

A bit of sunlight is good for the brain

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A fascinating recent study shows that moderate exposure to ultraviolet light stimulated the production of a neurotransmitter which promotes memory and learning.

The sun's ultraviolet rays are one of the best examples of a double-edged sword: on the one hand, exposure to the sun is essential for good health because the ultraviolet rays enable the production of Vitamin D, a substance which plays very important roles in bone development, immune function and the prevention of certain cancers. On the other hand, several studies have demonstrated beyond all doubt that excessive exposure to the sun is associated with an increased risk of developing skin cancers such as basal cell carcinomas, spinocellular carcinomas and melanomas. The melanomas are particularly dangerous because they can reach the circulating blood and thereby disperse in the form of metastases.

The sun should thus be considered as an exceptional source of a substance essential to health (Vitamin D), but which is so powerful that it must be encountered with extreme care.

EFFECTS ON THE BRAIN

Another positive effect of moderate exposure to the sun is its beneficial effect on mental health. For example, it was recently shown that the production of melanin (the brown/black pigment responsible for tanning) in response to ultraviolet light also generated endorphins, the endogenous opiates known to create a pleasant sensation and the feeling of well-being¹. Studies have also shown that exposure to the sun is often associated with a decrease in the severity of certain psychiatric problems, including bipolar disorder, possibly due to fluctuations in the levels of certain neurotransmitters such as serotonin.

Conversely, it has been known for some time that a large number of people are particularly sensitive to the decreased hours of sunshine occurring in wintertime, developing what has become known as "Seasonal Affective Disorder", characterized by a lack of energy and very low spirits which can evolve, in the most serious cases, into true depression. These symptoms can, however, be largely prevented in some cases by exposure to bright artificial light (light therapy).

IMPROVE COGNITIVE FUNCTIONS

A study recently published in the very prestigious journal *Cell* suggests that moderate exposure to the sun can also influence certain cognitive functions such as memory and learning². The scientists initially observed that exposure of the skin to ultraviolet rays was associated with a marked increase in the blood levels of



urocanoic acid, a by-product of the degradation of certain proteins present within the epidermis. Even more interesting is that the urocanoic acid generated by this light crosses the blood-brain barrier and is taken up by neurons where it is transformed into glutamate, a neurotransmitter that plays very important roles, particularly in the motor cortex and the hippocampus (the seat of memory). In other words, urocanoic acid could represent a sort of "messenger" establishing a link between exposure to the sun and cerebral functions.

This seems to be confirmed because exposure to ultraviolet light greatly improves the ability of studied animal models to resolve certain problems, such as learning to maintain equilibrium or even to recognize certain objects. This improvement in cognitive function was reproduced by simply injecting urocanoic acid into the animals, confirming that it is in fact the production of this molecule in response to ultraviolet light and its subsequent transfer into the neurons, which plays a role in the neurobiological effects of the sun.

5 TO 15 MINUTES

These observations confirm that moderate exposure to the sun is good for the health, both physically and mentally. And it is easy to do in summertime: just 5 to 15 minutes of occasional exposure of the hands, face and arms to the sun, two or three times each week in summer, is amply sufficient. The most important thing is to avoid sunburns at all costs: occasional, excessive exposures which result in sunburn are the principal risk factor for melanoma, particularly when they occur to the young or to those with pale skin. The large majority of studies indicate that regular and moderate exposure to the sun is not a significant factor in the risk of skin cancer and can even reduce the incidence of certain forms of cancer.

- (1) Fell GL et al. Skin-endorphin mediates addiction to UV light. *Cell* 2014;157; 1527-1534.
- (2) Zhu H et al. Moderate UV exposure enhances learning and memory by promoting a novel glutamate biosynthetic pathway in the brain. *Cell* 2018;173; 1716-1727.