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Some Recent Articles of Significance

Direct brain serotonin measurement validates Light therapy for SAD

Ten million people in the US can attest to the fact that the waning hours of sunlight in winter can provoke a dip in mood that may progress to full-fledged depression. Now a research team at Baker Heart Research Institute in Melbourne, Australia, has provided experimental evidence to support the long-suspected role of lowered serotonin levels in seasonal affective disorder (SAD).

It has been known that in response to lessening light, the neurons in the brain's supra-chiasmatic nuclei signal the pineal gland to increase production of the hormone melatonin. The fact that selective serotonin reuptake inhibitors – commonly used anti-depressants – alleviate SAD and increase availability of serotonin suggests that this neurotransmitter is implicated in the response to light. But a glitch in this theory is that cerebrospinal fluid and plasma in light-deprived individuals are not particularly low in serotonin.

Their researchers hypothesized that these other studies were not looking in the right place: cerebrospinal fluid reflects serotonin in the spinal cord, and blood plasma carries serotonin from the digestive tract. What has long been needed is a direct monitoring of brain serotonin levels as duration of light exposure changes.

The researchers inserted catheters into the arteries and jugular veins of 101 men, ranging in age from 18 to 79, to measure the levels of three neurotransmitters (serotonin, dopamine and norepinephrine) entering and leaving the brain. Subtracting the venous levels of each neurotransmitter from the arterial levels indicated the amount of that substance that was produced in the brain. They also monitored daily environmental conditions, including hours of bright light exposure, temperature, barometric pressure and rainfall.

Results were clear. Serotonin levels in the brain plunged between June and August, corresponding to Australian winter; not so the other two neurotransmitters, nor the serotonin produced in the gut or spinal cord. Nor did serotonin levels reflect the other environmental conditions. Serotonin levels were higher on bright days no matter what the time of year, and the amount of serotonin present reflected the hours of sun exposure on a particular day – conditions the day before had no effect. This suggests that daily light therapy, which many people with SAD use, has a sound basis in biology. (*The Lancet, Dec. 7, 2002, p. 1840*)