

Data interpretation

(HBV markers and Thyroid)

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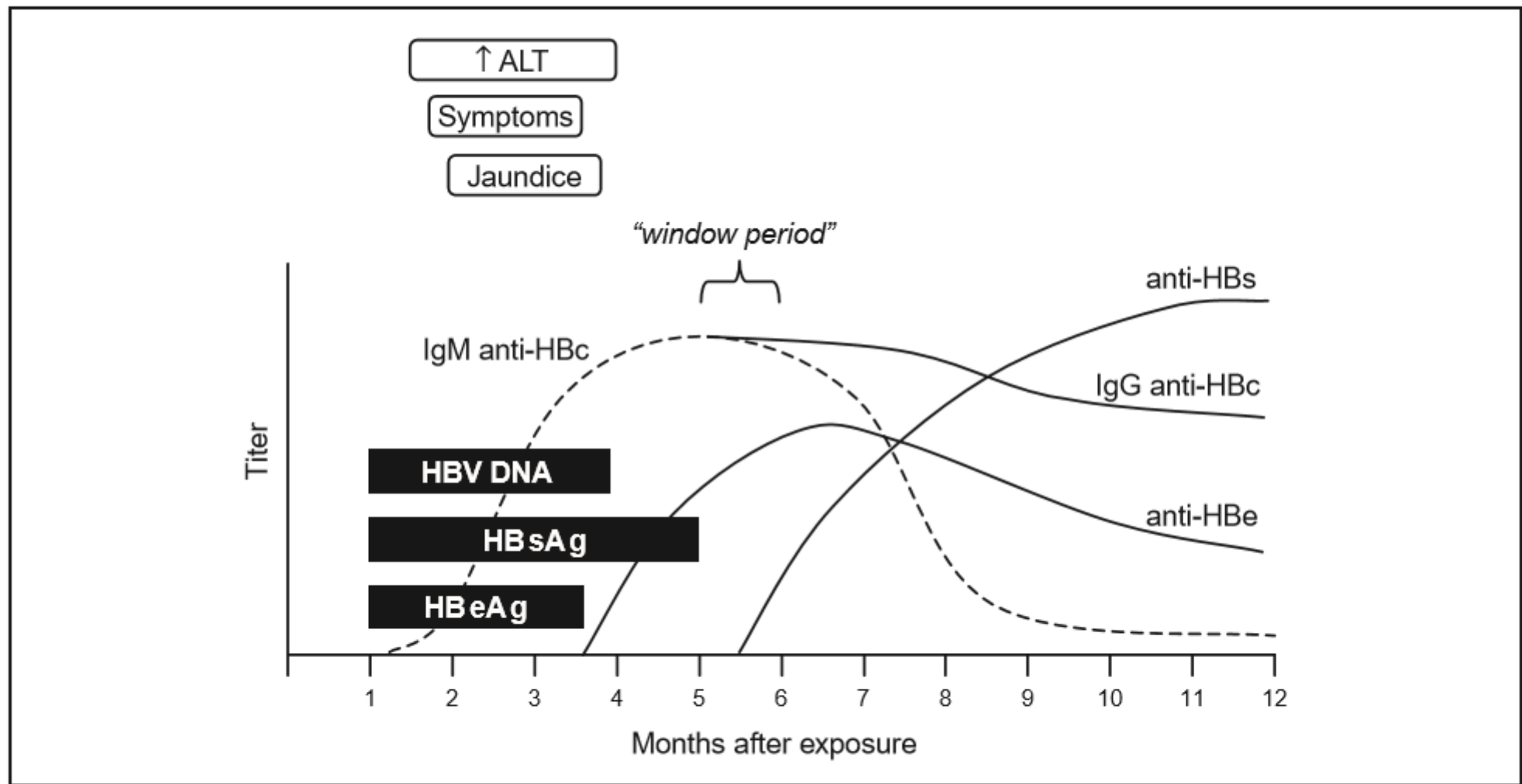
Consultant Family Medicine and Diabetology

Hepatitis B markers

- **HBsAg:** Hepatitis B surface antigen is the serologic hallmark of HBV infection. It appears before sx; used to screen blood donors;
 - ✓ persists >6 months >>chronic HBV.
- **HBeAg:** evidence of viral replication and increased infectivity
- **IgM anti-HBc:** first Ab to appear ; indicates acute infection
 - ✓ window period =HBsAg become -ve ,anti-HBs not yet +ve, anti-HBc only clue to infection
- **IgG anti-HBc:** indicates previous (if HBsAg -ve) or ongoing (if HBsAg +ve) HBV infection
-

- **anti-HBe:** indicates waning viral replication, reduced infectivity
- **anti-HBs:** indicates resolution of acute disease & immunity (sole marker after vaccination)
- **HBV DNA:** presence in serum correlates with active viral replication in liver

Figure 3-7 Serologic course of acute HBV infection with resolution



(Adapted from Friedman LS, Keeffe EB. Serologic course of HBV. *Handbook of Liver Disease* 2004; Hoofnagle JH, DiBisceglie AM. Serologic diagnosis of acute and chronic viral hepatitis. *Semin Liver Dis* 1991;11:73.)

Diagnosis	HbsAg	anti-HBs	anti-HBc	HBeAg	anti-HBe	HBV DNA
Acute hepatitis	⊕	⊖	IgM	⊕	⊖	⊕
Window period	⊖	⊖	IgM	±	±	⊕
Recovery	⊖	⊕	IgG	⊖	±	⊖
Immunization	⊖	⊕	⊖	⊖	⊖	⊖
Chronic hepatitis <i>HBeAg ⊕</i>	⊕	⊖	IgG	⊕	⊖	⊕
Chronic hepatitis <i>HBeAg ⊖</i>	⊕	⊖	IgG	⊖	⊕	±*

***Precore mutant:** HBeAg not generated, but anti-HBe can develop due to cross-reactivity w/ HBcAg; a/w high serum HBV DNA levels

- Recovery =past exposure

Approach to chronic hepatitis HBeAg -ve

Diagnosis	HbsAg	anti-HBs	anti-HBc	HBeAg	anti-HBe	HBV DNA
Chronic hepatitis HBeAg ⊖	⊕	⊖	IgG	⊖	⊕	±*

order

PCR (HBV DNA)

If serum HBV DNA level of >2,000 int. unit/mL , then diagnose patients as **HBeAg-negative chronic hepatitis**

If serum HBV DNA level of <2,000 int. unit/mL , then diagnose patients as **inactive carrier state** (ie, HBeAg-negative, persistently normal ALT)

35 years old lady came to your clinic for per-employment check up

- HBsAg: -ve
- anti-HBs: +ve
- IgM anti-HBc: -ve
- IgG anti-HBc: +ve
- HBeAg: -ve
- anti-HBe: -ve

• Immunized due to Past exposure

24 years old gentleman came to your clinic for pre-marital check up

- HBsAg: -ve
- anti-HBs: +ve
- IgM anti-HBc: -ve
- IgG anti-HBc: -ve
- HBeAg: -ve

• Immunized due to vaccination

46 years old gentleman came to your clinic for Hep B screening as his wife diagnosed to have acute Hep B last month

- **HBsAg:** -ve
 - **anti-HBs:** -ve
 - **IgM anti-HBc:** +ve
 - **IgG anti-HBc:** -ve
 - **HBeAg:** -ve
 - **anti-HBe:** -ve
-
- **Acute hepatitis (window period)**

31 years old male c.o jaundice and RUQ pain

- HBsAg: **+ve**
 - anti-HBs: **-ve**
 - IgM anti-HBc: **+ve**
 - IgG anti-HBc: **-ve**
 - HBeAg: **+ve**
 - anti-HBe: **-ve**
-
- **Acute Hepatitis B**

20 years old lady c.o mild jaundice

- HBsAg: **+ve**
 - anti-HBs: **-ve**
 - IgM anti-HBc: **-ve**
 - IgG anti-HBc: **+ve**
 - HBeAg: **+ve**
 - anti-HBe: **-ve**
-
- **Chronic Hepatitis B**

- HBsAg: **+ve**
- anti-HBs: **-ve**
- IgM anti-HBc: **-ve**
- IgG anti-HBc: **+ve**
- HBeAg: **-ve**
- anti-HBe: **+ve**

- What is your diagnosis?

chronic hepatitis HBeAg –ve.

- What is the most important next step?

Order **HBV DNA (PCR)** to distinguish HBeAg-negative chronic hepatitis Vs inactive carrier state

Interpretation of the hepatitis B serologic panel

Tests	Results	Interpretation
HBsAg	Negative	Susceptible
anti-HBc	Negative	
anti-HBs	Negative	
HBsAg	Negative	Immune due to natural infection
anti-HBc	Positive	
anti-HBs	Positive	
HBsAg	Negative	Immune due to hepatitis B vaccination*
anti-HBc	Negative	
anti-HBs	Positive	
HBsAg	Positive	Acutely infected
anti-HBc	Positive	
IgM anti-HBc	Positive	
anti-HBs	Negative	
HBsAg	Positive	Chronically infected
anti-HBc	Positive	
IgM anti-HBc	Negative	
anti-HBs	Negative	
HBsAg	Negative	Four interpretations possible*
anti-HBc	Positive	
anti-HBs	Negative	

* Antibody response (anti-HBs) can be measured quantitatively or qualitatively. A protective antibody response is reported quantitatively as 10 or more milliinternational units (≥ 10 mIU/mL) or qualitatively as positive. Post-vaccination testing should be completed 1-2 months after the third vaccine dose for results to be meaningful.

• Four interpretations:

1. Might be recovering from acute HBV infection.
2. Might be distantly immune and test not sensitive enough to detect very low level of anti-HBs in serum.
3. Might be susceptible with a false positive anti-HBc.
4. Might be undetectable level of HBsAg present in the serum and the person is actually chronically infected.

Centers for Disease Control and Prevention, Hepatitis B information for health professionals: Interpretation of hepatitis B serologic test results. Available from the CDC website.

Thyroid function test

- TSH is the single best or initial test of the thyroid function.
- A normal TSH is sufficed to halt further testing unless suspect of possible hypothalamic pituitary disease (central) .
- T3 and T4 immunoassays measure total serum concentrations

Which mean they influenced by TBG.

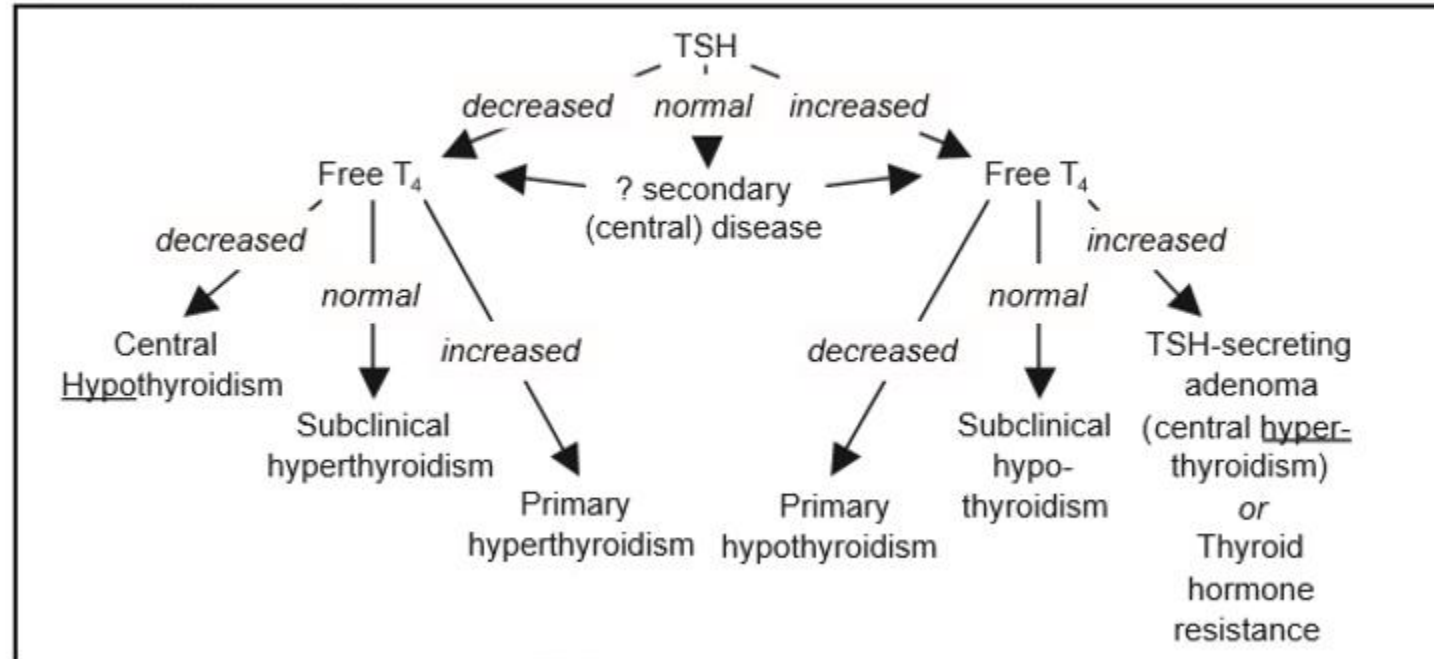
- Free T4 (FT4)immunoassay : not influenced by TBG ,increasingly popular .

Thyroid antibodies:

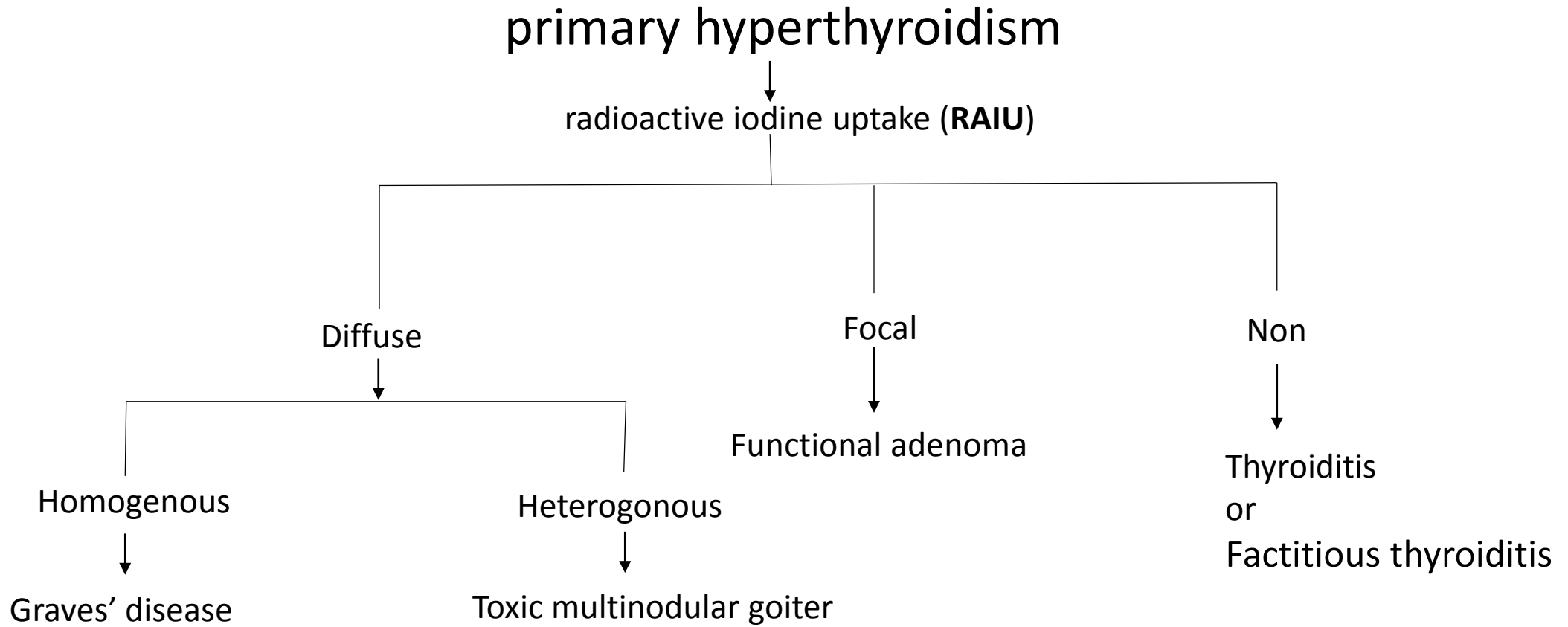
- Antithyroid peroxidase (TPO):
 - seen in Hashimoto's (high titer)
 - painless thyroiditis and Graves' disease (low titer)
- Thyroid-stimulating Ig (TSI) and thyrotropin-binding inhibitory immunoglobulin (TBII) seen in Graves' disease

Thyroid Function Test approach

Figure 7-1 Approach to thyroid disorders



What is the most important test to approach primary hyperthyroidism?



When to treat subclinical hypothyroidism

Treatment is controversial

- indications:

1. if TSH 10 mU/L,
2. symptomatic
3. goiter
4. pregnancy
5. infertility

26 years old lady c.o hair loss, no Hx of surgery or using medications

TSH:	15	miu/l	(0.25—5)
FT4:	8.3	pmol/l	(10.3—25 .8)

- What is your Diagnosis?

Primary hypothyroidism.

- What antibody you expect to be positive?

Antithyroid peroxidase (TPO)

28 years old lady c.o diarrhea and tremor

TSH:	.01	miu/l	(0.25—5)
FT4:	78	pmol/l	(10.3—25 .8)

What is your DDX?

1. Graves' disease
2. Subacute thyroiditis
3. Multinodular toxic goiter
4. Toxic nodule /adenoma

• what is the most proper test you will order to reach diagnosis?

Thyroid scan (RAIU)

Continue

- You order RAIU and result come back as increase uptake (Diffuse homogenous), what is your Dx?

Graves' disease

What is the most important test to approach primary hyperthyroidism?

primary hyperthyroidism

↓
radioactive iodine uptake (RAIU)

Diffuse

Focal

Non

Homogenous

Heterogenous

Functional adenoma

Thyroiditis

or

Factitious thyroiditis

↓
Graves' disease

↓
Toxic multinodular goiter

28 years old male k/c of down syndrome
come for check up.

TSH: 12 miu/l (0.25—5)

FT4: 14.6 pmol/l (10.3—25 .8)

What is your diagnosis?

Subclinical hypothyroidism

- What are the indication of treating this patient?

35 years old came from private clinic with the following labs:

TSH:	0.2	miu/l	(0.25—5)
FT4:	23.4	pmol/l	(10.3—25 .8)

What is your diagnosis?

Subclinical hyperthyroidism.

Bone metabolism

Common causes of hypercalcemia

Laboratory Findings in Calcium Disorders			
Ca	PTH	Disease	PO ₄
↑	↑↑	Hyperparathyroidism (1° and 3°)	↓
	↓	Malignancy	var.
		Vitamin D excess	↑

47 years old perioral paresthesia , cramps, and seizures for 2 weeks.

Corrected Ca. 1.4 mmol/L(2.10 – 2.55)

Ph. 1.67 mmol/L(0.74 – 1.30)

Alb. 35 gm/L(30 – 50)

Alk. Ph. 86 u/l(50 – 136)

- What is your diagnosis?

Primary hypoparathyroidism

- What is the most proper test you will order to approach this patient?

PTH

Rickets / Osteomalacia

- **Low** calcium
- **Low or Normal**
phosphate
- **High** alkaline phosphatase

Hypoparathyroidism

- **Low** calcium
- **High** phosphate
- **Normal** alkaline phosphatase

A 48 year old woman presents with 5 month
H/O difficulty in raising from sitting position

The following investigation is shown below:

Corrected Calcium.....	1.68 mmol/L	(2.1 – 2.6)
Phosph.....	1.59 mmol/L	(0.8 – 1.4)
Albumen.....	39 g/L	(35 – 50)
Alk. Phos.	144 mmol/L	(43 – 154)

What is your diagnosis?

Hypoparathyroidism

A 11-year-old girl presents with 1 year H/O pain in lower limbs.
O/E: unremarkable

The following results are shown:

Calcium	1.62	L	2.10 – 2.55	mmol/L
Corrected calcium	1.6	L	2.10 – 2.55	mmol/L
Inorganic Phosphorus	1.13		0.87 – 1.45	mmol/L
Albumin	39		35 – 50	g/L
Alkaline phosphatase	1191	H	195 – 476	u/L

Vit D	4.0	L	nmol/L
[Deficiency <25	Insufficiency 25 – 75		
Suffcient 75 – 250	Toxicity >250]		

- Most likely Diagnosis ?

Rickets