



Epigenetics

Gwen Lomberk

Gastroenterology Research Unit, Saint Mary's Hospital, Mayo Clinic College of Medicine, Rochester, Minn., USA

Abstract

'Epigenetics', the term that is used for the study of heritable changes in gene function that occur without a change in the DNA sequence, has become a significant area of research. As a consequence of this emerging field, our concepts founded upon genetics alone have been blurred and the way researchers think about heredity has changed. Epigenetic mechanisms such as DNA methylation, histone modifications ('histone code'), chromatin modifiers, RNA interference as well as their effects in gene activation and inactivation are increasingly understood to be more than 'sideline players' in phenotype transmission and development, which consequently impacts significantly on our study of disease states such as cancer.

Copyright © 2007 S. Karger AG, Basel and IAP

Chromatin Structure and Function Page:

<http://www.chromatin.us/chrom.html>

In order to pack an approximately 5- μ m nucleus with a strand of DNA roughly 1.8 m long, histones are the real organizers of the human body. Access to genes wrapped around these proteins to form chromatin and chromosomes plays an integral role in the regulation of gene expression and cellular mechanisms. This webpage provides information on chromatin biology, histones and epigenetics, including the impact that these proteins have on biological processes, and it also informs about some of the researchers in the field. This site has links to important protocols in this line of research, 3D structures of chromatin proteins, related websites and an email sign-up for current critical papers published in the field.

DNA Methylation Database: <http://www.methdb.de/>

This site contains access to a database containing information about the occurrence of methylated cytosines in DNA. This database allows searching for methylation content and methylation patterns and profiles. In addition, there are several useful links to other essential databases and methylation prediction programs.

Waterborg's Chromatin Homepage:

<http://sgi.bls.umkc.edu/waterborg/chromat/chromatn.html>

This is a nice educational website on chromatin and includes slide presentations covering key concepts and papers in the field. It covers nuclear packaging of DNA, chromatin structure and DNA domains, nucleosome structure, chromatin fibers, histone acetylation/deacetylation and how chromatin is transcribed. This website was modeled from a graduate class on chromatin and therefore serves as a useful resource for general information.

The Epigenome: <http://www.epigenome-noe.net/index.php>

This forum was formed by the many world-leading European laboratories in epigenetic research. The Epigenome Network of Excellence (NoE) has merged 25 research groups, plus their associate members. This website provides the community with protocols, useful tools and resources, educational links, conference and meeting announcements as well as various job opportunities and the ability to consult their members. This is an interactive website for the epigenetics community that also provides educational contents for novices in the field.

Epigenetics has been an exciting and evolving field of research. At first only centered on the methylation of DNA, this field has expanded extensively into chromatin modifications and chromatin dynamics, both at the level of histones and non-histone proteins. Epigenetics certainly has much potential for medical application as it can be more readily manipulated than genomic mutations, yet has dramatic effects on the cell. Hopefully these websites provide resources for every level of epigenetics, whether for studying or for setting up experiments. Either way, this is a field of research to watch as it is destined to continue to grow!

Gwen Lomberk, PhD
Scientific Editorial Assistant