

Cloudy memories, sunny predictions

Many scientists hold that the brain houses a number of specialized memory systems. Now, evidence for the existence of two such systems emerges from a study that also illuminates the impact of Parkinson's disease on mental life.

Parkinson's disease, which results in tremors and other movement disorders, causes people to lose brain cells that supply the chemical messenger dopamine to a strip of tissue called the neostriatum. Individuals with this condition find it difficult to track recurring events that, largely outside conscious awareness, shape their judgments, say psychologist Barbara J. Knowlton of the University of California, Los Angeles and her colleagues. The neostriatum may belong to a brain system devoted to the gradual learning of both mental and physical habits, the researchers propose.

In contrast, people who suffer another type of brain damage—which centers on a structure called the hippocampus—forget personal experiences shortly after they occur but excel at the so-called habit learning harmed by Parkinson's disease, Knowlton's group contends.

The researchers examined 20 people with Parkinson's disease who showed no signs of mental deterioration, 12 individuals with damage to the hippocampus and related areas, and 15 volunteers with intact brains.

The habit-learning task hinged on the ability to discern linked events in one's surroundings (SN: 7/13/96, p. 24). Cards bearing squares, triangles, circles, or diamonds were presented in combinations of up to three cards on a computer screen. Next, either a sunny or cloudy scene appeared. Certain card arrays appeared mainly before rain, others mainly before sunshine.

Participants assumed the role of a weather forecaster attempting to predict from the cards the approach of rain or clear skies before the weather pattern appeared on the screen.

By the end of 50 trials, volunteers with hippocampal damage and those with no brain damage had learned to predict weather conditions correctly in about 7 of 10 choices, the scientists report in the Sept. 6 SCIENCE. Those with Parkinson's disease made accurate forecasts only half the time, a rate no better than that achieved by guessing.

Despite their predictive successes, hippocampal-damaged participants rapidly forgot what they had done and seen in the study. Parkinson's disease patients and healthy individuals alike remembered those experiences in detail.

Wake up, sleepy brain

Lying with one's head immobilized under a brain scanner and an intravenous tube in one's arm is not a pleasant way to doze off, but seven men did just that in the name of science. Their ability to snooze in the face of such indignities has yielded a view of what happens in the brain during dreams.

The men, deprived of sleep in advance so they would slumber deeply, underwent positron emission tomography (PET) scans while awake, shortly after falling asleep, and during the sleep phase characterized by rapid eye movements and the occurrence of dreams. Volunteers were awakened while still in the dreaming phase, and each could recall his dreams.

During dream sleep, blood flow rose sharply in several brain areas, particularly the thalamus, assert Pierre Maquet of the University of Liège in Belgium and his coworkers. The thalamus, already linked to the processing of memories of emotional experiences, may reactivate emotional components of memories during dreaming, the scientists suggest in the Sept. 12 NATURE. Dreamers also displayed declines in blood flow in complex thinking areas at the front of the brain. Sparse neural activity there may contribute to a distorted sense of time and loss of self-awareness during dreaming, as well as to the forgetting of dreams upon awakening, the scientists theorize.

Breathing a life-sustaining liquid

The preemie's tiny chest rose and fell with the regularity of a metronome. Each breath was accompanied by a soft thump, the sound of the mechanical respirator force-feeding oxygen into the baby's underdeveloped lungs.

Without such help, the infant would die. Even with help—which includes treatment with surfactant, a lung lubricant that preemies often lack—the prospects for survival were dim.

Then, doctors tried a new treatment: They flooded the infant's lungs with a special lubricant.

Within an hour, the oxygen concentration in the infant's lungs more than doubled. Within 4 hours, the high carbon dioxide concentration in its blood fell to normal.

Thanks to this oxygen-bearing lubricant, called perflubron, the baby was one of eight to survive a crisis known as surfactant deficiency. Five others were not as lucky. Despite infusions of the liquid, these babies died, researchers report in the Sept. 12 NEW ENGLAND JOURNAL OF MEDICINE.

Nevertheless, the eight successes demonstrate that "partial liquid ventilation leads to clinical improvement and survival in some infants with severe respiratory distress syndrome who are not expected to survive," say Corinne Lowe Leach of Children's Hospital and the State University of New York in Buffalo and her colleagues.

Colorless and odorless, perflubron can take the place of surfactant. Like surfactant, perflubron bathes the lungs. But because it carries 25 times as much oxygen as blood plasma does, perflubron helps the lungs exchange carbon dioxide for oxygen.

These preliminary findings, the first reported from a 40-center trial of 480 premature babies, indicate that infants on a respirator can be sustained on perflubron for 76 hours. Thereafter, use of the lubricant can be discontinued, and infants can ultimately be shifted to room air. T. Allen Merritt of the University of California, Davis noted in an accompanying editorial that the therapy might also be used to deliver drugs to the airways and thus hasten recovery from serious diseases.

Is cholesterol a mood-altering lipid?

In a flurry of controversial studies over the past decade, researchers have found that people with low concentrations of cholesterol in their blood are more likely to attempt suicide than the rest of the population (SN: 3/11/95, p. 157).

Now two teams of European researchers seem certain to rekindle the controversy with reports in the Sept. 14 BRITISH MEDICAL JOURNAL examining the effects of cholesterol on mood in French men and Austrian new mothers.

Mahmoud Zureik of the National Institute of Health and Medical Research in Paris and his colleagues are studying more than 6,000 employed men age 43 to 52. The men submitted to annual measurements of cholesterol in their blood for at least 17 years.

By the end of that period, Zureik and his team report, 32 of the men had committed suicide. The researchers found that the risk of suicide was greater in men with low cholesterol concentrations, and in those whose concentrations declined over time, than in men with higher concentrations.

Barbara Ulm of the University of Vienna Hospital's Clinic of Obstetrics and Gynecology and her colleagues studied lipids, including cholesterol, in 20 women before and after delivery. Their aim was to learn "whether a fall in blood lipid after delivery could serve as a natural model to test the association between serum lipids and mood."

None of the women had mental, physical, marital, or money problems. Nonetheless, those with the greatest drop in cholesterol concentrations after delivery were the most likely to suffer postpartum depression, the researchers say.