



University
Debrecen



Care in Iron deficiency anemia

6. National 1. international pediatric nursing congress
29 november – 2 december 2017.

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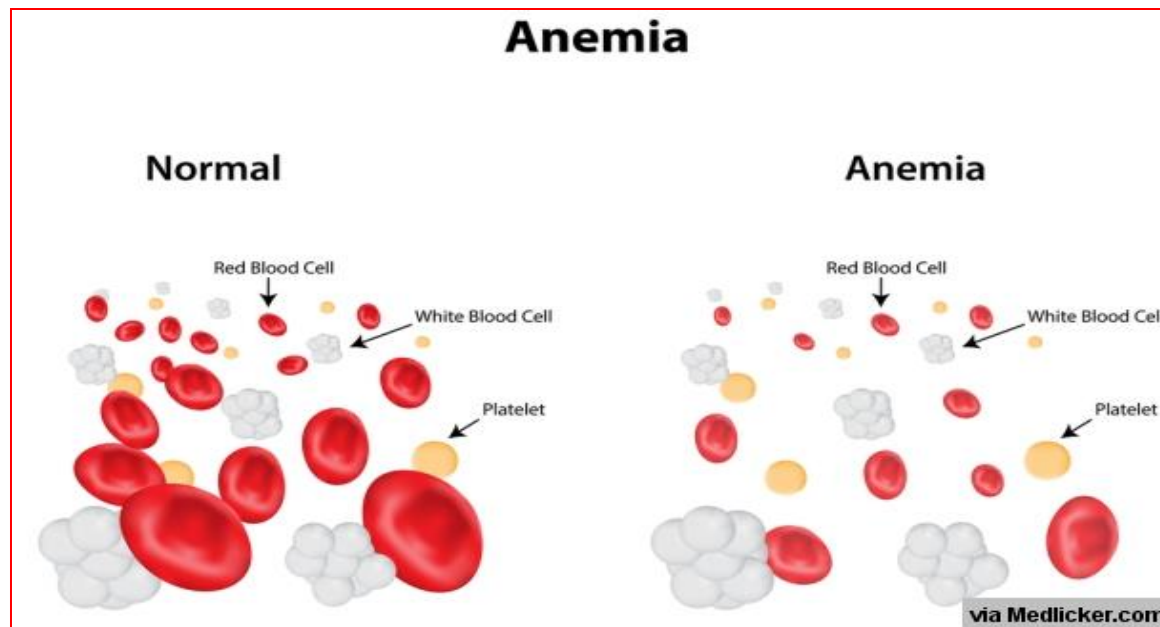
Iron



- ✓ When you think of iron, you might think of skyscrapers with metal beams infused with iron to make them strong. But people need iron to stay strong, too

Iron

- ✓ Iron helps red blood cells carry oxygen to the body and plays a key role in brain and muscle function.
- ✓ A lack of iron in the blood can lead to iron-deficiency anemia, a common nutritional deficiency in children.

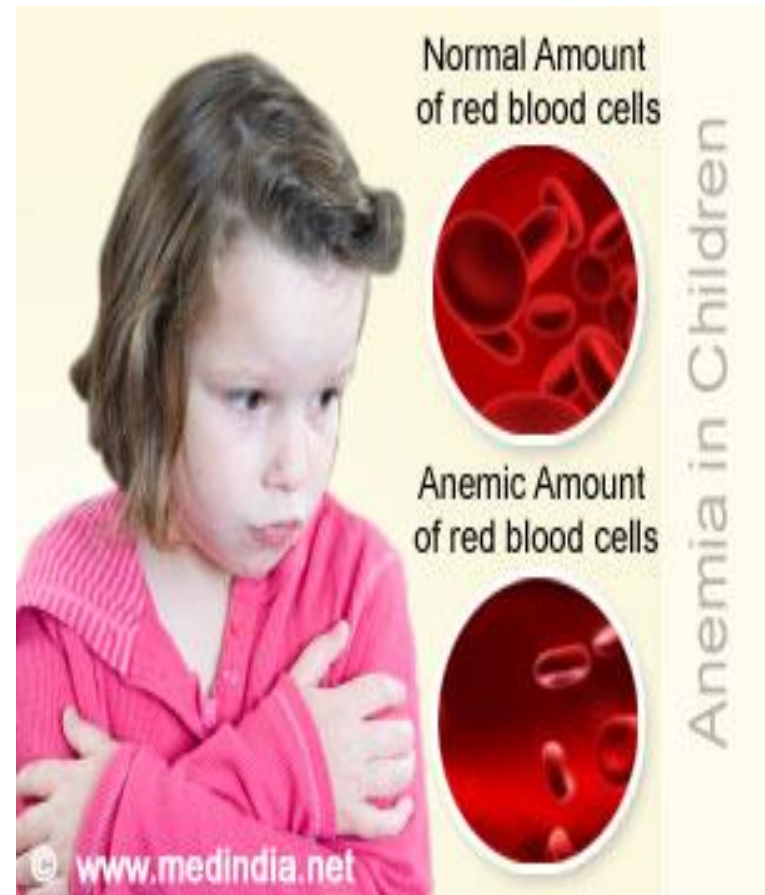


About Iron-Deficiency Anemia

- ✓ **Every red blood cell in the body contains iron in its hemoglobin, the protein that carries oxygen to the body's tissues from the lungs. Iron gives hemoglobin the strength to "carry" (bind to) oxygen in the blood, so that oxygen gets to where it needs to go.**
- ✓ **Somebody who become iron deficient aren't getting enough iron in their diet. This means that the body can't make hemoglobin, so it makes fewer red blood cells. This is a condition called anemia. When someone has anemia, less oxygen reaches the cells and tissues and affects how the body works.**

Why is iron important for children?

- ✓ Iron is a nutrient that's essential to your child's growth and development. Iron helps move oxygen from the lungs to the rest of the body and helps muscles store and use oxygen. If your child's diet lacks iron, he or she might develop a condition called iron deficiency.



How much iron do children need?

Babies are born with iron stored in their bodies, but a steady amount of additional iron is needed to fuel a child's rapid growth and development. Here's a guide to iron needs at different ages:

Age group	Recommended amount of iron a day
7 - 12 months	11 mg
1 - 3 years	7 mg
4 - 8 years	10 mg
9 - 13 years	8 mg
14 - 18 years, girls	15 mg
14 - 18 years, boys	11 mg

What are the risk factors for iron deficiency in children?
Infants and children at highest risk of iron deficiency include:

Babies who are born prematurely — more than three weeks before their due date — or have a low birth weight

Babies who drink cow's milk or goat's milk before age 1

Breast-fed babies who aren't given complementary foods containing iron after age 6 months

Adolescent girls also are at higher risk of iron deficiency because their bodies lose iron during menstruation.

What are the risk factors for iron deficiency in children?
Infants and children at highest risk of iron deficiency include:

Babies who drink formula that isn't fortified with iron

Children ages 1 to 5 who drink more than 24 ounces (710 milliliters) of cow's milk, goat's milk or soy milk a day

Children who have certain health conditions, such as chronic infections or restricted diets

Children ages 1 to 5 who have been exposed to lead

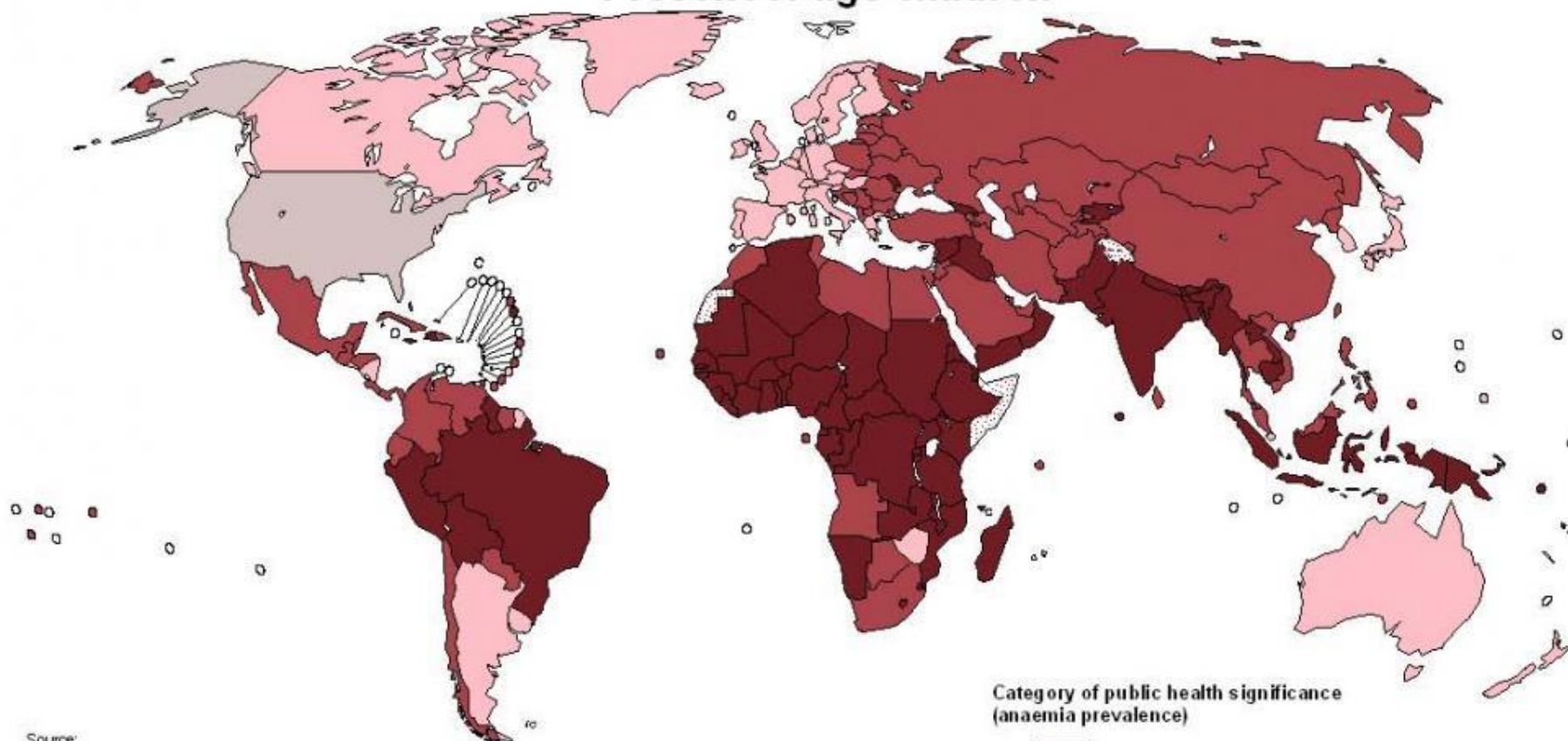
Causes

- In developed countries, getting enough iron in the diet is not usually a problem for healthy babies. In general, breastfed babies tend to get enough iron from their mothers until they start other foods and liquids.





Anaemia as a public health problem by country: Preschool-age children








Source:
de Benoist B et al., eds. Worldwide prevalence of anaemia 1993-2005.
WHO Global Database on Anaemia. Geneva, World Health Organization, 2008

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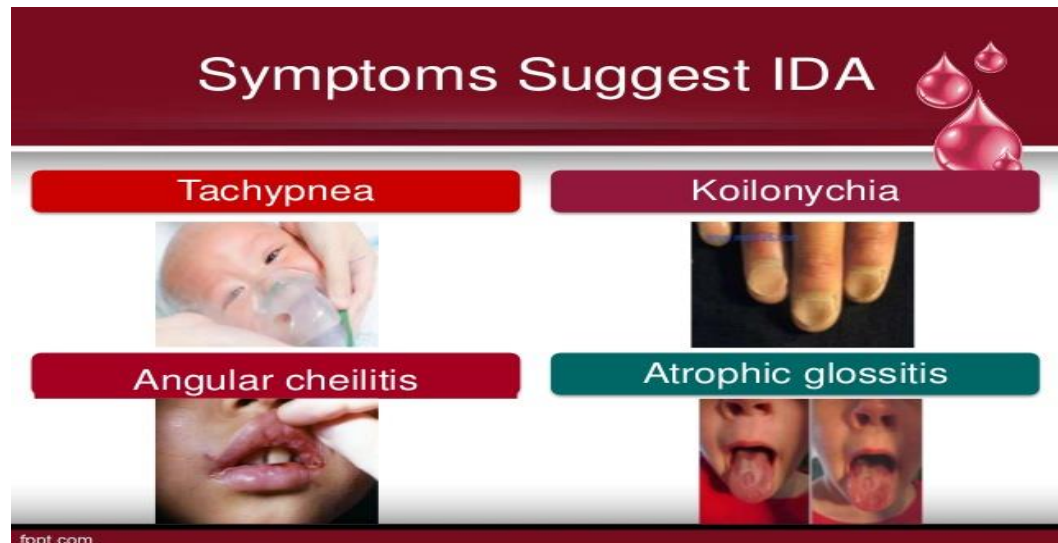
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Category of public health significance (anaemia prevalence)

-  Normal (<5.0%)
-  Mild (5.0-19.9%)
-  Moderate (20.0-39.9%)
-  Severe (≥40.0%)
-  No Data

Symptoms of iron deficiency anemia

- The symptoms of iron deficiency anemia can be mild at first, and they may not even notice them.
- According to the American Society of Hematology (ASH), most people don't realize they have mild anemia until they have a routine blood test.



The symptoms of moderate to severe iron deficiency anemia include

- general fatigue
- weakness
- pale skin
- shortness of breath
- dizziness
- strange cravings to eat items that aren't food, such as dirt, ice, or clay
- a tingling or crawling feeling in the legs
- tongue swelling or soreness
- cold hands and feet
- fast or irregular heartbeat
- brittle nails
- headaches



Causes of iron deficiency anemia

- According to the ASH, iron deficiency is the most common cause of anemia. There are many reasons why a person might become deficient in iron.

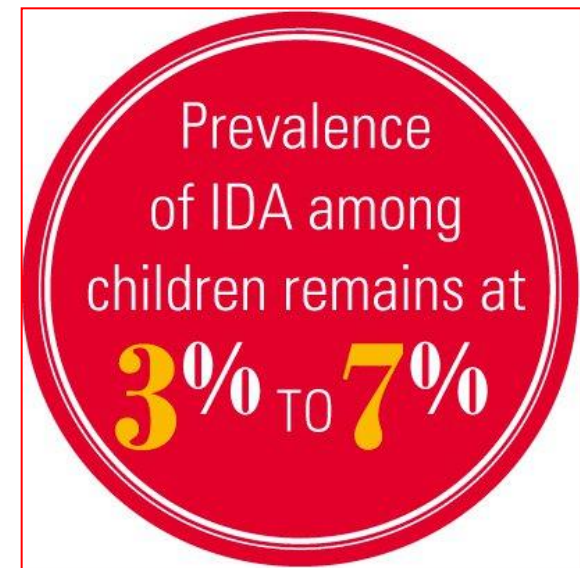
These include:

- **1. Inadequate iron intake**
- Eating too little iron over an extended amount of time can cause a shortage in your body. Foods such as meat, eggs, and some green leafy vegetables are high in iron. Because iron is essential during times of rapid growth and development young children may need even more iron-rich foods in their diet.

- **2. Inability to absorb iron**
- Certain disorders or surgeries that affect the intestines can also interfere with how your body absorbs iron. Even if you get enough iron in your diet, celiac disease or intestinal surgery such as gastric bypass may limit the amount of iron your body can absorb.

Prevention

- When caused by inadequate iron intake, iron deficiency anemia can be prevented by eating a diet high in iron-rich foods and vitamin C. Mothers should make sure to feed their babies breast milk or iron-fortified infant formula.



Foods high in iron include

- meat, such as lamb, pork, chicken, and beef
- beans
- pumpkin and squash seeds
- leafy greens, such as spinach
- raisins and other dried fruit
- eggs
- seafood, such as clams, sardines, shrimp, and oysters
- iron-fortified dry and instant cereals



Foods high in vitamin C include

- fruits such as oranges, grapefruits, strawberries, kiwis, guavas, papayas, pineapples, melons, and mangoes
- broccoli
- red and green bell peppers
- Brussels sprouts
- cauliflower
- tomatoes
- leafy greens



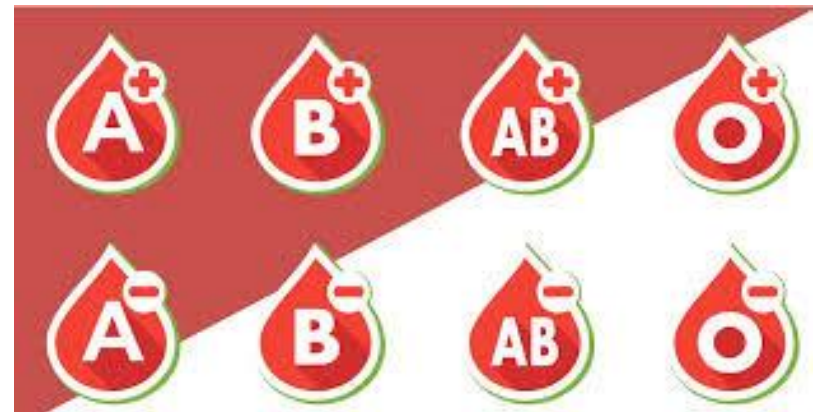
Diet

- Diets that include the following foods can help treat or prevent iron deficiency:
- red meat
- dark green, leafy vegetables
- dried fruits
- nuts
- iron-fortified cereals
- Vitamin C helps the body absorb iron. If the patient take iron tablets, a doctor might suggest taking the tablets along with a source of vitamin C, such as a glass of orange juice or citrus fruit.



Complete blood cell (CBC) test

- A complete blood count (CBC) is usually the first test a doctor will use. A CBC measures the amount of all components in the blood, including:
 - red blood cells (RBCs)
 - white blood cells (WBCs)
 - hemoglobin
 - hematocrit
 - platelets.
- The CBC provides information about blood that is helpful in diagnosing iron deficiency anemia. This information includes:
 - the hematocrit level, which is the percent of blood volume that is made up of RBCs
 - the hemoglobin level
 - the size of RBCs



Cases

- 11 children's document analyzes
- Period: 21/03/2016 – 27 /10/2017
- 1,5 years
- 11 cases



	1	9 hours later	3rd day	7th day	Normal rate	controls		
admission	2017. 01.24					2017.02.15	2017.05.03	2017.08.09
discharge	2017. 01.30							
bweight	7420							
blength	69							
wpc	3							
lpc	3						1 case	
Age	1 year							
hospital	7d							
WBC	10,80	8,28	4,62	8,61	5,5-15,0	13,56	10,69	11,58
RBC	4,49	4,42	4,31	4,59	4,0-5,2	4,68	5,06	5,18
HGB	66	64	62	72	105-140	70	92	100
HTC	24,5	23,7	24,1	25,8	30-42	26,6	30,4	31,8
FE		4nmol/l			9-21,5nmol/l			
FERR		8,0ng/l					6,4ng/l	
TRF		2,79g/l						
Transfizion no								
Terapy: Maltofer 2x10 drops, Folsav 2x1/2 tbl								
Diagnosis: microciter anaemia, serious iron deficiency								
In 2 weeks kontroll								

	1	In 7 hours later	Normal rate		
admission	2017. 06.27				2nd case
dscharge	2017. 06.29				
bw	8340				
bl	68				
wpc					
lpc					
age					
hospital	3				
WBC	4,30	3,46	5,5-15,0		
RBC	3,99	4,05	4,0-5,2		
HGB	79	80	105-140		
HTC	25,4	26,4	30-42		
FE		4nmol/l	7-18nmol/l		
FERR					
TRF		3,23g/l			
Transfizion no					
Terapy: Maltofer 2x10 csepp, Folsav 1x1/2 tbl					
Diagnosis: anaemia, iron defficiency D5090					

	1	In 2 days later	Normal rate	
admiss	2017. 09.10			
disch	2017. 09.13			
bw				3rd case
bl				
wpc				
lpc				Most bad case!
age				
hospital	3			
WBC	15,70			
RBC	4,77			
HGB	102			
HTC	32,3			
FE		4nmol/l	7-18nmol/l	
FERR		23,7ng/l		
TRF		3,06g/l		
Transfuzion no				
Terapy: Maltofer 2x8 drops, Folsav 1x1 tbl				
Diagnosis: iron defficiency D5090				

	ITO		Infant unit			
	1	In 4 days l		Normal rate		
adm	2017. 10.13				2017. 10. 27	
disch			2017. 10.18			
bw	9000					
bl	74					4th case
wpc	3-10%					
lpc	3-10%					
age	14 ho					
hospital	4 days		2days			
WBC	17,82	16,88	16,88	5,5-15,0	12,6	
RBC	4,79	5,32	5,32	4,0-5,2	5,8	
HGB	66	72	72	105-140	90	
HTC	26,6	30,2	30,2	30-42	36,6	
FE	11,3nmol/l			9-21,5nmol/l	4,3	
FERR	11,3ng/l					
TRF	3,80g/l					
Therapy: Ferrlecit , Folsav			Maltofer			
Transfuzion no						
Terápy: Maltofer 2x10 csepp, Folsav 1x1/2 tbl , Cebion 1x10csepp						
Diagnosis: iron defficiency anaemia D5090						
In 2 month kontroll						

	In 1day	In 5 days			Normal rate
admis	2016. 03. 31		2016. 04. 12	2016. 10. 08	
disch	2016. 04. 05				
bw	26		5th case		
bl	130				
wpc	10-25%				
lpc	3-10%				
kora	11 year				
hospital	6				
WBC	9,72	15,00	11,1	10,9	4,5-13
RBC	4,20	4,20	4,3	4,5	4,0-5,2
HGB	63	71	80	122	110-145
HTC	24,2	24,9	29,2	36,8	34,0-44,0
FE	0nmol/l		4nmol/l	9,7	9-21,5nmol/l
FERR			54,4ng/l		6,0-320,0
TRF	0g/l		2,43g/l	2,49	1,70-3,40
Therapy: Ferrlecit , Maltofer					
Transfuzion no					
Terápy: Maltofer 3x1tk, Folsav 1x1tbl, Cebion 1x10drops					
Diagnosis: iron defficiency anaemia D5090 in 1 week kontroll					

	Same day	In 1 day	In 7 days	Normal rate	
admis	2016. 09. 20				2016.12.27
disc	2016. 09. 27				
bw	54kg				
bl	168cm				
wpc	25-50%				
lpc	25-50%				
age	15 years				
hospital	8 days				
WBC	7,08		10,18	4,50-13	12,11
RBC	5,12		5,17	4,60-6,20	5,99
HGB	94		96	110-145	131
HTC	30,8		31,9	34-44	41,5
FE		4,7nmol/l		3-8nmol/l	4
FERR					
TRF		3,83g/l			
Therapy: Ferrlecit					
Transusion no					
Terápia: Maltofer, Folsav 1x1tbl,					
Diagnosis: iron defficiency anaemia D5090 in 3 weeks kontroll					

6th case

	Same day	In 1 day		In 3 weeks	Normal rate		
adm	2017. 06. 20			2017. 07. 18		2017. 08. 18	2017. 10. 05
disch	2017. 06. 26			2017. 07. 19			
bw	52kg						
bl	108cm						
wpc	75%				7th case		
lpc	75-90%						
Age	14 years						
hospital	7			1			
WBC	4,98	7,25		5,33	4,5-13	5,2	5,2
RBC	4,24	4,79		4,86	4,0-5,2	4,9	5,0
HGB	82	97		115	110-145	122	134
HTC	28,0	31,4		34,8	34-44	37,1	40,3
FE				3,18nmol/l	9-21,5nmol/l	6,6	14,6
FERR							
TRF					1,70-3,40	3,28	3,66
Therapy: Aktiferrin, Ferrlecit				Aktiferrin			
Transfuzion no							
Terápia: Neoferrofolgamma 3x1tbl				2x1tbl			
Diagnosis: iron defficiency anaemia D5090 in 2 weeks controll							

	aznap	1napmulva		normalertek	2017. 10. 04
felvetel	2017. 09. 19				
elbocsat	2017. 09. 25				
ts	7500				
thsz	75cm				
sulypct	3%				
hosszpct	3%				
kora	2years				
korhazban	7				
WBC		15,54		5,5-15,0	11,0
RBC		4,58		4,0-5,2	4,8
HGB		88		105-140	99
HTC		30,8		30-42	33,5
FE		6,4nmol/l		9-21,5nmol/l	
FERR					
TRF		3,84g/l			
Alkalmazott th: Folsav, Cebion Ferrlecit					
Transzfuziot nem kapott					
Terápia: Maltofer 2x10csepp, Folsav 1x1/2tbl, Cebion 1x10csepp					
Diagnosis: iron defficiency anaemia D5090 2 hét múlva kontroll					

8th case

	sameday	In 1 day later	Normal rate	
admis	2017. 09. 23			
disch	2017. 09. 25			
bw	43kg			
bl	160cm			9th case
wpc	25-50%			
lpc	50-75%			
age	12 years			Most bad case!
hospital	3 days			
WBC	8,7			
RBC	4,8			
HGB	74,0			
HTC	27,8			
FE			8-22nmol/l	
FERR	4,0ng/l			
TRF				
Therapy: Folsav, Aktiferrin				
Transfuzion no				
Terapy: Aktiferrin 2x1tbl, Folsav 1x1tbl,				
Diagnosis: iron defficiency anaemia D5090 in 2 weeks kontroll				

	Same day	In 1 day	In 2 days	Normal rate			
admis	2017. 05. 30				2017. 06. 09.	2017. 06. 21	2017. 07. 21
disch	2017. 06. 01						
bw	40kg						
bl	145cm				10th case		
wpc	10-25%						
lpc	3%						
age	14 years						
hospital	3 days						
WBC	12,65		9,62	4,5-13	18,0	11,0	7,3
RBC	3,92		5,42	4,0-5,2	5,5	5,2	5,0
HGB	71		119	110-145	118	122	125
HTC	24,5		38,5	34-44	40,0	39,2	38,9
FE							
FERR							
TRF		3,73g/l		1,70-3,40			
Therapy: Maltofer							
2E unit special RBC concentratum							
Terápy: Maltofer 2x5 ml							
Diagnosis: iron defficiency anaemia D5090 haem controll							

	Same day	In 2 days	Normal rate		
admis	2017. 03. 25			2017. 05. 10	2017. 06.14
disch	2017. 03. 29				
bw	50kg				
bl	172cm				
wpc	50-75%			11th case	
lpc	97%				
age	13 years				
hospital	5				
WBC	9,42	7,64	4,5-13	6,8	7,1
RBC	4,26	4,14	4,0-5,2	4,8	4,6
HGB	89	86	110-145	120	127
HTC	28,4	28,6	34-44	36,5	36,9
FE		4nmol/l	9-21,5nmol/l		
FERR			6-320ng/l	16,3	
TRF		1,56g/l			
Therapy: Maltofer, Folsav, Aktiferrin					
2E unit special RBC concentratum					
Terápy: Maltofer 2x1tbl, Folsav 100mg					
Diagnosis: microciter anaemia, low iron level D5090 in 6 weeks kontroll					

Main reasons:

1. Inadequate iron intake
2. Inability to absorb iron

Sumerizing

Cases:

- 2 child have got transfuzion - 2 units
- 5 iv inj therapy
- the blood test result increased
- Therapy: - oral medication
- - iv inj
- - adekvate diet



1 – 1 year old
 8 – between 1 and 15 y
 2 – no data



cases	age	hospitalization	iv inj	transfusion
1	1 year	7		
2	-	3		
3	-	3		
4	14 month	6	x	
5	11 year	6	x	
6	15 year	8	x	
7	14 year	8	x	
8	2 year	7	x	
9	12 year	3		
10	14 year	3		2 unit
11	13 year	5		2 unit

iron_deficiency



Tesekküller!
Thank you for your kind attention!



How can you care for your child at home?

- If the doctor recommended iron pills for the child, give them as directed.
 - Try to give the pills on an empty stomach about 1 hour before or 2 hours after meals. But child may need to take iron with food to avoid an upset stomach.
 - Do not give child antacids or let child drink milk or caffeine drinks (such as coffee, tea, or cola) at the same time or within 2 hours of the time that child takes iron pills. They can keep the body from absorbing the iron well.
 - Vitamin C helps the body absorb iron. Parents may want to give iron pills with a glass of orange juice or some other food high in vitamin C.

- Iron pills may cause stomach problems, such as heartburn, nausea, diarrhea, constipation, and cramps. Be sure the child drinks plenty of fluids. Include fruits, vegetables, and fibre in child's diet each day. Iron pills can change the colour of child's stool to a greenish or grayish black. This is normal. But internal bleeding can also cause dark stool, so be sure to mention any colour changes to the doctor.
- Call the doctor or nurse call line if you think your child is having a problem with the iron pills. Even after child starts feeling better, it will take several months for the body to build up its supply of iron.
- If the child misses taking a pill on time, do not give a double dose of iron.
- Keep iron pills out of the reach of small children. An overdose of iron can be very dangerous.

- Have the child eat foods rich in iron. These include red meat, shellfish, poultry, eggs, beans, raisins, whole-grain bread, and leafy green vegetables.
- Steam vegetables to help them keep their iron content.
- Do not give to child non-steroidal anti-inflammatory pain relievers.
- Liquid forms of iron can stain child's teeth. Parents can mix a dose of liquid iron in water, fruit juice, or tomato juice. Then let the child drink it with a straw so that it does not get on the teeth.

