

# THE STRESS-ILLNESS LINK:

## NOT 'IF' BUT 'HOW'

A recent scientific study failed to detect personality differences between people with ulcerated colitis and those without it. But shortly after the results had been reported it was learned that one of the researchers had been in psychoanalysis for 15 years — presumably because his mother had left him out on the fire escape as a child, hoping that someone would come along and pick him up. Another of the researchers, a psychoanalyst, committed suicide a short time after the study.

"This brought up questions about the reliability of the [research] team," understates a scientist connected with the study.

This somewhat bizarre account of research gone awry is not an everyday example of the problems besetting investigations into the effects of stress on the human body — but it's an indicator. "None of us needs to be reminded of our limited understanding of the etiology and mechanisms of . . . psychosomatic illness," says Richard S. Lazarus, professor of psychology at the University of California at Berkeley.

Lazarus was one of two dozen of the country's top experts in stress research who gathered recently at the Boston University School of Medicine to discuss the role of stress in diseases, particularly hypertension, gastrointestinal illness and female reproductive dysfunction.

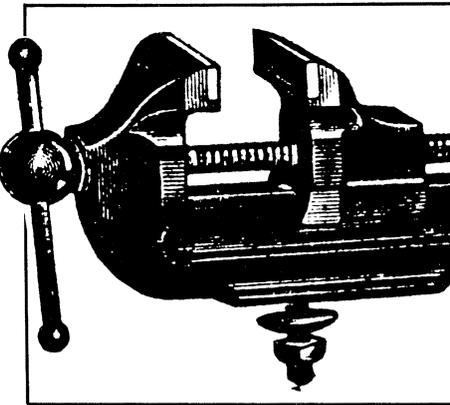
For decades, numerous studies of the causes and effects of stress have yielded theories, counter-theories and more theories, highlighted by the ideas of Hans Selye of the University of Montreal (SN: 5/31/75, p. 356). Selye defined stress as sort of an omnipresent reaction to almost any stimulus; a certain stress could trigger any number of diseases in one person, and be rather harmless to another, he proposed.

Although significant gains are being made in stress research — especially in relation to hypertension — the field remains littered with contradictory, confusing studies that frequently inspire head-scratching among the experts. Even in blood pressure/stress studies, "every one of the hypotheses . . . is contradicted by as much evidence as exists in its support," says S. Leonard Syme, chairman of Biomedical and Environmental Health Sciences at the University of California at Berkeley.

What bothers researchers today is not the question of *whether* stress can cause disease. Even though the results may be fragmented, studies clearly indicate that emotional stress does contribute to high blood pressure, gastrointestinal problems and apparently to a wide variety of other

Study results are confusing, but researchers believe they're finally on the right track

BY JOEL GREENBERG



illnesses in some individuals. Rather, the unanswered questions deal more with *who* becomes ill under stress, *why* the same stress will trigger different problems in different individuals and *why* other persons remain totally unaffected and healthy under stress.

In those critical areas, the consensus is that medical and psychological science

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has barely scratched the surface. "We've been looking for direct relationships between stress and illness," says Robert Rose, chairman of Boston University's Department of Psychosomatic Medicine and organizer of the conference. But the links are not that simple. "We must pay attention to what happens to people in their total life events," Rose said in an interview. "It's not that stress research has failed so much as it is insufficiently sophisticated to assess [individual] vulnerability . . . in a certain environment."

Nevertheless, studies over the years have yielded vast numbers of clues to the effects of stress and have built what Rose and others feel is a solid base upon which to launch more sophisticated research. Results in the stress/hypertension and circulatory disease field appear to be the most promising, as well as the most plentiful. "Taken together, the studies relating behavior to blood pressure regulation and hypertension provide justification for the conclusion that behavior and cardiovascular processes are intimately linked," says Alvin P. Shapiro, acting chairman of

the Department of Medicine at the University of Pittsburgh. "The issue for the future is not whether behavioral factors play any role in hypertension, but rather to what extent, under what conditions, and in which individuals behavioral factors are acting as important stimuli."

While stress/hypertension studies point to numerous links, they also raise an equal number of uncertainties. For example, the data show that:

- Blood pressure levels rise with age in some population groups, but not in others.
- Males have higher blood pressure levels between the ages of 25 and 55 years, but females have higher levels after that; the age at which female pressures exceed males differs among different population groups.
- Blacks tend to have higher blood pressure levels than whites, but there is a strong recent indication that the difference may be directly attributable to differences in socioeconomic status.
- Those in lower socioeconomic groups have been reported to have higher blood pressure in some studies, but not in others.
- Some researchers have reported higher blood pressure levels in urban areas; others have found higher blood pressure in rural areas.

At another level, "epidemiological studies have clearly and repeatedly shown that elevated blood pressure is a substantial risk factor for the development of coronary heart disease," notes Syme. "In spite of this, virtually every group known to have relatively higher blood pressure levels have relatively lower rates of coronary heart disease." He cited women, blacks, North African Jews and the Japanese as examples of groups with either high blood pressure and low heart disease rates, or vice-versa.

In a 1975 study of 4,000 Japanese men who migrated to California, researchers found that a substantial rise in coronary heart disease rate was not accompanied by a rise in blood pressure. Moreover, no difference in blood pressure levels was found between Japanese immigrants who had adopted Americanized lifestyles and those who had not. Those findings were "not what we had expected," Syme says, particularly in light of a 1960 study which showed that Zulus who had undergone drastic culture change (moving from a rural to an urban area) exhibited substantially higher blood pressures.

Still lingering as a sort of monument to the confusion in this field are the results of a 1968 study which took an ambitious look

at 1,483 households in Alameda County, Calif. Syme painfully sums up the "disappointing" findings: "No consistent relationships were found between blood pressure levels and any of the sociocultural variables studied, including residential, geographic, job and occupational mobility; intergenerational and intragenerational mobility; status inconsistency and status tension; and measures of traditionalism-modernity."

Since 1970, however, epidemiological studies have yielded somewhat more positive results. Correlations have been found between hypertension and job loss, economic deprivation and crowding, among other factors. One study in 1975 reported that men in penal institutions had higher blood pressures when they were forced to live in crowded, as compared with private, prison cells.

Among the most significant of the current research is a study by Rose and Har-

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vard University psychobiologist J. Alan Herd of 400 air traffic controllers. The results of the four-year investigation will not be released until next summer, but Herd told SCIENCE NEWS the researchers are seeing some "incredible ranges" of blood pressure levels in controllers both on and off the job. "A substantial percentage of subjects seem to be more responsive [to stress] than others," Herd says. "This could be dangerous in the sense that it is ominous if it is a chronic thing ... and we don't know that yet."

Like hypertension, gastrointestinal illness has been implicated as a consequence of stress in numerous studies. Findings include:

- Air traffic controllers are stricken with peptic ulcers nearly twice as often as are second-class airmen, according to a study by Rose and his colleagues.
- Men working in supervisory roles, such as foremen, get ulcers at a significantly greater rate than those in other work roles, such as craftsmen and executives, several studies have found.
- U.S. Army recruits contracted peptic ulcers between 1942 and 1945 at double the rate of recruits prior to and after World War II.
- Persons undergoing bereavement, separation and other situations involving loss of a loved one or "dashed hopes of being cared for" are identified as high-risk gastrointestinal patients.

Nearly all such studies are retrospective — an approach that carries with it a built-in lack of control over variables. However, stringently controlled research with rats has shown that rats prematurely separated from their mothers and immobilized in restraining cages developed ulcers,

while those weaned for a normal period of time (and also restrained) did not.

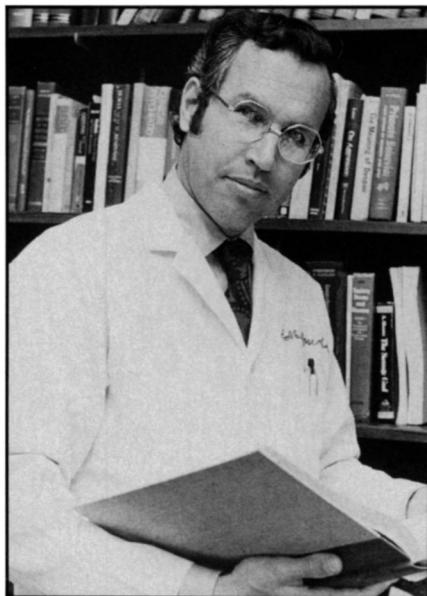
But comparatively little hard, scientific research has been done on exactly "what stress does to the gut," says William H. Bachrach, head of gastroenterology at Baylor College of Medicine in Houston. A

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major problem lies in the difficulty of measuring changes within the complex gastrointestinal network. "The technology, though improved, still needs to be evaluated," Bachrach says.



Rose: "Sophisticated" research needed.

As in nearly all behavioral research, the ultimate keys must lie in the study of human, not animal, reactions. And there appears to be a growing feeling that after-the-fact, wide-ranging epidemiological studies have carried researchers about as far as they are going to. "We have about all the epidemiological data we need," contends Norman Kaplan of the University of Texas. "And we still don't know what in the hell causes hypertension."

In all areas of stress research (including its potential links to female reproductive dysfunction — a mysterious area that has produced the least productive findings of any discussed at the Boston University conference), the call for the future is for new, "prospective" research approaches.

By necessity, future studies will be more complex. Already it is apparent that various brain-body links are mediated by a person's endocrine and autonomic nervous system mechanisms. There is evidence for the participation of renal mechanisms, adrenal cortical secretions and central nervous system polypeptides in the stress/hypertension connection. Similar links are being investigated in the relation of stress to gastrointestinal and reproductive problems. "There is nothing more difficult in science than assessing

what's going on in the intra-psychic machinery," says John Mason of the Walter Reed Army Institute of Research's Division of Neuropsychiatry and now at Yale.

Such measurements will most likely be included in the wave of prospective studies advocated by many of the experts. "There have been no systematic predictive studies of the onset conditions and settings in which predisposed persons at risk for the disease find themselves," says Herbert Weiner, professor of psychiatry and neuroscience at Albert Einstein College of Medicine in New York. "They need to be carried out. Nor have any systematic studies of how predisposed persons respond emotionally and cope with such settings been carried out."

Perhaps the first such predictive study of psycho-social factors in hypertension was begun seven months ago by Lazarus at Berkeley. Lazarus and colleague Judith B. Cohen are studying 96 "ordinary people — not in crisis" between the ages of 45 and 64. Although the subjects are seen once monthly, they are instructed to keep a daily "hassle log" that includes almost moment-to-moment accounts of arguments, financial and work problems and other stresses, as well as positive incidents of the day.

"It may be that the most important factors are the chronic, daily hassles rather than major life events," Lazarus says. At least as important as daily incidents and events are a person's emotions and methods of coping with stressful situations — both of which are also included in the daily log. "We're interested in how effectively these people adapt," he says. "We ask them how they coped with a specific episode ... what did they think about. Did they focus on lowering the stress or on changing the situation? How did they deal with an ar-

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gument with a spouse or a confrontation with someone they dislike ...? We want to know if a person shows a unique pattern of coping."

The approach is aimed at determining whether certain lifestyles, physical and psychological predispositions and ways of coping (denial, avoidance, attachment, etc.) interact in discernible ways that precipitate, or prevent, particular illnesses. "What makes one person sick and another not sick? Why do some people die under certain circumstances, and others do not?" asks Lazarus. "We don't know. Our past research has been too structured; there's been a constant artificial separation of the person from the environment [in such studies], but people are not simply passive respondents. How does a person fall apart, what does he say to himself? Some people develop high blood pressure, others gastrointestinal illness, or some-

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more conventional kinds of paleontological modeling are "either unable to explain it or unwilling to deal with it."

There is evidence of human hunters having been in the Arizona-California area 11,000 years ago, but there is no direct evidence of their having hunted sloths. Nevertheless, they might have done so without necessarily leaving evidence for archeologists to pick up. Furthermore, it is not necessary for humans to have hunted every species that disappeared in order to have unbalanced existence for all of them. In the case of the sabertooth tiger, for example, it may be that humans hunted the sabertooth's favorite prey. As a result, the sabertooth would have found less food and would have reproduced less efficiently. If humans kept up the pressure for long enough, the sabertooth would have died out.

There is evidence that suggests extinction by hunting for mammoths in the Ukraine, Martin points out. There is a region in that country where 30,000 years ago people built their habitations out of mammoth bones. To the south of this area is territory that was then inhabited by humans but where the mammoth was extinct. To the north is territory where mammoths were then plentiful but humans rare or nonresident. Martin suggests that the region where people were exploiting mammoth bones represents a forward wave of human occupation that was gradually sweeping north-eastward, extinguishing the mammoths as it went.

Martin proposes that a similar wave of hunting people passed across the Bering Sea land bridge that existed about 11,500 years ago and swept southward across North America. There is a good deal of dispute about the earliest date of human occupation of North America. Some evidence for human occupation that seems much older than 12,000 years ago has been found, but those anthropologists who still maintain that the first people came to America 12,000 years ago tend to reject it as mistaken. Martin's argument about the cause of the great extinction can still be maintained by proposing that humans who lived in North America before this wave of 11,000 or so years ago were too few in number to affect the balance of large mammal species or were not big game hunters.

Martin says that even if he's wrong, the answer to the question of the late Pleistocene extinction is going to be interesting. If he's right, then people have been disturbing the ecology for a long time. Environmentalists often praise primitive people for their ability to live in harmony with the environment. Indeed, since at least the time of Jean Jacques Rousseau, the Noble Savage has been praised for adopting a natural style of life. It may be that the Noble Savage was not so noble after all. □

### ... Stress

thing else — we can't focus on just one thing."

Syme adds that the search for contributing forces "should not be limited only to factors associated with socioeconomic status. People who are married have lower death rates than those who are single, widowed or divorced for a wide variety of conditions and causes of death. States in the United States with high death rates for one cause tend to have high death rates for virtually all causes. Religious groups, such as Seventh Day Adventists and Mormons, have low death rates from all causes. Groups experiencing social and cultural mobility have higher rates of coronary heart disease, lung cancer, difficulties of pregnancy, sarcoidosis and depression. Those said to have 'stressful life events' have been reported to have higher rates of a wide variety of diseases and conditions ...."

He proposes that a "general susceptibility might be involved" and calls for "an inquiry into the common denominators among these factors."

The ultimate goal, of course, is the treatment or prevention of stress-related diseases. "The whole point is to relieve the individual," Shapiro reminds his research colleagues. An estimated \$750 million was spent during the past year on drug treatment of hypertension. Biofeedback and other relaxation techniques are also being employed, although on not nearly as wide a scale as are drugs.

About 10 major studies have demonstrated that various relaxation techniques can lower blood pressure, notes Herbert Benson of Harvard Medical School and director of the hypertension section of Beth Israel Hospital in Boston. "Relaxation techniques have been shown to substantially lower blood pressure for up to six months," he says.

Some experts are impatient with the slow pace of stress/illness research efforts and feel that more than enough evidence already exists to support the existence of the connection. "We're hung up on what constitutes evidence," says Stewart Wolf, chairman of medicine and physiology at the University of Texas in Galveston. "Do we need, in order to establish the relevance of psycho-social factors, that [high] level of quantification? We know that alcohol is relevant to accidents, yet we're not hung up on the fact that there are people who drink and drive and *don't* get into accidents," he says.

"I suggest we no longer ask if psycho-social factors contribute to disease ... [and] act on our acceptance of the connection of life stress and illness."

Rose, however, cautions that considerably more research is needed in the field. "I'm conservative about treatment," he says. "We have to get much better data. But I'm encouraged by what's happening in the field now. Psychobiology will rise to the occasion." □

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**ROOTS OF CARING, SHARING, AND HELPING: The Development of Prosocial Behavior in Children** — Paul Mussen and Nancy Eisenberg-Berg — W H Freeman, 1977, 212 p., \$12, paper, \$4.95. Summarizes the available information on research in moral development, examines findings on the major determinants of prosocial behavior and assesses methods of study.

**SCIENTISTS CONFRONT VELIKOVSKY** — Donald Goldsmith, Ed., foreword by Isaac Asimov — Cornell U Pr, 1977, 183 p., diagrams, \$8.95. A critique of Velikovsky's theories by three astronomers, a sociologist and an expert on ancient astronomical records. Four of the essays are based on papers presented at the AAAS meeting in February 1974.

**STRESS AND COPING: An Anthology** — Alan Monat and Richard S. Lazarus — Columbia U Pr, 1977, 426 p., illus., \$20, paper, \$10. A systematic presentation of the major issues and findings in this field geared primarily to the undergraduate student.

**TECHNIQUES OF ARCHAEOLOGICAL EXCAVATION** — Philip Barker — Universe, 1977, 279 p., photographs & drawings, \$18.50. Traces the development of excavation methods from the 1880s to the present, and describes the stages by which an excavation is carried out from preliminary field work to numerous processes of excavation and recording. The responsibility of the excavator is extremely heavy, says the author, since the study of a site is an unrepeatable experiment.

**TECHNOLOGY AND HUMAN VALUES: Collision and Solution** — Bruce O. Watkins and Roy Meador — Ann Arbor Science, 1977, 174 p., \$12.50. A status report on the present state of technology and its continuing impact on the values of mankind.