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Epigenetics: is functional genomics the new frontier in migraine research?

The term epigenetics includes the study of all heritable changes that affect gene function without involving a change in DNA sequence. Epigenetics comprises the study of all biomolecular phenomena having a role in transforming genotype into phenotype. In the past decade, familial hemiplegic migraine (FHM), one of the less common and clinically relevant forms of migraine if compared with the clinical subtypes with or without aura, has become an important area in the study of migraine heredity. Results from FHM studies have improved scientific consideration of migraine. The view of migraine genetics has been written in an excellent way by using the language of DNA, and genetic mutations and recombinations have driven our understanding of how phenotypic markers are handed down in the same family, especially of FHM patients.

Today the explosive interest that surrounds epigenetics and diseases indicates a new direction for migraine genetics research. The key passage of how epigenetics events, such as gene silencing, imprinting, paramutation, DNA methylation and role of RNA, may extend the information derived from genetic aberrations in developing the clinical phenotype of migraine is the emerging frontier.

A full coverage of this argument is available at the *Science* Web site (*http://www.sciencemag.org/feature/plus/sfg/resources/res_epigenetics.shtml*). A section dedicated to functional genomics resources contains an archive of the most important papers published in this field during the last five years.

From this Web site, readers can perform a "grand tour" by reaching a large number of other sites discussing the various phases in which genes are controlled epigenetically, and then improve their knowledge of the first studies dedicated to diseases caused by disrupted epigenetic control of metabolism.

May migraine be included in these exciting research programmes? We will have to work for this. In the next stage of research on the genetics of migraine, we have to move from a "photographic map" of migraine genes to a "movie" showing the genetic mechanisms leading to migraine phenotype.