

WHY IS EPIGENETICS IMPORTANT TO CANCER RESEARCH?

Cancer is a disease of the genome, but genetic mutations are only one factor. Non-genetic changes also affect the phenotype. Understanding the epigenetic landscape is increasingly crucial for modeling cancer initiation, progression and therapeutic response.

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Use epigenomic technologies to identify cellular biomarkers associated with regulation of cancer genes or drug resistance

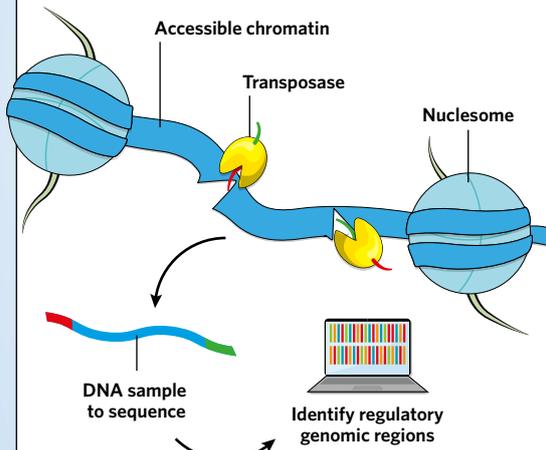
CHROMATIN ACCESSIBILITY

Shin, H.M. et al.

TECHNIQUE: ATAC-seq (Assay for Transposase-Accessible Chromatin).

AIM: Determine if genome-wide chromatin compaction in circulating CD8+ T cells of gastric cancer patients can predict response to immunotherapy.

FINDINGS: PD-1 immunotherapy responders had unique, opened regions of chromatin, unlike non-responders.



Shin, H.M. et al. *Nat Commun.* **12**, 975 (2021)

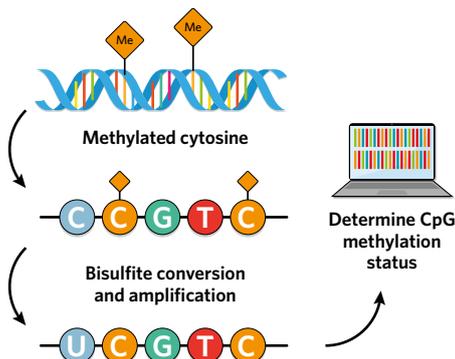
DNA MODIFICATIONS

Ylitalo, E.B. et al.

TECHNIQUE: CpG methylation profiling.

AIM: Read the epigenome of bone metastases from patients with prostate cancer to understand the regulation of gene expression during metastatic growth and its clinical relevance.

FINDINGS: Hypomethylation of CpG islands of promoter genes were associated with androgen receptor activity and more favorable patient prognosis after androgen-deprivation therapy.



Ylitalo, E.B. et al. *Clin Epigenetics.* **13**, 133 (2021)

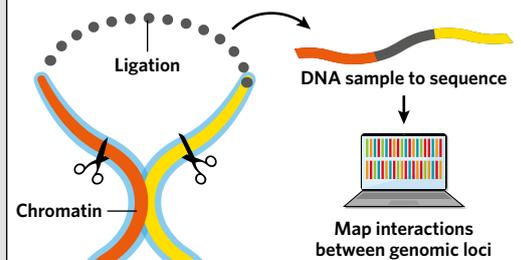
CHROMATIN INTERACTIONS

Vilarrasa-Blasi, R. et al.

TECHNIQUE: Hi-C (High-throughput Chromosome conformation capture).

AIM: Examine the genome's 3D organization, by detecting long-range DNA interactions, and gain insights into the cancer initiation process.

FINDINGS: Disease-specific changes in large gene-containing chromatin blocks contribute to the pathogenesis of chronic lymphocytic leukemia and mantle cell lymphoma.



Vilarrasa-Blasi, R. et al. *Nat Commun.* **12**, 651 (2021)

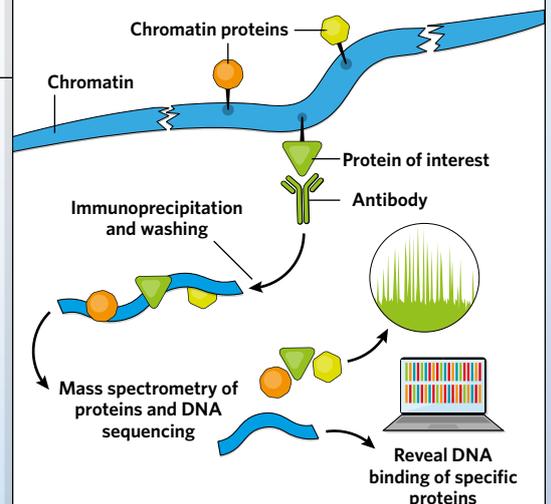
DNA-PROTEIN INTERACTIONS

Launonen, K.M. et al.

TECHNIQUE: ChIP-SICAP (Selective Isolation of Chromatin-Associated Proteins via Chromatin Immunoprecipitation).

AIM: Examine the 'chromatome' (the chromatin-protein network) in castration-resistant prostate cancer cells, and determine if any proteins around the androgen receptor (AR) affect AR-dependent transcription and carcinogenesis.

FINDINGS: Presence of SIM2, a transcription factor not previously associated with AR, had a marked effect on AR-mediated gene expression and correlated with disease aggressiveness.



Launonen, K.M. et al. *Oncogene* **40**, 4567-4579 (2021)

