



## Predictive Epigenetics: Fusing Theory and Experiment

### Epigenetics QUIZ - ANSWERS

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#### On to Epigenetics

- 1. A:** It means “on top of genetics” and refers to the heritable changes in gene expression without changes on the DNA sequence.
- 2. B:** An embryologist and a pioneer of Epigenetic studies.
- 3. C:** A genetic mutation is a permanent change in the genetic sequence while an epigenetic modification does not change the genetic sequence.
- 4. A:** They are genetically identical but have a different epigenome.
- 5. C:** It is the transmission of epigenetic marks from one organism to the next (i.e., from parent to child) that affects the traits of the offspring without altering the DNA sequence.
- 6. B:** Yes, because they can acquire different epigenetic marks during their life.

#### Epigenetics research and its applications in the medical field

##### 7. YES

Epigenetic modifications can sometimes result in pathogenic phenotypes.

Researchers showed that epigenetic modifications were involved in some rare limb malformations.

These congenital malformations are known to be genetic diseases. It means that genetic modifications for example; mutations are responsible for it. However, epigenetic changes also seem to play a role in establishing these pathogenic phenotypes. Indeed, rearrangement of Topologically Associated Domains (TADs), regions of enrichments of Chromatin interactions, were discovered in limb malformation mutant mouse strains<sup>1</sup>.

##### 8. YES

Epigenetic profiles can be used as markers to predict the likely outcome of a disease.

Epigenetic signatures are now exploited as indicators of medical conditions and used to improve prognosis.

For example; methylation profile signatures can be exploited to help the prediction of lung cancer<sup>2</sup>.

## 9. YES

Epigenetics marks constitute good targets for cancer-specific therapies.

Epigenetic therapy appears to be promising in the immuno-oncology field.

As epigenome profiles can be specific to some cancer types, epigenetic drugs are now used in clinical trials. To this date, only one category of epigenetic drugs is approved by the US Food and Drug administration to treat patients suffering, for example, from acute myeloid leukaemia. There is still a long way to go, but research on epigenetic therapy is growing in the medical field.

NB: Here, we refer to applications of Epigenetics using popularisation of scientific information. If you want to know more about the use and research of Epigenetics in the medical field, please check references, continue to read about epigenetics and stay tuned on [our website](#) for more interesting facts about Epigenetics.

### References:

1. Lupiáñez, D. G., et al. (2015). *Cell*. 21;161(5):1012-1025. doi: 10.1016/j.cell.2015.04.004. Epub 2015 May 7. [Pubmed](#)
2. CURELUNG, EU-funded project, (2014). Determining (epi)genetic therapeutic signatures for improving lung cancer prognosis. Retrieved from <https://cordis.europa.eu/project/id/258677>. (Last update: 2019)
3. Topper, M. J., et al. (2020). The emerging role of epigenetic therapeutics in immuno-oncology. *Nature Reviews Clinical Oncology*. Feb;17(2):75-90. doi: 10.1038/s41571-019-0266-5. Epub 2019 Sep 23. [Pubmed](#)