

# RISK (po)

TIME HEALTH TREND OF 2,4,5-T PRODUCTION WORKERS  
(A Clinical effect of prolonged 2,4,5-T contact)

**Lena Karamova, Gouzel Basharova, Grenada Dumkina, Zoya Podrez,  
Frima Pyanova**

Ufa Research Institute of Occupational Health and Human Ecology,  
94 Kouvykin str., Ufa, Russia

Since the end of the 50-s the Republic of Bashkortostan has had a large capacity manufacturers producing very diverse chlororganic compounds whose synthesis is accompanied by forming dioxins. The present-day science considers dioxins to be a global superecotoxicant whose even extremely low doses (1, 2) have a wide range of biological influence on all living organisms. However, the literature devoted to clinical manifestations of dioxins exposure is contradictory and not easy to compare. The latest mainly experimental data show that dioxins influence almost all organs and systems: immune, nervous, respiratory, digestive, endocrine (3-13), metabolic processes and so on.

A number of papers state a danger of malignant diseases (9, 14,15), reproduction malfunctions, appearance of congenital abnormalities and defective posterity (3, 5, 7, 15). However there are few papers to show consequences of polychlorinated hydrocarbons effect. As a result of accidents in Yusho and Yu-Sheng (Japan and Taiwan respectively) after their inhabitants used butter containing PCB and PCDD they developed chloracne, seborrhea, gingivitis, neuropathy, excessive pigmentation. The author's assessment of the role of PCDF in those cases did not seem convincing

since people were exposed to other pollutants as well, such as quarterophenyl (12, 14, 15, 16, 17). The studies of victims in Seveso (Italy) and veterans of Vietnam war (USA, Australia) also showed that the changes in health cannot be clearly explained by dioxin effect (18, 19). Anyway typical kind of skin acne - chloracne is recognised as a convincing and obligatory specific manifestation of dioxin exposure. From this point of view the production of butyl ether of 2,4,5-trichlorophenoxyacetic acid, that was current in Ufa (the capital of Bashkortostan Republic) in 1965-67 at Chimprom Production Association is of great interest. A crucial increase in skin diseases in workers employed in manufacturing of that product necessitated their health state study. Therefore the aim of our study is a retrospective assessment of an early and delayed clinical response of human organism to the production contact with 2,4,5-T for the period of 1965-1995.

## MATERIALS AND METHODS

To fulfil the aims mentioned we made a retrospective analysis of some archive materials on medical documentation in the Ufa Research Institute of Occupational Health and Human Ecology of the past years, as well as results of clinical examination of workers employed in 2,4,5-T production, compared them with scientific reports data made by research workers of the institute in 1968 by L.I. Bikbulatova and in 1984 by L.A.Belomytseva (2, 1) and own studies of the workers in question in 1992-1994. The present study includes a clinical examination of former 2,4,5-T production workers. It was made by different specialists to check the functions of organs and organism systems, such as, basic biochemical indicators of carbohydrate, protein lipid, pigment, ferment metabolism, indicators of peroxide lipid oxidation, porphyrine metabolism. Immunity state including characteristics of T-system, B-lymphocytes, phagocytal activity of leucocytes, NST-tests, content of immunoglobulins, circulating immune complexes, antibody titers to tissues of liver and stomach were studied.

# RISK (po)

## DISCUSSION OF RESULTS

The retrospective analysis showed that of 150 people examined in 1966-68, occupational chloracne developed in 129 instances (85.3%). The major age was within 20-24. It was discovered that skin lesion developed after workers were engaged at the shop for 3-6 months, it appeared on the average as dryness, peeling, slight skin itch. After 2 or 3 months from the onset of the disease some pigmentation near the exterior corners of the eyes, temples, as well as rash in the form of comedones, milium, acne-form papules of follicular character appeared. In the course of the disease the number of milia grew with folliculitis joining in, atheromes and cysts, atrophic scars also appeared. Then the clinics complicated by pyoderma, the skin acquired a sallow look. The lesion covered face and neck skin, shoulder girdle, back, shoulders, chest. A decrease of functional bar functions and trophic skin lesions were also present in chloracne patients.

A functional study of periphery vessels revealed a moderate arterial hypertension in every other patient. A special test revealed some changes in capillaries and their increased penetration.

Changes in gastroenteric tract were manifested by syndromes of dyspepsia (35.7%) and pain (30%) in epigastrium. Every third worker developed chronic gastritis or duodenitis with hypersecretion.

As far as the nervous system is concerned, neurasthenic syndrome and vasovegetative distony were revealed.

Hematologic shifts were characterized by a moderate decrease in neutrophils (in 56.6%), lymphocytes (37.3%) and monocytes (30.1%) and eosinophilia was discovered in 30%.

Biochemical studies revealed a certain suppression of anti-toxic function of liver and a moderate hypercholesterolemia. 26% of the workers examined developed a decrease in thyroid function and 32% - malfunction of resting metabolism. One could distinguish mild, mean and severe forms of the disease. An active and ti-

mely treatment showed reversibility of pathologic changes in skin as well as clinical and functional shifts in the organism.

In 1984 we reexamined the health state of 29 workers (21) who had a past history of chloracne. By the moment of the second examination the workers average age was  $28 \pm 3$ .

16-18 years later almost all of them had changes in the nervous system and vascular regulation (astheno-vegetative syndrome, neurocirculatory distony). Changes in bioelectric activity of heart were frequent. Diseases of alimentary organs (gastritis, gastric ulcer, cholecystitis) were detected. Changes in the differential blood count and indicators of blood clotting system were most frequent for periphery blood indicators. Immunity state of the subjects was characterized by a decrease in the number of T and B-lymphocytes and activation of autoimmunity indicators(40%).

As for skin manifestations, seborrhea and erithrasma were most prominent. Oncology diseases and kidney pathology were not revealed

An examination of the same workers with past history of chloracne was taken in 1993-94 according to the state program "Dioxin" approved by the government of the Republic of Bashkortostan. 91 people were examined by means of specially worked out methods. The average age of the people examined was  $48 \pm 2.5$ . The obtained data review in terms of postponed consequences show that the vegetative-vascular abnormalities that had been pointed out 28-30 years before, are of doubtless interest. Some of the subjects developed hypertensive and ischemic heart diseases. Symptoms of early ageing, an increase in blood clotting were detected. Encephalopathy and nephroso-nephritis appeared which possibly were the consequences of stable vascular abnormalities. It should be taken into account that kidneys are the organs that evacuate 2,4,5-T out of the body and the period of 2,4,5-T half-decay takes years. Other intest clinico-functional indicators and their dynamics from the onset of chloracne revealed moderate porphyria, increased autoimmunisation, a decrease in ferment activity, cell and humoral immunity. Polymorphous papule-like formations, erithrasma and skin seborrhea were observed.

# RISK (po)

## CONCLUSION

The data analysis of the study of early, delayed and postponed consequences of 2,4,5-T production contact showed that clinically evident manifestations of dioxin effects revealed within 3-6 months on the average. The disease is characterized by a torpid course and its clinical manifestations become obvious to the patient only 6-12 months later. The manifesting symptom of the disease is chloracne of a specific occupational character. The picture of early exposure clinic includes symptoms of vaso-vegetative disregulation with a vasodepressive effect, shifts in blood cell elements and ferment structures. Neuro-vascular abnormalities remain and even possibly develop into a pathology of the central nervous and cardiovascular systems, kidneys, suppression of ferment-enzyme functions, the reserve capacity of humoral and cell immunity.

## REFERENCE

1. Fyodorov L.A. Dioxins as an ecological danger, retrospective and perspective. M. "Nauka" ("Science"), 1993, 265 p.
2. Golubchikov C. Dioxins. Russian norms. "Zelyeny mir", 1994, N10, p.2. 3. Syrlov I.B. Chlorinated dioxins. Biologic and medical aspects. Analytical review. Novosibirsk, 1990. - 209 P.
4. Solon M. Dioxin 89. Review. "Khimia i zhizn", 1993. - N1. - p.82-85
5. Buslovich S.Yu. Toxicologic characteristics of herbicides chlorinated of phenoxyacetic acid. Minsk, BI, 1961. - 63 p.
6. Rumak V.S. Medical and biological basis, assessments of postponed consequences of phitotoxicants used in war actions containing 2,3,7,7-NCDD on the example of orange agent in the course of "Ranch HAND" operation. Autoreferat of dissertation for Doctor's Degree, 1993. - 50 p.
7. Hoffman R., Stehr-Green PA et all. Health effects of long term exposure to 2,3,7,8-tetracloridibenzo-p-dioxin. Sama - 1986, v.255, N 15, p. 2031-2038.

8. Stern P., Stain G et al. A pilot epidemiologic study of possible health effects associated with 2,3,7,8 tetrachlorodiben-zo-p dioxin contaminations in Missouri Arch. enviroz Health, 1981, vol 41, N 1, p. 16-22.
9. Eder E. An assessment of danger of hepatotoxicity, mutagenety, cancerogeneity of short chains chlorinated hydrocarbons. Dioxin - 93, V. 14, - p. 291-294.
10. Plum H.I. Dioxin and vitamin K Status of the newborn. I. Environ, Sci and Health A, 1994, 29, N 4, p.792-802.
11. John Jake Rian, Cheng Ching Hsu, Uyu. Liang. Leon-Zuo. Effect on children whose mothers were poisoned by PCDF and PCB in Yu-Sheng. Dioxin-93, V. 14, p. 243.
12. Larry L., Hugxem. Dioxin 93, N 14, p. 231.
13. Safe F.Ye. Po lychlorinated biphenyls - toxicology and assessment of its extent and danger. Dioxin-93, V. 14, p. 53-58
14. Dioxins in Environment. A scientific report on the questions of pollution. N27, London, Her Majesty Governmental Publication.
15. Ameno M., Yatsuri K., Umeda. Cohort study on the causes of death Jussho (PCB poisoning) patients with special reference to death from liver cancer. Idaku to Scibutsuggakku 10,11-16.
16. Rodan W.I., Cloden B.C., Kun-Long Hun et al. Congenital poisoning by polychlorinated biphenils and their contaminants in Taiwan. Science, 241, 334-336.
17. Ikeda M., Clinical pictures of occupational PCB poisoning and Yusho. Are they the same? Dioxin-94, V. 21, 51-55.
18. Domenico A., Rodwaan A.E., ads. A report of NATO/CCMS Working Group on management of accidents involving the release of dioxins and related compounds. Rapporti instiisen 88/8, Intituto, Superiore di Sanita, Rome.
19. Pesatori A.S., Zocetti S., Sen-Sonni et al. Cases of death and cancer diseases among population of Seveso.
20. L.I. Bikbulatova. Report "Health state of workers who had a contact with butyl ether 2,4,5-T in the course of its production" Ufa, 1968, P. 231/2.
21. Belomytseva L.A., Report "Health state of workers who had a contact with butyl ether 2,4,5-T in the course of its production". Ufa, 1984.