

DISEASE PROFILE

PSYCHOLOGICAL AND BEHAVIORAL DISTURBANCES

I. DEFINITION

A. Dictionary

The terms psychological and behavioral disturbances refer, respectively, to various mental disorders (e.g., depression, or hypochondria), and changes in conduct of an individual (e.g., fatigue, irritability, or lack of concentration) that may be caused by genetic and/or environmental factors.

B. Symptoms

The clinical hallmarks include: fatigue or lethargy, depression, loss of appetite, memory loss, loss of concentration, irritability, hypochondria, sleep disturbances, loss of libido, alcohol intolerance, apathy, and dulled emotional response.

C. Duration

Duration is highly variable depending on the type of symptom, its cause, and treatment.

D. Treatment

Drug treatment includes the use of tranquilizers and mood elevating drugs. Other treatments include psychiatric therapy, psychological therapy and dietary regimes.

E. Diagnostic Criteria

Because of the many different types of psychological and behavioral disturbances, diagnostic criteria and protocol are variable.

Medical history questionnaires are generally given along with clinical

CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER.

C23972

examinations to identify any organic causes. Patients may also be referred to specialists such as psychiatrists or psychologists for more specialized diagnostic testing (e.g., Wechsler test, a general intelligence and coordination test involving both verbal and performance skills; Rorschach test, sensitive to disorders of thought and emotion; and the Minnesota Multiphasic Personality Inventory (MMPI), a clinical test used to assess personality traits and diseases).

II. EVIDENCE RELATING DISEASE TO 2,4,5-T, TCDD, or 2,4-D EXPOSURE

A. Human Studies

1. Industrial Accidents

An explosion at a plant in Nitro, West Virginia in 1949 resulted in exposure of employees and clean-up crews to TCDD contaminated material. Fatigue, nervousness and irritability, and decrease in libido followed chloracne and peripheral neuropathy in order of relative frequency of clinical symptoms. A follow-up examination of workers three years later revealed a general regression of these symptoms. Some nervousness and excess fatigue continued. No clinical explanation could be made based on results of physical examination. The exposure level of TCDD was not reported in the study (1980, E).

Singer reported on a 1971 German study by Kleu and Goltz that looked at ten workers acutely exposed to TCDD fifteen years earlier. The study found that the workers still reported fatigue, decreased libido, alcohol intolerance, and memory loss. The exposure level of TCDD was not reported in the study (1982, C).

An explosion at a BASF chemical plant in West Germany in 1953 resulted in a total of 53 ill workers soon after the explosion. Of the 14 workers suffering from chloracne, three also reported increased fatigue (1973, I). A follow-up study in 1976 reported that of the 53 workers, two committed suicide. However, the suicides were attributed by psychiatric and neurological specialists to psychoses rather than dioxin exposure. (1976, G).

Workers exposed to TCDD as a result of an explosion at a 2,4,5-TCP production facility of the Coalite company in England in 1968 resulted in no cases of reported psychological or behavioral disturbances even though 79 cases of chloracne were reported. Levels of TCDD were not described (1973, H).

2. Occupational Exposure

Poland et al. studied the chronic industrial exposure of 73 male employees involved from 1964 to 1970 in the production of 2,4-D, 2,4,5-TCP and 2,4,5-T at a Newark, New Jersey plant of the Diamond Alkali Company. In addition to medical histories and physical examinations, the Minnesota Multiphasic Personality Inventory (MMPI) was administered to administrative staff and production workers. When scores of both groups of employees were compared with the normal values given for the MMPI test scales, administrative staff and production workers varied significantly from the norms on a total of six and nine scales respectively. Of particular interest were high values of the employees in the depression, hysteria, and manic scales. Furthermore, there was a high correlation between those employees with severe chloracne and a high manic scale score (a state characterized by an expansive emotional state, including elation, hyperirritability, or flight of ideas) (1971, M). However, beyond test score changes, the study did not identify any observable psychological or behavioral disturbances.

A Czechoslovakian study looked at dioxin poisoning during 1965 to 1968 among workers involved in the production of 2,4,5-T. Of the 400 workers employed in the plant, 80 became ill. Fifty-five of those persons were studied over a ten year period. Thirty-five workers were characterized as neurasthenic (characterized by chronic abnormal fatigability, lack of energy, feelings of inadequacy, moderate depression, inability to concentrate, loss of appetite, and insomnia) or depressive. The authors observed that during the ten year follow-up study the psychiatric conditions improved. The depressive and anxiety components of neurasthenic disorders had completely disappeared and the number of patients who showed no sign of mental disorders had increased (1981, D).

Baader and Bauer studied workers at a West German plant that produced pentachlorophenol for six months during 1948-1949. Of 17 workers suffering from chloracne, four also experienced disturbances of libido (1951, O).

Bauer et al. also studied 31 workers in a 2,4,5-T plant in Hamburg, Germany. Exposure levels and duration of exposure were not reported. There were reports of fatigue, a sense of insecurity, sullenness, and irritation. The authors observed that not infrequently, a mood component of fear and unease was present. Changes in affectivity were reported by patients in the form of increased emotional reactions, tendency to fits of temper, and in some cases a certain dullness. There were also reports of decreased libido, decreased appetite, and in some instances, abnormal and constantly changing eating habits with cravings for varied types of food. Six of the employees were studied over a two year period and given psychological examinations. The Hamburg-Wechsler test (German version of the Wechsler test) was administered for the discovery of intellectual performance shortcomings. In the majority of

CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER.

C23975

CARR, GOODSON & LEE, P. C.

Psychological and Behavioral Disturbances

Page 5

those tested, there was a significantly raised percentage of degeneration, providing a certain indication of an acquired decrease in mental capacity. The Rorschach psychogram was administered with results demonstrating signs of weakened emotional reactivity, poor concentration, reduction in tempo, and a sluggishness of mental processes (1961, N).

3. Veteran Studies

A recent study by Korgeski et al. examined the relationship between 100 Vietnam veterans' self-reported and objectively determined exposure to Agent Orange and the relationship between self-reported or objective ratings and self-reported psychological and medical problems. Comparison of the subjects' MMPI scores grouped according to self-reported levels of herbicide exposure indicated a consistent trend. Persons believing that they had been exposed to herbicides reported significantly more psychological problems.

The authors observed that these findings suggest a tendency for belief in exposure to herbicides to be correlated with self-reports of an extremely wide variety of psychological complaints, such as depression, anxiety, somatic complaints, and interpersonal difficulties. The study noted that a pattern of this type is not typical in persons suffering from most specific psychiatric disorders. The MMPI results were different when subjects were grouped according to objective ratings of herbicide exposure (based on where the subjects had been stationed in Vietnam and Defense Department records of herbicide spray missions). There were essentially no significant differences on the MMPI clinical scales between those classified as exposed and those classified as not exposed.

The study also looked at "success at living" variables since normally, persons experiencing significant emotional problems typically show poor levels of functioning in areas of life such as employment, income,

CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER.

C23976

CARR, GOODSON & LEE, P. C.

Psychological and Behavioral Disturbances

Page 6

educational attainment, social and community involvement. The results demonstrated that regardless of whether the subjects were classified according to self-reported or objective ratings of herbicide exposure, they did not differ on the indices of "success at living." Another series of tests found that there were no significant differences between the subjects on the indices of neuropsychological functioning, (e.g., delayed recall testing) whether they were grouped according to self-reported or objective ratings of herbicide exposure. The authors concluded that this study did not seem to support the hypothesis that exposure to Agent Orange caused psychological problems in veterans, nor did there seem to be a link between herbicide exposure and neuropsychological problems in veterans (1983, A).

A three month Australian study of 58 Vietnam veterans suggested that neuropsychiatric disturbances experienced by Vietnam veterans were linked to dioxin as well as organophosphate insecticides. Symptoms noted in the study included loss of drive, concentration and memory, irritability, insomnia, depression, and attempted suicide. All of these symptoms were aggravated by small amounts of alcohol to which most veterans were hypersensitive (1982, B).

4. Other

The accidental spraying of TCDD contaminated salvage oil in three horse arenas in Missouri resulted in TCDD concentrations of about 30 ppm in the arena soil. Human health impacts studied have been limited to six individuals exposed to the soil. One of the individuals experienced, among other things, lethargy (1977, F).

A questionnaire and interview of 98 Vietnam refugees who had claimed exposure to chemical sprays in South Vietnam found that 92%

CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER.

C23977

reported fatigue, weariness, or dizziness after the spraying. Most of the respondents claimed to have inhaled the spray and to have been wetted by it. The study did not address whether the reported injuries were verified by physicians (1972, L).

B. Animal Studies

1. Mammals

Dogs orally fed TCDD at doses of 0.1 to 3.0 mg/kg experienced, among other things, anorexia and depression (1973, K).

The Missouri horse arena incident (previously discussed) also resulted in injury to livestock. Of 85 horses ridden in the arena, 58 became ill. Of those 58, 24 horses suffered anorexia (1977, F).

2. Rodents

Rats receiving 100 ug/kg of TCDD demonstrated symptoms of ruffled hair coat, hunched posture, and depression (1973, J).

III. PRINCIPAL DOCUMENTS

- A. 1983. Correlates of Self-Reported and Objectively Determined Exposure to Agent Orange
Korgeski, Gregory P.; Leon, Gloria R.
Carr Document No. - A-2765
Copy attached
- B. 1982. Neuropsychiatric Effects of Herbicides
Barr, Malcolm
Copy attached
- C. 1982. Nerve Conduction Velocity Studies of Workers Employed in the Manufacture of Phenoxy Herbicides
Singer, Raymond; Moses, Marion; Valciukas, Jose'; Lilis, Ruth; Selikoff, Irving J.
Copy attached
- D. 1981. The Development and Prognosis of Chronic Intoxication by TCDD in Men
Vejlupkova-Pazderova, Jana; Jirasek, Lubor; Nemcova, Marcela; Pickova, Jane
Carr Document No. - A-2520
Microfiche No. - A639 C07-D02

CONFIDENTIAL

SUBJECT TO PROTECTIVE ORDER.

C23978

CARR, GOODSON & LEE, P. C.

Psychological and Behavioral Disturbances

Page 8

- E. 1980. The Mortality Experience of Workers Exposed to Tetrachlorodibenzodioxin in a Trichlorophenol Process Accident
Zack, J.A.; Suskind, R.R
Carr Document No. - A-198
Microfiche No. - A78 C04-C08
- F. 1977. Epidemiology and Pathology of a Tetrachlorodibenzodioxin Poisoning Episode
Kimbrough, Renate, D.; Carter, Coleman, D.; Liddle, John A.; Cline, Richard E.
Carr Document No. - A-219
Microfiche No. - A82 B14-C10
- G. 1976. Follow-up Report on the Trichlorophenol-Dioxin Accident at BASF AG on 13, November 1953
Thiess, A.M.; Goldman, P.
Carr Document No. - A-887
Microfiche No. - A262 B13-C04
- H. 1973. Chloracne From the Accidental Production of Tetrachlorodibenzodioxin
May, George
Carr Document No. - B-277
Microfiche No. - B123 B03-B12
- I. 1973. Severe Acute Chloracne: A Mass Intoxication by 2,3,6,7-Tetrachlorobenzodioxin
Goldman, Paul J.
Carr Document No. - A-885
Microfiche No. - A262 A08-B04
- J. 1973. General Biological Effects of TCDD in Laboratory Animals
Harris, M.W.; Moore, J.A.; Vos, J.G.; Gupta, B.N.
Carr Document No. - B-1212
Microfiche No. - B274 F03-F14
- K. 1973. Toxicology of Chlorinated Dibenzo-p-dioxins
Schwetz, B.A.; Norris, J.M.; Sparchu, G.L.; Rowe, V.K.; Gehring, P.J.; Emerson, J.L.; Gerbig, C.G.
Carr Document No. - A-944
Microfiche No. - A280 B06-C11
- L. 1972. Chemical Spraying as Reported by Refugees from South Vietnam
Rose, Hilary A; Rose, Steven P.R.
Carr Document No. - B-1422
Microfiche No. - B351 E14-F04
- M. 1971. A Health Survey of Workers in a 2,4-D and 2,4,5-T Plant
Poland, Alan P; Smith, Donald; Metter, Gerald; Possick, Paul
Carr Document No. - B-958
Microfiche No. - B253 D03-E03

CONFIDENTIAL

SUBJECT TO PROTECTIVE ORDER.

C23979

CARR, GOODSON & LEE, P. C.

Psychological and Behavioral Disturbances

Page 9

- N. 1961. Occupational Intoxication Occurring in the Production of Chlorophenol Compounds
Bauer, H; Shulz, K.H.; Spiegelberg, U.
Carr Document No. - B-482
Microfiche No. - B163 D08-E01
- O. 1951. Industrial Intoxication Due to Pentachlorophenol
Baader, E.W.; Bauer, H.J.
Carr Document No. - B-414
Microfiche No. - B149 A13-B05

CONFIDENTIAL

SUBJECT TO PROTECTIVE ORDER.

C23980

V. CONFOUNDERS

A. Because of the variability and subjective nature of many of the symptoms related to psychological and behavioral disturbances, there are a host of other genetic, physiological and environmental factors that should be considered on a patient specific basis (e.g., general health and family history, medication and recreational drugs, or occupation).

B. Post Traumatic Stress Disorder as experienced by Vietnam veterans, and others exposed to traumatic situations, manifests disturbances similar to those described by the plaintiffs. See, Stress Disorders Among Vietnam Veterans, edited by Charles R. Figley; (Brunner Mazel, 1978).

CONFIDENTIAL
SUBJECT TO PROTECTIVE ORDER.

C23981