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Opinion

Magnetic Therapy of Apnea

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Abstract

In my paper I describe causes, symptoms and treatments of apnea. I suggest a magnetic therapy of apnea, and I explain the physical processes underlying this therapy.

Apnea

Basic information on apnea is given in a paper of the Mayo Clinic. I will use this information; add further information and a final remark. Sleep apnea is a potentially serious sleep disorder in which breathing repeatedly stops and starts. If you snore loudly and feel tired even after a full night's sleep, you might have sleep apnea.

The main types of apnea are

1. Obstructive Sleep Apnea (OSA), which is the more common form that occurs when throat muscles relax and block the flow of air into the lungs.
2. Central Sleep Apnea (CSA), which occurs when the brain doesn't send proper signals to the muscles that control breathing.
3. Treatment-emergent sleep apnea, also known as complex sleep apnea, which happens when someone has OSA-diagnosed with a sleep apnea-that converts to CSA when receiving therapy for OSA.

If you think you might have sleep apnea, see your health care provider. Treatment can ease your symptoms and might help prevent heart problems and other complications.

Symptoms

The symptoms of obstructive and central sleep apnea overlap, making it difficult to determine which type you have. The most common symptoms of obstructive and central sleep apnea include load snoring, episodes in which you stop breathing during sleep, gasping for air during sleep, awaking with a dry mouth, morning headaches, difficulty staying asleep (known as insomnia), excessive daytime sleepiness (known as hypersomnia), difficulty paying attention while awake, irritability.

When to See a Doctor

Loud snoring can indicate a potentially serious problem, but not everyone who has sleep apnea snores. Talk to your health care provider if you have symptoms of sleep apnea. Ask your provider about any sleep problems that leave you fatigued, sleepy and irritable.

Causes

1. Obstructive sleep apnea. This type of sleep apnea happens when the muscles in the back of the throat relax. These muscles support the soft palate, the triangular piece of tissue hanging from the soft palate called the uvula, the tonsils, the side walls of the throat and the tongue.
2. When these muscles relax, your airway narrows or closes when you breathe in. You can't get enough air, which can lower the oxygen level in your blood. Your brain recognizes that you can't breathe, and briefly wakes you so that can reopen your airway. The awaking is usually so brief that you don't remember it. You might snort, choke or gasp. This pattern can repeat itself 5 to 30 times or more each hour, all night. This makes it hard to reach the deep, restful phases of sleep.
3. Central apnea. This less common type of sleep apnea occurs when the brain fails to send signals to your breathing muscles. This means that you make no effort to breath for a short period. You might awake with shortness of breath or have a difficult time getting to sleep or staying asleep.

Risk Factors

Sleep apnea can affect anyone, even children.

Obstructive sleep apnea:

- Sex: Men are 2 to 3 times more likely to have sleep apnea than are women. However, women increase their risk of they're overweight or if they were gone through menopause.
- Being older: Sleep apnea appears significantly more often in older adults.
- Family history: Having family members with sleep apnea might increase your risk.
- Use of alcohol, sedative or tranquilizers. These substances relax the muscles in your throat, which can worse obstructive sleep apnea.
- Smoking: Smokers are many times more likely to have obstructive sleep apnea than other people who have never smoked. Smoking can increase the amount of inflammation and fluid retention in the upper airway.
- Nasal congestion: If you have trouble through your nose-

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whether from an anatomical problem or allergies- you're more likely to develop obstructive sleep apnea.

- Medical conditions: Longtime heart failure, high blood pressure or type 2 diabetes may increase risk of obstructive sleep apnea. Polycystic ovary syndrome, hormonal disorders, prior stroke and chronic lung diseases such as asthma also can increase the risk

Central sleep apnea

Risk factors of this form of sleep apnea include:

- Being older: Middle-aged and older people have a higher risk of central sleep apnea.
- Being male: Central sleep apnea is more common in men than in women.
- Heart disorders: Having congestive heart failure increases the risk.
- Using narcotic pain medicines: Opioid medicines, especially long-acting ones such as methadone increase the risk of central sleep apnea.
- Stroke: Having had a stroke increases the risk of central sleep apnea.

Complications

Sleep apnea is a serious medical condition. Complications of OSA include

1) Daytime fatigue: The repeated awaking associated with sleep apnea, make typical restorative sleep impossible, and in turn make severe daytime drowsiness, fatigue and irritability likely. This might have troubles as to find you falling asleep at work, while watching TV and even when driving. People with sleep apnea have an increased risk of driving motor vehicles and work accidents. You also might feel quick-tempered, moody or depressed. Children adolescents with sleep apnea perform poorly in school or at work, or have behavior problems.
2) High blood pressure and heart problems: Sudden drops in blood oxygen levels that occur during OSA increase increases blood pressure and strain the cardiovascular system. Having OSA increases the risk of high blood pressure, also known as hypertension. OSA might also increase the risk of recurrent heart attack, stroke, irregular heartbeats, such as atrial fibrillation. If you have a heart disease. Multiple episodes of low blood oxygen (hypoxia or hypoxemia) can lead to sudden heart death and irregular heartbeats.

Treatment of Sleep Apnea

There are several types of treatments:

1) Healthy lifestyle changes can be very effective. These include regular physical activity, maintaining healthy sleep habits and a healthy weight, limiting alcohol and caffeine intake, and quitting smoking. Your provider may also recommend sleeping on your side- not on your back- as this may help keep your airway open while you sleep.
2) Breathing devices: A breathing device, such as a Continuous Airway Pressure (CPAP) machine, is the most common treatment of sleep apnea. A CPAP machine provides constant air pressure in your upper airway to keep them open and help you breath while you sleep.

Role of Inflammations

The role of inflammation in cognitive impairment of obstructive sleep apnea is described in reference [1]. Because of the inflammation associated with sleep apnea it is highly desirable to have an effective way to reduce or completely remove inflammations.

Magnetic Therapy of Apnea

I now suggest a magnetic therapy of apnea, and I explain the physical processes underlying this therapy. The basis of the therapy is that sleep apnea is associated with inflammations [1]. Inflammations can be cured by oxygen particles oxygen particles are in the blood. When applying a time-oscillating external electromagnetic field to the sites of inflammations, then an electromagnetic wave is generated in the tissue. An electromagnetic wave is described by

$$E=E_0 \cos(\omega t-k r), \quad (1)$$

$$B=B_0 \cos(\omega t-k r). \quad (2)$$

Here E is the electric part of the electromagnetic wave, and B is its magnetic part, with the magnetic induction

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

with the magnetic field H and the magnetization M: The quantity ω in angular frequency of the electromagnetic wave, and the vector k is its wave vector. An electromagnetic wave carries energy, and part of this energy is absorbed in the tissue, generating 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 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 are associated with the sleep apnea [1]. Furthermore, in the blood are particles with charge q, mainly Ca^{2+} ions or other ions with positive or negative charge, respectively. The electromagnetic field exerts Lorentz forces F on the ions,

$$F=q(v \times B). \quad (4)$$

Here v is the velocity of the ions in the blood, and the symbol x in the second part of equation 4 denotes the vector product. When the electromagnetic field is applied in a direction perpendicular to the blood flow, then the electromagnetic field accelerates the ions into directions perpendicular to the blood flow and gives them more energy. The ions hit the walls of the blood levels, and in each hit they transfer at list part of the 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 they 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 are associated with the sleep apnea [1].

I want to note that Lorentz forces to not occur only when applying a time-oscillating electromagnetic field, but also when applying a static magnetic field and/or a static electric field. This means that a magnetic therapy can be performed also by using static electromagnetic field, which is often simpler than using a time-oscillating electromagnetic field.

Conclusion

In my paper I described causes, symptoms and treatments of

sleep apnea. I suggested a magnetic therapy of sleep apnea, and I explained the physical processes underlying this therapy. The basis of the therapy is that sleep apnea is associated with inflammations [1]. By the magnetic therapy the blood flow increases and 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 are associated with the sleep apnea. This is an interesting example for a magnetic therapy of a disease. Magnetic therapies are used to treat many different diseases. Another very interesting example is the pulsed electromagnetic field treatment of cancer [2].

Famous People Suffering from Sleep Apnea

Many famous people suffered from sleep apnea, for instance the former USA Supreme Court justice Antonin Scalia.

References

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