiCypher**®

Bringing Epigenetics to Life

**CUTANA™ ASSAYS**  
For ultrasensitive  
genomic mapping

## CUTANA™ platform assays use a proprietary immunotethering method to deliver ultrasensitive chromatin profiling.

Based on the **Chromatin ImmunoCleavage (ChIC)** method, this technology supports **Cleavage Under Targets and Release Using Nuclease (CUT&RUN)** and **Cleavage Under Targets and Tagmentation (CUT&Tag)** experiments. CUT&RUN and CUT&Tag reagents are available now!

See back cover for ordering information.

### Overview of the CUTANA CUT&RUN approach

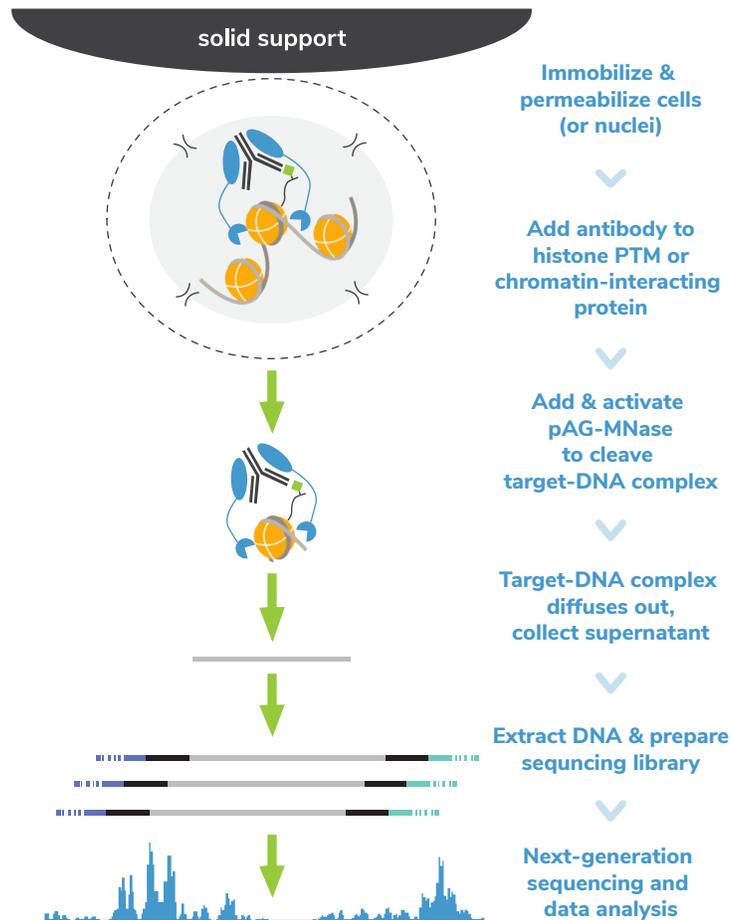


FIGURE 1

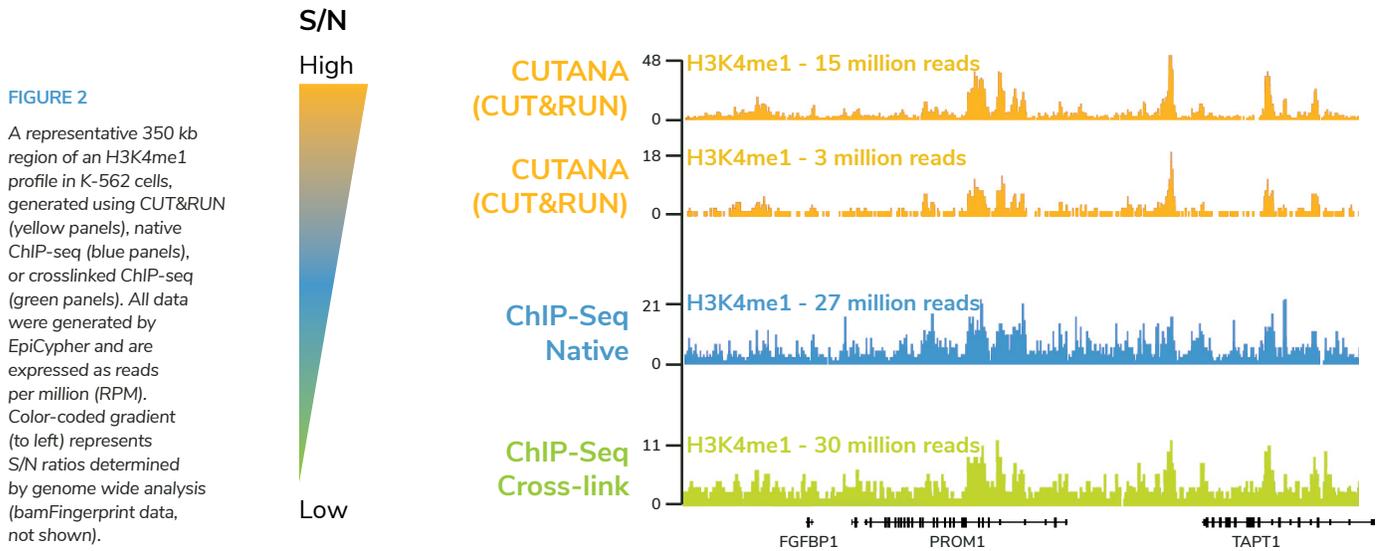
In CUTANA CUT&RUN, cells (or nuclei) are immobilized on lectin-coated magnetic beads, permeabilized, and incubated with an antibody to a chromatin target (e.g. histone PTM or chromatin / DNA interacting protein). Next, a fusion of Proteins A and G with micrococcal nuclease (pAG-MNase) is added and activated via  $Ca^{2+}$ . The clipped chromatin fragments diffuse out, followed by DNA purification and next-generation sequencing.

### CUTANA™ CUT&RUN Assays offer distinct advantages over ChIP-seq

- Low background: only 3-5 million sequencing reads required
- Lower cost: >10-fold less antibody and required sequencing depth
- High signal-to-noise (S/N), even down to low cell numbers
- Compatible with a variety of targets and sample types
- Robust, simple workflow, high throughput compatible

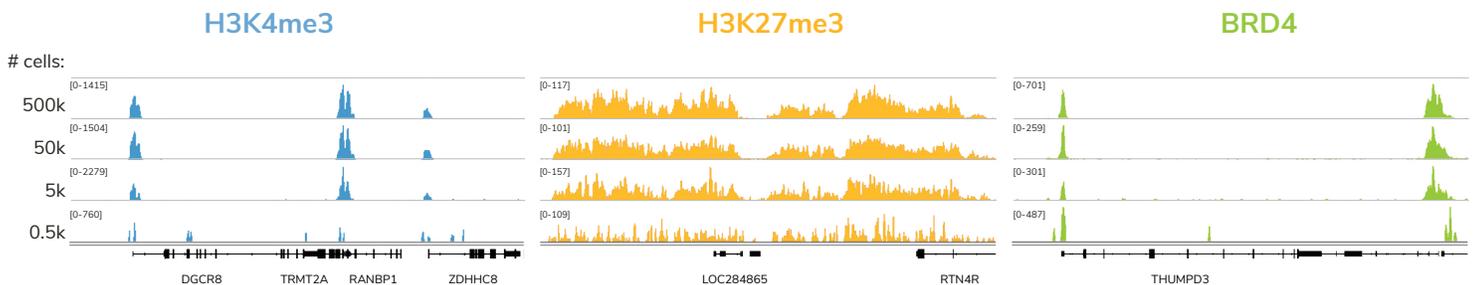
## CUTANA CUT&RUN improves S/N and reduces sequencing depth

ChIP-seq requires deep sequencing (typically >30 million reads) to resolve signal from background. In CUT&RUN, targeted release of genomic fragments into solution results in inherently low background. Therefore, very low sequencing depth (only 3-5 million reads) is required, dramatically reducing experimental costs.



## CUTANA CUT&RUN generates high quality data with low cell numbers

For initial optimization experiments, it is recommended to start with 500,000 cells. However, data quality is indistinguishable down to 5,000 cells **with no changes to the optimized workflow** ([EpiCypher.com/protocols/](https://www.epicypher.com/protocols/)).



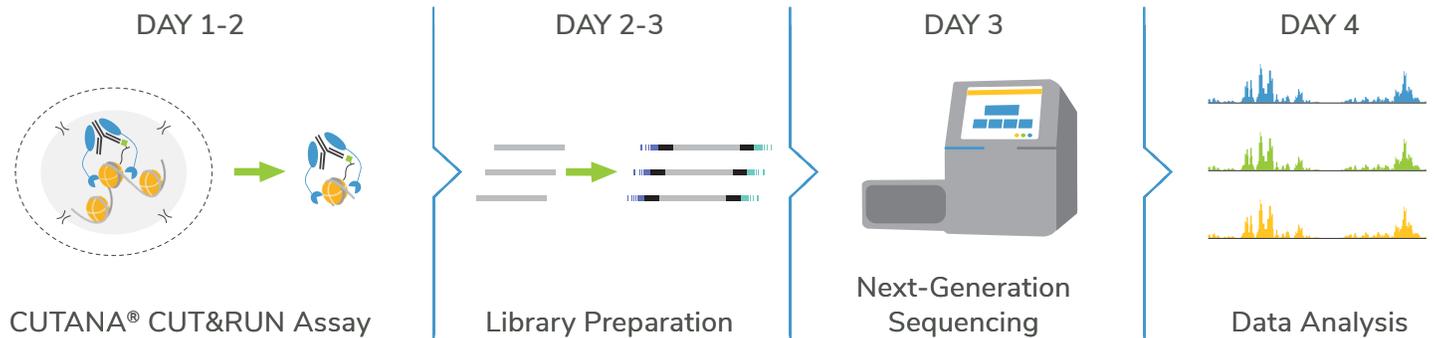
**FIGURE 3**

In CUTANA CUT&RUN K-562 cell titration experiments, data quality is largely indistinguishable from 500,000 cells down to 5,000 cells. Genome tracks show representative regions from cell titration experiments for a variety of different targets, including a euchromatin-associated histone PTM (H3K4me3, left), heterochromatin-associated PTM (H3K27me3, middle) and a chromatin binding protein (BRD4, right).



## Streamlined workflow: From cells to data in < 4 days

EpiCypher has developed a robust protocol for CUT&RUN, available at [EpiCypher.com/protocols/](https://epicypher.com/protocols/). Kits are also available to support the workflow, including step-by-step instructions with validated reagents to go from cells to DNA. Due to low sequencing requirements, benchtop sequencers (e.g. Illumina MiniSeq) can be used to quickly generate high resolution data.



## Get started designing your experiment

### Robust, easy to follow protocols

Follow these links to EpiCypher's optimized CUTANA CUT&RUN and CUT&Tag protocols. Fully-validated CUT&RUN kits are coming soon, which will include reagents and a detailed protocol to support the workflow from cells or nuclei to isolated CUT&RUN DNA.



### Control your experiment every step of the way using platform-validated reagents

- CUTANA Compatible Positive and Negative Control Antibodies: Tested for specificity using EpiCypher's recombinant nucleosome panels, verified to yield robust results in CUT&RUN.
- E. coli DNA Spike-in Control: Directly verified in CUT&RUN; provides a standard for experimental normalization.

## Check out these papers for validated approaches to get ideas for your next experiment

### CUT&RUN workflows

- Skene and Henikoff, eLIFE 2017 (PMID : 28079019)
- Thakur and Henikoff, G&D 2018 (PMID : 29386331)
- Liu et. al, Cell 2018 (PMID : 29606353)
- Skene et. al, Nat. Protoc. 2018 (PMID : 29651053)
- Janssens et. al, Epi. Chromatin 2018 (PMID : 30577869)
- Brahma and Henikoff, Mol. Cell 2019 (PMID : 30554944)
- Oomen et. al, Genome Res. 2019 (PMID : 30655336)
- Zheng and Gehring, Plant Reprod. 2019 (PMID : 30719569)
- Ernst et. al, Nat. Commun. 2019 (PMID : 30890697)
- Hainer et. al, Cell, 2019 (PMID : 30955888) **\*\* Single Cell\*\***
- Meers et. al, eLIFE 2019 (PMID : 31232687)\*  
\* Paper describes optimized protocol using pAG-MNase
- Meers et. al, Mol. Cell 2019 (PMID : 31253573)
- Li et. al, Cell Rep. 2020 (PMID : 31940490)

### ChIC workflows

- Schmid et. al, Mol. Cell 2004 (PMID : 15469830)
- Ku et. al, Nat. Methods 2019 (PMID : 30923384) **\*\*Single Cell\*\***

### Upcoming technology: CUT&Tag workflows

Go from cells to NGS sequencing libraries by direct tagmentation of sequence adapters to target genomic loci! Learn about this new & upcoming technology and stay tuned for new product releases and validated protocols!

- Kaya-Okur et. al, Nat. Comm. 2019 (PMID : 31036827) **\*\*Single Cell\*\***
- Schmunk et. al, bioRxiv. 2020 (2020.03.24.006874v1)
- Henikoff and Henikoff, bioRxiv. 2020 (2020.04.15.043083)\*  
\* Uses EpiCypher's pAG-Tn5 and CUTANA compatible antibodies

# CUTANA™

## Products and Services

### Do-It-Yourself

#### ADVANTAGES:

- Reduced cost
- Flexibility to customize experimental workflow

#### ORDERING INFO:

##### Enzyme Fusions

##### pAG-MNase for ChIC/CUT&RUN

Catalog No. 15-1016	50 rxns
Catalog No. 15-1116	250 rxns

##### pAG-Tn5 for ChIC/CUT&Tag

Catalog No. 15-1017	50 rxns
Catalog No. 15-1117	250 rxns

#### CUTANA Compatible Antibodies

##### H3K4me3

Catalog No. 13-0041 100 µg

##### H3K27me3

Catalog No. 13-0030 100 µg

##### H3K36me3

Catalog No. 13-0031 100 µg

##### Rabbit IgG Negative Control

Catalog No. 13-0042 100 µg

#### Spike-in Controls

##### E. coli DNA

Catalog No. 18-1401 100 ng

#### Additional Tools & Reagents

##### ConA Conjugated Paramagnetic Beads

Catalog No. 21-1401	50 rxns
Catalog No. 21-1411	250 rxns

##### 8-strip 0.2 mL PCR Tubes

Catalog No. 10-0009 120 strips

##### Magnetic Separation Racks

Catalog No. 10-0012	1.5 mL tubes
Catalog No. 10-0008	0.2 mL tubes

##### High Fidelity 2X PCR Master Mix for CUT&Tag

Catalog No. 15-1018 50 rxns

##### DNA Purification Kit

Catalog No. 14-0050

### Validated Kits

#### ADVANTAGES:

- Optimized workflow (cells → DNA)
- Validated reagents
- Streamlined sample handling for higher throughput
- Included controls for troubleshooting

#### ORDERING INFO:

##### CUTANA Kit for ChIC/CUT&RUN

Catalog No. 14-1048

##### Assay Kit for ChIC/CUT&Tag

Coming Soon



### Services

#### ADVANTAGES:

- End-to-end services
- Customized
- Optimized protocols designed to capture challenging targets
- High priority projects

New to CUT&RUN? Lack the resources to perform assay internally?

#### We can help!

Inquire at [info@epicypher.com](mailto:info@epicypher.com) to learn more about EpiCypher's CUTANA™ Assay Services for ChIC/CUT&RUN