

# نحوه اپروچ به دختر 18 ساله با تپش قلب و درد قفسه سینه در درمانگاه پزشکی خانواده

ارایه دهنده: دانیال حبیبان کارورز پزشکی خانواده  
استاد راهنما: دکتر نسیم عبادتی متخصص پزشکی خانواده

بیمار دختر 18 ساله که با تپش قلب و درد قفسه سینه از 2 هفته اخیر مراجعه کرده بودند بیمار ذکر میکند تپش قلب بیمار در حالت استراحت هم وجود داشته است در دو هفته اخیر به دنبال افزایش فعالیت دچار درد قفسه سینه و تنگی نفس FC2 میشود. بیمار از خستگی زود هنگام هم شاکی بود. درد قفسه سینه به جایی انتشار نداشته است و در حال فعالیت رخ میدهد و با کاهش فعالیت درد نیز بهبود می یابد

DH= Neg

PSH= Neg

PMH=Neg

SH=Neg

در معاینه بیمار تکیکارد بود PR=150 و BP =12/7 و T =36.7

بیمار هوشیار و اورینته بود که با پای خودش به درمانگاه مراجعه کرده بود و در ظاهر Pale بود ملتحمه Pale بود

بیمار ILL و Toxic نبود در معاینه ظاهری بیمار لاغر به نظر میرسید  $H = 155$  و  $W = 45$  KG

در معاینه قلب  $S_1$  و  $S_2$  بدون سوفل سمع شد. سمع ریه ها clear بود رال و ویز شنیده نشد شکم نرم بود درد را ذکر نمی کرد تندرس نداشت ضایعات پوستی نداشت . خارش نداشت . افت دهان نداشت لنفادنوپاتی نداشت . فورس هر 4 اندام 5 از 5 بود نبض اندام ها پر و قرینه بود .

مدارک همراه بیمار

بیمار همراه خود سونوگرافی شکم و لگن داشت که نرمال بود ولی کمی مایع آزاد در لگن مشاهده شده بود. بیمار با خود نوار قلب به همراه داشت که تاقیکاردی واضح با  $rate 150$  داشت ولی تغییرات دیگری در نوار قلب وجود نداشت

## اپروچ به تپش قلب بیمار

Palpitations are defined as an unpleasant awareness of the forceful, rapid, or irregular beating of the heart. Patients may additionally describe the sensation as a rapid fluttering or a flip-flopping in the chest, or a pounding sensation in the chest or neck

In the majority of patients with palpitations, the cause for their palpitations can be determined using a focused medical history, physical examination, 12-lead electrocardiogram (ECG), and limited laboratory testing.

## Cardiac

- Arrhythmias (tachyarrhythmias, bradyarrhythmias, and ectopic beats) due to:
  - Structural heart disease
  - Underlying conduction system abnormality
  - Medical comorbidity (eg, COPD, pulmonary embolism)
  - Idiopathic
- Mitral valve prolapse
- Pacemaker syndrome
- Atrial myxoma
- Intra-cardiac shunt

## High output states

- Normal pregnancy
- Anemia
- Paget disease of bone
- Fever

## **Metabolic and endocrine**

- Hypoglycemia
- Hyperthyroidism
- Pheochromocytoma

## **Catecholamine excess**

- Stress
- Exercise

## **Substance use**

- Cocaine
- Caffeine
- Alcohol
- Amphetamines
- Nicotine

## Medications

- Sympathomimetic agents
- Vasodilators
- Anticholinergics
- Beta blocker withdrawal

## Psychiatric disorders

- Generalized anxiety
- Panic disorder
- Somatization disorder

# Lab data

CBC	14.3/07/20	M.Ayazi	Result	Unit	Normal Range
Test			7,3	$10^{12}/mm^3$	4,0-10
W.B.C			4,1	$10^6/mm^3$	4,2-5,4
R.B.C			4,8	g/dl	12-15,5
HGB		<u>L</u>	27,3	%	36-46
HCT			16,59	pg	27,5-32
MCH		<u>L</u>	24,91	%	32-37
MCHC		<u>L</u>	46,59	FL	77-97
MCV		<u>H</u>	419	Mil/ $mm^3$	14.-400
PLT			48,7	%	40-75
Neut			26,0	%	20-45
Lymph			5,3	%	0-15



۱۴۰۳/۰۷/۳۰

M.Ayazi

Biochemistry

Test	Result	Unit	Normal Range
Troponin کمی	<۰,۱	ng / ml	Negative: <۰,۱
ferritin	۱۸	ng/ml	۱۰-۱۱۰
Urea	۱۹	mg/dl	۱۵-۴۵
Creatinine	۰,۷۳	mg/dl	۰,۷-۱,۴
Na	۱۳۶	meq/L	۱۳۵-۱۴۵
K	۴,۴	meq/L	۳,۵-۵,۵
Fe	۵۲	Ug/dl	۳۷-۱۶۵
TIBC	۴۴۵	micg/dl	۲۵۰-۴۵۰
BS	۸۲	mg/dl	<۱۳۰

# anemia definition

Anemia is defined for patient care as a reduction in one or more of the major red blood cell (RBC) measurements obtained as a part of the complete blood count (CBC): hemoglobin concentration, hematocrit, or RBC count. A low hemoglobin concentration and/or low hematocrit are the parameters most widely used to diagnose anemia.

Females – Hemoglobin <11.5 g/dL (119 g/L) or hematocrit <35 percent

● Males – Hemoglobin <13.5 g/dL (136 g/L) or hematocrit <40 percent

Review the history, CBC, MCV, and reticulocyte count if available

What is the MCV?

MCV <80 fL

Common causes:

- Iron deficiency
- Thalassemia
- ACD/AI (less likely)

Obtain iron studies in all individuals\*  
(concomitant iron deficiency can affect hemoglobin analysis)

Low ferritin or TSAT?¶

Yes

No

**Iron deficiency anemia diagnosed**

- Replete iron
- Address cause

**Possible thalassemia or ACD/AI**

- Hemoglobin analysis, especially if severe microcytosis, family history of thalassemia, and/or lifelong microcytic anemia

MCV 80 to 100 fL

Common causes:

- Iron deficiency
- Vitamin B12 or folate deficiency
- ACD/AI
- Drug-induced
- Infection
- Liver disease or alcohol use
- Hemolysis
- Hypothyroidism
- Others<sup>Δ</sup>

Obtain reticulocyte count and chemistry panel with kidney and liver function tests.

Subsequent testing is based on the clinical scenario.

Refer for hematology evaluation if initial testing is unrevealing.

MCV >100 fL

Common causes:

- Vitamin B12 or folate deficiency
- Drug-induced
- Liver disease or alcohol use
- Hypothyroidism
- High reticulocyte count<sup>◇</sup>
- MDS
- Others<sup>Δ</sup>

Refer to separate algorithm on evaluation of macrocytic anemia

Suspected iron deficiency



Obtain serum ferritin with or without iron studies (iron and TIBC, with calculated TSAT; refer to inset)\*

Is the ferritin low?

Yes

No

Is the TSAT low?¶

Yes

No

### Iron deficiency confirmed

- Treat with iron
- Identify source of deficiency or blood loss
- Confirm resolution of iron deficiency and anemia after treatment

### Iron deficiency unlikely but possible

- Specialized testing for iron deficiency if suspicion is high<sup>Δ</sup>
- Testing for other causes of symptoms or anemia

## Findings in iron deficiency (selected examples)

### History:

- Symptoms of anemia such as undue fatigue
- Pica, pagophagia, or restless legs syndrome
- Autoimmune gastritis or celiac disease
- Heavy menses or prior pregnancies
- GI bleeding or frequent blood donation

### Examination:

- Pallor, brittle skin
- Fingernail changes (spoon shape, horizontal lines)
- Cheilosis, loss of tongue papillae
- Occult blood in stool

### CBC:

- Anemia, low RBC count
- Normocytic or microcytic RBCs
- Low reticulocyte count
- High platelet count

### Iron studies:

- Ferritin <30 ng/mL (or <41 ng/mL if anemia and comorbidities are present)\*
- TSAT <20%¶

**Decreased intake**

Vegetarian, vegan, or other diet with limited sources of iron

**Decreased iron absorption**

Celiac disease

Atrophic/autoimmune gastritis

*Helicobacter pylori*

Bariatric surgery

Medications that reduce gastric acidity (unlikely to be the sole cause)

Genetic disorders such as IRIDA (rare)

**Blood or iron loss**

Heavy menstrual bleeding

Pregnancy and lactation

Gastric ulcer disease or gastritis

Colorectal cancer

Gastrointestinal telangiectasias, HHT

Bleeding disorders such as VWD

Gastrointestinal parasites

Frequent blood donation

Surgical blood loss

Iatrogenic (frequent blood draws)

Hemodialysis

# symptoms of anemia

- Fatigue
- Hair loss
- Pica (pagophagia, ice craving.ashes. charcoal.coffee grounds)
- Restless legs syndrome
- Headache
- Exercise intolerance
- Exertional dyspnea
- Weakness

## less common symptoms

Mood changes – Depressed mood or irritability is often cited as a symptom of iron deficiency

hearing loss (uncommon and the mechanism is unknown)

no need to further investigations

# Findings on examination

The physical examination in individuals with iron deficiency (with or without anemia) may be normal or it may reveal one or more of the following findings

- Pallor
- Dry or rough skin
- Atrophic glossitis with loss of tongue papillae, which may be accompanied by tongue pain or dry mouth



# Findings on examination

Cheilosis (also called angular cheilitis)

- Koilonychia (spoon nails)
- Esophageal web, which may be accompanied by dysphagia (eg, Plummer-Vinson or Patterson-Kelly syndrome; rare)
- Alopecia (rare) in especially severe cases
- Chlorosis (pale, faintly green complexion; extremely rare) weakness, fatigue, and sometimes pallor, shortness of breath, coldness of extremities, changeable appetite, sore tongue, loss of hair, brittle fingernails, or dry skin

## Atrophic glossitis



A smooth tongue that has lost its papillae and is often sore suggests a deficiency in riboflavin, niacin, folic acid, vitamin B12, or iron. This patient had vitamin B12 deficiency.

Cheilosis (also called angular cheilitis)



Erythema and fissures are present at the corners of the mouth

- Koilonychia (spoon nails)



# Findings on CBC

Changes in the CBC occur in proportion to the severity of iron deficiency and tend to lag behind changes in iron studies; reduced storage iron precedes anemia. In turn, a slight decline in hemoglobin (usually 1 to 2 g/dL) precedes microcytosis . Thus, in early iron deficiency and in many individuals in high-resource settings, the CBC may be relatively normal

- Low red blood cell (RBC) count (typical RBC count for a patient with a hemoglobin of 9 g/dL would be approximately 3 million cells per microL)

- Low hemoglobin and hematocrit

- Low absolute reticulocyte count

- Low mean corpuscular volume (MCV) and low mean corpuscular hemoglobin (MCH)

The platelet count may be increased in iron deficiency anemia. This is thought to result from stimulation of platelet precursors by erythropoietin

# iron studies

Ferritin is the most useful test, if low, since there is no other cause of low ferritin besides iron deficiency. Otherwise

Serum iron – Iron can be measured in serum (preferred) or plasma. The test measures circulating iron, most of which is bound to the transport protein transferrin. Serum iron is low in iron deficiency as well as in anemia of chronic disease/anemia of inflammation (ACD/AI)

Serum transferrin – Transferrin is a circulating transport protein for iron. It is increased in iron deficiency but can be decreased in ACD. Transferrin can also be reported as TIBC

# Iron studies

Transferrin saturation – Transferrin saturation (TSAT) is the ratio of serum iron to TIBC:

$$\text{TSAT} = ([\text{serum iron} \div \text{TIBC}] \times 100)$$

In iron deficiency, iron is reduced and TIBC is increased, resulting in a lower transferrin saturation. Normal values are in the range of 25 to 45 percent [94,95]. Values below 10 percent are common in individuals with iron deficiency, and a cutoff of <20 percent is generally used to screen for iron deficiency

# Stages of iron deficiency

In the first stage, iron stores can be totally depleted without causing anemia. Once these stores are depleted, there is still enough iron present in the body within the "labile" iron pool from the daily turnover of red cells for normal hemoglobin synthesis, but the individual becomes vulnerable to development of anemia should there be further iron losses.

Further loss of iron results in anemia, which is initially normocytic with a normal absolute reticulocyte count. This stage of iron deficiency is common in the United States.

More profound deficiency results in the classical findings of anemia with RBCs that are hypochromic (low mean corpuscular hemoglobin [MCH]) and microcytic (low mean corpuscular volume [MCV]). Reticulocyte production cannot be increased in the setting of iron deficiency



## Laboratory findings in different stages of iron deficiency

	Normal	Iron deficiency without anemia	Iron deficiency with mild anemia	Iron deficiency with severe anemia
Hemoglobin	Normal range*	Normal range*	9 to 12 g/dL (90 to 120 g/L)	6 to 7 g/dL (60 to 70 g/L)
Red blood cell size and appearance	Normal	Normal	Normal or slight hypochromia (slight decrease in MCHC)	Microcytosis (decrease in MCV) and hypochromia (decrease in MCHC)
Serum ferritin	40 to 200 ng/mL (40 to 200 mcg/L; 89.9 to 449 picoM/L)	<40 ng/mL † (<40 mcg/L; <89.9 picoM/L)	<20 ng/mL (<20 mcg/L; <45 picoM/L)	<10 ng/mL (<10 mcg/L; <22.5 picoM/L)
Serum iron	60 to 150 mcg/dL (10.7 to 26.7 microM/L)	60 to 150 mcg/dL (10.7 to 26.7 microM/L)	<60 mcg/dL (<10.7 microM/L)	<40 mcg/dL (<7.1 microM/L)
Total iron-binding capacity (TIBC; transferrin)	300 to 360 mcg/dL (53.7 to 64.4 microM/L)	300 to 390 mcg/dL (53.7 to 69.8 microM/L)	350 to 400 mcg/dL (62.6 to 71.6 microM/L)	>410 mcg/dL (>73.4 microM/L)
Transferrin saturation (serum iron/TIBC)	20 to 50%	20%	<15%	<10%
Reticulocyte hemoglobin [1]	30.6 to 35.4 pg	22.3 to 34.7 pg	14.8 to 34.0 pg	Data not available
Bone marrow iron stain	Adequate iron present	Iron absent	Iron absent	Iron absent
Erythrocyte zinc protoporphyrin, ng/mL RBC	30 to 70	30 to 70	100 to 200	100 to 200

# anemia treatment

Regardless of the presence of symptoms, all patients with iron deficiency anemia and most with iron deficiency without anemia should be treated . The rationale is that there is risk for further organ damage/ischemia and progression of anemia unless the underlying cause of the deficiency is addressed and adequate iron stores are replenished.

When treatment is indicated, the usual approach is repletion of iron. Blood transfusion should not be used as treatment for iron deficiency unless the individual has severe anemia with hemodynamic instability

Adult with iron deficiency

Is there severe\* or life-threatening anemia?

Yes

No

**RBC transfusion is generally indicated\***

- Additional iron administration is generally indicated after the patient has been stabilized.
- Refer to inset for additional management considerations.

**Are any of the following present?**

- Lack of response to, intolerance of, or inability to adhere to oral iron
- Surgery planned within the next two months
- Inflammatory bowel disease
- Gastrectomy or bariatric surgery
- Dialysis-dependent kidney disease

Yes

No

**IV iron is generally preferred<sup>¶</sup>**

- Premedications generally are not used.
- The main considerations in choice of formulation are cost and whether a single dose infusion is preferred.
- Refer to inset for additional management considerations.
- Refer to UpToDate for drug information and table that lists IV iron products and dosing.

**Oral iron is generally preferred**

- Dosing is once per day on alternate days (or Monday, Wednesday, Friday).
- Duration of therapy depends on iron deficit (typical range, six weeks to six months).
- Refer to inset for additional management considerations.
- Refer to UpToDate for drug information and table that lists oral iron products and their iron content.

**Additional management considerations**

- If anemic, check response to treatment in two or more weeks (interval depends on acuity and ease of testing) and periodically thereafter. Refer to UpToDate for expected response.
- If isolated iron deficiency without anemia, check ferritin after a course of treatment.
- Address lack of response with additional testing as appropriate, such as testing for:
  - Other causes of anemia
  - For oral iron, conditions that interfere with absorption
  - Ongoing blood loss
- Determine and address cause(s) of iron deficiency, such as:
  - Lack of dietary iron (unusual)
  - Conditions that interfere with absorption
  - Heavy menstrual bleeding
  - Source of gastrointestinal blood loss, especially for adults over 40 to 50 years

## الزام تزریق در مراکز درمانی مجهز

۱۰ میلی لیتر حاوی ۵۰ میلی گرم آهن المیتال در هر میلی لیتر

### تجویز آبروجت

تزریق آهسته و زبندی بدون تزریق کپیدن

با سرعت ۱ میلی ثانیه در دقیقه

بعد از تزریق

دوره درمانی با همزمانی دارو بعد از باز کردن ویال به دلیل نداشتن ماده نگهدارنده

انفورزون طی حداقل ۱۵ دقیقه

بررسی ویال از نظر وجود ذرات خارجی و یا تغییر رنگ

دقیق سازی تا حداکثر ۲۵ میلی لیتر در سرم سدیم کلراید (رمال سالون ۶٪) با توجه به دوز تجویزی

به طور کلی علائمتی نباید در بیمار دیده شود (تاریک شدن یا سبکی گریه در نوزاد کمتر باشد)

## ماینورینگ هنگام تزریق

### پایش مشارخون در طول تزریق

پایش علائم واکنش های حساسیتی در طول تزریق و تا حداقل نهم ساعت بعد از پایان آن

پایش علائم واکنش های حساسیتی در طول تزریق و تا حداقل نهم ساعت بعد از پایان آن

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پایش علائم واکنش های حساسیتی در طول تزریق و تا حداقل نهم ساعت بعد از پایان آن

### نشت دارو به خارج از رگ

در صورت مشاهده نشت دارو به بافت یا باز کردن ویال به سرعت تزریق را متوقف کنید

در صورت مشاهده نشت دارو به بافت یا باز کردن ویال به سرعت تزریق را متوقف کنید

### شرایط نگهداری

پیش از باز کردن ویال: در دمای ۲ تا ۸ درجه سانتیگراد، محافظت از نور مستقیم

پس از باز کردن ویال: حداقل بقای شده تا حداکثر ۲۴ ساعت در دمای اتاق (۱۵ تا ۲۵ درجه سانتیگراد)

موارد جانبی: احساس تهوع، افزایش فشار خون، گرگرفتگی، واکنش حساسیتی، در محل تزریق، قرمزی پوست، هایپوسفاسمی، سرگیجه، استفراغ، شوک آنافیلاکسی، احساس ناراحتی در قفسه سینه، تنگی نفس، کاهش کومورید، درد مفاصل

در میان واکنش های حساسیتی، شیوع گرگرفتگی و افزایش فشار خون بین ۱٪ تا ۱۰٪، شیوع کپیر، تنگی نفس و امت فشار خون ۱/۱ تا ۱٪ و شیوع شوک آنافیلاکسی ۱/۱۰ تا ۱/۱۰۰ است.

شدت واکنش حساسیتی	اقدام اولیه	بهبودی بیمار بعد از اقدام اولیه	حالت بیمار بعد از اقدام اولیه
<p><b>شدت</b></p> <p>حارش، گرگرفتگی، احساس ناراحتی در قفسه سینه، تپش فشار خون، کومورید، درد مفاصل</p>	<p>۱- انفورزون آبروجت را برای حداقل ۱۵ دقیقه متوقف کنید.</p> <p>۲- به پزشک اطلاع دهید.</p> <p>۳- بیض، فشار خون، تعداد تنفس و اشباع اکسیژن را پایش کنید.</p> <p>۴- صورت کودک و بیمار را تحت نظر داشته باشید.</p> <p>۵- از تزریق آبروجت هیستامین ها می توانند باعث نشت فشار خون، خواب آلودگی، تعریق و تپش قلبی شوند، خودداری کنید.</p>	<p>۱- برای بیمار گلوکوکورتیکوئید و ویدی امانل هیدروکورتیزون ۲۰۰ میلی گرم یا متیل پردنیزولون ۳۰ میلی گرم تزریق کنید.</p> <p>۲- انفورزون را با سرعت کمتر (حداقل ۳۰ دقیقه) مجدداً شروع کنید.</p> <p><b>اگر علائم جدید شروع شد:</b></p> <p>۱- تزریق آبروجت را متوقف کنید.</p> <p>۲- اقدامات اولیه را شروع کنید.</p> <p>۳- عارضه رخ داده را ثبت و مستند کنید.</p>	<p>۱- بزرگ بودگی مدیریت واکنش حساسیتی متوسط ۱۰</p> <p>شیردرد یا برای بیمار در نظر بگیرید.</p>
<p><b>متوسط</b></p> <p>کپور، سرخه، تنگی نفس، حالت تهوع، استفراغ، تپش قلبی، امت فشار خون، آدم</p>	<p>۱- تزریق آبروجت را متوقف کنید.</p> <p>۲- به پزشک اطلاع دهید.</p> <p>۳- بیض، فشار خون، تعداد تنفس و اشباع اکسیژن را پایش کنید.</p> <p>۴- در صورت شدت کاهش علائم بیمار ابتدا با دارو کنید.</p> <p>۵- بیمار را در وضعیت دراز کشیده قرار دهید و پایشش را با دارو ۲ تا ۴ میلی گرم به صورت عضلانی تکرار کنید.</p> <p>۶- این برون (۱ mg/ml) را سریعاً در قسمت قدامی آن تا دوز ۲ تا ۴ میلی گرم به صورت عضلانی تکرار کنید.</p> <p>۷- پایش الکترولیتی فشار خون، ضربان قلب، تعداد تنفس و اشباع اکسیژن را شروع کنید.</p> <p>۸- برای بیمار مانیتک اکسیژن با سرعت ۲ تا ۴ لیتر در دقیقه قرار دهید.</p> <p>۹- در صورت امت فشار خون، ۱ تا ۲ لیتر سرم آبروجت (رمال سالون) تزریق کنید.</p> <p>۱۰- پس از تزریق گلوکوکورتیکوئید و ویدی امانل هیدروکورتیزون ۲۰۰ میلی گرم</p>	<p>۱- از تزریق مجدد آبروجت خودداری کنید.</p> <p>۲- تا یک ساعت دیگر بیمار را تحت نظر داشته باشید.</p> <p>۳- عارضه رخ داده را ثبت و مستند کنید.</p> <p>۴- در همه ای های تزریقی دیگر استفاده کنید.</p>	<p>۱- تمام آنها را ثبت کنید.</p> <p>۲- در صورت نیاز پیمانگی اشکایی قلبی-تنفسی پیشنهاد (ACLS) را اجرا کنید.</p> <p>۳- اگر اولین دوز این نفرین موثریت آمیز نبوده دوز دوم را پس از ۱۵ دقیقه تکرار کنید. اکثر بیماران مبتلای به آنافیلاکسی به یک دوز یا حداکثر سه دوز این نفرین حساسیتی پاسخ می دهند.</p> <p>۴- در صورتی که بیمار اکت فشارخونی دارد، دو یک دوز آبروجت تکرار و ابتدا با مراقبت وریدی را شروع کنید.</p> <p>۵- تمام باسیدها را مستند و شرایط های ویژه مستند کنید.</p>

# Target ferritin

in most patients the target ferritin after iron repletion should be at least 50 ng/mL [10].

Some individuals may require higher ferritin levels. As examples:

- In restless legs syndrome (RLS), a target ferritin of >75 ng/mL has been proposed

For iron deficiency-related alopecia, a target ferritin of >70 ng/mL is appropriate; some experts prefer a higher target

For iron deficiency-related alopecia, a target ferritin of >70 ng/mL is appropriate; some experts prefer a higher target

▮ Individuals with ongoing blood loss, such as in hereditary hemorrhagic telangiectasia (HHT), may require higher levels depending on the severity of bleeding

# source of deficiency

all patients

dietary

impaired absorption

pregnancy

bleeding = the most common

menstruation

others .especially in 50< y/o people >>> colonoscopy

# Treatment with oral iron

Dosing schedule= daily or every other day(for reducing gastrointestinal side effects)

Number of doses per day – There is no reason to give more than one dose per day.

Amount of iron per dose – We use one tablet per dose (either every-other-day or Monday-Wednesday-Friday)

Duration of therapy – The duration of treatment with oral iron differs among experts and in different settings. Some stop treatment when the hemoglobin level normalizes because this allows early detection of recurrent anemia from further blood loss. Others treat for at least six months after the hemoglobin has normalized to completely replenish iron stores

# Treatment with oral iron

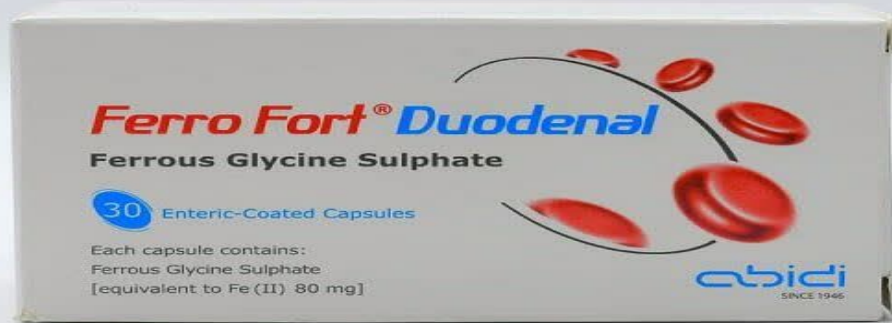
Treatment with oral iron may take as long as six to eight weeks to fully ameliorate the anemia, and as long as six months to replete iron stores.

summarisation???

Standard recommended dosing in adolescents and adults varies widely, ranging from 60 to 300 mg elemental iron per day .We use ferrous sulfate because it was effective and generally well tolerated.

Iron is absorbed best from the duodenum and proximal jejunum. Thus, enteric-coated or sustained-release capsules, which release iron further down in the gastrointestinal tract, are counterproductive as well as expensive and should be avoided if possible.





**Oral iron products**

Drug	Examples of United States trade (brand) names	Elemental iron content (and equivalent iron salt) per tablet, capsule, or liquid measure*
<b>Available over-the-counter and by prescription:</b>		
<b>Ferrous fumarate</b> (Contains 33% elemental iron per mg ferrous fumarate salt)	<ul style="list-style-type: none"> <li>■ <b>Tablets</b></li> <li>■ Ferrimin 150</li> <li>■ Ferretts, Ferrocite</li> <li>■ Various over-the-counter and store brand products with "iron" in the name</li> </ul>	150 mg elemental iron (equivalent to 450 mg ferrous fumarate) per tablet <sup>¶</sup> 106 mg elemental iron (equivalent to 324 or 325 mg ferrous fumarate) per tablet 29 mg elemental iron (equivalent to 90 mg ferrous fumarate) per tablet
<b>Ferrous gluconate</b> (Contains approximately 10 to 14% elemental iron per mg ferrous gluconate salt)	<ul style="list-style-type: none"> <li>■ <b>Tablets</b></li> <li>■ Ferate, Fergon</li> <li>■ Various over-the-counter and store-brand products with "iron" in the name</li> </ul>	27 mg elemental iron (equivalent to 240 mg ferrous gluconate) per tablet 27 mg elemental iron (equivalent to 240 mg ferrous gluconate) per tablet 38 mg elemental iron (equivalent to 324 mg ferrous gluconate) per tablet
<b>Ferrous sulfate</b> (Generally contains 20 to 30% elemental iron per mg ferrous sulfate salt but can vary by manufacturer)	<ul style="list-style-type: none"> <li>■ <b>Liquids</b></li> <li>■ BProtected Pedia Iron, Fe-Vite Iron, Fer-In-Sol</li> <li>■ FeroSul</li> <li>■ Various over-the-counter and store-brand products with "iron" in the name</li> <li>■ <b>Tablets</b></li> <li>■ Feosol original, Ferosul, FerrouSul</li> <li>■ Various over-the-counter and store-brand products with "iron" in the name</li> </ul>	<b>Multiple concentrations exist; check labeling closely</b> 15 mg elemental iron (equivalent to 75 mg ferrous sulfate) <b>per 1 mL</b> ("drops," "solution") 44 mg elemental iron (equivalent to 220 mg ferrous sulfate) <b>per 5 mLs</b> ("elixir," "liquid") 44 mg elemental iron (equivalent to 220 mg ferrous sulfate) <b>per 5 mLs</b> ("liquid") 60 mg elemental iron (equivalent to 300 mg ferrous sulfate) <b>per 5 mLs</b> ("syrup") 65 mg elemental iron (equivalent to 325 mg ferrous sulfate or 200 mg desiccated ferrous sulfate) per tablet 65 mg elemental iron (equivalent to 325 mg ferrous sulfate) per tablet

# Intolerance

Iron therapy can cause unpleasant gastrointestinal symptoms such as nausea and constipation, likely related directly to the amount of elemental iron ingested

Gastrointestinal intolerance often can be reduced by altering the supplementation regimen:

- Use doses on the lower end of the recommended range, such as the dose of 65 to 130 mg elemental iron once daily recommended above. (See 'Oral iron therapy' above.)
- Try alternate-day dosing (eg, 60 mg every other day). Studies in adults suggest improved tolerance and absorption with alternate-day dosing, although the efficacy of this strategy in individuals with more severe iron deficiency or in younger age groups has not been established

## Improve absorption\*

- Avoid enteric coated or timed-release products
- Take separately from foods that may impair absorption
  - Meals
  - Coffee
  - Eggs
  - Oxalates (spinach, kale, beets, nuts, chocolate, tea, wheat bran, rhubarb, strawberries, some herbs)
  - Phytates (soy, fiber, cereals, some nuts, beans, lentils, peas)
  - Tannates (tea, cocoa, some spices, some berries)
  - Calcium (milk, yogurt, cheese, some greens, fish)
- Minimize exposure to medications that decrease gastric acidity
  - Antacids (take iron 2 hours before or 4 hours after the antacid)
  - Histamine receptor blockers (discontinue if no longer needed)
  - Proton pump inhibitors (discontinue if no longer needed)
- Take with foods/supplements that may increase absorption
  - Vitamin C
  - Orange juice

## Improve tolerability\*

- Use a titratable (eg, liquid) form ¶
- Change from every-day to every-other-day dosing
- Dietary modifications (eg, take with food) Δ
- Take a product with less elemental iron Δ
- Use a stool softener or laxative

# What happened in the end?

Biochemistry		1402/08/16	S.Naghdi		
Test	Result	Unit	Normal Range		
ferritin	38	ng/ml	10-110		
FBS	93	mg/dl	Normal: 60-110		
TIBC	436	micg/dl	250-450		

CBC		1402/08/16	M.Seyed		
Test	Result	Unit	Normal Range		
W.B.C	6,3	$10^3/mm^3$	4,0-10		
R.B.C	5,3	$10^6/mm^3$	4,2-5,4		
HGB	<b>L</b> 11,4	g/dl	12-15,5		
HCT	38,7	%	36-46		
MCH	21,51	pg	27,5-32		
MCHC	<b>L</b> 29,46	%	32-37		
MCV	<b>L</b> 73,02	FL	77-97		
PLT	268	Mil/ $mm^3$	140-400		
Neut	60,0	%	40-75		
Lymph	32,3	%	20-45		
Mixed	7,7	%	0-15		
RDW CV	25,9				
Anisocytosis	2+				
Microcytosis	1+				
Hypochromic	1+				

E Habiba



Handwritten signature or notes in Persian script.

Handwritten notes in Persian script, including a date '1402/08/16' and some numbers like '2756'.



Handwritten notes in Persian script, including a date '1402/08/16' and some numbers like '2756'.

Thanks for your attention