

Strong Support for Virus in Human Cancer

Circumstantial evidence has long pointed to a link between Epstein-Barr virus and the cancer of lymphoid organs called Burkitt's lymphoma. Strong, recent evidence that the virus causes the cancer is reported in the Aug. 24 *NATURE*. A project sponsored by the World Health Organization has been following 42,000 children in the West Nile District of Uganda since 1972 (SN: 11/8/75, p. 298). The results, while solidly implicating the virus, leave important puzzles. Researchers still are asking why the cancer is limited to only a small fraction of the children infected by the virus, and why the virus elsewhere in the world causes not Burkitt's lymphoma but nasopharyngeal carcinoma or mononucleosis.

The plan of the WHO study was to obtain blood samples from young children before onset of Burkitt's lymphoma. The investigators explained their purpose at local public meetings in the study area. A few days later the parents brought their children to a central point for the blood sampling. Then a team of investigators regularly visited all health centers to locate new cases of the cancer. In the four-year period from 1973 to 1977, 14 members of the sampled group were diagnosed as having Burkitt's lymphoma. Although the number of cases was smaller than the researchers had expected, they were able to draw strong conclusions.

Burkitt's lymphoma develops in children who have had a long and heavy exposure to the Epstein-Barr virus, according to the results. In most of the lymphoma cases, the child's blood had contained a sign of that viral infection years earlier. The sign is an unusually high level of antibody to a component of the outer coat of the virus. That antibody is stable in the blood, whereas other antibodies induced by the virus decline rapidly. The researchers suggest that high levels of coat antibodies may reflect the severity of the original infection, whereas lack of other antibodies indicates that the long-standing infection is not chronically active.

The data permit calculation of a striking risk factor attached to high antibody levels. A child with coat antibody levels higher than the mean of the general population has a risk of developing the cancer that is about 30 times higher.

According to M. A. Epstein, one of the discoverers of the virus, a climate-dependent factor seems essential for Burkitt's lymphoma, and a variety of observations indicate that the cofactor is hyperendemic malaria. For example, malaria may stimulate and maintain an unusual supply of lymphoid cells especially vulnerable to becoming malignant when they are infected by the Epstein-Barr



Ugandan child with Burkitt's lymphoma.

virus. Yet, he points out, only a rather small number of the children doubly infected with the virus and malaria develop Burkitt's lymphoma. Perhaps genetic predisposition or a particular sequence in timing of the infections is a yet undiscovered prerequisite.

Both Epstein and the WHO team believe that the conclusive evidence that Epstein-Barr virus causes lymphoma awaits a vaccination against the virus (and a subsequent decrease in tumor incidence). The present results should encourage attempts to produce such a vaccine.

The WHO study involved more than 70 scientists from Africa, Europe and the United States. Among the principal investigators were Guy de-Thé of the International Agency for Research on Cancer in Lyon, France, P. M. Tukey of the East African Virus Research Institute in Entebbe, Uganda, E. W. Williams of Arua, Uganda, G. W. Bornkamm of the University of Erlangen in West Germany, P. Fierino of the Center for Disease Control in Atlanta and Werner Henle of Children's Hospital in Philadelphia. □

Delinquency as a learning disability

A method of pinpointing certain potential delinquents by the third grade—early enough to prevent violent and antisocial behavior in many of them—has been reported by a University of Rhode Island psychologist. The key lies in early detection of neuropsychological problems, mainly in the form of previously unnoticed or untreated learning disabilities, says Allan Berman. Such subtle brain deficiencies are in many cases responsible for triggering delinquent behavior years later, Berman explained last week at the annual meeting of the American Psychological Association in Toronto.

This research is critical, he says, because the outlook for helping most delinquents after they have reached adolescence is extremely bleak. Those involved in the treatment of violent adolescents must face daily the discouraging fact that "the teenagers who come through our offices having committed violence will never function adequately again," Berman says. "Statistics as well as clinical experience suggest that once an adolescent has become violent or delinquent, his life expectancy is short, and what life expectancy he does have will be spent in and out of institutions...."

Berman initially studied 45 delinquent boys serving their first sentence at a Rhode Island correctional facility and compared them with a matched control

group from a Providence inner city public high school. "All subjects were administered the complete Halstead-Reitan Neuropsychological Battery, extensive interviewing, several associated tests, and were debriefed," Berman reports.

Berman and his colleagues found that "the level of performance and the patterning of abilities and deficits was markedly different for the two groups." Seventy percent of the delinquents showed "significant" deficits on the neuropsychological battery, Berman said in an interview. "Delinquents showed more extreme impairment in verbal, perceptual and nonverbal conceptual spheres," he said. The "typical" delinquent, according to Berman's results, is a youngster "who has had difficulty in conceptualizing or making sense out of the world that surrounds him. He usually lacks the verbal skills that are necessary to function effectively with people.... As a consequence, he has had difficulties in making the complex interpersonal solutions important in life."

Those results, combined with those of his ongoing follow up of youngsters who were in third grade three years ago, are impressive enough to Berman for him to say: "We think you can predict high risk children in the third grade." The ability to predict rests on four critical differences between potential delinquents and other youngsters at that age:

• Some youngsters doing poorly in school (primarily because of learning disability problems) make a crucial switch in peer groups and begin to associate with other children who are also doing poorly. "We think this is a powerful predictor," Berman says.

• Delinquency-prone children show significant deficiencies on the Halstead-Reitan battery in the trailmaking test (connecting dots between letter and number sequences), tactile performance and the speech sounds perception test. "Auditory problems affect language development and understanding," Berman says. "This is often misperceived as the child not wanting to pay attention, which leads to hassles at school."

• While tending to perform normally on the language and reasoning portions of the Wechsler intelligence scale, delinquent youngsters do considerably more poorly on the perceptual and hand-eye coordination aspects.

• Nondelinquents tended to have "attentive, supportive" families. Even control group youngsters who had similar learning disabilities—and who came from similar socio-economic conditions—seemed to avoid adolescent problems because of their family support.

Overall, the three factors that Berman terms "killers" in determining potential delinquency are: the existence of a learning disability; the failure of parents and school testers to detect the deficiency; and a nonsupportive family. Berman places the brunt of the blame in many cases on school psychologists. "Many psychologists are not adequately trained diagnostically," he says. "They wouldn't know a neuropsychological pattern if they saw it. The disabilities are subtle in some cases, but not so subtle in others. We need much more thoroughly trained people doing diagnostic work."

But should even trained personnel make and act on predictions of potential violence? Singling out certain persons—youngsters or adults—as potential troublemakers is a risky business, both ethically and scientifically, Berman concedes. He points to the earlier, controversial research of Vernon Mark and Frank Ervin which argued that some individuals have "deficient" brain mechanisms that predispose them to violence. After suggesting that brain operations might be appropriate for some of those persons, Mark and Ervin met with a huge public outcry against their work and subsequently withdrew from that field of research.

Although Berman's proposals advocate no surgical or drug intervention, he admits to feeling "uncomfortable with this research" for two reasons: Some observers argue that his prediction capabilities fall short of being foolproof—and he therefore has no ethical right to intervene with youngsters of basically normal intelligence; and if he did intervene with the children in his study at this point, it would

not allow him to follow those he predicts will be delinquents to their point of delinquency. And by then, as he admits, it may be too late for successful intervention.

If the disabilities are spotted early enough—and Berman believes that is now possible—special academic programs in most cases will be able to "nip the process" of delinquency. And even if the problems are identified after third grade level, the psychologist says many such children can be helped before serious antisocial behavior sets in. Drug therapy would be

warranted only to correct "documented seizure activity," of which Berman saw little in his study.

"All I'm really saying is ... at least consider the possibility that neuropsychological aspects are involved as primary causative factors" in delinquency. "Too many young people's lives," he concludes, "are being wasted while we wait for elegant theories. ... Reality demands that we move quickly and effectively into alternate programs since most currently existing programs are not working." □

Jensen: Intelligence a 'biological rhythm'

Few issues in science stir up as much emotional debate as the question of the origins of intelligence. And for the past decade, one of the chief pot-boilers has been University of California psychologist Arthur R. Jensen. In 1969, Jensen set off a major spark by arguing that genetic factors are significantly more important than environmental ones in determining a person's IQ—a theory that drew the ire of blacks and other minorities. Things simmered somewhat last year when Jensen studied rural Southern blacks and acknowledged that in some cases IQ does have a definite environmental factor (SN: 6/18/77, p. 390).

Now, Jensen has added another ingredient that seems sure to get things bubbling again. It involves "g"—a somewhat pervasive factor of general intelligence measured by administering a conglomeration of various intelligence tests. Like IQ, the question of whether *g* is primarily inborn or acquired has been subject to much theoretical argument.

In his latest study—presented at the APA meeting—Jensen reports that *g* (and IQ) has a definite "biological basis." "I would certainly argue that," he told SCIENCE NEWS. "I think there is a genetic basis—it would be impossible to argue otherwise."

The cornerstone of his latest work involves reaction time (RT), as measured on a rather simplistic panel consisting of sets of one to eight green jewelled lights. RT is measured by how long it takes a person to lift his finger off a central pushbutton and move it to the button under the light that has just flashed on. The task, measured in milliseconds, is so simple that the person's reaction occurs faster than the speed of conscious awareness.

This establishes reaction time as a measure independent of other intelligence tests—a critical characteristic because of Jensen's results: He found that reaction times of the more than 400 subjects correlated "across the board" with their performances on a variety of verbal and non-verbal intelligence measures.

"This shows that mental ability measured by standard intelligence tests is getting at something much more basic than skills acquired at school or home, or than

specific knowledge," he suggests. The psychologist administered RT tests to each person for one-half hour a day for a month. The subjects included university, vocational college, sixth and ninth grade and retarded students.

In each group, the more lights appearing on a panel the slower the reaction time. (For example, times were fastest when the person knew only one light would flash, and were slowest when one of eight was about to flash.) According to his results, the *amount* of individual slowing time is related to intelligence.

Jensen hypothesizes a noncognitive mechanism for superior reaction times, and, in turn, intelligence: Each person has his or her own "rhythm" of oscillation within and between nerve cells in the brain. The faster the neural rhythm, the more chances for the "switched on" cells to relay information and the greater the intelligence, according to the hypothesis.

Jensen did find a "large significant difference" between the reaction times, as well as the intelligence measures, of university students and vocational college students; and as one might expect, the retarded persons scored quite a bit lower than the rest of the subjects.

Although he found no sex differences in performance, Jensen says he did detect "black-white difference at the junior college level," with blacks exhibiting somewhat slower reaction times (not enough black students participated at the university level to draw any such conclusion there, he says). This may seem surprising considering the "popular misconception" that blacks, particularly athletes, seem to have quicker reactions than whites, he says. But Jensen says his test measures a "different range [of quickness] than that involved in athletic skills." Muhammad Ali was given a similar reaction time test by another researcher and "came out just average," Jensen says. He emphasizes, however, that these results do "not at all" alter his previous conclusions that environment contributes to intelligence at some level. "I'm not putting any stress on the racial aspects," he says of his latest research. "That would be kind of a red herring and detract from the use of reaction time" as an indicator of intelligence. □