

* gene - fundamental unit of genetic information

+ Topoisomerase structure, function & inhibitors

→ Topoisomerase α type

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DNA Topoisomerase I
DNA Topoisomerase II

→ function :-

Topoisomerase I :- Reversibly cleave one strand of double helix

- Has both strand cutting & strand resealing activity
- Not require ATP
- Store energy from phosphodiester bond they cleave & use the energy to reseal the strand
- It create transient nick in one DNA strand, allow passing of intact DNA strand through break before it is resealed & relieve supercoils.
- Relieve positive & negative supercoil in prokaryote & eukaryotes & in *E. coli* - only negative supercoil

Topoisomerase II :- Require ATP

- Tightly bound to DNA double helix

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make transient nick break in both strand

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allow second stretch of DNA double helix to pass through breaks

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Reseal break.

- Remove both positive & Negative supercoiling

→ Topoisomerase inhibitors

→ ciprofloxacin
Norfloxacin
Nalidixic acid → ⊖ Bacterial DNA gyrase.
↓
cause DNA replication by adding ⊖ supercoil.

→ Etoposide → ⊖ Human topoisomerase II.
Adriamycin ↓
Use - Anti-cancer drug.

→ 5-mercaptopurine → ⊖ Human DNA polymerase

→ 5-Fluorouracil → ⊖ Thymidylate synthase.

→ Camptothecins → DNA topoisomerase I

→ Etoposide → DNA topoisomerase II

→ Doxorubicin → ⊖ DNA topoisomerase

→ Structure