	Thioamides		Iodide
E.g.	Methimazole **(Preferred)**	**P**ropylthiouracil	**-Potassium iodide (KI)** **-Lugol's solution**
MOA	**Inhibit peroxidase enzyme** → inhibit iodination and oxidative coupling→ **block synthesis of T4 & T3**		• ↓ **Iodination** of thyroglobulin (Acute **Wolff-Chaikoff Effect**) • ↓ **T4/T3 release** → **main effect** • ⏱️ **Rapid symptom relief** → in **2–7 days** • ⏳ **Short-lived** → gland escapes inhibition after few weeks
	---	**inhibits the peripheral conversion** of T4 to T3.	
Uses	**Use in pregnancy**		**Short term therapy:** • **Thyroid storm** • **Pre-op** (7–14 days) → ↓ size + vascularity of thyroid • ☢️ **Post-RAI** → KI for 3–7 days
	Cause birth defects	**Drug of choice in pregnancy**	
	Indications		
	-Induce **remission in Graves' disease** -**Preoperative**→ Before surgery **(to prevent thyroid storm)** and RAI treatment		
S/E	**Hepatotoxicity (Liver failure) & Leukopenia**		1. **Hypersensitivity:** skin rash, etc. 2. **Iodism:** salivary/lacrimal swelling, sore gums/teeth 3. **Metallic taste** 4. **Mucosal ulcers**
	Low risk	**High** risk	
	📋 **Monitor** Liver functions × first 6 months		
	Other		
	1. **Rash + Arthralgia + Fever** → in ≤5% of patients 2. **Lupus-like syndrome / Hepatitis / GIT distress** → less common 3. **Mild ↓ WBCs** 4. **Severe agranulocytosis (BM Depression) (Rare & Fatal):** Granulocyte count <250/µL ○ 🔄 **Reversible →** Stop drug ○ 📍 **PTU > Methimazole** ○ 🕒 **Onset:** within first 3 months ○ 📋 **Monitor:** CBC ○ 🔴 **Contact doctor**: Experiencing fever, malaise, sore throat, flu-like symptoms		
Pharmacodynamic	**Efficacy**		---
	More effective	**Less** effective	
	T½		
	Longer (8 hrs) → Once daily	**Short** (2 hrs) → 2-3 times a day	
	Plasma Protein binding		
	Not bound → crosses placenta and appears in breast milk	80% bound	
Effects	⏳ **Delayed onset** → takes 4–8 weeks ⬆️ **Start with high dose** → once euthyroid → taper ↓ monthly to maintenance 📅 **Treatment duration**: 12–24 months ✅ **~45%** achieve permanent remission		---

β-Blockers in Hyperthyroidism

- **Hyperthyroid effect on Sympathetic NS:** ↑ β-receptor density → leads to sympathetic overactivity
- **Mechanism of β-blockers (Atenolol, Propranolol):** ↓ CVS symptoms
  - **Propranolol:** also ↓peripheral conversion T4 → T3
  - **When contraindicated** → use CCBs like diltiazem

	Radioactive iodine (I^{131}) (RAI)
MOA	• Colorless, tasteless, oral route • 🚀 **Rapid GI absorption** → selectively taken up by thyroid • ☢️ **Emits low-penetration radiation** → destroys thyroid tissue • ⏳ T4/T3 normalize over 4–8 weeks
Adjunctive therapy	**1. Thioamides** ⏸ Stop 3–7 days before RAI 🔄 Restart 3–7 days after **2. β-Blockers** 🔴 Continue to control symptoms until RAI takes full effect **3. Iodide salts (KI)** 🚫 **Do NOT give before RAI** → competes with I^{131} uptake ✅ **Use AFTER RAI** → ↓ thyroid hormone release
SE	**80–90% → hypothyroid post-RAI** → Require lifelong levothyroxine
CI	• **Pregnancy** → Not teratogenic if pregnancy occurs after TTT • Young children, Thyroid cancer, Uncontrolled heart disease • Moderate to severe **Graves' ophthalmopathy**

	Levothyroxine (T4)	Liothyronine (T3)
Nature	• Synthetic T4 • Drug of choice (↓Potent)	Synthetic T3
MOA	**T4 = major circulating form** → converted in tissues to T3 (active form) by **deiodinase**	**T3** → binds to nuclear thyroid receptors (TRs) → **regulates gene transcription** for key metabolic processes
Relative Potency	**1**	**4**
T ½	**8 days**	**1 day**
Dose	**Once daily**	**1-3 times/day**

Levothyroxine (T4)

⚠ ↓ **Absorption with:** Coffee, Ca^{2+}, Al^{3+}-antacid (Take on **empty stomach**)

- **Monitor response after 6–8 weeks** → assess clinical status + **↓ TSH**
- **Start low dose in:** Elderly & Severe/long-standing hypothyroidism →Gradually increase to avoid CVS stress

Drugs causing hypothyroidism: **Lithium and Amiodarone (anti-arrhythmic)**

Surgical Treatment of Hyperthyroidism

Features

- Subtotal or total thyroidectomy
- Least favored therapy

TTT of choice in

- Very large gland causing Pressure symptoms
- Large multi-nodular glands
- Females who desire Pregnancy within the next year
- Thyroid cancer
- Moderate to severe Graves' ophthalmopathy

S/E

- **Hypo**thyroidism
- **Hypo**parathyroidism (Transient/Permanent)
- Recurrent laryngeal nerve paralysis

	Severe hyperthyroidism (Thyroid storm)	Severe hypothyroidism (Myxedema coma)
Def	An acute, life-threatening complication of hyperthyroidism.	Metabolic decompensation & mental status change
Mortality	---	**high mortality rate** despite treatment
Management	**1. Inhibition of hormone synthesis:** ○ **PTU: High dose** → then lower dose and 4 times daily ○ **Preferred over methimazole** → also inhibits peripheral conversion **2. Inhibition of hormone release:** ○ **KI→** give ≥ 1 hr after Thioamide to prevent new hormone synthesis **3. Inhibition of Peripheral conversion:** IV corticosteroids **4. Control of CV effects:** ○ Propranolol (oral/IV) ○ Metoprolol (cardio-selective) ○ Diltiazem (if β-blockers are CI) **5. Fluid replacement** **6. Treatment of the cause** **7. Manage hyperthermia** ○ ✅ Cooling blankets / acetaminophen ○ 🚫 Avoid aspirin (↑ displacement of the drug→ ↑ free T4/T3)	**1. Levothyroxine IV** **High Loading dose:** 500–800 µg **Maintenance dose**: 100 µg/day **2. Hydrocortisone** 100 mg IV 3 times/day **3. Fluid replacement** **4. Treatment of the cause** **5. Supportive care** ○ Respiratory support ○ Hypothermia → warming blankets