



Hyperphosphatemia associated
with hypercalcemia
a laboratory error or a sign of
disease

PARS MEDICAL LABORATORY

(2 of 7)

-(minae)(03/06/11)(18 : 41)

آزمایشگاه تشخیصی طبی پارس
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اصفهان خیابان آماگاه کوجه کلدسته تلفن ۳۳۴۴۴۱۴ ۳۳۴۴۴۱۸ (اجتماعی) (۱۳۷۹-۱۳۵۱۲)

پزشک معالج : آقای دکتر خسرو / حکمت جو

نام : خانم فاطمه یاس فلاحتی

پذیرش : ۰۳/۰۶/۰۸

سن و جنس : سال ۶ F

شماره : 6-413

Blood Biochemistry (By Hitachi)

Test	Result	Unit	Refrence Values	Method
Fasting Blood Sugar	79	mg/dl	Adult 70 -- 110 Children 70 -- 127 Newborn 36 -- 100	467
BUN	13	mg/dl	Child: 5-18 Adult :10-20 > 50 years : 9-25	
Creatinine	0.6	mg/dl	0.5 -- 1.5	
Uric Acid	3.7	mg/dl	Female 2.3 -- 6.1 Male 3.6 -- 8.2	
Cholesterol	178	mg/dl	Desirable < 200 Borderline 200 -- 240 High >240	
Triglycerides	96	mg/dl	Up to 200	Depending on age and diet
HDL	49	mg/dl	27 --- 80	
LDL	94	mg/dl	Up to 160	
Calcium (Ca)	H 11.8	mg/dl	8.5 --- 10.5	
Phosphorus (P)	H 6.5	mg/dl	Adult 2.5 -- 5 Child 4 -- 7	
Bilirubin Total	0.5	mg/dl	0.2 --- 1.2	
Bilirubin Direct	0.2	mg/dl	0.1 --- 0.4	
S.G.O.T (AST)	16	IU/L	Up to 40	
S.G.P.T (ALT)	13	IU/L	Up to 40	
Alkaline P (ALP)	H 640	U/L	Adult 64 -- 306 Children..... 180 --1200	
Iron (fe)	98	micg/dl	Female: <40 years : 35 - 165 40-60years : 40 - 120 Pregnancy : 30 - 150 Male : 40 - 170 Children : 30 - 140 Newborn : 70 - 200	
Ferritin.....	36	ng/ml	Permenopausal : 10 - 100 Menopausal : 20 - 200 Men : 20 - 300	
Magnesium.....	2.1	mg/dl	Newborn 1.2 -- 2.6 Children 1.5 -- 2.3 Male 1.8 -- 2.6 Female 1.9 -- 2.5	
Zinc (Zn).....	95	micg/dl	Newborn..... 50 -- 100 Child 65 -- 110 Female 70 -- 114 Male 72 -- 150	

14/09/2024

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- **A 6 y/o boy referred with:**
- **Ca : 13.1**
- **Ph : 13.5**
- **History of cataract, operated.**
- **History of hearing loss.**
- **One year ago:**
- **Ca : 13.5 ; Ph: 11**

- **Renagel started, but had not a good compliance.**
- **Six months later :**
- **Ca : 8.9 10.8**
- **Ph : 11.6 8.7**
- **Cr : 0.5 ; Alb : 3.9**
- **Vit D : 66**
- **24 hr urine Ca : 45 mg (normal range)**

مؤسسه رادیولوژی و سونوگرافی دکتر فرزانه فریدون

◀ سونوگرافی داپلر رنگی عروق
◀ سونوگرافی غربالگری و ناهنجاری در جنین
◀ سونوگرافی ترنس وازینال
◀ سونوگرافی سطحی ، پستان ، تیروئید

۱۴۰۳/۰۲/۳۱

نام و نام خانوادگی بیمار: محمدپویا صالحی
تاریخ: ۱۴۰۳/۰۲/۳۱
همکار گرامی: سرکار خانم دکتر براهیمی

سونوگرافی کلیه هاومجاری ادراری

ابعاد کلیه راست 78*28mm وضخامت پارانشیم آن 10mm است .
ابعاد کلیه چپ 78*34mm وضخامت پارانشیم آن 8mm است .
ابعاد و ضخامت پارانشیمال کلیه ها طبیعی است.
اکوی پارانشیمال کلیه ها شدیداً افزایش یافته است . چک BUN/Cr توصیه میشود .
سنگ کالیسیال به قطر 2mm در پل تحتانی کلیه راست دیده میشود .
اتساع خفیف لگنچه با حداکثر قطر AP برابر با 6mm در سمت چپ رویت شد .
توده فضاگیر در کلیه ها دیده نمیشود .
سنگ ویا اتساعی در انتهای دیستال و پروگزیمال حالبها دیده نمیشود .
مثانه دارای ضخامت جدار نرمال است .
توده فضاگیر و سنگ در مثانه مشهود نیست .

دکتر زهرا اسداللهی

متخصص رادیولوژی ، سونوگرافی ، سی تی اسکن
ام آر آی و اینترویشن

با احترام
نظام پزشکی : ۳۷۵۵۷
دکتر زهرا اسداللهی ۰۷۵۵۷



شماره:
تاریخ:
پیوست:

**Whole Exome Sequencing Analysis
Pre-Sanger Report**

Case ID: NGSW0208-26	Referrer: Dr.Mostofizadeh
Patient Name: Mohammad Pouya Salehi	Date Sample Received: 02/08/10
Sample Type: Blood	Date of report: 03/01/25

Result

Major Findings

Gene	Protein	cDNA	Zygosity	Class	Phenotype
<i>FGF23</i>	p.Phe157Leu	NM_020638.3 c.471C>A	Patient: Hom Mother: Ukn. Father: Ukn.	VUS	Tumoral calcinosis, hyperphosphatemic, familial, 2(AR)
<i>USH2A</i>	p.Asp3288Val	NM_206933.4 c.9863A>T	Patient: Hom Mother: Ukn. Father: Ukn.	VUS	Usher syndrome, type 2A (AR)
<i>LRP2</i>	p.Lys4516Asn	NM_004525.3 c.13548G>C	Patient: Het Mother: Ukn. Father: Ukn.	VUS	Donnai-Barrow syndrome (AR)
	p.Gly4126Ser	NM_004525.3 c.12376G>A	Patient: Het Mother: Ukn. Father: Ukn.	VUS	

FGF23 in Human Disease

- The **elevated serum levels of FGF23** causes autosomal dominant hypophosphatemic rickets.
- Conversely, patients with the rare syndrome tumoral calcinosis present with hyperphosphatemia and soft tissue calcium-phosphate deposits.
- Some of these patients have point mutations in the FGF23 gene that cause abnormal processing of the protein, with low levels of the active hormone in the blood and high levels of inactive fragments.

Actions of FGF23

- **Overexpression of FGF23 or administration of FGF23 results in the development of hypophosphatemia and impaired 1 alpha hydroxylation of 25(OH) D.**
- **Absence of FGF23** results in impaired renal phosphate excretion, leading to the development of **hyperphosphatemia** within the first 2 weeks of life.
- **Affected mice also develop hypercalcemia** due to high levels of 1,25-dihydroxyvitamin D, a result of the lack of the normal suppressive effect of FGF23 on the renal 25(OH)D 1 alpha hydroxylase.

- **FGF23 decreases circulating levels of 1,25-dihydroxyvitamin D**, both by decreasing mRNA levels for the renal 25(OH)D 1 alpha hydroxylase as well as by increasing expression of the 24-hydroxylase, the key enzyme involved in inactivation of 1,25-dihydroxyvitamin D.

Tumoral Calcinosis

- Tumoral Calcinosis (TC) is a **rare metabolic bone disorder** commonly presenting in **childhood and adolescence** with periarticular ectopic calcification occurring in the extra-capsular tissues, predominantly affecting large joints such as the hips, shoulders, elbows, and gluteal region.

Tumoral Calcinosis(TC)

- TC has been classified into **3 main subtypes** based on the pathogenesis:
- **Primary hyperphosphataemic familial tumoral calcinosis (HFTC),**
- **Primary normophosphataemic familial TC**
- **Secondary TC**

- **HFTC results from FGF23 (Fibroblast growth factor 23) deficiency or resistance.**

- **Normophosphataemic familial TC** has been associated with mutations in *SAMD9* in some cases.
- **Secondary TC** is associated with a range of underlying conditions or metabolic abnormalities.
- The most common cause of secondary TC is chronic renal failure; other causes include but are not limited to secondary hyperparathyroidism (brown tumours) and scleroderma .

CLINICAL DESCRIPTION

- **The disease is exceedingly rare, and lack of high-quality prospective studies has resulted in critical knowledge gaps in its natural history.**

- **Ectopic calcifications in the skin and subcutaneous tissue** are a classic and potentially morbid feature of HFTC .
- Lesions consist of hydroxyapatite and/or calcium carbonate , and typically occur in peri-articular locations that are exposed to repeated pressure or trauma.

- **The lateral hips are the most frequently affected site**, but a wide range of areas may be involved, including the elbows, shoulders, hands, Achilles tendons, and others .
- **Calcifications typically onset during the first two decades of life**, and have been reported in children as young as 6 weeks.
- Patients present along a broad spectrum, **ranging from no involvement** to lesions that are large, painful, and debilitating.

Hyperostosis

- Patients present with **pain and tenderness overlying the diaphyseal regions of long bones**, often accompanied by edema, erythema, and warmth.
- The **tibias are most commonly affected**, but multiple sites may be involved, including the ulnas, radii, and metacarpals

Inflammatory Disease

- **Patients may exhibit clinical signs of systemic inflammation, recurrent fevers, fatigue, anemia, and polyarthrititis.**

Ocular Involvement

- **Eye itching and irritation**
- **Corneal calcifications**
- **Retinal angioid streaks**

Other Calcifications

- Calcifications may affect **small and large vessels in various locations**, including the aorta, iliacs, carotids, cerebral vasculature, and others.
- Cardiac calcifications may include the coronary vessels or muscular structures.
- Testicular microlithiasis
- **Nephrocalcinosis**

- The various treatment approaches employed include **surgical resection of lesions**, medical therapies with phosphate binders such as **sevelamer** or carbonic anhydrase inhibitor such as **acetazolamide** to lower serum phosphate, and topical sodium **thiosulphate**, which is thought to reduce mineralization of calcium deposits.
- **Probenecid** (*a uricosuric agent*)
- **Nicotinamide** (downregulates sodiumphosphate co-transporters in the kidney and intestine)
- **Antiinflammatory agents**
- **Calcium salts must be avoided**

