Townsend Letter for Doctors & Patients, June 1996, Page 83 – 85

Q: You mention sunlight as beneficial to your health. How?

For example, it can cure depression, improve immunity, stimulate our metabolism while decreasing food craving, and increase our intelligence.

Although exposure to sun does contribute to aging of the skin, people who spend years working outdoors have a reduced incidence of cancer of internal organs. For many years, it has been known that the death rate increases during the winter months and also increases at night (winter or summer). Most deaths occur just before dawn when the body is in its least efficient state. It is just in the last few decades that we have been learning the reasons for this beneficial effect of light. It turns out that daylight stimulates our ability to use oxygen for energy production, and protects our tissues from some of the free-radical toxins that are produced by normal metabolism, by stress, or by radiation.

While ultraviolet light, and even blue light, tend to suppress our cells' ability to produce energy, those types of light penetrate only a short distance into living tissue, and so it is mainly the skin which is damaged by too much sunlight. Since blood does circulate in the layers of skin which receive ultraviolet rays, prolonged sun exposure can damage the immune system by injuring white blood cells, but usually the stimulating effect of the other types of light that penetrate more deeply offset this effect on the immune system.

Many health food stores are now selling melatonin, to reduce sleep and " prevent cancer. " They have taken some information out of context, and don't realize how dangerous melatonin is. It makes the brain sluggish, causes the sex organs to shrink, and damages immunity by shrinking the thymus gland. It is the hormone of darkness and winter, and is produced in the pineal gland by any stress which increases adrenalin. Adequate sun light suppresses the formation of melatonin.

This means that the immune system is most responsive in the summer, when days are long. Daylight stops the stress reaction, and protects our immune system.

Q: Doesn't exposure to the sun age you?

This effect is variable, and depends on our hormones and diet.

The unsaturated oils have been identified as a major factor in skin aging. For example, two groups of rabbits were fed diets containing either corn oil or coconut oil, and their backs were shaved, so sunlight could fall directly onto their skin. The animals that ate corn oil developed prematurely wrinkled skin, while the animals that ate coconut oil didn't show any harm from the sun exposure. In a study at the University of California, photographs of two groups of people were selected, pairing people of the same age, one who had eaten an unsaturated fat rich diet, the other who had eaten a diet low in unsaturated fats. A panel of judges was asked to sort them by their apparent ages, and the

subjects who consumed larger amounts of the unsaturated oils were consistently judged to be older than those who ate less, showing the same age-accelerating effects of the unsaturated oils that were demonstrated by the rabbit experiments.

While it is important to avoid overexposure to ultraviolet light, the skin damage that we identify with aging is largely a product of our diet.

Q: Don't you have to avoid sunlight because of skin cancer?

The type of skin cancer which is clearly caused by sunlight is a relatively harmless type of cancer, which appears only in sun-damaged skin. Melanoma, which is often called a skin cancer, because it sometimes begins in moles, does not have such a simple relationship to sunlight, and its incidence is significantly increased by the use of estrogen.

It is often said that the great increase in deaths from melanoma during the last 60 years has been caused by an increased popularity of sunbathing, but during the same time there has been a great increase in the incidence of cancer of the prostate, which is in a location that gets very little exposure to light. What these two cancers have in common is a sensitivity to estrogen, and it is during this same period of time that we have been exposed to increased amounts of estrogen-like chemicals in the environment as a result of industrial pollution: Dioxins, phenols, chlorinated hydrocarbons, DDT, smoke, etc. It is likely that these cancers (and others) are caused by the estrogenic pollutants.

The incidence of melanoma is consistently lower at greater elevations, where ultraviolet light is more intense, than at lower elevations. It is common for melanoma to develop on relatively shaded areas, including the middle of the back and the inside of the thigh, unlike the ordinary less malignant skin cancers, which develop most often on the forehead, nose, ear, cheek, and lip, where sun exposure is greatest. People who work outside have a low incidence of melanoma according to some studies, and this is sometimes said to be because they don't get sunburned, as pale people do when they spend time in the sun after being indoors for long periods. Sunburn does cause freckling, which is a clumping of pigment cells, but recent studies show that children who get sunburned are not at increased risk for melanoma. Sunburn causes complex changes in the tissue, including weakened immunity.

To avoid the aging and immuno- suppressive side effects of sunlight, it seems best for sunlight to come through a window glass which removes most of the ultraviolet light, and some of the blue light. Plastic film is available which contains copper that removes this harmful part of sunlight, and can be applied to ordinary window glass. Sitting in sunlight coming through a window of this sort, for short times during the day, is very protective. Besides protecting against cancer, it helps to keep the mood and energy level high, by keeping melatonin low and stimulating metabolism.

Recently, the polyunsaturated oils have been identified as the main thing in cells that radiation interacts with, to cause cellular damage. Vitamin E, taken internally or even applied to the skin, has been found to reduce the damage produced by exposure to

ultraviolet radiation, which is logical, since it interrupts the chain reactions of toxic free-radicals produced when unsaturated oils are oxidized by radiation or other injury. Aspirin has been found to have a similar effect in reducing the harmful effects which develop in the skin after sunlight overexposure. Coconut oil has been used for generations in " suntan lotions, " and whether it is absorbed through the skin or eaten as a food, it clearly has a protective antioxidant function. Carotene seems to work with vitamin E in the skin to reduce injury by ultraviolet radiation. Caffeine also has shown a protective action against radiation, but its mechanism of action isn't clearly understood.

Q: Why not use sun-blockers, so you can get light without getting burned?

If a sunscreen lotion is based on the use of an opaque reflective material, such as zinc oxide or titanium oxide, that substance remains mostly on the surface of the skin. This should make it fairly harmless, though it is possible that traces of titanium could be absorbed with oils into the skin, where it could be made toxic by interaction with ultraviolet rays.

However, other chemicals used in the sun screen lotions, such as PABA derivatives, also react dangerously with light, and are easily absorbed in significant quantities into the deeper layers of the skin, where they can cause mutations.

For example, several recent studies have found that the sun-blockers, which decrease the ordinary skin damage caused by ultraviolet rays, actually increase the risk of developing melanoma, by causing mutations when the cells' chromosomes interact with the sunscreen and the light. (Something similar happens in the disease, porphyria. A pigment that accumulates causes the skin to become very sensitive to the sun. Estrogen is known to intensify the disease.)

Even natural colored compounds, which have sometimes been used in suntan lotions, should be avoided, since they might be able to transmit the energy of light to the chromosomes, causing mutations.

Radiation from the sun reacts with the unsaturated fats you have eaten to cause oxidative damage to skin cells. Vitamin E, vitamin A and carotene are antioxidants that prevent skin cell damage, when they are taken internally or applied to the surface of the skin. None of these causes any harmful effects in the sun.

Aspirin reduces the iron content of the blood serum, and also inhibits the formation of the sometimes-toxic prostaglandins from fatty acids. Coconut oil is very resistant to radiation damage and, like vitamin E, tends to stop the chain reactions that occur in unsaturated fats. The old formula for suntan oil, coconut oil with iodine, might turn out to be a safe sunscreen, since the brown iodine absorbs light, as other " U.V. blockers " do, but iodine is also an effective chain breaker that inactivates free radicals, and it can't be absorbed into cells in its brown form. It doesn't have the potential for causing cancer that the popular sunscreens do.

Q: Is sunlight still beneficial if you use a safe sun blocker?

The popular chemical sun blockers are meant to stop the ultraviolet rays. If they can do that, without increasing the risk of melanoma, then they are very beneficial, because this will allow you to get a long exposure to direct sunlight, which penetrates deeply and has an anti-stress effect. But so far, there is no research that shows any of the chemical ultraviolet blockers is safe.

Q: Why do people seem to get sicker in the wintertime, often right after Christmas?

Nights are much longer in the winter, and even in the summer, death rates are higher during the night than in daytime. December 21 is the day with the fewest hours of sunlight, but the cumulative damage of prolonged darkness reaches its peak about a month later. Cold temperatures do have some harmful effects, but by keeping people indoors, or bundled up in thick clothing, cold weather also causes us to get very little exposure to sunlight. Winter sickness is mainly the result of a ” light deficiency. ”

When young sailors spent 6 months in the continuous polar night of Antarctica, they developed the same signs of nocturnal stress that are common in old people during the night. Many old people habitually get up before dawn, because they find it impossible to stay asleep. Even healthy young people (and animals) experience some degree of nocturnal stress as soon as the light is turned off at night, and their body responds with an increased production of adrenalin and cortisol.

The energy-producing part of cells, the mitochondrion, shows signs of being increasingly damaged as the night progresses, but they are gradually restored to their normal condition during the daytime light hours. This means that our greatest ability to resist stress is in the late afternoon, and we are most susceptible to injury at dawn. In the winter, nights are long and days are short, so we experience a cumulative increase in our susceptibility to stress-injury during the winter months.

The light which penetrates deeply into our tissues (mainly orange and red light) is able to improve the efficiency of energy production’ and to suppress the toxic free-radicals that are always being formed in cells.

Q: Can you get enough sunlight during the summer to hold you through the winter?

No, many of the beneficial effects of bright light disappear during just a few hours of darkness, though the restoration of our tissues that happens during the summer puts us into a better state for surviving the winter, for example by allowing massive regeneration of the thymus to occur. (This occurs in adults, not just in children. The idea that the thymus disappears after puberty is based on autopsies. If a person lives for even 3 hours after an accident or the onset of sickness, the thymus has had time to shrink.)

Frequent short exposures to bright light is almost as valuable as continuous sunlight, and it is less likely to cause skin aging.

Q: How much sunlight do we need a day for general health?

If artificial light is bright enough, it is as effective as sunlight at stopping the stress reaction, but people seldom use lights that are bright enough. Generally, people and animals are healthier when days are longer than 12 hours, that is, after March 21 and before September 20. When days are shorter than 12 hours, artificial lights should be used from sunset until bedtime, but the greatest brightness probably doesn't have to be continuous. Studies on isolated organs and tissues suggest that a few seconds of penetrating bright light are enough to break the free radical chain reactions, slowing the production of toxic substances, which tend to increase in concentration during nocturnal stress. A few seconds' exposure to the direct light of ten 150 Watt incandescent bulbs, for just a few minutes every two or three hours, might provide more effective protection than continuous exposure to a single 100 Watt light.

Glossary

Mutations are changes in DNA molecules which can kill cells, or accelerate their aging, or contribute to the development of cancer.

Cellular respiration: the ability of cells to consume oxygen and produce useful biological energy.

Free radicals are parts of molecules that can be produced by radiation (including sunlight), which contribute to cells' aging, cancer, and mutations.

The thymus gland is an essential part of our immune system, and it shrinks when we don't get enough light.

Melatonin, or pineal hormone: the pineal gland in the brain responds to an absence of light (or to any stress which increases the adrenalin systems) by secreting a hormone called melatonin, which lightens the skin, makes the brain sluggish, turns off thyroid and progesterone production, and suppresses immunity and fertility.

Immunosuppression refers to any process that lowers the efficiency of our immune system, such as stress, radiation, or poisoning.

Summary

1) In fall and winter, use very bright incandescent lights daily from sunset until bedtime.

2) Expose as much skin as possible to the bright light; even a minute is better than nothing. Thin, light-colored clothing transmits a considerable amount of light.

3) Infrared bulbs, with clear glass, are especially beneficial. Special low temperature red lights are available.

4) It is better to get your sunlight through windows, because it has less ultraviolet light than direct sunlight.

5) Don't use sun-blocking lotions, other than the simply reflective type (zinc oxide or titanium oxide).

6) Decrease the use of unsaturated oils in the diet, and use coconut oil as food and also on the skin during exposure to direct sunlight.

7) Vitamin E and aspirin reduce the harmful effects of sunburn, even when used after exposure to the sun, they can be applied topically to the burned skin. Vitamin E often contains some soy oil, so I recommend small doses of about 100 ma. per day.

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References

1. B. K. Armstrong, " Stratospheric ozone and health, " Int. J. Epidemiol 23(51873-996, 1994.

2. R. J. Berger and N. H. Phillip, " Constant light suppresses sleep and circadian rhythms in pigeons without consequent sleep rebound in darkness, " Amer. J. Physiol. – Regul. Integr. C 36(4), R945 - R952, 1994. " Sleep patterns… showed no evidence of prior sleep deprivation during LL. "

3. A. Bibikova, U. Oron, " Regeneration in denervated toad (Bufo viridis) gastrocnemius muscle and the promotion of the process by low energy laser irradiation, " Anat. Rec. 242(1), 123-128, 1996.

4. L. Bolognani, et al., " Effects of low-power 632 nm radiation (HeNe laser) on a human cell line: Influence on adenylnucleotides and cytoskeletal structures, " J. Photochem. Photobiol. B-Biol. 26(3), 267-264,1994.

5. N. V. Bulyakova, M. F. Popova, " Stimulation of post-traumatic regeneration of skeletal muscles of old rats after x-ray irradiation, " Bull. Exp. Biol. & Med. 103(4), 646-660.

6. A. Cagnacci, R. Soldani, C. Romagnolo, and S.S.C. Yen, " Melatonin-induced decrease of body temperature in women: A threshold event, " Neuroendocrinology 60(6), 649-662, 1994.

7. J. T. Chuang, M. T. Lin, ” Pharmacological effects of melatonin treatment on both locomotor activity and brain serotonin release in rats, ” J. Pineal Res. 17(1) 11 – 16, 1994.

8. A N. F. Conti, ” Effects of low-power 632 nm radiation (HeNe laser) on a human cell line: Influence on adenylnucleotides and cytoskeletal structures, ” J. Photochem. Photobiol. B-Biol 26(3), 267-264, 1994.

9. A Distefano, L. Paulesu, ” Inhibitory effect of melatonin on production of IFN gamma or TNF alpha in peripheral blood mononuclear cells of some blood donors, ” J. Pineal Res. 17(4),164-169, 1994.

10. V. A Frolov, ” Seasonal structural and functional changes in the rabbit heart, ” Bulletin of Experimental Biology and Medicine, 420-423, 1984.

11. V. A. Frolov, V. P. Pukhlyanko, T. A. Kanskaya, ” Changes in left ventricular mitochondria in intact rabbits during the 24 hour period, ” Bull. Exp. Biol. & Med., 363-366, 1986.

12. R. P. Gallagher, et al., ” Sunlight exposure, pigmentation factors, and risk of nonmelanocytic skin cancer 1. Basal cell carcinoma, ” Arch Dermatol 131(2), 167-163 1996. [" The lack of association between cumulative sum exposure and BCC contradicts conventional wisdom about the cause of this tumor... "]

13. R. P. Gallagher, et al., ” Sunlight exposure, pigmentation factors, and risk of nonmelanocytic akin cancer: 2. Squamous cell carcinoma, ” Arch. Dermatol. 13 1(2), 164 – 169, 1995. [" ...No association were seen between risk of SCC and cumulative lifetime sum exposure. "]

14. S. L. Harrison, et al., ” Sun exposure and melanocytic naevi in young Australian children, ” Lancet 344(8936), 1629 – 1632, 1994. (Sunburn.)

15. M. Hasegawa, A. Adachi, T. Yoshimura, S. Ebihara, ” Retinally perceived Light is not essential for photic regulation of pineal melatonin rhythmicity in pigeon Studies with microdialysis, ” J. Comp. Physiol. A 175(5), 581-586, 1994.

16. J. 1. Kitay, M. D Altschule, The Pineal Gland, Harvard Univ. Press, Cambridge, 1964.

17. L. H. Kligman, P.S. Zheng, ” The protective effect of a broad-spectrum sunscreen against chronic UVA radiation in hairless mice: A histologic and ultrastructural assessment, ” J. Soc. Cosmet. Chem. 46(1), 21-33, 1994. (OXYBEN ZONE caused more skin damage than was seen in unprotected mice.)

18. Kunkel and Williams, J. Biological Chemistry, 1961.

19. W. Malorni, et al., Both UVA and UVB induce cytoskeleton-dependent surface blebbing in epidermoid cells, ” J Photochem Photobiol. B Biol 26(3), 266-270, 1994.

20. A. L. Makdmov, T. B. Chernook, ” Biorhythmic aspects of intercontinental Antarctic adaptation, ” Izvestiya Akademii Nauk Kirgiskoy SSR No. 2, pp. 36 – 37, 1986.

21. F. Nachbar, H. C. Korting ” The role of vitamin E in normal and damaged skin, ” J. Molecular Med. -Jmm. 73(1), 7 – 17, 1995.

22. R. Pasquali, et al., Acta Endocrinologica 107, 42-48, 1984. (Thyroid seasonal changes in men)

23. D. Pastore, M. Greco, V. A. Petragallo, S. Passarella, ” Increase in H+/e(-) ratio in mitochondria irradiated with helium-neon laser, ” Biochem. Mol. Biol. Int. 34(4), 1994.

24. A T. Pikulev, et d., Radiobiology 24(1), 29 – 34, 1984. Krebs cycle enzymes.

25. Yu. 1. Prokopenko, Gigiyena i Sanitariya 12, pp. 8-10 1982, ” Adaptogenic light. ”

26. J. M. Rivas, S. E. UUricb, ” The role of IL-4, IL-10 and TNF-alpha in the immune suppression induced by ultraviolet radiation, J. Leukocyte Bbl. 66(61 769-776, 1994.

27. E. S. Robinson, et d., ” Malignant melanoma in ultraviolet irradiated laboratory opossums: Initiation in suckling young metastasis in adults, and xenograft behavior in nude mice, ” Cancer Res. 64(22), 6986-6991, 1994.

28. G. L. Schieven, J. A. Ledbetter, ” Activation of tyrosine kinase signal pathways by radiation and oxidative stress, ” Trends Endocrinol Metab. 6(9), 383 – 388, 1994. ” The ability of radiation and oxidative stress to bypass control by normal ligands to act on receptors and their signal transduction pathways offers a new perspective on the ways in which organisms can respond to stress. ”

29. B. J. Vermeer M. Hurks, ” The clinical relevance of immunosuppression by UV irradiation, ” J. Photochem. Photobiol. B-Biol. 24(3),149-154,1994.

30. P. Wallberg, E. Skog, ” Increasing incidence of basal cell carcinoma, ” Br. J. Dermatol 131(6), 914-916, 1994.

31. J. Westerdahl, et d., ” At what age do sunburn episodes play a crucial role for the development of malignant melanoma? ” Eur. J. Cancer 30A(I l), 1647-1664,1994.