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Reviews

## The DNA methylation paradox

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### Abstract

The methylation of CpG islands is often equated with transcriptional inactivity and there is overwhelming evidence that this is the case for islands located in gene promoters. Such methylation is probably part of a mechanism to permanently silence the activities of genes, including those on the inactive X chromosome. Not all CpG islands and methylation sites are located in known promoters; several tissue-specific and imprinted genes have CpG islands located at considerable distances downstream of transcription initiation sites, and many genes have multiple promoters. Methylation of CpG islands downstream of transcription initiation does not block elongation in mammalian cells. This has given rise to an interesting paradox in which methylation in the transcribed region is often correlated with expression, in contrast to the inverse correlation seen at the site of transcriptional initiation. The methylation paradox might be resolved if it is hypothesized that transcription through a CpG island facilitates *de novo* methylation.

## Keywords

Genetics; Biochemistry

## Keywords

DNA methylation; cancer; transcription; CpG; mammal; genomic imprinting

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