



The Science of Fresh Air and Sunshine

By Dr Lin Day (www.babysensory.com)

Introduction

There is no substitute for fresh air or natural sunlight. Fresh air contains high levels of negative ions that can have a positive impact on brain function, mood and well-being. Sunlight provides Vitamin D that children need to grow strong, healthy bones and offers protection from several common disorders and diseases.

Children may spend a lot of time indoors every day in poorly ventilated rooms, where the positive ion count is high. High levels of positive ions can affect mental performance and lead to behavioural problems and even aggression. Lack of natural sunlight can reduce energy levels, affect mental ability and speed of thinking and make children more susceptible to infection.

Fresh air and natural sunlight are priority foods for the brain and body. But, do children get enough?

What are ions?

An atom that has one of its normal orbiting electrons removed is called a positive ion. An atom that has an extra electron added is called a negative ion. In this context, the terms ‘negative’ and ‘positive’ are reversed. Even more confusing is the fact that negative ions can have a positive effect on mood and behaviour, whereas positive ions can have a negative effect on human biochemistry.

Negative ions are created when energy from sunlight, radiation, moving air or water breaks a positive ion apart to forcibly remove an electron. When the displaced electron attaches itself to a nearby atom, it becomes a negative ion.

Negative ions

The normal negative ion count in fresh country air is about 4,000 negative ions per cubic centimetre. The highest concentrations of negative ions are found in mountain air and waterfalls, which may contain up to 100,000 negative ions per cubic centimetre. Sea air and natural forests are also heavily charged with negative ions, which is why people often feel invigorated, refreshed and energized by them. Electrical storms can also regenerate positively charged atmospheres by releasing trillions of negative ions into the air.

Negative ions are good for brain and overall health. They can relieve several symptoms from seasonal affective disorder (SAD or the ‘winter blues’), fatigue, stress and tension, to headaches, asthma, hay-fever, hypertension, muscle pain, neuralgia, arteriosclerosis,



cerebral apoplexy and cancer. Negative ions also promote the production of immunizing antibodies, which increase resistance to disease.

Negative ions regulate the production of serotonin inside the brain, thus promoting strong brain waves that increase mental performance, alertness, concentration, creative thinking and problem-solving ability. A few good reasons for getting out in the fresh air!

Biochemistry

About 85 percent of ions are absorbed through the skin, the largest organ of the body. The remaining 15 percent are inhaled from the surrounding air.

Clinical research shows that negative ions can accelerate the movement of microscopic hairs (cilia), which can prevent air pollutants, chemical and smoke fumes from reaching the respiratory tract. Negative ions increase lung capacity and the ability to absorb oxygen, which is vital for brain, tissue and nerve cell function. They facilitate crucial cell processes that involve the combustion (oxidation) of nutrients. Without negative ions, the absorption of nutrients and the elimination of waste material could not be carried out effectively. Negative ions also accelerate degradation of the brain neurotransmitter serotonin, which has a calming effect on behaviour, whereas positive ions have the opposite effect.

Normal levels of serotonin help the body to deal with mental, emotional, and physiological stress. However, high levels of positive ions can stimulate overproduction of serotonin. Initially, excess serotonin produces a state of exhilaration, euphoria or hyperactivity, which quickly gives way to irritability, anxiety, lethargy, fatigue and diminished mental ability. High concentrations of positive ions can also trigger overproduction of histamine, a chemical that aggravates allergies. Prolonged exposure can lead to headaches, depression, respiratory problems and behavioural disorders.

Positive ions

When children spend long periods of time indoors, where there is little ventilation, they may inhale pollen, fungal spores, dust, chemical fumes, bacteria, and infectious viral particles that reside on positively charged particles in the air. Negative ions draw positive ion particles together in clumps. When the clumps become too heavy to remain airborne, they drop to the floor where they settle as visible dust. This frees the air from potential irritants that can cause a variety of allergic reactions such as hay-fever and asthma. However, children and babies who spend time on the floor may develop respiratory problems if the surface is not cleaned or vacuumed regularly.

Indoors, high levels of positive ions are found in places where TVs, computer monitors, electrical equipment and fluorescent lighting operate. Central heating and air-conditioning systems can draw negative ions out of the air and create an overload of positive ions. In poorly ventilated places such as classrooms, homes and offices, the negative ion count may be as little as 100 negative ions per cubic centimetre.



High levels of positive ions are also found in polluted areas, in places where humidity and temperature are high and where warm, dry winds blow. Positive ionisation also increases significantly before a storm, which may explain why animals become restless and why humans often feel exhilarated and excited. A full moon also increases the positive ion count, which is the reason why some people become more aggressive in their behaviour.

When the atmosphere has more positive ions per cubic centimetre than negative ions, the imbalance can lead to respiratory disorders. Children are especially susceptible to asthma attacks from positive ionisation. Babies also cry more when the negative ion count is depleted. Respiratory disorders, headaches and allergies may also be exacerbated by synthetic clothing, carpets, upholstery and even cellulose and silicone-based furniture finishes, which can produce a positive static charge. Natural fibres and wood carry little charge of either kind.

Sunlight

Another side benefit of getting fresh air is sunlight. Sunlight provides 95 percent of the body's vitamin D requirement. The rest can be obtained from oily fish, margarine, milk, eggs and vitamin supplements. However, taking vitamin D supplements for long periods of time can be harmful. In fact, baits laced with vitamin D are used very effectively for the control of rodent pests.

Vitamin D facilitates absorption of calcium, which helps to build strong bones and teeth. Babies and children need vitamin D for healthy bone growth and development. Inadequate levels of vitamin D are associated with rickets, a disease that affects the way bones grow and develop. Adults also need adequate amounts of the vitamin to enhance bone mineral density and to prevent osteoporosis, a disease of the bones that increases the risk of fracture. Vitamin D can reduce high blood pressure and cholesterol levels and provide protection against thyroiditis, Crohn's disease, diabetes, cancer and multiple sclerosis.

Studies show that exposure to sunlight in childhood dramatically reduces the risk of developing multiple sclerosis, a disease of the central nervous system, in later life. Sunlight also helps to warm the body's muscles, which eases stiffness and helps to reduce the pain caused by inflammatory conditions such as rheumatoid arthritis; it is also good for skin conditions such as psoriasis and dermatitis.

Cancer and sunscreen

A recent study published in the Journal of the National Cancer Institute showed that exposure to sunlight prevented and reversed the growth and spread of prostate, breast, cervical and skin cancers. Nevertheless, the pharmaceutical and sunscreen industries have warned people that sunlight causes cancer. Yet, research shows that the highest incidences of skin cancer have arisen from the use of sunscreen containing benzophenone and oxybenzone. These chemicals are used in industrial processes to initiate chemical reactions. When activated by ultraviolet (UV) light, Benzophenone produces dangerous free radicals, which react with other molecules and damage cell DNA. Cell damage can cause the development of cancer.



Sunscreen may also contain triethanolamine and PABA, cancer-causing compounds that may not be disclosed on the label. The rise in melanoma has been exceptionally high in Australia, where the use of sunscreen has been heavily promoted. If used during pregnancy, sunscreen can enter the bloodstream through the skin and cause serious problems in the sexual development of the foetus. In fact, any chemical or substance that is absorbed through the skin can be harmful to human health.

Some sunscreens do not provide full protection against harmful UV radiation. In addition, sunscreen may suppress the natural production of melanin, which offers protection from UV radiation, and reduce the manufacture of vitamin D in the skin.

Sunlight overexposure

Care must be taken to avoid overexposure to UV radiation. Ten to fifteen minutes of sunlight exposure on the hands, arms and face two to three times a week (depending on skin sensitivity) is enough to satisfy the body's vitamin D requirement. People with dark skins need more sunlight to generate vitamin D. People with fair or light skin need less sunlight because they produce vitamin D more quickly. However, fair-skinned people are an easy target for sunburn because their skin cells contain less melanin. Repeated, severe sunburn has clinical implications for an increased risk of skin cancer.

A baby's skin is more susceptible to UV damage than an adult's because it is much thinner. Babies should be kept in the shade especially between 11am and 3pm, when UV radiation is at its strongest. Loose cotton clothing will help to keep them cool and provide skin protection from the sun. Although childhood exposure to UV radiation is a known risk factor for skin cancer, it is also important to acknowledge that the use of sunscreen has been linked to melanoma, the most serious type of skin cancer.

Sunlight makes people feel happier and more energetic and it boosts the production of endorphin, which reduces stress. If combined with exercise, sunlight can alleviate depression and numerous other health complaints. However, lack of exposure to sunlight can trigger SAD and carbohydrate cravings and affect the ability to think clearly and make decisions.

Conclusion

Fresh air is highly underrated. It brings more oxygen to the brain, muscles, tissues and cells, which in turn affects mental and physical performance. Getting plenty of clean, fresh air is the best way to keep the brain functioning at full capacity.

Everyone needs natural sunlight to stay healthy. In fact, the risk of illness increases without enough exposure to sunlight. Where there is little sunlight to disperse or kill infectious particles, it is hardly surprising that people succumb to micro-organisms that cause colds and influenza.

In places where fresh air is a premium, taking children to the country will give them the chance to breathe in negative ions, stay healthy and learn about life at the same time. In



the winter months, when respiratory disorders are most prevalent, getting children out in the fresh air and sunlight can invigorate them, providing they are warmly dressed for the cold. Simply going outside for 15 minutes a day can improve every aspect of life from mood and energy levels to health and well-being.

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