Behavior

Lighting up the lives of the depressed

For most of us, winter is a time of slowed activity; the shorter daylight and extended indoor periods can be, well, "depressing." But for some people, psychiatrists have documented, the winter brings true, clinical depression. Such persons experience depressed feelings; they oversleep, overeat and generally slow down significantly.

Preliminary studies have indicated that "winter depression" may be helped by artificially extending light periods each day. Now, in a study in the February AMERICAN JOURNAL OF PSYCHIATRY, researchers from the National Institute of Mental Health (NIMH) in Bethesda, Md., report that bright light has "a marked antidepressant effect." The scientists further suggest that the therapeutic mechanism may involve the altering of two brain neurotransmitter chemicals: melatonin and serotonin.

Norman E. Rosenthal and his NIMH colleagues treated 13 patients (6 of whom were hospital inpatients) with both bright and dim lights in the morning and evening and with various combinations of the two. The control treatment involved sleep deprivation, which has been effective in other depression studies.

The researchers found that in 10 of the patients bright light — several times brighter than ordinary room light — "caused a marked improvement in mood which was seen within a few days and lasted throughout the week of treatment. Removal of the light regularly caused relapse within a few days." The bright light was superior to the dim light in reducing depression. In a follow-up study, evening light alone was also effective.

On the basis of previous animal studies, the scientists suggest that bright light somehow suppresses melatonin, which along with serotonin has been implicated in the onset of depression. "Light," they conclude, "may be an important element in the treatment of such patients [with winter depression] and a valuable key to understanding their condition."

Kindness on the rocks

Any bartender will tell you that alcohol often makes people more aggressive and generally less inhibited. But the power of booze to loosen inhibitions sometimes promotes *helpful* behavior, says psychologist Claude M. Steele of the University of Washington in Seattle, turning "one of the most maligned drugs in human history [into] a milk of human kindness."

As pressures increase both to express and to inhibit a social behavior, such as helping someone with a tedious task, several drinks of liquor break down the inhibiting thoughts and generate more responses of a greater intensity, reports Steele in the January JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY.

First, he analyzed 34 previous studies of alcohol's effects on antisocial behaviors such as aggression. Alcohol increased these behaviors, but the increases were greater and the behaviors more extreme when a response was under strong conflicting pressures and a large amount of alcohol was consumed.

He then found that alcohol can increase "helping" behavior also. In two studies using a total of 224 college students, subjects were given either several drinks of vodka or no alcohol. They were then pressured to help an experimenter with a tedious proofreading task. Students imbibing the most alcohol (about four drinks) who were under the highest conflict (the most negative attitudes toward the proofreading task combined with highest perceived importance of the research) volunteered to do significantly more proofreading than subjects receiving less or no alcohol who were under either low or high conflict. Expectations about drinking and the alcoholic "high" did not account for the results, explains Steele.

"Alcohol impairs inhibitory control [of social behavior] in general," he says. "I'm not saying it's something to use to become more helpful, but we've shown that the same processes that govern its negative effects also govern some positive effects."

Biology

Julie Ann Miller reports from San Francisco at the Annual Congress for Recombinant DNA Research

Cancer and the yeast

Malignancy arises from an abnormality in a select group of normal cellular genes or in their control, according to a major hypothesis among cancer researchers today. An important question is, what role do these genes normally play in a cell? James Broach of Princeton University, Michael Wigler of the Cold Spring Harbor (N.Y.) Laboratory and colleagues have now answered this question for one of the genes — at least as it performs in yeast cells. The answer: The gene called *ras* modulates the activity of a regulatory enzyme called adenylate cyclase.

The yeast *Saccharomyces cerebisiae* has two genes that are similar to the human gene, *c-ras,* which has been implicated in bladder cancer. The yeast genes, *RAS1* and *RAS2,* appear to be involved in a yeast cell's decision about whether to reproduce by cell division or to form spores. A normal yeast chooses cell division when nutrients are plentiful, and sporulation when nutrients are scarce. But a yeast with reduced *RAS* activity sporulates even in the presence of excess nutrients, and yeast with no active *RAS* gene cannot survive. In experiments with genetically engineered yeast, however, a transplanted human *c-ras* gene can substitute for the yeast gene and the cell will grow normally. "The human gene can work in the yeast system," Broach says.

The *ras* gene associated with human cancer is a mutant that produces a protein with one altered amino acid (SN: 11/13/82, p. 316). The scientists have examined a yeast *RAS* gene with the corresponding mutation. They find that yeast cells carrying this mutant gene (called *RAS-val19)* also are impaired in the divide-or-sporulate decision. The mutant always enters into cell division even if there are insufficient nutrients. This overenthusiasm for cell division might be considered the yeast equivalent of malignancy.

The scientists soon realized that the *RAS* mutants were similar to another set of yeast strains. Yeast lacking adenylate cyclase — the enzyme that makes cyclic AMP, a small regulatory molecule—cannot begin cell division. On the other hand, strains that bypass the need for adenylate cyclase always begin cell division, even under inappropriate conditions. By putting different combinations of the genes into yeast, the researchers determined that the *RAS* gene products regulate growth in yeast solely by modulating adenylate cyclase activity. Biochemical measurements backed up this conclusion. "We haven't sorted it all out yet," Broach says, "but the analogies between the yeast and human situations are striking."

Shedding light on plant metabolism

Light has a dramatic effect on the development of plants. How does light switch on the activity of genes? Nam-Hai Chua and colleagues at Rockefeller University in New York have been examining several light-triggered genes that are active in specific plant tissues. They find that the signals for light activation, and also those for tissue specificity, are recognized even after the genes are moved by genetic engineering techniques to another species of plant. Even the botanists' distinction between the subclasses of flowering plants poses no barrier. A gene from wheat, a monocotyledon, was properly turned on by light and expressed in the appropriate tissues in tobacco, a dicotyledon, Chua reports.

In work with scientists at the Monsanto Co. of St. Louis, Chua and colleagues have moved DNA containing a light-activated gene from pea plants into petunia cells. Originally the DNA transferred included 1,000 nucleotides adjacent to the beginning of the protein-encoding region. In subsequent experiments, the flanking region was repeatedly trimmed, and the level of gene expression declined. But light continued to activate the gene until only 35 nucleotides remained adjacent to the coding sequence. Chua concludes that this short segment of DNA must be at least in part responsible for light activation of the gene.