Hormone levels high in SIDS

Silently, suddenly, and without apparent struggle, an infant dies in the United States almost every hour, leaving grieving parents and scientists only a handful of hints to "sudden infant death syndrome." Adding to the list of anatomical and behavioral characteristics of infants who die from SIDS compiled in the last decade (SN: 4/15/78, p. 234; 3/8/80, p. 150), researchers at the University of Maryland now have detected abnormally high levels of a thyroid hormone in SIDS victims.

Although he cautions that the finding "has no [direct] clinical significance at this time," J. Tyson Tildon of the university's SIDS Institute told SCIENCE NEWS that the discovery has opened a new line of investigation in SIDS research and could eventually permit physicians to identify some infants at risk for crib death through a simple blood test.

However, further studies are needed to determine whether the rise in blood levels of tri-iodothyronine (T-3) takes place weeks or only moments before an infant's death. "We know that it [T-3] is elevated in SIDS children, but we don't know what that means," says Tildon, who supervised the study conducted by graduate student Marco Chacon and published in the November JOURNAL OF PEDIATRICS.

The scientists compared blood samples of 50 SIDS victims who died when they were about 15 weeks old with samples from 18 infants who had died of other causes and with samples from 12 healthy babies of the same age. While infants in the latter two groups averaged 170 nanograms of T-3 for every 100 milliliters of blood, 88 percent of the crib death victims had levels more than three times as high.

Animal studies testing the physiological effects of chronically high T-3 levels have not yet been completed, but the hormone is known to play a key role in the development of the central nervous system, Tildon says. Abnormalities in the hormone levels might play a part in the excess "brown fat" surrounding the adrenal gland, the thickening of pulmonary arteries, and brainstem abnormalities thought to be characteristic of SIDS victims. Reported growth retardation and fever, common at the time of death, might also be influenced by elevated T-3 levels, the researchers assert. Whether the high levels contribute to the death of such infants, or result from some other abnormality, is not known.

Richard Naeye, a pathologist researching SIDS at the Pennsylvania State University Medical Center in Hershey, Penn., voices concern that a public eager for definitive answers to questions of causality in crib death will misinterpret the recent findings. "This is not the answer," Naeye says. "At least not now." He and the Maryland researchers agree that it is very possible that T-3 levels might rise just moments before or even after an infant's death, precluding a bloodtest's value as a predictive tool. □

Naloxone and schizophrenia

Naloxone, a potent blocker of opiate receptors in the brain, first raised psychiatrists' eyebrows several years ago when several preliminary studies reported that single injections of the drug temporarily alleviated symptoms — especially auditory hallucinations — in some schizophrenics (SN: 7/15/78, p. 38). But subsequent efforts to delineate a role for endorphins, the brain's natural opiates, in schizophrenia have yielded mixed results.

In an effort to clarify a complicated picture, the World Health Organization sponsored a collaborative project that administered naloxone to 32 schizophrenics and 26 manic patients at mental health centers in the United States, Switzerland, India, Germany, the Soviet Union and the Netherlands.

The international team's report, to be published in the ARCHIVES OF GENERAL PSYCHIATRY, adds a new twist to the early findings by indicating that the endogenous opiate system may interact with the dopaminergic system to shape the symptoms of some schizophrenics.

In the double blind study, each patient was given a subcutaneous injection of either naloxone (.3 milligrams for every kilogram of body weight) or a saline placebo on the first day of the study, and given the alternate treatment several days later. Nineteen of the schizophrenics were concurrently treated with neuroleptics (anti-psychotic drugs), while the other 13 schizophrenics received no drugs other than naloxone. (Neuroleptics are used frequently to treat schizophrenics and are believed to act by blocking the transmission of the neurotransmitter dopamine at nerve synapses, effectively reducing dopamine levels in the brain.) When physicians compared behavior of the patients on various rating scales before and several hours after naloxone injections, only those treated with both naloxone and neuroleptics showed a significant reduction in overall schizophrenic symptoms. Naloxone seemed to have no behavioral effect on the manic patients tested.

Results of the study "do not support a simple excess endorphin-schizophrenia hypothesis," the researchers report. "Nevertheless, some relationship between endorphins and schizophrenic symptomatology is suggested." The endorphin and dopamine systems may interact to shape schizophrenia, says David Pickar, one collaborator in the study from the National Institute of Mental Health. □

Syndrome linked to dopamine

The Lesch-Nyhan syndrome, an X-linked disease characterized by spasticity and aggressive self-mutilation, appears to be linked to chemical, rather than anatomical, abnormalities. Autopsies of three patients with the disease revealed that the dopamine nerve terminals, which are critical to normal motor control, function at only 10 to 30 percent of normal values. The study, reported in the Nov. 5 NEW ENGLAND JOURNAL OF MEDICINE, is the first attempt to directly measure neurotransmitters in brain tissue of patients with this disease, according to the researchers.

The observed decrease in dopaminergic neurons, and accompanying decrease in enzymes required for dopamine synthesis, was confined to the terminal regions (caudate nucleus, putamen, nucleus accumbens and external pallidum) of the brain. A decrease in the function of cholinergic neurons in these parts of the brain was also apparent. In contrast, the cell body region (substantia nigra) had normal dopamine levels. These observations are consistent with the theory that a dysfunctioning extrapyramidal system — the control center for motor movement and regulation — is involved in this disease.

The neurotransmitter alteration was also chemically specific. Gamma-aminobutyric acid (GABA) and acetylcholine neuronal activity levels were considered normal in both the terminal and cell-body sections of the brain. The functioning of serotonin-neuron terminals appeared to be increased.

Neuropathological studies of brain material showed no morphologic abnormalities in any part of the brain. Dietary deficiency, which has been observed to produce alterations in levels of catecholamines and serotonin in the brain, did not seem to account for the lower dopamine-neuron levels.

A deficiency in the enzyme hypoxanthine-guanine phosphoribosyl transferase is thought to be the underlying metabolic basis of Lesch-Nyhan syndrome. Afflicted persons carry a spontaneous, X-linked genetic mutation and generally die before reaching the age of 30. They lead lives of devastating self-destruction, biting lips and fingers unless forcibly restrained. Scientists believe that the study of other rare genetic diseases such as Lesch-Nyhan may further clarify the relationship between neurotransmitters and brain function regulators and even suggest a chemotherapeutic approach to treatment. "Frequently, it is through nature's mistakes that her secrets are revealed," says Irwin J. Kopin of the National Institute of Mental Health in an NEJM editorial. □