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Epigenetics

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Definition

Epigenetics refers to gene expression that can be modified by environmental or external factors, resulting in heritable characteristics, that do not involve changes to the underlying DNA sequence. Thus, it is a change in phenotype without a change in genotype. Epigenetics instructs how cells read genes. There are numerous definitions of the term epigenetics, which is a regular and natural occurrence, and the study of epigenetics is producing a continually evolving knowledge base.

Epigenetic systems differ from genetic systems as environmental influences do not change the genotype. That is, acquired characteristics of individual organisms or cells associated with environmental or external factors (i.e., epigenetic changes) are not heritable via genetic processes such as DNA mutation (i.e., genetic changes). Rather, epigenetic mechanisms include DNA methylation/demethylation, which influences whether or not a gene is expressed. Transcription may also be influenced via changing the structure of folded units of DNA and histone (i.e., a chromatin unit). Studies of epigenetic influences in the

context of neuropsychology and psychiatry have sought to understand predisposition to neurocognitive disorders and mental illness, including neurodevelopment, neurological disease, and aging, as well as to elucidate the mechanisms underlying variability in treatment response (Bale 2015; Holliday 2014). Epigenetics is hoped to contribute to improved understanding of the mechanisms underlying developmental and degenerative brain disorders and to influence potential therapies (Jakovcevski and Akbarian 2012).

Cross-References

- ▶ [Epigenome](#)
- ▶ [Gene-Environment Interaction](#)

References and Readings

- Bale, T. L. (2015). Epigenetic and transgenerational reprogramming of brain development. *Nature Publishing Group*, 16(6), 332–344. <http://doi.org/10.1038/nm3818>.
- Holliday, R. (2014). Epigenetics: A historical overview. *Epigenetics*, 1(2), 76–80. <http://doi.org/10.4161/epi.1.2.2762>.
- Jakovcevski, M., & Akbarian, S. (2012). Epigenetic mechanisms in neurological disease. *Nature Medicine Review*, 18, 1194–1204.