PHARM.D • YEAR 2

Pharmacology

CHAPTER 6

Pharmacology of Hormones and Hormone Antagonists

PPT CHAPTER COVER

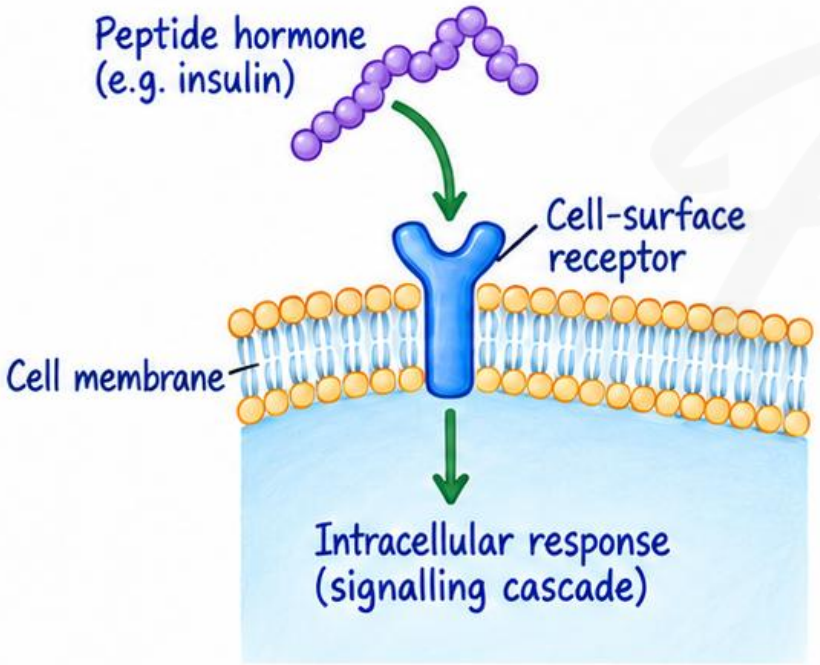


DOCTOR OF PHARMACY

Hormones: signals and drug targets

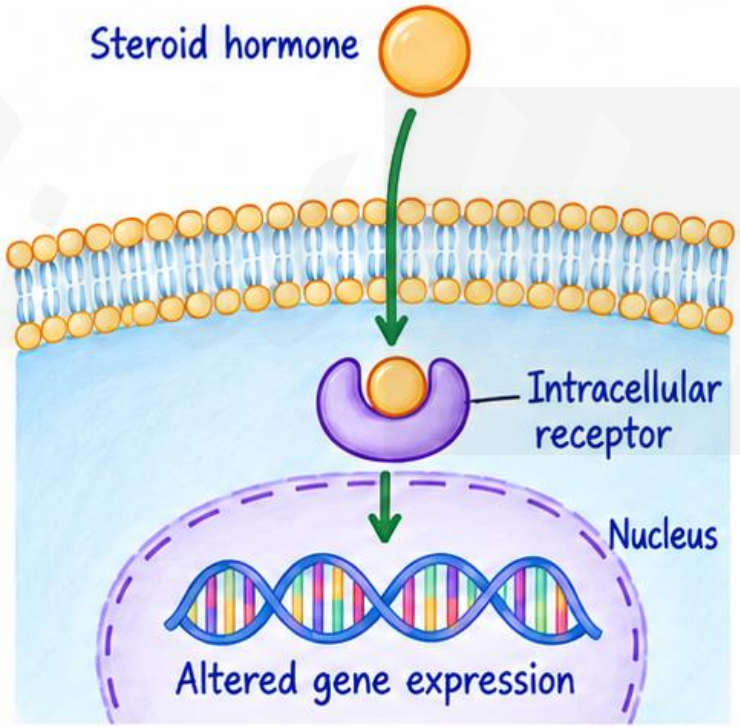
Peptide hormones

Insulin and oxytocin act at cell-surface receptors; many require injection.



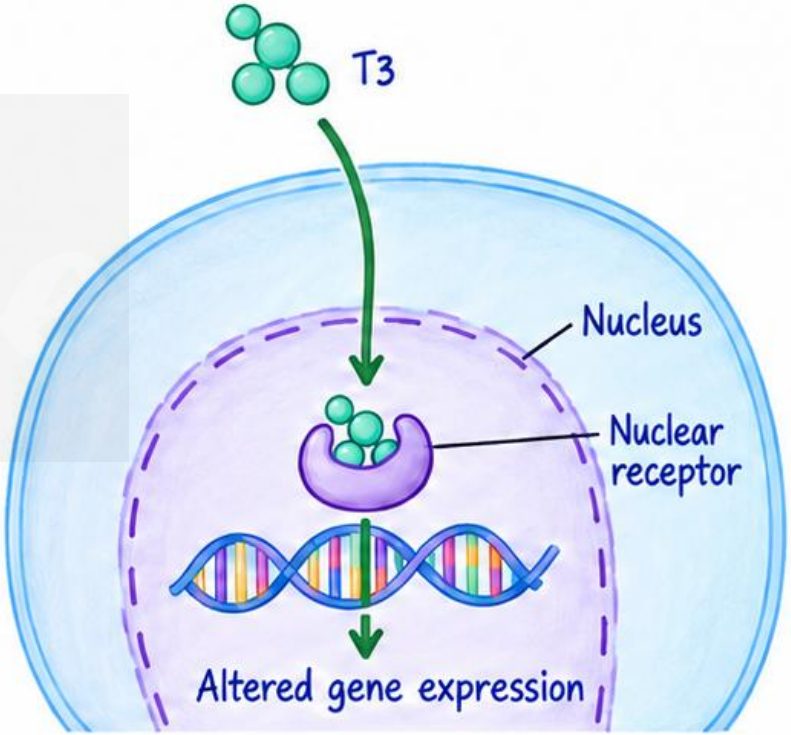
Steroid hormones

Sex hormones bind intracellular receptors and alter gene expression.



Thyroid hormones

T3 acts mainly at nuclear receptors, despite being an amino-acid derivative.



Therapeutic strategies

Replace a deficiency, modify hormone secretion, stimulate a receptor or block an unwanted action.

Response depends on receptor expression, dose, feedback and the patient's physiological state.

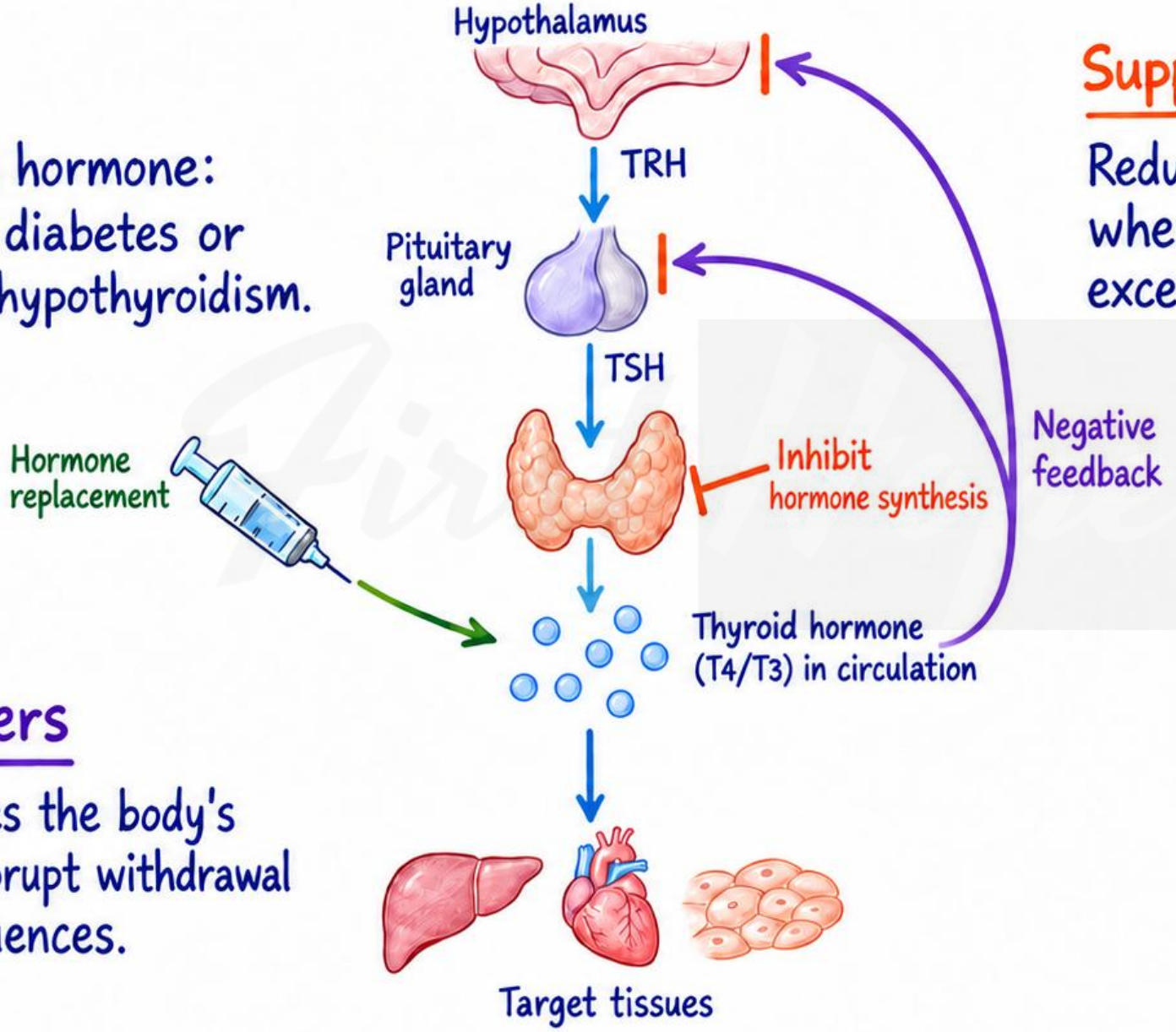
Hormone treatment: replacement versus suppression

Replacement

Supply a missing hormone: insulin in type 1 diabetes or levothyroxine in hypothyroidism.

Suppression or antagonism

Reduce synthesis or block effects when hormone activity is excessive.



Feedback matters

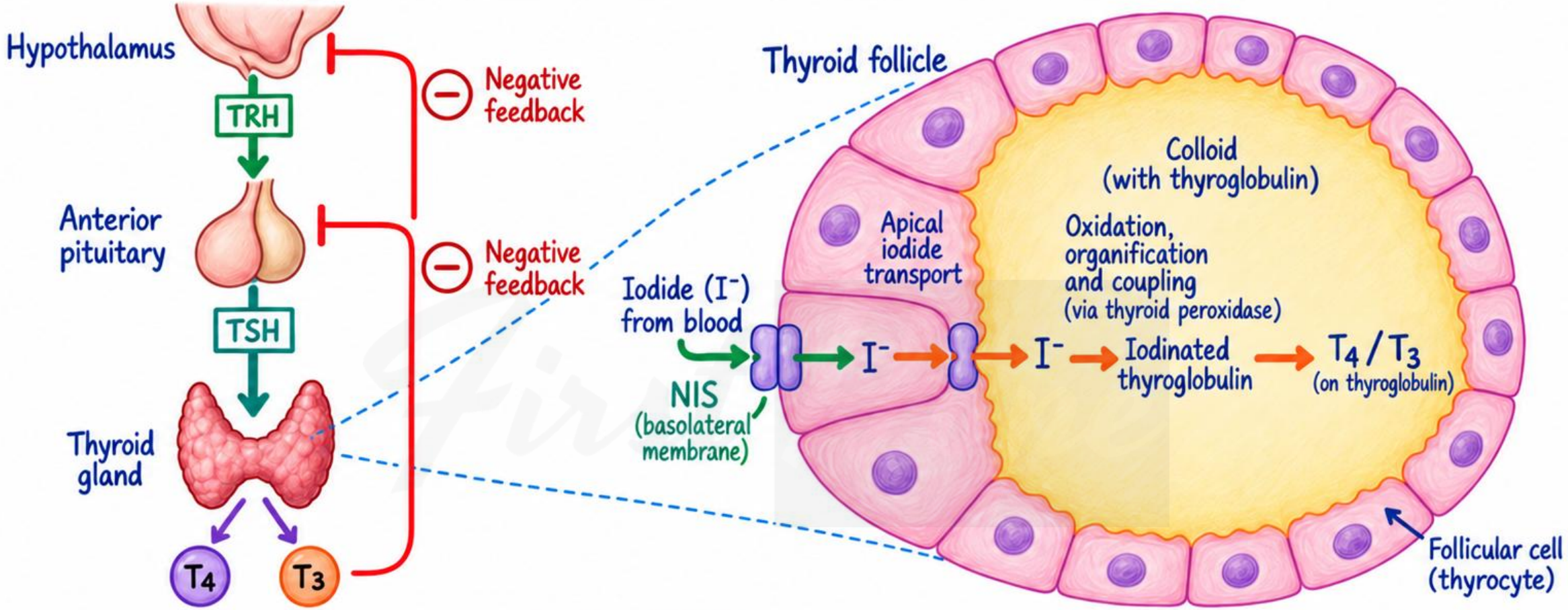
Treatment changes the body's own secretion; abrupt withdrawal may have consequences.

Individualisation

Consider age, pregnancy, organ function, interactions and the treatment goal.

Monitor the relevant clinical response and laboratory marker; the same dose does not suit everyone.

The thyroid axis and hormone synthesis



Control axis

Hypothalamic TRH stimulates pituitary TSH; TSH stimulates thyroid hormone production.

In the follicle

Iodide uptake is followed by oxidation, organification and coupling on thyroglobulin.

Thyroid peroxidase supports these synthetic reactions.

Release and conversion

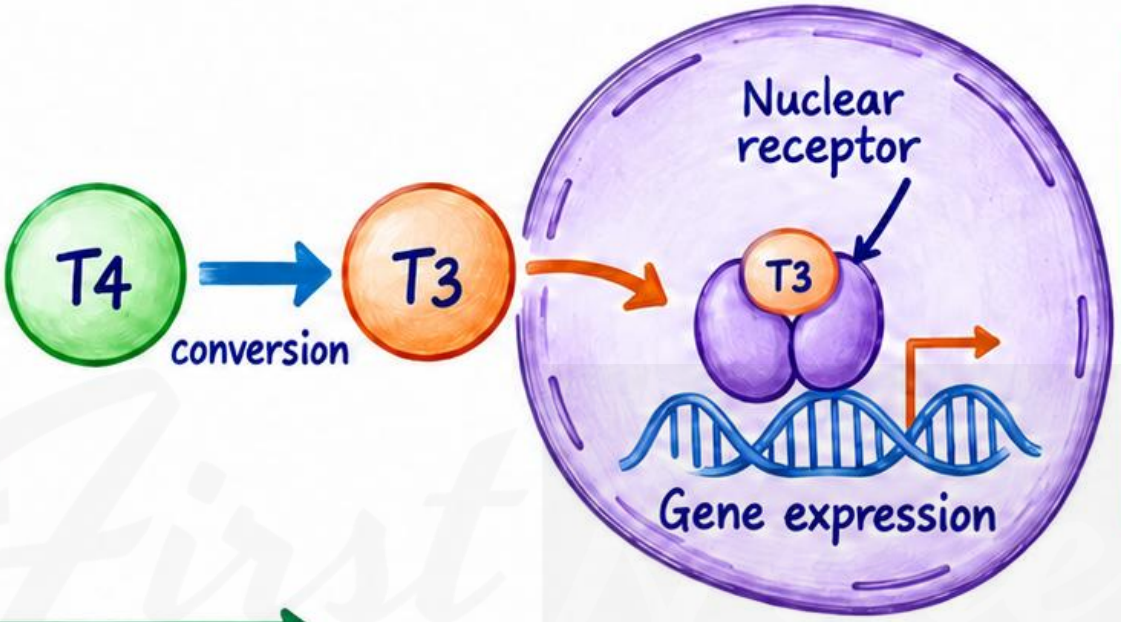
The gland releases mainly T_4; peripheral deiodination supplies much circulating T_3.

T_3 and T_4 feed back to reduce TRH and TSH secretion.

T4 and T3: actions and differences

T4: levothyroxine

Long half-life, about seven days; provides a stable source for conversion to T3.



T3: liothyronine

Faster onset and shorter duration; produces larger concentration fluctuations.

Longer duration →

Shorter duration →

Shared actions

Increase metabolic activity and heat production; support growth and nervous-system development.
Cardiac effects include increased rate and contractility.

Levothyroxine is usual replacement therapy. T3 is reserved for selected specialist situations, not routine substitution.

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