

# Fighting the Enemy Within

Basic Life Science and Issues : Presentation

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Group 4

November, 2019

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## Fighting the Enemy Within

11th chapter of *The Epigenetics Revolution*

*"Epigenetic perspective of Cancer and its treatment"*



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- proto-oncogenes for cell proliferation
- tumor suppressor genes for regulation



# Introduction: Cancer

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- proto-oncogenes is over-activated
- tumor suppressor genes is inactivated



# Introduction: Cancer

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# Epigenetic Approach for Oncogenesis

- DNA Methylation

Hypermethylation of CpG island

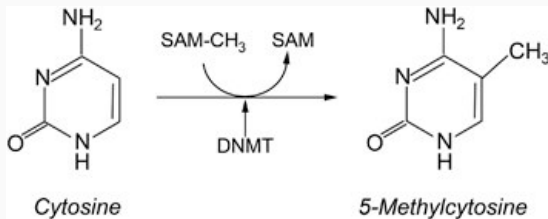
- Repressive Histone Modification

Histone deacetylation



# DNA Methylation

Cytosine before Guanine can be methylated



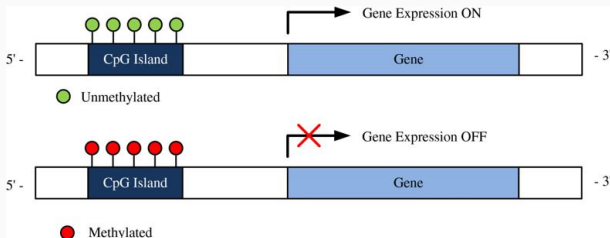
Methyl group is bond on 5' carbon atom





# DNA Methylation

CpG dinucleotide cluster (CpG island, CGI) are usually located in the promoter regions of genes in a DNA sequence.



Hypermethylated CGI disables specific gene expression.

# Histone deacetylation



# Characteristics of Oncogenesis

- Multi-step process
- Defections must be accumulated

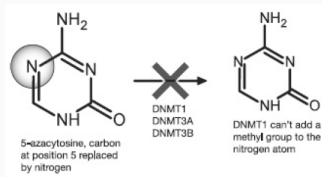
Inherited oncogenes are slowly expressed  
e.g.) BRCA1 mutation

- Tumour suppressor gene - Switched off
- Alteration with epigenetic access



# Approach for Treatment

- DNMT enzyme inhibitors  
5-azacytidine, 2-aza-5'-deoxycytidine



methylation inhibited by 5-azacytidine



# No easy wins

- HDAC inhibitor  
SAHA, Romidepsin



# Alternative Approach



# Conclusion



# References

- [1] Carey, N. (2012). *The Epigenetics Revolution*. Columbia University Press
- [2] Kakumani, R.; et al. (2012). *Identification of CpG islands in DNA sequences using statistically optimal null filters*, EURASIP Journal on Bioinformatics and Systems Biology
- [3] Kazantsev, Aleksey G; et al. (2008). *Therapeutic application of histone deacetylase inhibitors for central nervous system disorders*, Nature Reviews. Drug Discovery London Vol. 7 Iss. 10 854-68.





Q & A

Thank you!