

The Sun is an Antidepressant

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The gradual increase in the hours of sunlight is an unmistakable sign that the depths of winter are behind us and that we can begin to anticipate the arrival of spring. This is excellent news for people who are particularly sensitive to the absence of light.

The energy generated by the sun is propelled towards the Earth in the form of electromagnetic radiation composed of 50% infrared radiation (responsible for the heat from the sun), 40% visible light and 10% ultraviolet light. All these forms of radiation are caused by identical particles (photons), but they are propagated at different frequencies.

The retina of the eye possesses receptors which are activated by photons of visible light, constituting the first step in the process of vision which permits us to distinguish the colours (from violet to red) and the shapes in the world that surrounds us. The use of captured photons by the retina is not limited solely to vision, however, as several studies have shown that the visible light is a powerful regulator of several processes, notably circadian rhythms, and can even affect behaviour.

SEASONAL AFFECTIVE DISORDER

The important role that light plays in mood is well illustrated by the appearance of symptoms, normally associated with depression, in several animal species when deprived of light (loss of appetite, immobility).

In humans, it has long been known that a large number of people are particularly sensitive to the decreased numbers of sunlit hours that accompany the winter season, developing what is now called "seasonal affective disorder" (SAD), characterized by a lack of energy and low spirits which may evolve, in the more serious cases, to actual depression. It has been estimated that up to 10% of the population in Nordic countries is affected by SAD.

SUNLIGHT AS ANTIDEPRESSANT

In some cases it is possible to treat the seasonal depression simply by exposing the eyes to the sun's light spectrum (without infrared or ultraviolet), a technique called phototherapy.

To better understand the mechanisms responsible for this improvement in mood caused by light, a group of Chinese scientists examined the activity of cells in the nervous system of a model species, the gerbil (a small rodent from Mongolia), in response to light⁽¹⁾. First of all, they observed that the neurons associated with photoreceptor cells in the retina were directly connected to a highly specific region in the brainstem, known to participate in the synthesis of serotonin, one of the principal neurotransmitters involved in the control of mood. Consequently,



when the eye is stimulated by a source of light, the activation of neurons in the retina immediately activates the production of serotonin by the brain and simultaneously reduces the depressed behaviour of the animal.

This is a very efficient mechanism; the scientists observed that, in the animals which were deprived of light and had developed symptoms of depression, the simple act of stimulating the eye with a light source was as efficient in treatment as was the administration of fluoxetine (Prozac), an antidepressant medication which increases the levels of serotonin in the brain. In other words, sunlight is an actual antidepressant that falls to us from the sky!

Springtime is well-known for restoring people's moods, even amongst those who are depressed, but while waiting for spring, it's still possible to profit from the positive effects of sunlight, even during winter. Indoor lighting is a poor substitute for sunlight and it is important to enjoy fresh air for at least one hour per day, ideally while taking part in sporting activities which combine exposure to sunlight along with the beneficial effects of exercise on health. People who feel abnormally sad, irritable or tired during winter should not at all hesitate to look into the best therapeutic approach to follow.

⁽¹⁾ Ren C et al. Direct retino-raphé projection alters serotonergic tone and affective behavior. *Neuropsychopharmacology* 2013; 38(7):1163-1175.