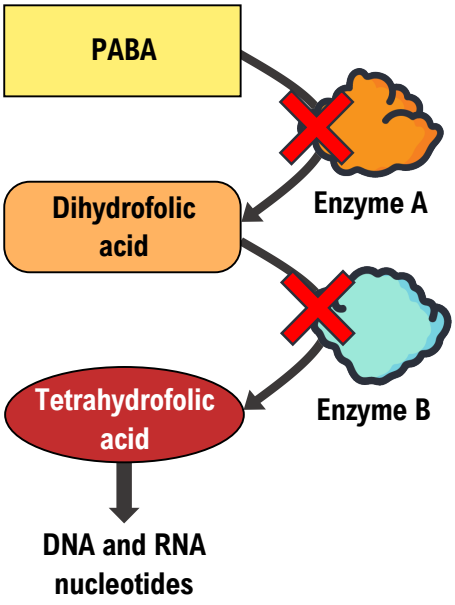
TOPIC: COMPETITIVE INHIBITORS OF METABOLIC PATHWAYS

Sulfa Drugs & Folic Acid Synthesis

◆ *Recall*: bacterial cells synthesize _____ acid → humans get it from their _____



◆ **Sulfonamides (_____ Drugs):** block folic acid production.

→_____ inhibition.

- Structurally similar to *para-aminobenzoic* acid (_____).
- _____, widely used antibacterial.
- Used less today, but still used for some _____ & other infections.

◆ Trimethoprim: competitively inhibits the _____ step in folic acid synthesis.

- Not a _____ drug.

◆ Often used together _____.

- E.g. sulfamethoxazole-trimethoprim (Bactrim®):

  - More _____.
  - Reduces spread of resistance.

Gram ⊕ ___ Gram ⊖ ___

EXAMPLE

For each statement below, determine which of the two words best completes the sentence.

1. Sulfa drugs and trimethoprim block the synthesis of (ATP / Folic Acid).
2. The combination drug sulfamethoxazole-trimethoprim exhibits a(n) (synergistic / antagonistic) effect.
3. Sulfonamides work by (competitive inhibition / non-competitive inhibition).
4. Sulfonamides are structurally similar to (PABA / dihydrofolic acid).
5. Trimethoprim is structurally similar to (PABA / dihydrofolic acid).

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PRACTICE

Why are sulfa drugs & trimethoprim often used together?

a) Sulfa drugs target Gram-positive bacteria, while trimethoprim targets Gram-negative bacteria.

b) Trimethoprim destroys naturally occurring enzymes that inhibit sulfa drugs.

c) They exhibit synergism by inhibiting different steps of the same metabolic pathway.

d) Trimethoprim blocks sulfa drugs from affecting folic acid synthesis in human cells.

PRACTICE

Which mechanism below best describes the method by which sulfa drugs inhibit the folic acid production pathway?

a) Sulfa drugs block the conversion of tetrahydrofolic acid into folic acid.

b) Sulfa drugs bind to PABA, preventing it from being converted to tetrahydrofolic acid.

c) Sulfa drugs denature the enzyme that converts dihydrofolic acid to tetrahydrofolic acid.

d) Sulfa drugs bind to the same enzyme that converts PABA to dihydrofolic acid.