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Epigenetic therapies and the development of personalized treatment of genetic pathologies

Rick Wallace
The Visionetics Institute, USA

Despite the investment of a substantial amount of technological, financial and academic resources, there has been minimal progress in the attempt to reduce the mortality rate associated with multitudinous forms of cancer and other genetic diseases. The advancement in the understanding of epigenetics and its impact on gene expression has introduced a potential gateway through which early detection of genetically influenced bio-pathologies can be experienced. Through the use of epigenetic data, it may be possible to detect or even anticipate the disruption of epigenetic networks that subsequently lead to the development of a number of major pathologies that include chromosomal instability syndromes, cancer and mental retardation. The introduction of epigenetics as a diagnostic tool may not only create the capacity to detect the aforementioned pathologies, it may also reveal other pathologies that are caused by epigenetic alterations. There is also great potential in the development of therapies that are centered in epigenetic processes that include DNA methyl transferase and histone deacetylases, as well as enzyme inhibitors, all of which have shown anti-tumorigenic promise as it pertains to certain malignancies. Epigenetics also offers great promise in the area of personalized treatment based on certain genetic predispositions. The study of epigenetics creates the opportunity to integrate advanced technologies and concepts into the process of diagnosis, prognosis and therapeutics — ultimately improving on the current dismal results being experienced.