



## ORIGINAL ARTICLE

## Magnetic Therapy of Anemia Caused by Inflammations

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### Abstract

In my paper I describe the magnetic therapy of anemia caused by inflammations, and I explain the physical processes underlying this therapy.

### Keywords

Anemia, Magnetic therapy, Underlying physical processes

### Anemia Caused by Inflammations, Causes, Symptoms, Possible Treatments

Anemia occurs when there are not enough healthy red blood cells to carry oxygen to the organs of the body. The patients suffering from anemia feel cold, tired and weak. The most common type of anemia is the iron deficiency anemia. Iron produces a substance in the red blood cells then enables them to carry oxygen (hemoglobin). It can be eased by adding iron the food. The second-most type of anemia is the anemia caused by inflammations which are generated by infections, autoimmune diseases, cancer and chronic kidney diseases. In this type of anemia the body has a normal or even increased amount of iron stored in the body tissues, but a low level of iron in the blood. The inflammations hinder the body from using the stored iron to make enough healthy red blood cells, and this generates anemia. This type of anemia occurs more likely in older adults, because they have more likely chronic diseases which generate inflammations.

The symptoms of anemia are

Fast heart beat

Body aches

Fatigue or feeling dizzy

Feeling tired or weak

Getting tired early during or after physical activity

Pale skin

Shortness of breath

Possible treatments are blood transfusions and treatments with medical drugs, which - however - may have unwanted bad side effects [1].

An alternative treatment of anemia caused by inflammations is the magnetic therapy, which I describe in the next section.

### Magnetic Therapy of Inflammation Caused Anemia

The basis of this therapy is that inflammations can be cured by the oxygen particles in the blood. When applying an external time-oscillating electromagnetic field, then an electromagnetic wave is generated in the tissue. An electromagnetic wave is described by

$$\mathbf{E} = \mathbf{E}_0 \cos(\omega t - \mathbf{k} \cdot \mathbf{r}), \quad (1)$$

$$\mathbf{B} = \mathbf{B}_0 \cos(\omega t - \mathbf{k} \cdot \mathbf{r}). \quad (2)$$

Here  $\mathbf{E}$  is the electric part of the electromagnetic wave, and  $\mathbf{B}$  is the magnetic part, with the magnetic induction

$$\mathbf{B} = \mathbf{H} + 4\pi\mathbf{M}, \quad (3)$$

with the magnetic field  $\mathbf{H}$  and the magnetization  $\mathbf{M}$ . In equations 1 and 2 the quantity  $\omega$  is the angular frequency of the electromagnetic wave, and the vector  $\mathbf{k}$  is its wave vector.

An electromagnetic wave carries energy, and part of this energy is absorbed in the tissue, producing a

certain amount of warming up the tissue. When the blood vessels are warmed up, then their diameters increase and the blood flow increases. As result the oxygen particles in the blood which are required to cure inflammations come more rapidly and more frequently to the sites of inflammations, and this helps to remove the inflammations which can cause anemia.

Furthermore, in the blood are particles with charge  $q$ , mainly  $\text{Ca}^{2+}$  ions and other ions with positive or negative charge, respectively. The electromagnetic field exerts Lorentz forces  $\mathbf{F}$  on the ions,

$$\mathbf{F} = q(\mathbf{E} + \mathbf{v} \times \mathbf{B}) \quad (4)$$

Here  $\mathbf{v}$  is the velocity of the ions in the blood, and the symbol  $\times$  in the second part of equation 4 denotes the vector product. When the electromagnetic field is applied in a direction perpendicular to the direction of the blood flow, then the Lorentz forces accelerate the ions in directions perpendicular to the blood flow and give them more energy. The ions hit the walls of the blood vessels, and in each hit they transfer at least part of their energy to the blood vessels, generating a certain amount of warming up the blood vessels. When the blood vessels are warmed up, then their diameters increase and the blood flow increases. As a result the oxygen particles in the blood which are required to cure inflammations come more rapidly and more frequently to the sites of inflammations, and this helps to remove the inflammations which can cause amnesia.

I want to note the Lorentz forces do not appear only when applying time-oscillating electromagnetic fields,

but also when applying static electric and/05 magnetic fields. This means that a magnetic therapy of the inflammation-caused anemia can also be performed by using static electromagnetic fields which is often simpler than using time-oscillating electromagnetic fields.

## Conclusions

In my paper I have discussed causes, symptoms and possible treatments of anemia. I have concentrated in the inflammation-generated anemia, which is the second-most type of the anemia.

I have described the magnetic therapy of this type of anemia. The basis of this therapy is that inflammations can be cured by the oxygen particles in the blood. By the application of electromagnetic fields the blood flow increases, and as a result the oxygen particles come more rapidly and more frequently to the sites of inflammations and this helps to remove the inflammations which cause anemia.

This is a very interesting example for the use of electromagnetic fields to cure human diseases. Electromagnetic therapies are applied to cure many human diseases, and interesting other example is the pulsed electromagnetic field treatment of cancer [2].

## References

1. (2021) Lindsey Hudson.
2. Vadala M, Morales-Medina JC, Vallelunga A, Palmieri B, Laurino C (2016) Mechanisms and therapeutic effectiveness of pulsed electromagnetic field therapy in oncology. *Cancer Med* 5: 3128-3139.