Back To Chiropractic CE Seminars

Labs for the DC: Iron Deficiency Anemia
2 Hours

- Presented by John B. Campise, D.C.-

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This course counts toward your California Board of Chiropractic Examiners CE. (also accepted in other states, check our website or with your Chiropractic State Board). The California Board requires that you complete all of your CE hours **BEFORE** the end of your Birthday month. We recommend that you send your chiropractic license renewal form and fee in early to avoid any issues.

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I'm always a phone call away... 707.972.0047 or email: marcusstrutzdc@gmail.com -Marcus Strutz, DC, Back To Chiropractic CE Seminars

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John B. Campise, Doctor of Chiropractic

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EDUCATION

-Doctor of Chiropractic, March 2001 – Life Chiropractic College West, Hayward, CA

-Undergrad 90 quarter hours, June 1997 – Santa Clara University, Santa Clara, CA

CHIROPRACTIC TECHNIQUE ADVANCED STUDY

-Neuro-Emotional Technique Certification, January 2006, Dr. Scott Walker, D.C., NET, Inc., Carlsbad, CA

-Applied Kinesiology Certification, May 1999, Tim Francis, D.C., ICAK USA, Sunnyvale, CA

-Carrick Institute Chiropractic Neurology Diplomate Course: 250 hours audited, May 1999

John B. Campise, Doctor of Chiropractic

CONFERENCE PRESENTATIONS

-Neuro-Emotional Technique “Success Seminars” 25th Anniversary. *24 hour clock acupuncture theory correlations to NET and homeopathic support of the chiropractic adjustment.*

CHIROPRACTIC PRACTICE

-Campise Chiropractic private practice, June 2001 - Present, Fresno, CA. General Practice with a focus on nutrition, wellness, and rehabilitation of traumatic brain injuries.

-Dr. Kotsonis, D.C., DACNB Chiropractic Office, Jan 2015 - Dec 2015, Clinton Township, MI. General practice with a focus on stroke rehabilitation. For 2 weeks every month Dr. Campise was trained by and filled in for Dr. Kotsonis while he recovered from lumbar spinal fusion surgery.

Legal Disclaimer

Please be advised that everything contained within this PowerPoint and/or within this lecture is not intended to be clinical advice, counseling or advice for any patient.
The examples contained herein are for the comprehension of nutrition/labs and is intended for nothing other than informative continuing education purposes.
All protocols herein should not be used until proper history, exam and special studies have been completed and assessed.

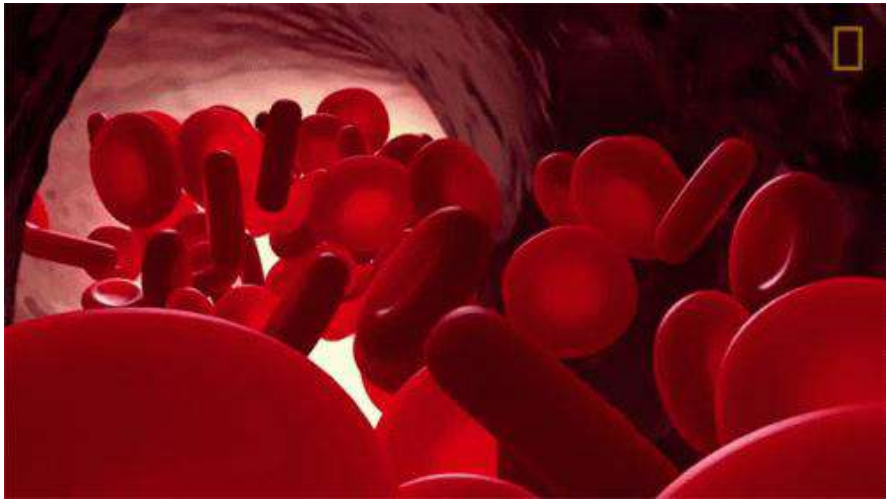
Laboratory Interpretation For the Chiropractor:

Iron Deficiency Anemia
~ 2 hrs
Overview

Red Blood Cell Anemia (iron deficiency type)

- Clinical overview
- Causes of condition
- Signs and Symptoms
- Lab findings and interpretation
- Medical vs alternative treatment options

Anemia



Anemia

Red Cell Anemia

We will cover 1 type:
Iron deficiency

White Cell Anemia

AKA: Leukopenia

Platelet Anemia

AKA: Thrombocytopenia

Anemia

Clinical Overview

“Emia” is latin for blood and “An-” means “without or lacking.” So anemia simply means “lacking blood.” But it specifically means a lack of blood cells (either red or white) or a lack of the parts that make up blood cells or produced by blood cells (ie. hemoglobin, platelets, etc.).

Anemia

Clinical Overview

There are several types of anemia and generally several causes of each type. It is important to know which type and even more important to know which cause of which type in order to best help the patient.

Anemia

Clinical Overview

Red Blood Cell (RBC) anemia

Various types:

1) Nutrient Deficiency Anemia
2) Hemolytic Anemia
3) Megaloblastic Anemia
4) Microcytic Anemia
5) Pernicious Anemia
6) Aplastic Anemia

Anemia

Clinical Overview

Red Blood Cell (RBC) anemia

Various causes:

1) B2 deficiency
2) B6 deficiency
3) B9 (folate) deficiency
4) **B12 deficiency**
5) Copper deficiency
6) **Iron deficiency**
7) **Protein deficiency**
8) Autoimmune disease
9) Infection
10) Kidney issues
11) Liver issues
12) Spleen issues
13) **Internal bleeding**

Anemia

Clinical Overview

White Blood Cell (WBC) anemia: Leukopenia

Various causes:

1) AIDS
2) Bone marrow failure
3) Liver or Spleen disease
4) Cancer or Chemotherapy

Anemia
Clinical Overview

Platelet anemia (Thrombocytopenia)

Various causes:

1) Genetic disorders
2) B9 (Folate) deficiency
3) B12 deficiency
4) Vitamin K deficiency
5) Blood thinning medication
6) Autoimmune diseases
7) Infections
8) Enlarged Spleen
9) Blood clotting diseases (ie., TTP, DIC)
10) Cancers

Anemia

Iron Deficiency

Causes

1) **internal bleeding**
2) excessive menstrual bleeding
3) severe malnutrition
4) various intestinal diseases interfering with absorption of iron

MUST RULE OUT FIRST, especially if no signs or symptoms of #2-4.

Anemia

Iron Deficiency

Causes

1) **internal bleeding:**

Must first rule out:

-intestinal cancer
-kidney or bladder disease
-pancreas or liver cancer
-colon polyp or diverticulitis
-stomach ulcer bleeding

Anemia

Iron Deficiency

Causes

1) **internal bleeding:**

Ask Patient:

-Have they noticed any blood in stool or urine?

-What color is their stool?

-Black stool (oreo cookie) could be upper GI bleeding.

Anemia

Iron Deficiency

Causes

1) **internal bleeding:** If the patient says they have noticed blood in their stool or urine, then refer to a GI specialist or Urologist to find the cause of the bleeding.

Anemia

Iron Deficiency

Patients cannot see and will not notice microscopic amounts of blood in their stool or urine.

Causes

1) **internal bleeding:**

If the patient says they DO NOT have blood in their stool or urine, **THIS IS NOT GOOD ENOUGH**. Microscopic levels of blood loss over time can lead to anemia. A urine and stool test must be ordered to rule out.

Anemia

Iron Deficiency

Causes

2) Excessive menstrual bleeding

Refer to a Gynecologist to rule out uterine diseases.

Anemia

Iron Deficiency

Causes

2) Excessive menstrual bleeding

Also refer to a holistic practitioner who can help to correct their hormone imbalances by assessing thyroid, adrenal, diet, and stress issues.

Anemia

Iron Deficiency

Causes

3) Severe malnutrition

Patients at high risk:
-Vegans
-Elderly
-Cancer patients
-Anorexic or bulimic patients

Anemia

Iron Deficiency

Causes

4) various intestinal diseases interfering with absorption of iron

- Celiac disease (severe gluten intolerance)
- Crohn's disease
- Tropical Sprue (infection leading to chronic diarrhea)
- Inflammatory Bowel Disease

Anemia

Iron Deficiency

Signs and Symptoms

- Fatigue
- Slow wound healing
- Brittle nails
- Shortness of breath
- Lightheadedness
- Cold Hands and Feet
- Headaches
- Blue sclera
- Pale skin
- Weakness

Anemia

Iron Deficiency

Labs to order:

Complete Blood Count (CBC): includes RBC, hemoglobin, hematocrit, MCV, MCH, MCHC, RDW.

Iron Panel: includes ferritin, serum iron, transferrin, UIBC/TIBC (unsaturated/total iron binding capacities)

Anemia

Iron Deficiency

Fun Fact:

uL = microliter

1 mL = 1,000 microliters

Labs Findings and Interpretation:

RBC (Red Blood Cell count)
tends to be low.

RBC normal range:

men: 4.1-5.8 million cells per uL

women: 3.7-5.2 million cells per uL

Anemia

Iron Deficiency

Labs Findings and Interpretation:

Why does iron deficiency cause low **RBC**?

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2730642/

"Iron deficiency in the body limits the synthesis of heme, a prosthetic group of hemoglobin that in turn limits the synthesis of hemoglobin and *decreases the production of red blood cells* (RBCs) in the bone marrow resulting in anemia. Since cellular energy metabolism is dependent on oxygen, anemia has a wide range of clinical consequences. One of the consequences of severe iron deficiency is a *decrease in the life span of RBC*s in circulation that further exacerbates the anemic condition."

Anemia

Iron Deficiency

Fun Fact:

dL = deciliter

1 liter = 10 deciliters

Labs Findings and Interpretation:

Hemoglobin will tend to be low.

Normal range men: 13-17.7 g/dL

Normal range women: 11-15.9 g/dL

Anemia

Iron Deficiency

Labs Findings and Interpretation:

Why does iron deficiency cause low **Hemoglobin**?

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2730642/

"Iron deficiency in the body limits the synthesis of heme, a prosthetic group of hemoglobin that in turn **limits the synthesis of hemoglobin**..."

Anemia

Iron Deficiency

Labs Findings and Interpretation:

Hematocrit tends to be low.

Normal range men: 40 - 54%

Normal range women: 36 - 48%

Anemia

Iron Deficiency

Labs Findings and Interpretation:

What is **Hematocrit**?

https://www.ncbi.nlm.nih.gov/books/NBK542276/

“HCT measures the volume of packed red blood cells (RBC) relative to whole blood. Hence, it is also known and reported as a packed cell volume (PCV). It is a simple test to identify conditions like anemia or polycythemia and also to monitor response to the treatment. The term "hematocrit (HCT)" originated from English “hemato-“ and Greek “krites.” HCT measures the volume of packed red blood cells (RBC) relative to whole blood…

Anemia

Iron Deficiency

Labs Findings and Interpretation:

What is **Hematocrit**? (cont.)

https://www.ncbi.nlm.nih.gov/books/NBK542276/

…A glass tube and a centrifuge machine are sufficient to measure HCT. After centrifugation, the component of blood separates into three distinct parts. From below upwards, the layers are - a layer of red blood cells (RBC), a layer of white blood cells (WBC) and platelets, and a layer of plasma at the top. HCT calculation is by dividing the lengths of the packed RBC layer by the length of total cells and plasma."

Anemia

Iron Deficiency

Labs Findings and Interpretation:

Hematocrit:

- Another way of measuring RBC's

- Hematocrit will tend to be **LOW** with iron deficiency anemia.

Anemia

Iron Deficiency

Fun Fact:

fL = femtoliter

1 mL = 1 trillion femtoliters

Labs Findings and Interpretation:

MCV (mean corpuscular volume) tends to be normal.

Normal range (men): 80-100 fL

Normal range (women): 80-100 fL

Anemia

Iron Deficiency

Labs Findings and Interpretation:

What is **MCV** (mean corpuscular volume)?

Defines the size of the red blood cell.

- A low MCV is a sign of microcytic anemia.
- A high MCV is a sign of macrocytic anemia.
- Iron deficiency anemia will usually present as normocytic.

Anemia

Iron Deficiency

Labs Findings and Interpretation:

MCV (mean corpuscular volume):

Defines the size of the red blood cell.

MCV is expected to be NORMAL with iron deficiency anemia.

Anemia
Iron Deficiency

Fun Fact:

pg = picogram

1 gram = 1 trillion picograms

Labs Findings and Interpretation:

MCH (mean corpuscular hemoglobin) tends to be LOW.

Normal range: 29 (+/- 2) pg

Anemia

Iron Deficiency

Labs Findings and Interpretation:

MCH (mean corpuscular hemoglobin):

Quantifies the average amount of hemoglobin per red blood cell.

MCH is expected to be **LOW** with iron deficiency anemia.

MCH generally follows the RBC trend, high or low.

Anemia

Iron Deficiency

Fun Fact:

dL = deciliter

1 liter = 10 deciliters

Labs Findings and Interpretation:

MCHC (mean corpuscular hemoglobin concentration) tends to be LOW.

Normal range: 34 (+/- 2) g/dL

Anemia

Iron Deficiency

Labs Findings and Interpretation:

MCHC (mean corpuscular hemoglobin concentration):

MCHC correlates the hemoglobin content with the volume of the cell.

MCHC is expected to be **LOW** with iron deficiency anemia.

Anemia

Iron Deficiency

Labs Findings and Interpretation:

RDW (RBC Distribution Width) tends to be HIGH.

Normal range: 13 (+/- 1.5) %

Anemia
Iron Deficiency

Fun Fact:

ug = microgram

1 g = 1 million micrograms

Labs Findings and Interpretation:

Serum Iron will tend to be low, but often normal.

Normal range men: 38-169 ug/dL

Normal range women: 34-152 ug/dL

Fun Fact:

dL = deciliter

1 liter = 10 deciliters

Anemia

Iron Deficiency

Labs Findings and Interpretation:

What is **Serum Iron**?

Serum iron (SI) levels reflect the total amount of iron in blood, including transferrin-bound and non–transferrin-bound iron.

From: Fowler's Zoo and Wild Animal Medicine, Volume 8, 2015

Anemia

Iron Deficiency

Labs Findings and Interpretation:

What is **Serum Iron**?

Measurement of serum iron concentration alone provides little useful information of iron status as values show considerable variation within normal individuals. **Low concentrations are seen in iron deficiency but are also seen in the anaemia of chronic disease and after surgery.**

From: Rebecca Frewin, in Clinical Biochemistry: Metabolic and Clinical Aspects (Third Edition), 2014

Anemia
Iron Deficiency

Fun Fact:

ng = nanogram

1 g = 1 billion nanograms

Labs Findings and Interpretation:

Ferritin will tend to be **LOW**.

Normal range men: 30-400 ng/mL

Normal range women: 15-150 ng/mL

Anemia

Iron Deficiency

Labs Findings and Interpretation:

What is **Ferritin**?

https://pubmed.ncbi.nlm.nih.gov/18835072/

“Ferritin, a major iron storage protein, is essential to iron homeostasis and is involved in a wide range of physiologic and pathologic processes. In clinical medicine, ferritin is predominantly utilized as a serum marker of total body iron stores. In cases of iron deficiency and overload, serum ferritin serves a critical role in both diagnosis and management. **Elevated serum and tissue ferritin are linked to coronary artery disease, malignancy**, and poor outcomes following stem cell transplantation”

Anemia

Iron Deficiency

Labs Findings and Interpretation:

What is **Ferritin**?

https://pubmed.ncbi.nlm.nih.gov/24549403/

"Serum ferritin" presents a paradox, as the iron storage protein ferritin is not synthesised in serum yet is to be found there. Serum ferritin is also a well known inflammatory marker, but it is unclear whether serum ferritin reflects or causes inflammation, or whether it is involved in an inflammatory cycle…"

Anemia

Iron Deficiency

Labs Findings and Interpretation:

What is **Ferritin**?

https://pubmed.ncbi.nlm.nih.gov/24549403/

"...We argue here that serum ferritin arises from damaged cells, and is thus a marker of cellular damage. The protein in serum ferritin is considered benign, but it has lost (i.e. dumped) most of its normal complement of iron which when unliganded is highly toxic. The facts that serum ferritin levels can correlate with both disease and with body iron stores are thus expected on simple chemical kinetic grounds…"

Anemia

Iron Deficiency

Labs Findings and Interpretation:

What is **Ferritin**?

https://pubmed.ncbi.nlm.nih.gov/24549403/

"…Overall, this systems approach serves to explain a number of apparent paradoxes of serum ferritin, including (i) why it correlates with biomarkers of cell damage, (ii) why it correlates with biomarkers of hydroxyl radical formation (and oxidative stress) and (iii) therefore why it correlates with the presence and/or severity of numerous diseases. This leads to suggestions … of the recognition that serum ferritin levels mainly represent a consequence of cell stress and damage."

Anemia

Iron Deficiency

Labs Findings and Interpretation:

Ferritin bottom line:

Low ferritin is the best marker for iron deficiency.

Chronic inflammatory conditions can raise ferritin levels which can sometimes mask iron deficiency.

So normal ferritin does not completely rule out iron deficiency.

But high ferritin can be a sign of iron overload which can be just as problematic for the patient as low iron due to iron's tendency to cause oxidative stress.

High ferritin can also be a sign of inflammation, and not related to iron overload.

Anemia

Iron Deficiency

Labs Findings and Interpretation:

Transferrin will tend to be HIGH.

Normal range: 215-380 mg/dL

Anemia

Iron Deficiency

Labs Findings and Interpretation:

What is **Transferrin**?

Transferrin and TIBC measure essentially the same thing, so usually only one or the other of these is ordered. See the next slides on TIBC for more info.

Anemia
Iron Deficiency

Fun Fact:

ug = microgram

1 g = 1 million micrograms

Labs Findings and Interpretation:

UIBC/TIBC (Unsaturated/Total iron binding capacity): will tend to be **HIGH** when iron deficiency is present

Normal range: UIBC 111-343; TIBC 250-450 ug/dL

Anemia

Iron Deficiency

Labs Findings and Interpretation:

What is **UIBC/TIBC**:

https://pubmed.ncbi.nlm.nih.gov/32644545/

"Iron-binding capacity is the capacity at which transferrin binds with iron. Transferrin, previously known as siderophilin, is the principal plasma transport protein for ferric iron (Fe^{3+}) …the indirect laboratory assessment of transferrin concentration may be inferred by TIBC. TIBC may be calculated as total or unsaturated. Depleting bodily iron stores by any mechanism increases circulating levels of transferrin…

Anemia

Iron Deficiency

Labs Findings and Interpretation:

What is **UIBC/TIBC**: (Continued)

https://pubmed.ncbi.nlm.nih.gov/32644545/

… At optimal health, only one-third of transferrin is saturated with iron, and serum transferrin has an extra binding capacity of 67%, the unsaturated iron-binding capacity (UIBC). TIBC is the total serum iron and UIBC. Percentage transferrin saturation is calculated by dividing serum iron by TIBC and multiplying the result by 100.”

Anemia

Iron Deficiency

Labs Findings and Interpretation:

UIBC/TIBC:

Generally:

If either UIBC or TIBC is high then the patient likely has low iron levels.

Anemia

Iron Deficiency

Labs Findings and Interpretation:

WARNING: You cannot diagnose iron deficiency with a CBC alone. Yet I've seen many patients prescribed iron supplements without ever being tested with an iron panel or ferritin levels. ***Taking iron can cause inflammation, muscle and joint pain, and liver stress for those who are not actually low in it.***

Anemia

Iron Deficiency

Medical vs Alternative Treatment Options:

Medical: Iron sulphate pills and a stool softener to counteract the constipation the iron sulphate causes. Birth control pills to reduce menstrual bleeding, antibiotics and acid blocking drugs to heal stomach ulcer, surgically remove colon polyps, and hysterectomy or uterine ablation to cure bleeding fibroids.

Anemia

Iron Deficiency

Medical vs Alternative Treatment Options:

Alternative: Take liver concentrate pills for non-constipating iron together with vitamin C for better absorption. Take herbs to heal stomach ulcer (mastic gum, okra, DGL). Take cayenne pepper capsules to stop mild intestinal bleeding. Herbally balance hormones to reduce excess menstrual bleeding. Bioidentical progesterone topical to shrink uterine fibroids.

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