Interpreting Endocrine Results in Primary Care

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Endocrine Physiology – Tests tricky to interpret

Pituitary
LH
FSH
Prolactin
Growth Hormone (IGF-1)
(ACTH)

Thyroid
TSH
FT4 (TT4)
FT3 (TT3)
TPO- Ab
Tg Ab
Anti-Tg Ab

Reproductive
Oestradiol
Testosterone
(SHBG)

Bone
PTH
Calcium
Phosphate
Alk Phosphatase

Adrenal
Cortisol
DHEAS
Androstenedione
(Renin)
(Aldosterone)

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Endocrine Physiology – Tests to be discussed today

Prolactin

TSH
FT4 (TT4)

TPO- Ab

Calcium

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Questions…

Is it urgent?

What's the cause?

What should I do about it?

Kindly note:

- There are few (if any) guidelines on interpreting these results in primary care
- In an effort to be pragmatic, I have generated algorithms to help in your practice.
- These are my own personal recommendation
- I have simplified advice to give an overview
- Ideal management will vary, depending on clinical scenario and patient history
- Information in these slides are not intended to replace clinical judgement

1. Prolactin – common referral

"Dear Dr.

Please see Lauren, 24 years old. Menorrhagia and high prolactin, 780mU/L (RR 100-480mU/L). She has done some research and is very anxious regarding the possibility of a pituitary tumour.

Yours, .

……."

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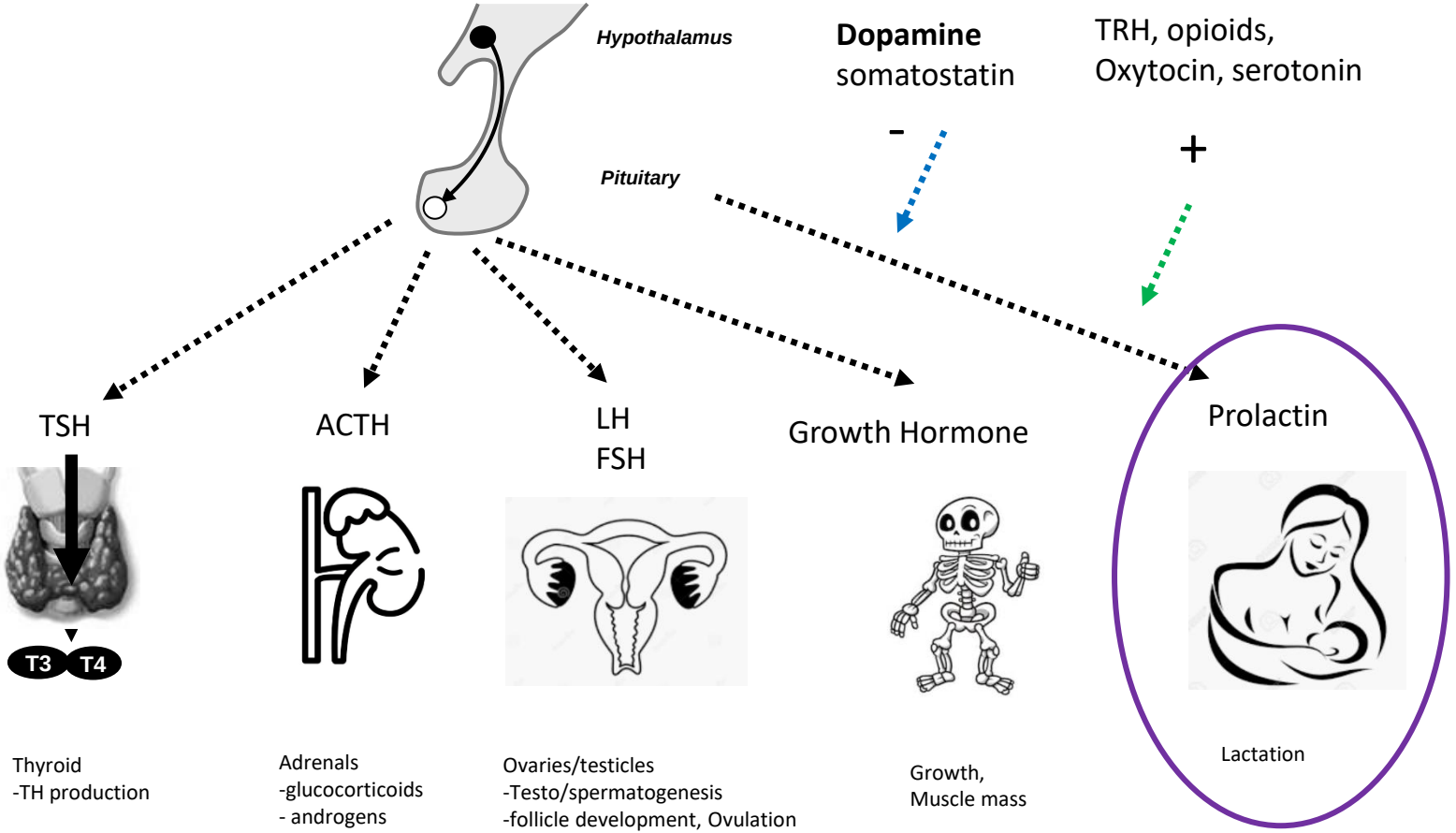
1. Prolactin – Reminder of Anterior Pituitary Function



1. Hyperprolactinaemia

When to check prolactin?

- Galactorrhoea (males or females)
- Hypogonadism:
  - Females: Amenorrhoea/oligomenorrhoea
  - Males: Reduced libido, Erectile dysfunction, Reduced beard growth
- Infertility

1. Hyperprolactinaemia – Causes

Physiological

- Pregnancy
- Breastfeeding
- Ovulation
- Poor sleep
- Stress
- Exercise
- Nipple stimulation/chest wall injury

Pharmacological

- Antipsychotics
- Antidepressants
- Anti-emetics
- Opioids
- Some anti-HTN

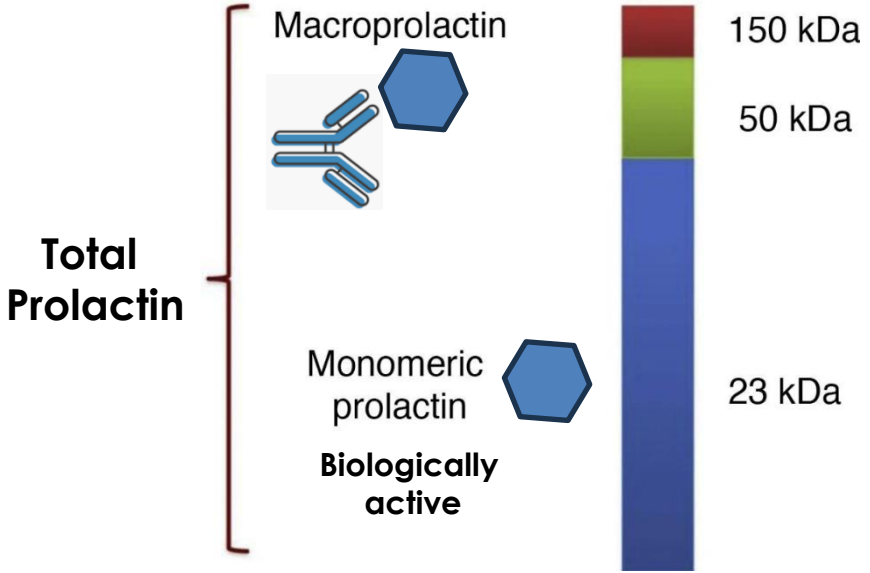
(see reference slide at end)

Pathological

- Pituitary tumours – prolactin producing
- Pituitary tumours – non functioning ("stalk effect")
- Other brain tumours near sella turcica
- PCOS
- Renal failure
- Cirrhosis
- Primary hypothyroidism
- Seizures

1. Hyperprolactinaemia – Measurement

Beware of Macroprolactin
- If "post-fractionated" (also called corrected) prolactin is normal, **ignore** the high total prolactin level



Be aware of units:
- mU/L used here
- ug/L used in USA
- 1ug/L = 21mU/L

1. Hyperprolactinaemia – Height of Elevation indicates cause

Approximate values

>10,000mU/L

Macroprolactinoma

4,000mU/L

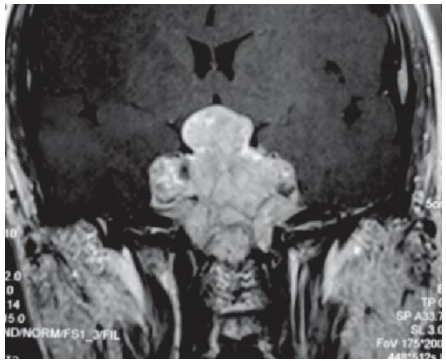
Microprolactinoma, medications*,
Stalk effect from sellar tumour

2,000mU/L

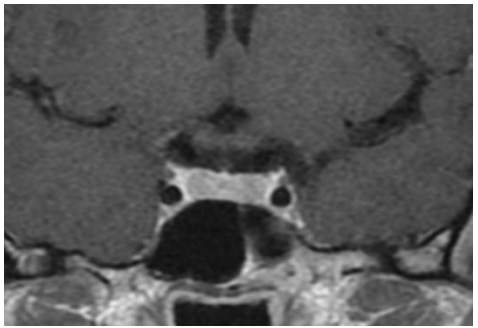
Stress, medications, PCOS,
Stalk effect from sellar tumour

500mU/L

Normal Range



Pituitary macroadenoma on MRI



Normal pituitary gland on MRI

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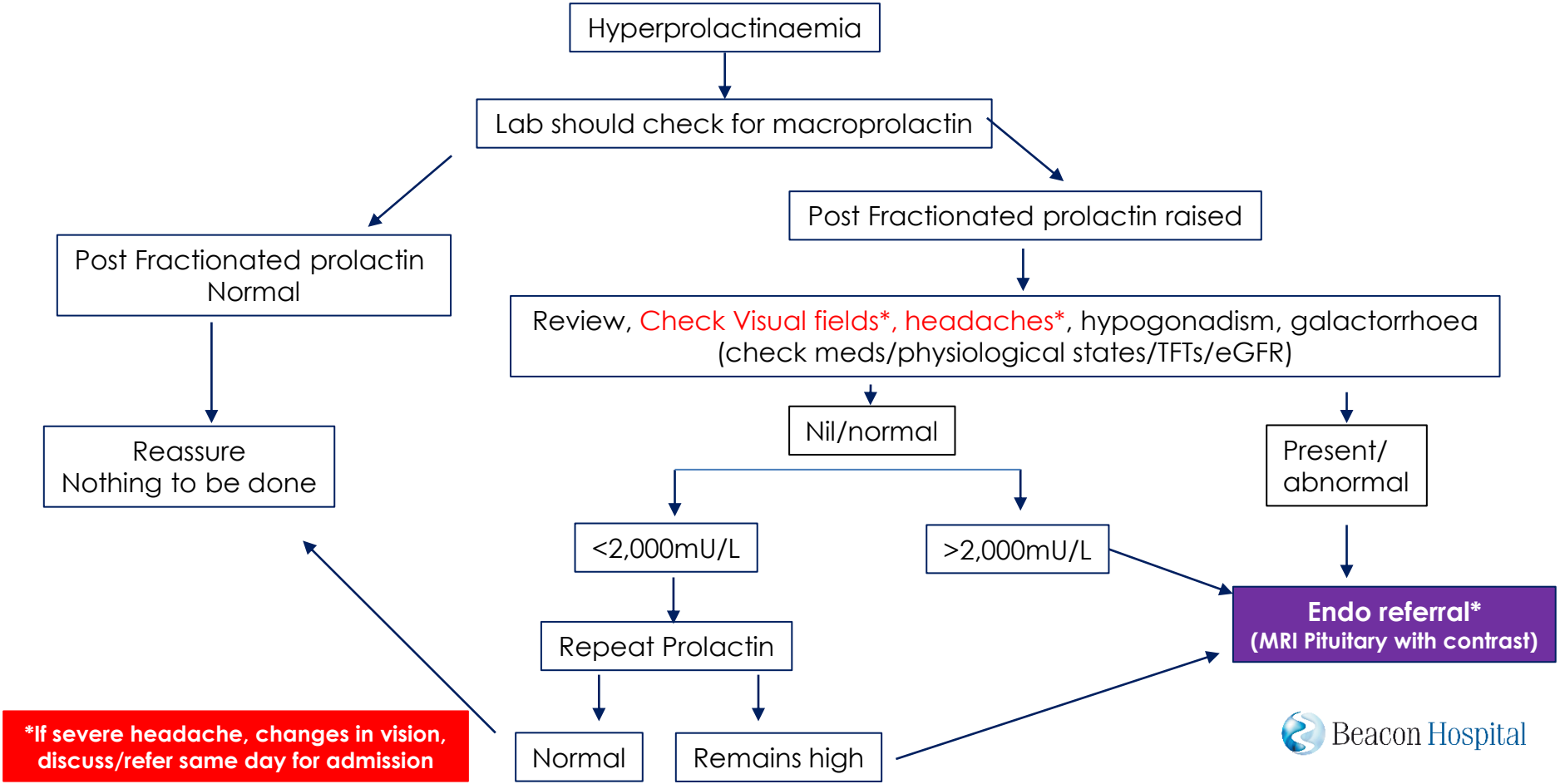
*Risperidone, Phenothiazines and metoclopramide can cause Prolactin up to 4,000mU/L

1. Hyperprolactinaemia – Review of results



2. Calcium – common referral

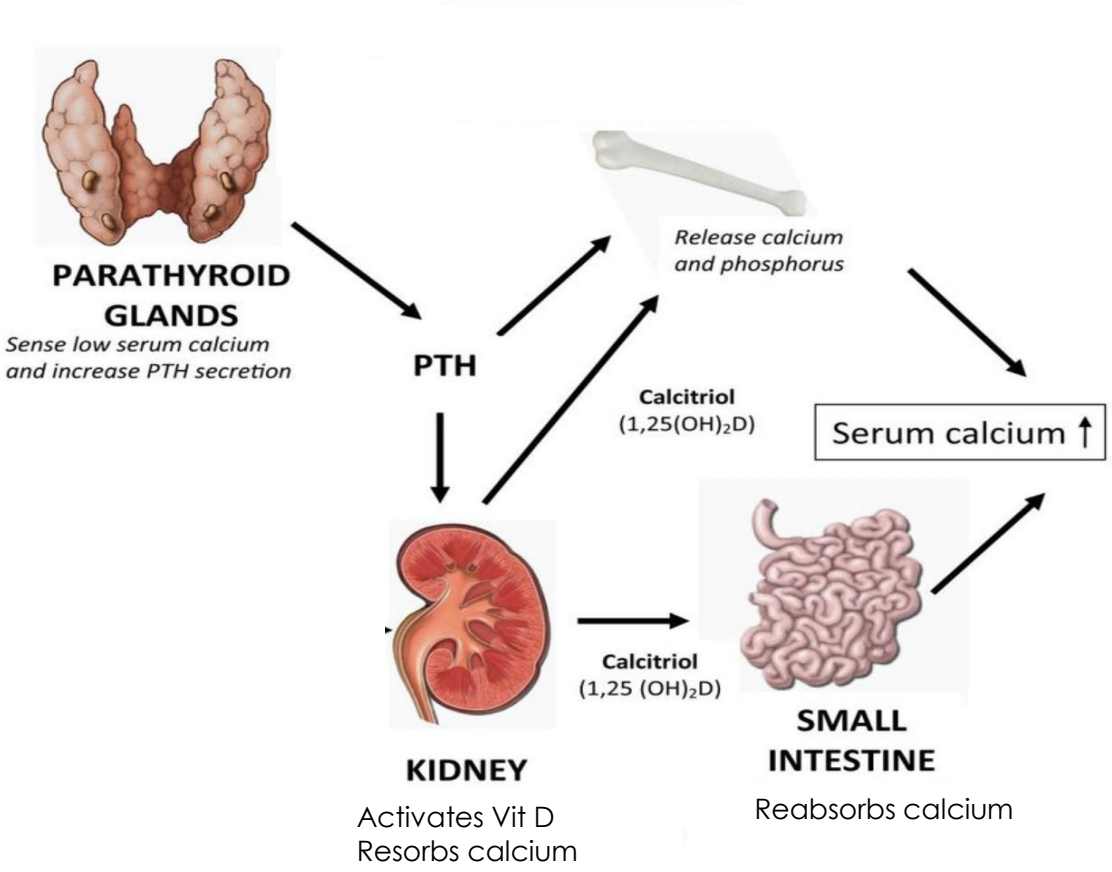
"Dear Dr.

Please see Mary, 72 years old. Routine bloods show raised calcium, 2.86mmol/L (RR 2.2 – 2.6mmol/L). She has had intermittent raised calcium levels since 2019. She has no symptoms.

Yours, .

……."

2. Hypercalcaemia



Effect of PTH

↑ Serum Calcium (↓ Serum Phosphate)

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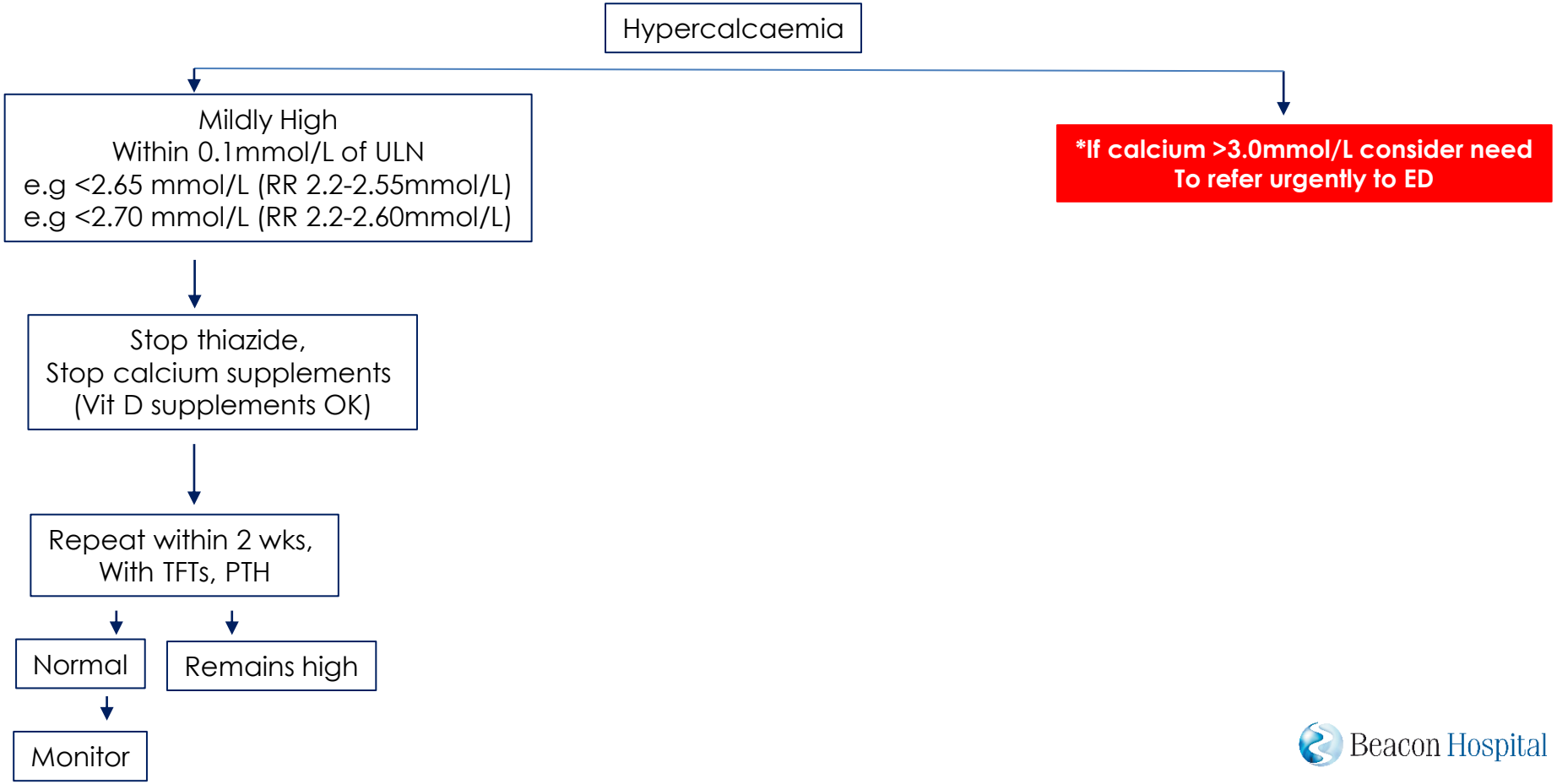
2. Hypercalcaemia - Causes

LOW PTH	HIGH PTH (or upper end of RR)
Malignancy	Primary Hyperparathyroidism
Granulomatous disease (Sarcoid)	Lithium
Vit D Intoxication	(Thiazides)
Thiazides	Tertiary hyperparathyroidism (ESRF)
Thyrotoxicosis	
Immobilization	

2. Hypercalcaemia – Review of results



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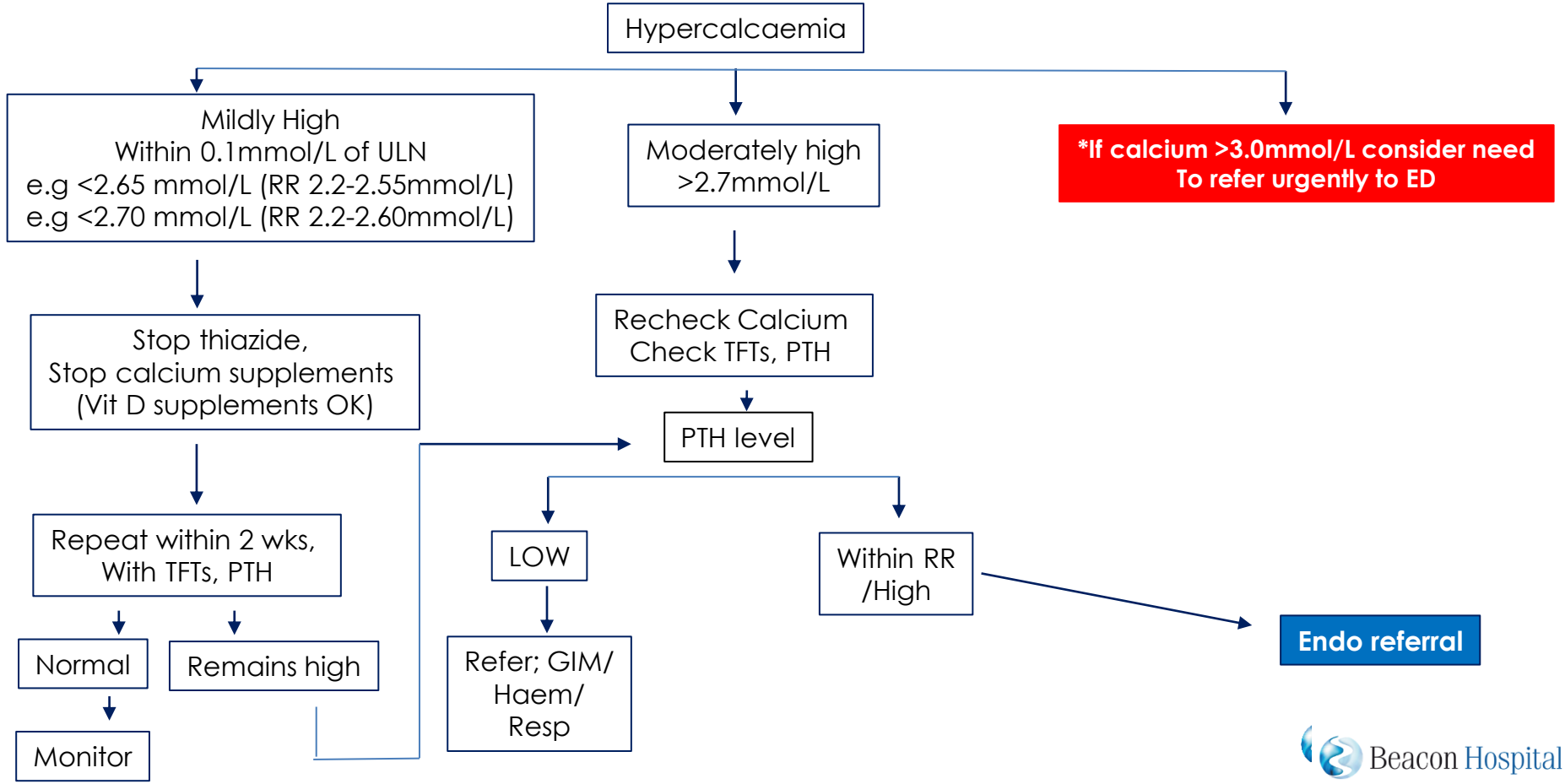
2. Hypercalcaemia – Review of results



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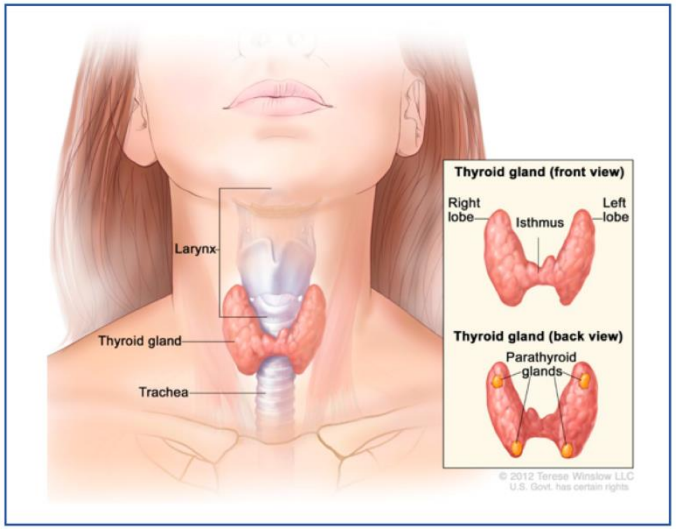
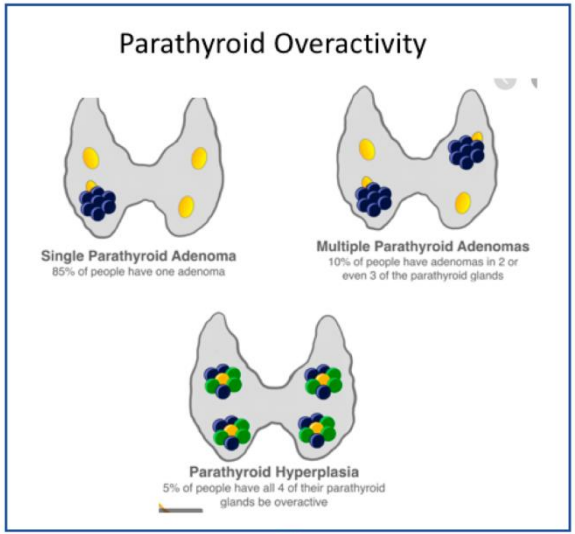
2. Primary Hyperparathyroidism?





Is calcium high?	☑
Is PTH high or upper end normal range?	☑
Pt NOT on thiazide	☑
Creatinine not very elevated?	☑
Urinary calcium not low (spot/24 hr)*	☑

Yes!

*usually requested in secondary care ; excluding Familial Hypocalciuric Hypercalcaemia & assessing calciurua

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3. Thyroid – common referral

"Dear Dr.

Please see Seán, 45 years old. Routine bloods show positive TPO- Ab, 1000iu/ml (RR <34). TSH 2.4mU/L (RR 0.27-4.2). He is tired.

Yours, .

……."

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3. Thyroid Autoantibodies

	Anti-TPO (Thyroid peroxidase)	TSH Receptor Abs (TRAb)	Thyroglobulin Abs
When to measure:	Newly hypothyroid/ Subclinical Hypothyroid	Newly thyrotoxic	Don't bother (only useful after thyroid cancer)
Condition	Hashimoto's Thyroiditis	Graves' disease	Hashimoto's Thyroiditis
Sensitivity	~75%	>95%	Lower
Specificity	~75%	>95%	Lower
Healthy population	10%	<1%	
Worth repeating?	NO	YES	NO

Message:
Request TPO once at identification of hypothyroidism
Request TRAb if patient newly Thyrotoxic

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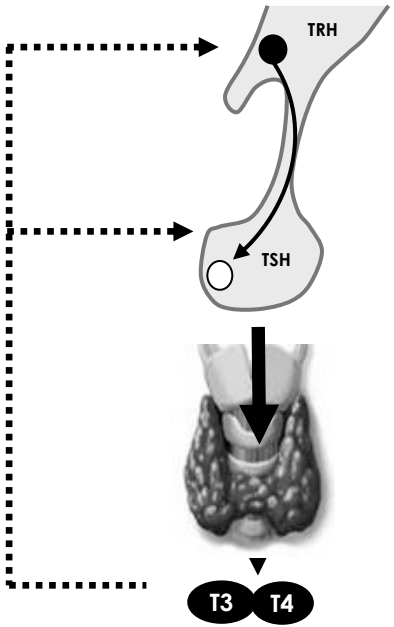
3. Thyroid Autoantibodies

If TPO Ab +,
TSH normal

Annual TFTs

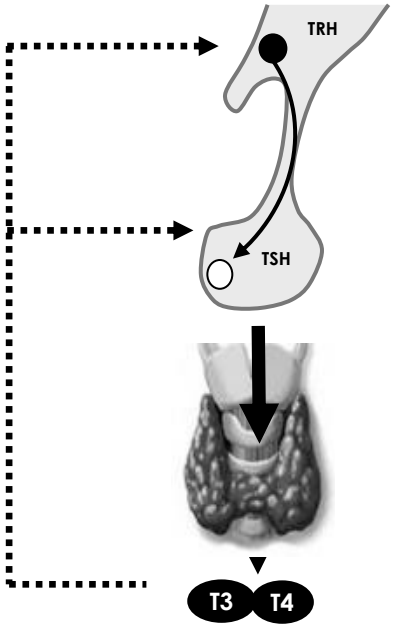
4. Mild Thyroid Function Test abnormalities I



	Subclinical HYPOthyroidism	Subclinical HYPERthyroidism	Secondary Hypothyroidism (TSH deficiency)
TSH	↑	↓	**N**
FT4	**N**	**N**	↓
FT3	**N**	**N**	↓/**N**

NOTE: **All** could spontaneously revert to normal

4. Mild Thyroid Function Test abnormalities I



	Subclinical HYPOthyroidism	Subclinical HYPERthyroidism	Secondary Hypothyroidism (TSH deficiency)
TSH	↑	↓	**N**
FT4	**N**	**N**	↓
FT3	**N**	**N**	↓/**N**

Treat if:
TSH >10mU/L
TSH <10mU/L, + symptoms (trial)

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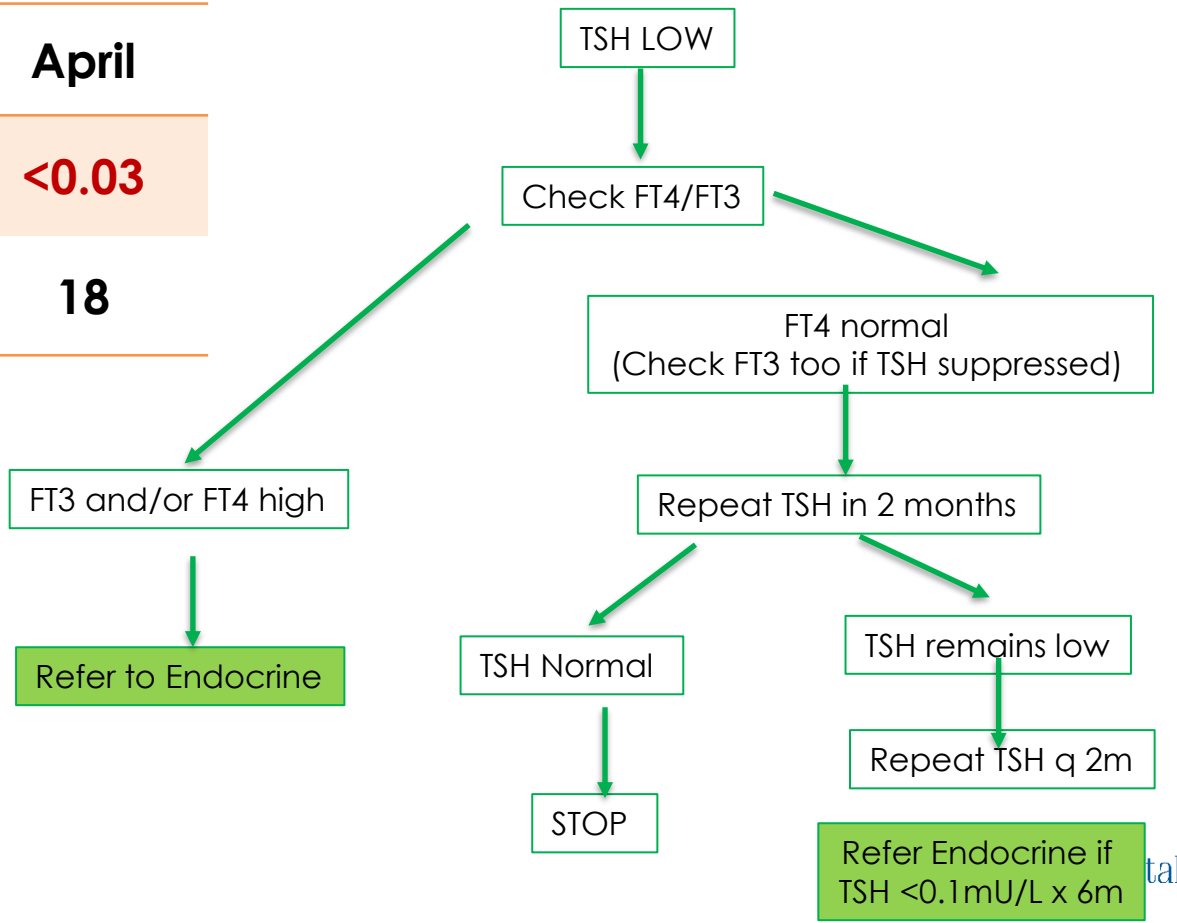
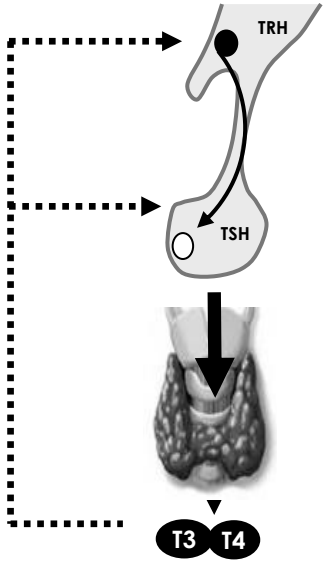
4. Mild Thyroid Function abnormalities II – Subclinical HYPERthyroidism

	Jan	April
TSH mU/L (0.27-4.2)	**0.12**	**<0.03**
fT4 pmol/L (12-22)	**18**	**18**



4. Mild Thyroid Function abnormalities III – Low FT4, TSH within range



*cut-off will vary depending on assay, illustrative example for common assay used (Roche)

**RF Pituitary disease include; previous radiotherapy, Immune checkpoint inhibitor use, previous pituitary disease/surgery, Head injury

TSH Normal, FT4 low (RR 12-22*)

FT4 <9* pmol/L

Check cortisol Urgently, 9am

If cortisol <100nmol/L$, Start hydrocortisone 10mg tds urgently **DO NOT** start thyroxine

FT4 9-11.9nmol/L

Symptoms of hypothyroidism?
Hypopituitarism (hypogonadism)?
Headaches?
Risk Factors Pituitary disease**

Check pituitary screen at 9am
LH, FSH, Testo/E2, Prolactin, (IGF-1)

Symptoms and/OR Pituitary screen Abnormal

Pit screen normal

Repeat TSH, FT4 in 3months

If normal, STOP

Abnormal FT4

Refer to Endocrine

$provided not on dexamethasone or prednisolone

Summary of Key Points

Prolactin
Few indications;
Hypogonadism/galactorrhoea

Often normal on repeat

Beware of MacroPRL

Refer if persistently raised PRL or symptoms

Urgent referral if headaches/Visual changes

Hypercalcaemia
Always check PTH
Stop Thiazides
If PTH low -> GIM
If PTH high/within RR -> Endo
Urgent referral if >3mmol/L

Subclinical HYPERthyroidism
Repeat
Check FT3 – if high Refer
If persistent > 6m – Refer
Subclinical HYPOthyroidism
Treat if persistent and TSH >10mU/L
Treat if persistent and TSH <10mU/L with symptoms (trial)
Low FT4 (alone)
Consider pituitary disease, but if marginal, likely normal

TPO- Ab
Check ONCE at diagnosis of hypothyroidism
Indicates Hashimoto's Thyroiditis
TRAb
Indicates Graves' disease
VERY helpful test

Patient Resources

British Thyroid Foundation

The Pituitary Foundation

Parathyroid UK

You and your Hormones

an education resource from the Society for Endocrinology

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British Thyroid Foundation

Free webinars, online
Can watch later

https://www.btf-thyroid.org/training-for-primary-healthcare-professionals

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Thank you

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Drugs that cause high prolactin (HPRL)

Drug Class	No Significant HPRL	HPRL in <25% of Patients	HPRL in 25–50% of Patients	HPRL in >50% of Patients
Typical antipsychotics		• Loxapine • Pimozide		• Butyrophenone • Phenothiazines • Thioxanthenes
Atypical antipsychotics	• Aripiprazole • Clozapine • Ziprasidone	• Olanzapine • Quetiapine		• Amisulpride • Risperidone • Sultopride • Sulpiride • Tiapride
Tricyclic antidepressants	• Nortriptyline	• Amitriptyline • Amoxapine • Clomipramine • Desipramine • Doxepin • Imipramine • Maprotiline • Trimipramine		• Clomipramine
Monoamine oxidase inhibitors				• Clorgiline • Pargyline
Antiemetics				• Alizapride • Domperidone • Metoclopramide • Metopimazine
Antihypertensives		• Methyldopa • Reserpine	• Verapamil	

SSRIs too, usually mild
OCP, usually v mild

Hyperprolactinaemia
J Clin Med. 2019 Dec; 8(12): 2203.