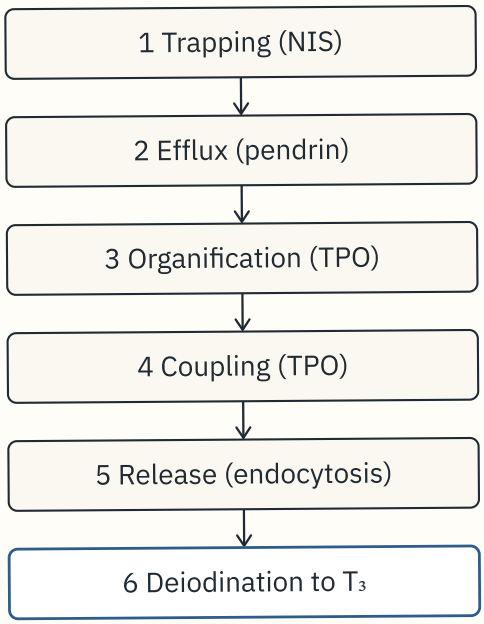
# Thyroid hormone synthesis

Six steps and the drug at each one




## Step by step

1. TSH drives every step and growth of the gland
2. MIT + DIT makes $T_3$; DIT + DIT makes $T_4$
3. $T_4$ is made far more than $T_3$
4. Deiodinases 1 and 2 activate; 3 makes reverse $T_3$

| Step | Drug |
|---|---|
| 1 Trapping (NIS) | Perchlorate, thiocyanate |
| 2 Efflux (pendrin) | None of the antithyroid drugs |
| 3 Organification (TPO) | Methimazole, PTU |
| 4 Coupling (TPO) | Methimazole, PTU |
| 5 Release | Pharmacological iodide |
| 6 $T_4$ to $T_3$ | PTU, at high doses |

Step and drug

### Rule of thumb

**Perchlorate blocks uptake**
**Thionamides block the peroxidase**
**PTU also blocks conversion**
**Iodine lack: low hormone, high TSH, goitre**

## Exam traps

- Pendrin is not the target of the antithyroid drugs.
- Pharmacological iodide inhibits release; its block on synthesis (Wolff-Chaikoff) lasts only days.
- Of the two thionamides, only propylthiouracil also blocks $T_4$ to $T_3$ conversion, at high doses.

Thyroid hormone synthesis, step by step

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/endocrinology/thyroid-hormone-synthesis-and-drug-targets

For exam study only, not medical advice. Follow local guidelines and your lab's ranges.
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