

Beryllium Disease among Workers in a Spacecraft-Manufacturing Plant — California

From 1977 to 1981, three cases of beryllium disease (berylliosis) among workers in a large spacecraft-manufacturing plant in California, were reported to the Beryllium Case Registry (BCR) of the National Institute for Occupational Safety and Health (NIOSH). All three patients were machinists who had worked with beryllium metal from the late 1950s to the mid-1970s, fabricating special parts for missile guidance systems.

A case history: Beginning in the mid-1970s, a machinist (born in 1936) noted progressive shortness of breath, cough, and slight sputum production; by 1978, he was unable to work. Despite previous athletic ability, by 1980, he could not perform routine household chores without shortness of breath. He had never smoked. Physical examination revealed a well-developed, well-nourished male with rapid pulse rate; his diaphragm moved poorly, and breath sounds were decreased at the bases of both lungs. Occasional rhonchi were heard at the base of the right lung. He experienced shortness of breath on minimal exertion and had "clubbing" of the fingers and toes. Chest x-rays taken in 1966, 1967, and 1976 were reported to have been negative. However, films taken in June 1978 showed extensive confluent basilar infiltrates in both lung fields. The junctional areas in the mid-zones showed some granularity. The heart and costophrenic angles were normal. A chest x-ray taken in January 1980 showed irregular opacities involving the lower halves of both lungs, with bilateral areas of subsegmental atelectasis.

Laboratory tests in January 1980 showed a hemoglobin level of 16.1 g. White blood cell count was 6,100, with a normal differential. Sputum tests were negative for fungi and acid-fast bacilli. Measurements of arterial blood gases showed a pH of 7.42, PCO₂ of 36 mm Hg, PO₂ of 69, and oxygen saturation of 93%. Pulmonary function tests showed moderate reduction of vital capacity and total lung capacity and marked reduction of forced expiratory volume and diffusing capacity. Pathologic examination of biopsied mediastinal lymph nodes revealed non-caseating granuloma and chronic interstitial pneumonitis. A lymphoblast transformation test (LTT) conducted in 1981 was positive.

The patient was first employed in 1956 as a milling machinist. He worked with beryllium metal and alloys from 1960 through the mid-1970s at three different plants of this company, two of which have been closed. According to the industrial protocol, such machining was to be done wet or under high-efficiency, local-exhaust ventilation. However, the patient stated that at times there was sufficient spillage of dusts to require vacuuming. He did not use a respirator.

Other cases: The two other patients had similar case histories. The second patient (born in 1914) was employed in 1958, had worked in all three facilities, and became symptomatic in 1976. His LTT was negative while he was on steroid therapy. The third patient (born in 1936) was employed in 1956, had worked at two of the three facilities, and became symptomatic in 1980. His LTT was positive in 1981.

In 1981, NIOSH personnel evaluated both employee health records and present and past levels of employee exposure to beryllium. Records of the company's air sampling for beryllium indicated that, from 1963 to 1973, 14%-44% of samples* taken at the machine shops exceeded the present standard for exposure to beryllium.[†] From 1973 through 1981, the stand-

*Short-term, breathing-zone samples collected with high-volume pumps.

[†]2 $\mu\text{g Be/m}^3$ of air as an 8-hour time-weighted average promulgated by the Occupational Safety and Health Administration.

Beryllium Disease — Continued

ard was exceeded only once; a sample in 1977 was 4.6 $\mu\text{g}/\text{m}^3$. Review of the company's medical records showed no additional cases among current employees in the same job category.

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Editorial Note: Chronic berylliosis is a pulmonary and systemic granulomatous disease caused by exposure to beryllium. Acute beryllium disease in the form of chemical pneumonitis was first reported in Europe in 1933 (1) and in the United States in 1943 (2). Cases of chronic berylliosis were first described in 1946 among workers in plants manufacturing fluorescent lamps in Massachusetts (3). The BCR, established at the Massachusetts Institute of Technology in 1952 to collect data and to study the clinical course, treatment, and complications of beryllium disease (4), was maintained by the Pulmonary Unit of the Massachusetts General Hospital through 1977. A total of 887 cases were registered during those 25 years (5). Since 1978, the BCR has been maintained by NIOSH, and 10 additional cases have been identified.

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TABLE I. Summary—cases specified notifiable diseases, United States

Disease	32nd Week Ending			Cumulative, 32nd Week Ending		
	August 13, 1983	August 14, 1982	Median 1978-1982	August 13, 1983	August 14, 1982	Median 1978-1982
Aseptic meningitis	440	366	328	4,268	3,873	2,896
Encephalitis: Primary (arthropod-borne & unspec.)	50	35	36	694	677	520
Post-infectious	2	3	4	55	57	137
Gonorrhea: Civilian	18,299	19,424	21,892	540,399	580,314	595,812
Military	733	706	618	14,798	16,809	16,752
Hepatitis: Type A	379	426	554	13,080	13,567	16,872
Type B	409	504	363	13,718	12,993	10,509
Non A, Non B	66	46	N	2,070	1,404	N
Unspecified	126	197	217	4,736	5,234	6,144
Legionellosis	18	23	N	447	313	N
Leprosy	3	-	3	155	126	116*
Malaria	20	28	31	464	637	637
Measles: Total	11	29	105	1,163	1,153	11,592
Indigenous	9	N	N	967	N	N
Imported*	2	N	N	196	N	N
Meningococcal infections: Total	29	45	45	1,899	2,057	1,837
Civilian	29	45	45	1,884	2,045	1,824
Military	-	-	-	15	12	13
Mumps	30	24	54	2,311	4,108	6,859
Pertussis	57	65	51	1,265	813	830
Rubella (German measles)	11	10	33	739	1,873	3,118
Syphilis (Primary & Secondary): Civilian	685	712	662	19,694	20,159	15,922
Military	8	10	5	255	258	196
Toxic-shock syndrome	3	N	N	264	N	N
Tuberculosis	429	448	617	14,177	15,452	16,536
Tularemia	10	7	6	187	138	122
Typhoid fever	10	3	9	228	229	282
Typhus fever, tick-borne (RMSF)	61	50	50	797	683	691
Rabies, animal	97	139	139	3,749	3,898	3,898

TABLE II. Notifiable diseases of low frequency, United States

	Cum. 1983		Cum. 1983
Anthrax	-	Plague	27
Botulism: Foodborne	12	Poliomyelitis: Total	3
Infant (Calif. 1)	38	Paralytic (La. 1)	3
Other	-	Psittacosis	74
Brucellosis (Miss. 1, Ark. 1, Tex. 2)	116	Rabies, human	2
Cholera	1	Tetanus	45
Congenital rubella syndrome	16	Trichinosis	24
Diphtheria	-	Typhus fever, flea-borne (endemic, murine) (Tex. 2)	30
Leptospirosis	28		

*Two of the 11 reported cases for this week were imported from a foreign country or can be directly traceable to a known internationally imported case within two generations.

Beryllium Disease — Continued

Chronic berylliosis resembles sarcoidosis in many respects, and the differential diagnosis is often difficult (6). Recently, four cases of berylliosis, initially considered to be sarcoidosis, were reported among workers who smelted scraps of beryllium-copper alloy in a plant in Connecticut (7). Some investigators advocate the use of the LTT as a diagnostic tool based on the theory that berylliosis is a manifestation of immunologic reaction (8,9).

Although the use of beryllium compounds in fluorescent lighting tubes was discontinued in 1949, potential for exposure to beryllium exists in the nuclear and aerospace industries and in the refining of beryllium metal and melting of beryllium-containing alloys, the manufacturing of electronic devices, and the handling of other beryllium-containing material. The present cases indicate that an exposure hazard exists, even in industries with modern technology. By the time a case is diagnosed and reported to the BCR, many years may have passed, and the patient may already suffer considerable pulmonary disability.

It is important that management recognize the health hazards of beryllium, properly inform workers of these hazards, and establish programs to control exposure. When a physician sees a patient with suspected sarcoidosis, the occupational history should be thoroughly elicited to rule out possible berylliosis. Suspected cases of berylliosis should be reported to local and state health departments and to the Surveillance Branch, Division of Surveillance, Hazard Evaluations, and Field Studies, NIOSH, Robert A. Taft Laboratories, 4676 Columbia Parkway, Cincinnati, Ohio 45226, telephone (513) 684-3268. An evaluation for admission into the BCR will be made by NIOSH consultants at no cost to the patient or referring physician.

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An Outbreak of *Pseudomonas* Folliculitis Associated with a Waterslide — Utah

On May 3, 1983, the Salt Lake City-County Health Department notified the Office of Epidemiology and Surveillance, Utah Department of Health, of complaints from individuals who had developed rash illnesses or earaches after swimming at a local waterslide* on April 30, 1983. By May 7, 265 cases were identified among 650 persons who visited the waterslide on April 30 (Figure 1).

*An elevated, curved tube that carries water into a plunge pool.



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MORBIDITY AND MORTALITY WEEKLY REPORT

Epidemiologic Notes and Reports

Plague — South Carolina

On August 5, 1983, plague was diagnosed in a 13-year-old girl in South Carolina. She became ill while en route to Maryland from her previous residence in Santa Fe, New Mexico, and subsequently died. The area in which she had lived had been recognized as a locality where sylvatic plague was enzootic.

On July 25, the girl, a horsewoman who spent considerable time outdoors, handled and then released a wild chipmunk. On July 27, she flew to Atlanta, Georgia, and spent the night with friends; the following day she was driven to Seneca, South Carolina. That evening, she complained of a sore throat and tenderness in her right groin and reportedly had a temperature of 40.0 C (104 F). On July 29, she saw a physician, who noted an oral temperature of 38.3 C (101 F), pharyngeal erythema, tender cervical lymph nodes, and a 1-x-2-centimeter tender right inguinal lymph node. Laboratory tests, including complete blood count, urinalysis, and throat culture, and tests for mononucleosis, were done, and oral penicillin was prescribed. Three days later she was seen again, still febrile and with expanding right inguinal nodes. Her white blood cell count was 20,500, and a chest x-ray was normal. Because of her history of residence in a plague-enzootic state, a diagnosis of plague was considered. She was hospitalized and given parenteral therapy, including streptomycin. By the following morning, she was tachypneic, with productive bloody sputum, and appeared moribund. She was transferred to a large, regional medical center where, despite intensive supportive care and therapy with intravenous chloramphenicol, she developed overwhelming sepsis and died on August 2. A chest radiograph taken before death revealed extensive pulmonary infiltrates.

Ante-mortem aspiration of the right inguinal lymph node demonstrated gram-negative bipolar staining bacilli on Giemsa stain. Both this aspirate and multiple cultures of blood yielded *Yersinia pestis*. In addition, fluorescent antibody (FA) stains for *Y. pestis* were positive for specimens consisting of blood smears, culture material, and pulmonary secretions.

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Editorial Note: This is the fifth documented case of plague east of the hundredth meridian (south central Texas to north central North Dakota), excluding laboratory accidents, since 1920. All five patients were exposed in enzootic areas (four in the western United States, one in Vietnam). Considering this patient's outdoor activities and area of residence, exposure possibilities are numerous; her exact exposure will probably never be known, since the chipmunk was not captured. That she was able to handle the animal suggests it was not healthy.

Because the patient had no evidence of pneumonia before hospitalization, no chemo-

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The data in this report are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the succeeding Friday.

The editor welcomes accounts of interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials. Such reports and any other matters pertaining to editorial or other textual considerations should be addressed to: ATTN: Editor, *Morbidity and Mortality Weekly Report*, Centers for Disease Control, Atlanta, Georgia 30333.

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