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SCHOOL OF MEDICINE
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I. SUMMARY

In November 1988, the National Institute for Occupational Safety and Health (NIOSH) received a request for a Health Hazard Evaluation from the Occupational Medicine Program of the George Washington University School of Medicine in Washington, D.C. The requestor was concerned about three cases of optic neuritis which had occurred among employees in the pathology department of the medical school over a two year period.

NIOSH investigators conducted a walk-through survey of the pathology department on February 9, 1989. All three cases were interviewed, and blood samples were drawn for viral studies from the cases and from other employees in the department. There appeared to be no other cases of optic neuritis at this medical school, based on a survey of employees and on interviews with ophthalmologists at the medical school.

Most cases of optic neuritis do not have an etiologic agent identified. No common factors were identified which would have explained the three cases in this investigation. Only one employee was actively involved in handling human tissue specimens which were sent to this department for detection of viruses by immunofluorescence and by electron microscopy. However, the other two cases both worked in offices adjacent to areas where viral studies were done.

Studies for viral antibodies were done in consultation with investigators at the Division for Viral Diseases, Centers for Disease Control (CDC). All blood samples were negative for antibody to HTLV-I, a virus which may be involved in some cases of optic neuritis. Urine screening for heavy metals was negative for all three cases.

Based on this investigation, the NIOSH investigators were unable to determine the etiology of this cluster of three cases. It remains unknown whether these cases are the result of viral infections. As work practices in this department followed generally accepted guidelines for handling infectious materials, no specific recommendations for changing work practices were made. A recommendation was made that the medical school maintain a log of needlestick injuries as is maintained for hospital personnel.

KEYWORDS: SIC 8062 (general medical and surgical hospitals), optic neuritis, retrovirus, zinc, heavy metals, health care workers, infectious materials.

II. INTRODUCTION

In November 1988, the National Institute for Occupational Safety and Health (NIOSH) received a request for a Health Hazard Evaluation from the Occupational Medicine Program of the George Washington University School of Medicine in Washington, D.C. The requestor was concerned about three cases of optic neuritis which had occurred among employees in the pathology department of the medical school over a two year period.

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NIOSH investigators sent a preliminary letter to the requestor on March 1, 1989. This indicated that there were no hazards in the department of an immediate nature which required corrective action, and suggested that the requestor obtain urine samples from the three cases for the purpose of screening for heavy metals. On January 4, 1990 letters were sent to the three cases and to fifteen other persons who had provided blood samples during the walk-through inspection to notify them of the results of the laboratory tests.

III. BACKGROUND

Optic neuritis is a term which includes two general types of disorders of the optic nerve: inflammatory processes, and demyelinating disorders.¹

Most cases of optic neuritis are idiopathic; that is, no specific etiologic agent can be identified. There are no population-based data available on the incidence or prevalence of this disorder. The usual clinical presentation of optic neuritis is the rapid loss of vision in the affected eye. There may be associated headache or pain upon movement of the eye. About 75% of cases will have spontaneous recovery of vision over a three- to four-month period. However, nearly all of these patients will have some residual visual deficit, such as decreased visual acuity or deficits in color vision.²

There is an intriguing association between optic neuritis and multiple sclerosis (MS). Approximately 50% of patients with optic neuritis will, in succeeding years, go on to develop MS, a demyelinating disorder of the central and peripheral nervous system.³ The epidemiology of MS displays geographical clustering in urban areas within temperate climates, compatible with the distribution of a disease of either infectious or environmental origin.

Although no agent has been identified as the cause, recent studies have found an association between the Human T-Cell Lymphotropic Virus (HTLV-1) and MS.⁴

HTLV-1 has also been associated with the neurological disease tropical spastic paraparesis, which shares some features with MS.⁵ Other studies have indicated that metals may have a role in this disease. Patients with MS display elevated levels of zinc bound to red blood cell (RBC) membranes.⁶ Whether this association is causal or reflects some abnormality in membrane transport in MS is unknown. An investigation of a work-place cluster of MS at a manufacturing plant which used zinc in a plating department found slightly higher plasma and RBC Zn levels among cases compared to community controls, but not when compared to unaffected workers at the same plant.⁷

IV. WALK-THROUGH SURVEY

A. ENVIRONMENTAL ASSESSMENT

The work area is the pathology department of George Washington University Medical School, located on the 5th Floor of the Ross Hall building. This is a basic science department of the medical school and is separate from the hospital pathology department. It does not do routine surgical pathology but provides certain clinical pathology services to the hospital, including examination of tissue specimens by immunofluorescence and electron microscopy. The department has approximately 50 employees, including faculty and research staff. Pathology residents from the hospital also spend variable periods of time in the department while doing research projects.

During the the walk-through inspection no new specimens were delivered for analysis. Personnel who were observed handling and processing samples which had been delivered prior to the inspection followed generally-accepted practices for handling infectious materials.

No log of needlestick injuries in the medical school involving potentially infectious materials is maintained, although such records are maintained for workers in the hospital.

Visual inspection of the air-handling unit associated with the pathology department did not reveal any unusual obstructions, source of contaminants, or maintenance concerns.

B. MEDICAL

Interviews were conducted with the three cases and with other individuals in the department. The diagnosis of optic neuritis in the three cases was confirmed after a review of medical records and after discussion with the treating ophthalmologist. All three cases had been seen by the same ophthalmologist.

The three cases had occurred between September 1987 and October 1988. One case frequently handled human tissue specimens which were to be analyzed for viral studies. Another case occasionally had specimens brought into her office by physicians seeking to deliver them to the department for analysis, and may have handled the specimen containers at these times. The third case did not handle specimens. One case had sustained a needlestick injury at work in 1987, several months prior to the onset of optic neuritis.

The offices of all three cases were located within 50 feet of one another along the same corridor of the pathology department. Only one case performed work which involved the use of a microscope.

None of the three cases had received blood transfusions. None had any known avocational (hobby) exposure to heavy metals or neurotoxins. None were taking any medication known to be toxic to the eye or nervous system.

A few days before the NIOSH visit, the medical school safety department conducted a survey of 144 personnel within the building who worked on the 2nd through 7th floor. The survey consisted of questions concerning emergency procedures, hazardous materials, and indoor air quality. Included in the survey was a question concerning sudden loss of vision. This survey disclosed one other individual who had had optic neuritis. She had been hired in 1988 and worked in a department on another floor of the medical school. She had had optic neuritis in 1982-4, prior to being employed at the medical school.

V. RESULTS AND DISCUSSION

Blood samples were drawn from the three cases. All individuals present in the department at the time of the walk-through inspection were asked to supply a blood sample for the purpose of serving as controls. Of the approximately 20 persons present in addition to the three cases, 9 participated. The hospital safety department identified a group of 6 employees in the physical and occupational therapy department of the hospital, which was located in a different building, who were also willing to serve as controls. Blood samples were taken these individuals.

Viral studies

Blood samples were analyzed for antibodies to HTLV-1. A portion of each blood sample was saved and frozen in the CDC serum bank for future assay should some other virus be implicated in the etiology of optic neuritis. Each participant consented to this.

The results of the assay for antibody to HTLV-1 were negative for all three cases and for all of the other individuals who were tested.

We had anticipated that analysis would also be done for antibodies to Coxsackie A24 virus, which is associated with acute conjunctivitis, a type of eye infection. However, the antibody test for Coxsackie A24 virus was still in the developmental stage at the CDC Center for Viral Diseases at the time of the investigation and could not be developed to have sufficient specificity to screen for past A24 infection, so this test was not performed.

Zinc

All blood zinc levels were within normal limits (50-160 micrograms/100cc). The three cases had a higher mean zinc level (115.0 ± 13.1) than either the controls who worked in the pathology department (109.6 ± 28.3) or the hospital controls (98.8 ± 11.2). These differences were not statistically significant by one-way ANOVA, perhaps because of the small number of participants in each group.

Heavy metal screening

Screening of a 24 hour urine specimen for heavy metals was done by the occupational medicine program at GWU for all three cases. One coworker in the pathology department also agreed to collect a specimen. For all 4 individuals, undetectable or levels expected for the general population were found for arsenic, mercury, and delta-amino levulinic acid, a urinary marker of lead exposure.

VI. CONCLUSIONS AND RECOMMENDATIONS

Optic neuritis is a disorder of unknown cause. The occurrence of three cases within a worksite could have been due to chance alone. The possibility that these cases were due to viral infection cannot be ruled out. However, no single virus, other than perhaps HTLV-1, has been implicated in this disorder. The pathology department where these cases occurred does handle human tissue specimens from immunocompromised patients who have various viral infections. Whether infection could have occurred as a result of handling a tissue specimen is unknown.

Human tissue samples that are received for analysis by this department should continue to be handled in accordance with CDC guidelines for working with potentially infectious materials as outlined in the NIOSH publication "Guidelines for Protecting the Safety and Health of Health Care Workers"⁸.

A log of needlestick injuries should be maintained for the medical school, as is maintained at the hospital at GWU.

VII. REFERENCES

1. Behrens MM. Optic Nerve Disorders. *Seminars in Neurology* 6:204-216, 1986.
2. Lessell S. Optic Neuropathies. *N.E.J.M.* 299:533-6, 1978.
3. Wynn DR, Rodriguez M, O'Fallon WM, and Kurland LT. Update on the Epidemiology of Multiple Sclerosis. *Mayo Clin Proc* 64:808-817, 1989.
4. Reddy EP, Sandberg-Wollheim M, Mettus RV, Ray PE, and Koproski H. Amplification and Molecular Cloning of HTLV-1 Sequences from DNA of Multiple Sclerosis Patients. *Science* 243:529-33, 1989.
5. Levine PH, and Blattner WA. The Epidemiology of Diseases Associated with HTLV-I and HTLV-II. *Infectious Disease Clinics of North America* 1:501-10, 1987.
6. Ho SY, Catalanotto FA, Lisak RP, and Dore-Duffy P. Zinc in Multiple Sclerosis. *Annals Neurology* 20:712-715, 1986.
7. Stein EC, Schiffer RB, Hall WJ, and Young N. Multiple Sclerosis and the Workplace: Report of an Industry-Based Cluster. *Neurology* 37:1672-7, 1987.
8. Guidelines for Protecting the Safety and Health of Health Care Workers. U.S. Department of Health and Human Services, Centers for Disease Control, National Institute of Occupational Safety and Health, DHSS (NIOSH) Publication 88-119, September 1988.

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IX. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this report are temporarily available upon request from NIOSH, Hazard Evaluations and Technical Assistance Branch, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), 5285 Port Royal, Springfield, Virginia 22161. Information regarding its availability through NTIS can be obtained from NIOSH Publications Office at the Cincinnati address. Copies of this report have been sent to:

1. Occupational Medicine Program, GWU School of Medicine
2. Employee representative, GWU School of Medicine Department of Pathology
3. OSHA, Region III
4. CDC, Center for Infectious Diseases, Division of Viral Diseases

For the purpose of informing affected employees, copies of this report shall be posted by the employer in a prominent place accessible to the employees for a period of 30 calendar days.