



## Solvent-related chronic toxic encephalopathy as a target in the worker's mental health research

ANDRÉIA RAMOS<sup>1</sup>, SILVIA R. JARDIM<sup>1</sup> and JOÃO F. SILVA-FILHO<sup>2</sup>

<sup>1</sup>Programa Organização do Trabalho e Saúde Mental (OTSAM)  
Instituto de Psiquiatria, Universidade Federal do Rio de Janeiro  
Av. Venceslau Brás, 71/Fundos, 22090-140 Rio de Janeiro, RJ, Brasil

<sup>2</sup>Decania Centro de Ciências da Saúde / Universidade Federal do Rio de Janeiro  
Cidade Universitária, 21944-590 Rio de Janeiro, RJ, Brasil

*Manuscript received on September 3, 2003; accepted for publication on July 21, 2004;  
presented by LUCIA MENDONÇA PREVIATO*

### ABSTRACT

The article is aimed at discussing the theoretical grounds which support the diagnosis of solvent-related chronic encephalopathy in the field of the worker's mental health, having it as a target in this area. The psychiatric, neurological and labor health postulates which contribute to the multidisciplinary description of such diagnostic category are presented.

**Key words:** solvents, chronic encephalopathy, diagnostic criteria, the worker's mental health.

### INTRODUCTION

Psychiatric disorders related to exposure to neurotoxins have determined different types of welfare benefits being granted by the welfare system in a number of countries, though the diagnosis provided to justify them does not always establish a clear relationship between the exposure and the disorder (Callender et al. 1997, Ramos et al. 1998, 2004, Ramos and Silva Filho 2001). The relative risk of a disability pension due to pre-senile dementia is higher among the workers exposed to solvents than in the control groups (Axelson et al. 1976, Mikkelsen 1980, Olsen and Sabroe 1980). There is a trend in making a diagnosis of neurotic disorder for workers who are exposed to neurotoxins and who are considered to be eligible for the welfare benefit. According to Lindström et al. (1984), in a

study on solvent exposure, the exposure to this neurotoxin increases the risk of early pensions as a result of neurotic disorders, though early pensions due to alcohol addiction and other neuropsychiatric disorders do not grow in the presence of solvent exposure. Perhaps this can be explained by the fact that, most of the times, these workers present unspecific complaints. Arlien-Søborg et al. (1979) examined seventy wall painters after they had undergone health care due to solvent intoxication symptoms or suspected dementia. The authors discharged possible causes of organic mental disorder and found significant changes in the tests and assessment carried out (neurological test, brain computerized tomography). They concluded that the long-term exposure to solvents would gradually result in the development of a chronic brain syndrome called "wall painters' chronic syndrome".

Correspondence to: Andréia Ramos  
E-mail: aa-ramos@uol.com.br

The wall painters have primarily been the subjects in most of the clinical studies (Hanninen et al. 1976, Arlien-Søborg et al. 1979, Gebéran et al. 1989).

The Swedish Board of Occupational Safety and Health studied a group of 81 industrial painters (Elofsson et al. 1980). The study comprised a psychiatric interview, neurological and ophthalmic tests, a series of 18 psychometric tests, a study on the potentials visually evoked by the normal electroencephalogram and the frequency analysis, the measure of ongoing speed and limit of vibration perception, a scanner. Each patient underwent a two-day test session, carried out at the Karolinska Hospital in Stockholm. Two control groups were chosen in the electronic industry (the second one being necessary due to the refusal by a company in taking part of the study). Significant differences appeared as regards reaction time, manual dexterity, perception speed and short-term memory, as well as in different electro-physiological parameters. On the other hand, verbal, spatial and reasoning skills were not altered. The authors stress that the group studied was not exposed to concentrations higher than the current maximum values in force in Sweden.

In order to know whether the changes observed among the painters were reversible or not, Bruhn et al. (1981) repeated the same psychometric tests for a group of twenty-six (26) patients, two years after the interruption. They observed an improvement in the subjective symptoms, but no change in the tests. The stability in the psychometric test was, for them, an argument for a differential diagnosis of Alzheimer's Disease, by which deterioration worsens within a few years.

Chronic exposure to solvents is associated with subjective complaints particularly related to cognitive functions. Although the neurological test is often normal, apart from more severe cases of exposure, the sub-clinical neuropsychological effects tend to appear earlier in the individual's exposure history (Österberg et al. 2000a). The neuropsychological abnormalities include behavioral, cognitive and emotional disorders (Österberg et al. 2000b).

Complaints about headaches, dizzy spells, fatigue, paresthesia, pain and weakness are frequently reported. Subjective complaints of memory disorders (amnesia, difficulty in concentration) have often been made (Edling and Ekberg 1985, Cranmer and Goldberg 1987).

Over the last two centuries the account of neuropsychiatric changes as related to occupational exposure to solvents has been a subject of interest among medical researchers. One of the first to describe them was the French physician Delpech, who, in 1856, reported the psychiatric alterations in workers exposed to carbon disulphide. Following that, the publication of papers organized by Knabenhans and Borbely, in 1936, with hundreds of references on the neural-toxic effects of several solvents (apud Triebig and Hallermann 2001).

Between the 1940s and the 1970s, few works were published on the subject, except for the research carried out by Grandjean et al. (1955) with Swedish workers exposed to trichloroethylene. From the 1970s on, there was a comeback of a larger number of studies about different categories of professionals exposed to solvents. However, it cannot be stated that the studies carried out so far represent uniformity on the nosology employed for neuropsychiatric disorders due to solvent exposure.

In spite of all the difficulties identified even to this day in studying the neuropsychiatric aspects of occupational exposure to solvents, the chronic toxic encephalopathy (CTE) can be taken as a subject of discussion in building up the field of the worker's mental health in so far as it provides some elements for reflexion:

- 1) performance of the hard work of "messaging up with" the hegemonic medical knowledge in a still developing field;
- 2) adoption of a multidisciplinary research model in the worker's mental health which advances towards the build-up of concepts and connection of different disciplines;
- 3) search for scientific strictness in building up the theoretico-conceptual grounds of the field.

### HEGEMONIC MEDICAL KNOWLEDGE IN A STILL DEVELOPING FIELD

One of the main ideas which have influenced the foundations of Psychiatry since its birth is duality. The eighteenth-century Psychiatry is strongly influenced by the Cartesian thinking and adopts the view of man as made up of mind and body, soul and matter.

The bidimensional idea – biological or organic and moral or psychological – is observed throughout the whole history of Psychiatry. Over the last two hundred years of history, this double dimension has resulted in a bipolar theoretico-practical horizon, which has been presented as a tension between two major projects for Psychiatry, each of them stressing what seemed to be the primary dimension in subjective and psychopathological phenomena. As a matter of fact, this contradiction has reflected a dispute over the epistemological statute of Psychiatry, dilacerated between two perspectives: that of becoming a medical specialty, based on the objective knowledge of the physical causes in psychopathological symptoms, or that of becoming a special medicine, devoted to understanding the moral causes (psychological, social, cultural) of the disturbances of the soul (Bezerra Jr 2000).

The attempt at approaching either a natural science or a mental science constitutes a polarity in the field of Psychiatry, alternating the influence of the models. As Bezerra Jr. (2000) points out, “(...) *though that tension gave birth to intense disputes aimed at the establishment of hegemonic models, to a certain extent it became constituent of the psychiatric field, outlining a certain plurality of perspectives. Despite the theoretical conflicts and the differences in proposing clinical models, the tacit acceptance of a born duality ended up giving way to mutual recognition by the disagreeing parts as being participants in the same complex field.*”

The diagnostic category of *chronic toxic encephalopathy related to occupational exposure to solvents* evokes the discussion on the physical/organic/biological – moral/psychological/social dual-

ity in the field of the so-called The Worker’s Health and, more precisely, The Worker’s Mental Health, based on the very criteria proposed to define it, once they imply a complex symptomatology. Thus, only by acknowledging the complexity in this field shall we be able to advance in the discussion of mental disorders as related to occupational exposure to solvents.

In spite of the extensive discussions about mental disorders due to general organic illness or exposure to a toxic agent, for decades the research on organic mental disorders was overlooked by Psychiatry; a subject being left for Neurology. The interest was boosted by the identification of an increase in the prevalence and incidence of cases, especially illnesses which presented cognitive impairment symptoms, as in dementia. Besides, the comeback of the hegemony of the biomedical model for mental illness associated with the increase in complementary screening technology applied to Psychiatry contributed to a growing interest in the previously so-called organic mental disorders.

Bleuler (in Triebig and Hallermann 2001) classified the psychiatric alterations due to general organic illness or related to exposure to certain substances as psycho-organic syndromes, stressing the difference between the psychiatric symptoms of the so-called endogenous psychiatric syndromes and those related to a supposedly identifiable etiological factor. The effort since then has been to distinguish between the clinical features of the syndromes of endogenous source, that is to say, non-organic or non-functional, and the organic mental syndromes; once this difference is vital for the establishment of nosological diagnosis, treatment and prognosis.

Jaspers (1963) called our attention to the overlapping nature of organic and psychic or functional symptoms: “Organic cerebral illnesses can occasionally show, particularly in the initial stages, almost every known morbid psychic phenomenon”.

Slater and Roth (1969) described psychological changes produced by organic cerebral illness suggesting a classification like “Acute Psychosomatic Syndrome” and “Chronic Psychosomatic

Syndrome”. In their proposal of classification, there was some concern in distinguishing the specific features which made clear the choice of not only considering the cognitive impairment symptoms as indicators of organic mental disorders. In his work we have found accounts of criteria such as increased emotional instability, lowered insight, impulsiveness, – which the authors considered as possibly being the primary syndrome symptoms – pathological laughter or cry, irritability, paranoia, depressive state with hypochondriac drives, lively and unstable emotions becoming superficial and monotonous. Lishman (1978) discussed psychiatric manifestations resulting from the exposure to heavy metals and other chemicals, stressing the occurrence of not only cognitive impairment symptoms, but also of personality changes and mood swings.

Over the past decades, the psychiatric classifications have kept this trend of gathering disorders secondary to general organic illness, though without being concerned with the aspects of work which could be related to the disorder described. It is possible to understand the difficulty in the field of Psychiatry in classifying mental disorders resulting from general organic illness or exposure to toxic agents by carrying out a review of the process of building criteria for these two pathologies in two major manuals of psychiatric classification: chapter V of the International Classification of Diseases – ICD (WHO 1992) and the Diagnostic and Statistical Manual of Mental Disorders – DSM.

Taking the DSM as an example, we have verified that, from the first version (DSM-I 1952) to the current one (DSM-IV), some changes occurred as regards the concepts and criteria employed for the diagnosis. The DSM-I included a category called “*organic brain disorder*” which was divided into “acute” or “reversible” and “chronic” or “irreversible”. By doing so, the manual explained that a certain disorder would be irreversible if it lasted longer. The DSM-II, in 1968, changed the word “syndromes” for “disorders” and divided them into “psychotic” and “non-psychotic”, whereas the division into “acute” and “chronic” was rec-

ommended as optional. “Organic brain syndrome” was defined as a class of *disorders* caused by or associated with brain function impairment; its main features being the impairment of orientation and of intellectual, memory and judgment functions and lability or superficiality of affection. Hence, it was named “basic organic brain syndrome” and exclusively defined in terms of a “global disorder of cognition”. The non-cognitive psychiatric symptoms related to organic mental disorders were then excluded (DSM-II 1968).

Lipowski (1980, 1984) suggests, based on a review of the literature, that the concept of “basic organic syndrome” derives from the assumption by Bleuler of “organic psycho-syndrome”.

Nonetheless, the division into “psychotic” and “non-psychotic” and “acute” (reversible) and “chronic” (irreversible) has proved to be of little use and received a number of criticisms, the main one being that the distinction created a false dichotomy based on prognostic judgment. Thus, a cognitive symptom could be completely or partially mitigated even if its evolution was not acute. The critics to this classification proposed that the reversibility of cognitive disorder should, then, be considered within a spectrum of degrees of functional recovery which varied from total to partial to absent.

In the DSM-III, the concept of organization was expanded by including psychiatric syndromes in the category of organic disorders. A vital feature was the inclusion of “psychological or behavioral abnormality associated with transient or permanent dysfunction of the brain”. The DSM-III made a distinction between the so-called “non-organic (“functional”) mental disorders” and “organic mental disorders”, proposing that, in order to diagnose these, it was necessary to give evidence of a specific organic factor considered to be the etiology of the disorder, either by means of medical history, physical test or laboratory tests. This proposal gave way to criticisms based on the argument that the “functional” mental illnesses (e.g. schizophrenia, affective disorder) would hold an even worse stigma since they would be considered “untrue” medical illnesses for

not having an identifiable biological/structural factor in their etiology (DSM III 1980, Spitzer et al. 1992).

In the discussions by the work groups in order to formulate the DSM-IV it was proposed that the term “organic” was abolished, and the expression “secondary” was used instead. According to this proposal, the disorders first considered as organic mental ones were re-defined as “secondary disorders” or “substance-induced” disorders and included in larger diagnostic groups, organized with basis on common phenomenology. Thus, they attempted to eliminate the distinction between “organic” versus “functional”, “psychological” versus “biological”, “mind” versus “body”; which implied the assumption that other psychiatric conditions did not have biological or organic substratum (DSM-IV 1994).

The final version of the DSM-IV kept three categories which replaced the previous classification for organic disorders:

- 1) *Delirium, dementia, amnestic disorder and other cognitive disorders* whose main phenomenological feature is “...a clinically significant impairment in cognition or memory which represents an important change as regards the previous level of functioning” (DSM-IV, p. 121)
- 2) *Mental disorders due to a general medical condition* which is “characterized by the presence of mental symptoms regarded as a direct physiological consequence of a general medical condition” (DSM-IV, p. 161)
- 3) *Substance-related disorders* “include disorders related to abuse drug consumption (including alcohol), side-effects of a medicine and exposure to toxins” (DSM-IV, p. 171).

The chapter V of the 10th Version of the International Classification of Diseases (ICD-10) kept the terminology “organic mental disorder”, adding the word “symptomatic”. In this category group named “Organic Mental Disorders, including Symp-

tomatic Ones”, are the disorders whose main feature is the cognitive impairment (Dementia, Delirium, Organic Amnestic Syndrome) and those whose characteristics are the psychiatric symptoms (Other Mental Disorders Resulting from Brain Damage and Dysfunction and Physical Illness, Personality and Behavior Disorders Resulting from Brain Illness, Damage or Dysfunction).

Neither the ICD-10 nor the DSM-IV proposes the inclusion of labor activity as a component criterion for diagnosing disorders, making it difficult to suspect of a possible work-related mental disease.

Therefore, as regards the clinical descriptions and the diagnostic guidelines of **Mental and Behavior Disorders**, there is no reference to psychiatric disorders as related to solvent exposure in the **Group V** of the ICD-10. Therein, the solvent-related encephalopathy can be diagnosed in the group of categories of **Organic Mental Disorders F00-F09**. The reference to neuropsychiatric disorders secondary to solvent exposure is described in the Group VI which defines the **Nervous System Diseases** and is labeled **G92.1 for Acute Toxic Encephalopathy and G92.2 for Chronic Toxic Encephalopathy**. In the DSM-IV there is no specific code for encephalopathy. A possible diagnosis is through the categories *Dementia, Delirium, Amnestic Disorder and Other Cognitive Disorders, Mental Disorders due to a General Medical Condition and Substance-Related Disorder*.

Similar difficulties are observed among the work groups who propose to discuss diagnostic criteria for organic mental disorders. We have chosen solvent-related chronic toxic encephalopathy because it brings about so much questioning in different branches of knowledge, and we believe that more definite criteria are needed for better characterizing the disease, apart from a more precise measurement of the level of impairment and the inclusion of the so-called unspecific non-cognitive symptoms which enhance the possibility of identifying these disorders. We have observed that, even in the absence of cognitive impairment, there can be mood swings and personality changes. In this sense we regard the cur-

rent psychiatric classifications as having advanced in the discussion of the concept organic disorders.

#### INTERDISCIPLINARY MODEL

The search for a model which produced challenging knowledge aimed at new practice constitutes the very history of the worker's mental health in Brazil. This branch of knowledge and practice has been in formation with basis on hypotheses which have appeared and evolved since the 1970s, especially with the inclusion of Social Sciences in the interpretation of the relationships between health/disease and work within the contributions from the Latin-American Social Medicine and Public Health as regards the elaborations in the theoretical field of Health and Work. This is the hypothesis that Lacaz (personal communication) investigates, adding that The Worker's Health is made up like a speech – concepts, utterances, norms and practices – being established in view of the hegemony of Labor Medicine and Occupational Health. For the author:

*the “(...) field of the Worker's Health would be a new look, a new focus on the conceptual and methodological view which emerges about Public Health in Brazil as regards the study and intervention in the relationships between work and health/disease, trying to establish a framework with the new social actors, i.e., the industrial working class, in a society which faces deep changes from the political, economic and social point of view, having the Brazilian reality of the late 1970s and early 1980s as its background. (Lacaz personal communication)*

The Worker's Health would be, then, a *démarche* primarily characterized by:

1) the introduction of the importance of **work** in the discussion about the social determination of the health/illness process for the study of such determination, specifically incorporating the idea of **work process**<sup>1</sup>(1) as an explanatory category which would

<sup>1</sup> It refers to the value-generating process through work in class society.

be involved in the social relationships of production existing between capital and work; 2) the incorporation of the idea of worker placing it under the perspective of interaction between the biological and the psychic aspects which constitute an unbroken bond; 3) an “abstract activity” to be designed by researchers from varied fields (health, social sciences, anthropology, philosophy), having as target the relationships Capital/Work, Work/Health, Society/Classes/Health and using the interdisciplinary theoretical and conceptual approach as instruments and methods which adopt analytical techniques from different subject areas; 4) the existence of health care teams (several occupations of different expertise and “health agents” (workers)), placing the “technique on the workers' service”; 5) the adoption of an empirical-conceptual and clinical-epidemiological approach to public health, planning, engineering, social and political sciences as instruments and means.

To the same author, one of the epistemological thresholds of Labor Medicine – Occupational Health and captured by The Worker's Health as a field would be the *[in]ability of recognizing the relationships between job organization/sharing and the consequences for the health of workers, particularly expressed as “chronic-degenerative” diseases and mental health disorders in the contingent of workers.*

Seligmann-Silva (1994), in turn, defines the field of “Labor Mental Health” as emerging from the branch of study of social production of mental disorders, emphasizing the three dimensions in the study of mental health/illness processes in the new field bearing the marks of the “*theoretico-methodological building*” in *The Worker's Health* “*which lies in this interdisciplinary field, even though in a stage of construction.*”

These three dimensions are: **interdisciplinarity**, **focus on work** as subject of analysis in mental health studies and **ethics** in health research and practices, as the author points out:

*“The study of the links between Mental Health and Work is nothing new. However, the theoretic-*

*cal and methodological development on the subject, as well as the clarity even stronger of its political, economic, socio-cultural meanings takes such intensity and comprehensiveness that it becomes possible to speak of the appearance of a new branch of study highlighted by interdisciplinarity. In this field, health/illness processes tied to labour life begin to be examined, either in their determination or development, through quite a different perspective from the one previously adopted, both because of its richness of analytical perspectives and the determination of a perspective in which the purposes of investigations take **ethic directives**. This means that principles which go beyond the search for productivity are adopted, in so far as the studies turn to identify all the "sickening" aspects, including those which may be simultaneously serving the interests of production"* (Seligmann-Silva 1994).

So far, the generation of knowledge about solvent-related chronic toxic encephalopathy has been possible because different disciplines have been devoted to its study. We have observed that not only Toxicology but also Neurology, Psychology, Epidemiology and Psychiatry have attempted to account for this matter, turning to different aspects of the same issue. Therefore, we can abandon – at least partially – a centralizing model of generating knowledge, giving way to a more comprehensive discussion of different disciplines and bearing in mind *"that for each field there will be always a battle, in which the specificities must be detected as regards what is new, what seeks recognition and what is dominant, hegemonic and attempts to keep the monopoly by excluding the possibility of coexistence and concurrence"* (Lacaz 1997).

This discussion is tied to the ongoing study on Psychiatric Morbidity, carried out by Ramos et al. (2004) among the wall painters at a public Brazilian university who are exposed to solvent mixture, and which is aimed at demonstrating the importance of the participation of different professionals – psychiatrists, psychologists, biochemists, work safety technicians, nurses – in the field of The Worker's Health with the aim of promoting the knowledge

concerning neuropsychiatric disorders related to occupational exposure to solvents.

Still according to Lacaz (1997): *"(...) we have observed that the field [of the worker's health] has not reached the level of "epistemological process" which places it as a discipline or even a would-be science (...), in spite of the efforts which have been made in creating a differentiated method, but, given its interdisciplinary profile, it will develop for a while before establishing itself as a scientific discourse, or a discipline which differentiates it from the mere ideological movement that the political and ideological features of the field sometimes insists on keeping.*

Perhaps it is possible to say that there is an interdisciplinary model being consolidated in the discussion about solvent-related chronic toxic encephalopathy. On the new Brazilian record of professional diseases or work-related diseases, regulated by decree #3.048/99 on 6<sup>th</sup> May, 1999 by the Ministry of Welfare (DOU 12.05.99 – no. 89), the committee of specialists in Labor Pathology reached about 200 specific nosological entities, all of them referring to the International Classification of Diseases in its 10<sup>th</sup> Revision (ICD-10), including the twelve diagnostic categories of chapter V of the ICD-10, i.e., mental and behavioral disorders (Jardim 2000, 2001, Glina et al. 2001).

This record is characterized by a double entry where the diagnoses for the diseases are found on the first column and the etiological agents or occupational risk factors known to be related to each diagnostic category are found on the second column.

The Committee of Specialists who prepared the list proposal preferred working with the broad notion of "work-related diseases" rather than the differentiation between "professional diseases" and "work-related diseases" existing in the previous legal description.

According to the proposed list, mental illnesses which may be related to solvent exposure include: 1) Dementia in other specific illnesses classified in other points (F02.8.); 2) Delirium, not overlapping with dementia (F06.7); 3) Mild cognitive disorder

(F06.7); 4) Organic personality disorder (F07.0), 5) Unspecific organic or symptomatic mental disorder (F09.-); 6) Depressive episode (F32.-). Therefore, apart from the diagnoses related to cognitive impairment disorders there is the inclusion of depressive episode diagnosis emphasizing that the exposure to neurotoxins often produces mood swing symptoms besides cognitive symptoms.

Moreover, the new list includes the diagnoses of acute toxic encephalopathy (G92.1) and Chronic Toxic Encephalopathy (G92.2) from the group VI of the ICD-10 (Nervous System Disorders).

#### SCIENTIFIC STRICTNESS

The discussion about the best characterization and classification of neuropsychiatric disorders related to solvent exposure is a good example of the difficulties and attempts in putting scientific strictness into practice when building the theoretico-conceptual framework in the field of worker's health. Since the very beginning of the description of these disorders, difficulties have been observed in establishing more specific criteria. The adoption of terms such as "paint disease" or "wall painters' disease" has contributed to a superficial account of the pathology which has resulted in a considerable uncertainty about the health risks to groups of workers in contact with solvents (Triebig and Hallermann 2001).

Recent studies (Triebig and Hallermann 2001, van der Hoek et al. 2000) have confirmed the still prevailing difficulty in building up a theoretical framework which comprises the questioning and information already existing on chronic toxic encephalopathy secondary to solvent exposure. Research involving interviews with researchers from the European Union countries, schools and legislation analysis on occupational diseases in several countries reveals there is no consensus in the use of the criteria and the existing classifications on the subject matter.

In 1985, a Working Team from the World Health Organization (WHO 1985) presented diagnostic criteria and a classification for chronic toxic

encephalopathy. In the same year, the "Workshop on neurobehavioral effects of solvents" in Raleigh, N.C., USA introduced a somewhat different classification for CTE. According to WHO, the CTE can be classified into three stages (Table I):

- 1) "organic affective syndrome" (type I): characterized by depression, irritability, loss of interest in daily activities; course ranging from days to weeks with no sequels; unknown pathophysiology.
- 2) mild chronic toxic encephalopathy (type II): characterized by fatigue, mood swing, recall complaints, attention complaints; insidious beginning; ranging from weeks to months; reversibility being questionable; impairment of central nervous system functions: psychomotor function (speed, attention, dexterity), short-term memory; unknown pathophysiology.
- 3) "severe chronic toxic encephalopathy" (type III): characterized by loss of mental abilities, severe enough to interfere with the social and work functioning, impairment of memory, abstract thinking and judgment, cortex function disorder, personality change; insidious beginning with undefined duration normally irreversible; impairment of the central nervous system functions similar to type II, but more striking, abnormalities in neurophysiological tests and neuroradiological tests; unknown pathophysiology, often associated with structural damage to the central nervous system.

The classification by Raleigh, on the other hand, recognizes 4 stages (Table II):

- 1) "symptom only" (type 1): unspecific symptoms like fatigue, recall complaints, difficulty in concentrating and loss of initiative; irreversible course if exposure is discontinued; no objective evidence of neuropsychiatric dysfunction.
- 2) "sustainable personality change and mood swing" (type 2A): striking and sustainable



**TABLE I**  
**Classification of organic chronic mental illnesses, WHO 1985.**

Illness	Patophysiology	Course	Clinical manifestations	Changes in the central nervous system functions
Organic affective syndrome (type I)	Indefinite	Days to week without sequels	Depression irritability, lack of interest in daily activities	
Mild chronic toxic encephalopathy (type II)	Indefinite	Insidious beginning duration: weeks to months. Questionable reversibility	Fatigue, mood swing, recall complaints, attention complaints	Psycho-motor function (attention, dexterity, speed); short-term memory
Severe chronic toxic encephalopathy (type III)	Indefinite, often associated with structural damage to CNS	Insidious beginning. Duration: indefinite, usually irreversible	Loss of mental abilities, enough severity to interfere with the social or labour functioning; impairment of memory, abstract thinking and judgment; personality change	Abnormalities similar to type I; more acute and diffuse functional impairment; abnormality of some neuro-psychological and neuro imaging tests

change in personality involving fatigue, emotional lability, control over impulse, mood and motivation.

- 3) "mental function impairment" (type 2B): difficulty in concentrating, memory impairment and loss of learning ability; symptoms are followed by objective evidence of impairment, there may be minor neurological signs; reversibility is questionable.
- 4) "dementia" (type 3): striking global deterioration of intellect and memory; symptoms are often followed by neurological signs or findings in neuro imaging scans; irreversible.

Type I by WHO and types 1 and 2A by Raleigh use the same subjective symptoms as diagnostic criteria. Type II, proposed by WHO, and type 2B, by Raleigh, imply the objective evidence of impairment of attention and memory and loss of psychomotor

function (WHO) or learning ability (Raleigh). These signs, though not specific as such, can be considered as criteria for diagnosing CTE type II or type 2B. An advantage in the classification by Raleigh for type 2B in relation to type II by WHO is that it requires three out of the four existing criteria, whereas WHO requires one or more. Therefore, the former allows the formation of more homogeneous groups since it establishes a boundary which defines the level of encephalopathy.

The classification proposed by WHO presents the criteria "objective findings in clinical testing and the like" without, however, proposing more specific descriptions of the neuropsychological testing, which is considered to be vital in diagnostic assessment. None of the classifications consider the duration and the intensity of exposure as criteria.

Triebig and Hallermann (2001) identified different reactions before the diagnosis of solvent-

**TABLE II**  
**Effects of solvents in the central nervous system: categorization proposed by type:**  
**working group, Raleigh, USA 1985.**

Category	Effects
<b>Type I: symptoms only</b>	
Symptoms	Unspecific symptoms, such as fatigue, memory impairment, difficulty in concentrating and loss of initiative
Course	Reversible if exposure is discontinued
Cognitive impairment	No objective evidence of neuro-psychiatric disfunction
<b>Type 2A: change in personality or continuous mood swing</b>	
Symptoms	Striking and continuous change in personality, involving fatigue, emotional lability, impulsiveness and overall mood swing and alteration in motivation
<b>Type 2B: impairment of intellectual function</b>	
Symptoms	Difficulty in concentrating, memory impairment and loss of learning ability
Cognitive impairment	The symptoms are followed by objective evidence of impairment
Neurological impairment	There can be minor neurological signs
Course	Complete reversibility of type 2B is questionable
<b>Type 3: dementia</b>	
Symptoms	Striking global deterioration of memory and intellect
Neurological impairment	Often followed by neurological signs of neuro imaging findings
Course	Hardly ever reversible, though it can be non-progressive if exposure is discontinued

related chronic toxic encephalopathy in the European Union countries. The professionals surveyed referred to different criteria of causality. In most of the countries surveyed there was agreement as regards the occupational history as a compulsory diagnostic resource as well as concerning the information on the time of exposure and the need for carrying out pathological and neuropsychological tests in order to make the level of dysfunction clear. The presence of neurological signs, for instance, is required in Belgium, Italy, Germany and Switzerland so as to establish the causal nexus. The presence of a possibly non-neurological illness related to solvents is considered differently in a number of countries such as Germany, France, Italy, Belgium, Switzerland and Finland, where they consider hepatic damage or nephropathy as an indicator of intense exposure to a specific solvent like chlorinated hydrocarbons.

The criterion for the development of the disease is another polemic point. Among some European countries, apart from Denmark and Sweden, researchers agree that the improvement in the symptoms after interrupting the exposure makes the causal nexus improbable. Then, the existence of a symptom-free interval between the end of the exposure and the onset of the disease is not accepted in most of the countries.

As regards the reversibility or irreversibility of the disease, most of the European Union countries tend to adopt the criteria of the Classifications proposed by WHO (1985) and by the Raleigh Conference (1985).

Apart from not allowing the creation of a more consensual classification, the lack of criteria for describing such changes also make the comparison among the studies difficult. Thus, the limited use of a uniform characterization still being discussed prevents the comparison among the studies as regards the incidence, etiology and effects of preventive and therapeutic measures.

The current inaccuracy concerning the criteria – especially for diagnosis and causality – and the classification of solvent-related chronic toxic

encephalopathy give way to discrepancies among the countries as regards the recognition of solvent-related chronic encephalopathy as an occupational disease. In Finland, the disease has been recognized as an occupational disease since 1948, in Norway since 1970, in Sweden since 1976, in Denmark since 1978, in Switzerland since 1981, in Germany since 1997, in Austria and Belgium since 1998 and in Brazil since 1999.

Improved proposals for classifying solvent-related chronic toxic encephalopathy are:

- 1) establishment of criteria which describe the relationship between exposure, development and course of signs and symptoms;
- 2) adoption of criteria on severity and extent of impairment for each neuropsychological domain;
- 3) indicative of well-described diagnostic tests to measure the alterations and classify the level of encephalopathy;
- 4) adoption of criteria for excluding confusing elements from the diagnosis and classification such as medicine and psychoactive substances;
- 5) research work based on data from workers' population at risk and not only from professional categories, aiming at increasing the identification of cases.

## CONCLUSION

So what does the field of the worker's mental health mean by taking charge of research and discussion on chronic encephalopathy? As for other diagnostic criteria – for instance, Repetitive Strain Injury (REL) – solvent-related chronic toxic encephalopathy allows the inference of some questions which may contribute to fostering a still developing field.

Because chronic toxic encephalopathy is pointed out by many as being related to an unspecific solvent and, therefore, being hard to be characterized, the field of the worker's mental health faces the straightforward consequence of this, which is the illegitimacy of the diagnosis or the questioning of its legitimacy, experienced by workers diagnosed for it in different social contexts: family, community, work, medical care and welfare units (unpublished data).

The very psychiatric classifications make the diagnosis difficult among physicians and researchers because they do not consider the occupational exposure as a diagnostic criterion. The unspecificity of the symptoms should not be taken as an explanation for considering the diagnosis invalid. The proof is that the two international classifications (WHO and Raleigh) include the symptoms as criteria.

It falls to the field of the worker's mental health to contribute towards the advancement of the discussions about the characterization and recognition of work-related mental disorders so as to promote a reformulation of the concept of the disease and the relationship between work process and mental health/illness process (Jardim et al. 1999). It is a "daring" attitude, according to Lacaz (personal communication), since it proposes to generate challenging knowledge, bearing in mind that the action takes place in an "early-aged" field [of the worker's health].

However, by moving from a hegemonic knowledge-generating model to a broader and more heterogeneous one, it is expected that the multiplicity of knowledge brings about more questions than answers, so that later it constitutes the theoretical framework of a branch of knowledge, demanding more willingness to exchange from the different disciplines involved.

#### ACKNOWLEDGMENTS

A.R. is a recipient of a Ph.D. fellowship from Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq).

#### RESUMO

O artigo se propõe a discutir os fundamentos teóricos que compõem o diagnóstico de encefalopatia crônica relacionada a solventes no campo da saúde mental do trabalhador, propondo-o como um objeto de pesquisa desse campo. São apresentados postulados da psiquiatria, da neurologia e da saúde do trabalhador que contribuem para a elaboração pluridisciplinar dessa categoria diagnóstica.

**Palavras-chave:** solvente, encefalopatia tóxica, critério diagnóstico, saúde mental do trabalhador.

#### REFERENCES

- ARLIEN-SØBORG P, BRUHN P, GYLDENSTED C AND MELGAARD B. 1979. Chronic painters' syndrome. *Acta Neurol Scand* 60: 149–156.
- AXELSON O, HANE H AND HOGSTEDT C. 1976. A case-referent study on neuropsychiatric disorders among workers exposed to solvents. *Scand J Work Environ Health* 2: 14–20.
- BEZERRA JR B. 2000. Naturalismo como anti-reducionismo: notas sobre cérebro, mente e subjetividade. *Cadernos IPUB* 6: 158–177.
- BRUHN P, ARLIEN-SØBORG P, GYLDENSTED C AND CHRISTENSEN L. 1981. Prognosis in chronic toxic encephalopathy. *Acta Neurol Scand* 64: 259–272.
- CALLENDER TJ, RISTOVV M, GUERRA M AND RUTTENBERG R. 1997. Social and economic impact of neurotoxicity in hazardous waste workers in Lenoir, North Carolina. *Environ Research* 73: 166–174.
- CRANMER JM AND GOLDBERG L. 1987. Proceeding of the work-shop on neuro-behavioral effects of solvents. *Neurotoxicology* 7: 1–95.
- DSM I. 1952. *Diagnostic and Statistical Manual of Mental Disorders*. American Psychiatric Association, Washington.
- DSM II. 1968. *Diagnostic and Statistical Manual of Mental Disorders*, ed 2. American Psychiatric Association, Washington.
- DSM III. 1980. *Diagnostic and Statistical Manual of Mental Disorders*, ed 3. American Psychiatric Association, Washington.
- DSM IV. 1994. *Diagnostic and Statistical Manual of Mental Disorders*, ed 4. American Psychiatric Association, Washington.
- EDLING C AND EKBERG K. 1985. No acute behavioral effects of exposure to styrene: a safe level of exposure? *Br J Ind Med* 42: 301–304.
- ELOFSSON S, GAMBERALE F, HINDMARSH T, HINDMARSH T, IREGREN A, ISAKSSON A AND JOHNSSON I. 1980. Exposure organic solvents: a cross-sectional epidemiologic investigation on occupationally exposed car and industrial spray painters with special reference to the nervous system. *Scand J Work Environ Health* 6: 239–273.
- GEBÉLAN E, USEL M, RAYMOND L, TISSOT R AND SWEETNAM PM. 1989. Disability, mortality, and incidence of cancer among Geneva painters and electricians: a historical prospective study. *Br J Ind Med* 46: 16–23.

- GLINA DMR, ROCHA LE AND MENDONÇA MG. 2001. Saúde Mental e trabalho: uma reflexão sobre o nexo com o trabalho e o diagnóstico, com base na prática. *Cad Saúde Pública* 17: 607–616.
- GRANDJEAN E, MÜNCHINGER R AND TURRIAN V. 1955. Investigations into the effects of exposure to trichloroethylene in mechanical engineering. *Br J Ind Med* 12: 131–142.
- HANNINEN H, ESKELINE L, HUSMAN K AND NURMINEN M. 1976. Behavioral effects of long-term exposure to a mixture of organic solvents. *Scand J Work Environ Health* 4: 240–255.
- JARDIM SR. 2000. O diagnóstico dos transtornos mentais relacionados ao trabalho. *Arq Bras Psiquiatr Neurol Med Legal* 74: 47–52.
- JARDIM SR. 2001. Ética e saúde mental do trabalhador: a legitimidade do transtorno de estresse pós-traumático relacionado ao trabalho. In: MORAES T (Org), *Ética e Psiquiatria Forense*, Rio de Janeiro: Edições IPUB-CUCA, p. 57–84.
- JARDIM SR, RAMOS A AND SILVA FILHO JF. 1999. Saúde mental e trabalho: avaliação da capacidade laborativa e proteção à saúde mental dos trabalhadores. *Arq Bras Psiquiatr Neurol Med Legal* 1: 34–39.
- JASPERS K. 1963. *Psicopatologia Geral*. Rio de Janeiro: Livraria Atheneu.
- LACAZ FAC. 1997. Saúde dos Trabalhadores: cenários e desafios. *Cad. Saúde Pública* 13 (Supl 2): 7–19.
- LINDSTRÖM K, RIHIMAKI H AND HÄNNINEN H. 1984. Occupational solvent exposure and neuropsychiatric disorders. *Scand J Work Environ Health* 10: 321–323.
- LIPOWISKI ZJ. 1980. A new look at organic brain syndromes. *Am J Psychiatry* 137: 674–677.
- LIPOWISKI ZJ. 1984. Organic brain syndromes: new classification, concepts and prospects. *Can J Psychiatry* 29: 198–204.
- LISHMAN WA. 1978. *Organic Psychiatry – the psychological consequences of cerebral disorder*.
- MIKKELSEN S. 1980. A cohort study of disability pension and death among painters with special regard to disabling presenile dementia as an occupational disease. *Scand J Social Med Suppl* 16: 34–43.
- OLSEN J AND SABROE SA. 1980. A case-referent study of neuropsychiatric disorders among workers exposed to solvents in the Danish wood and furniture industry. *Scand J Social Med Suppl* 16: 44–49.
- ÖSTERBERG K, ØRBAEK P, KARLSON B, BERGENDORF U AND SEGER L. 2000a. A comparison of neuropsychological tests for the assessment of chronic toxic encephalopathy. *Am J Ind Med* 38: 666–680.
- ÖSTERBERG K, ØRBAEK P, KARLSON B, SEGER L, ÅKESSON B AND BERGENDORF U. 2000b. Psychological test performance during experimental challenge to toluene and n-butyl acetate in cases of solvent-induced toxic encephalopathy. *Scand J Work Environ Health* 26: 219–226.
- RAMOS A AND SILVA FILHO JF. 2001. Transtornos neuropsiquiátricos e exposição a solventes. *Arq Bras Psiquiatr Neurol Med Legal* 78: 8–13.
- RAMOS A, FRAGA S, KRIEGER M, JARDIM S, CURI R, FERREIRA H, SILVA MGR AND SILVA FILHO JF. 1998. Aspectos psiquiátricos da intoxicação ocupacional pelo mercúrio metálico: relato de um caso clínico. *Rev Bras Psiq* 20: 200–204.
- RAMOS A, SILVA FILHO JF AND JARDIM SR. 2004. Exposição a pesticidas, atividade laborativa e agravos à saúde. *Rev Med de Minas Gerais*. In Press.
- SELIGMANN-SILVA E. 1994. *O Desgaste Mental no Trabalho Dominado*. Rio de Janeiro: Cortez/UFRJ, p. 50.
- SLATER E AND ROTH M. 1969. *Clinical Psychiatry*. Londres: Baillière, Tindall & Cassell Ltd.
- SPTIZER RL, FIRST MB, WILLIAMS JBW, KENDLER K, PINCUS HÁ AND TUCKER G. 1992. Now is the time to retire the term “organic mental disorders”. *Am J Psychiatry* 149: 240–243.
- TRIEBIG G AND HALLERMANN J. 2001. Survey of solvent related chronic encephalopathy as an occupational disease in European countries. *Occup Environ Med* 58: 575–581.
- VAN DER HOEK JAF, VERBERK MM AND HAGEMAN G. 2000. Criteria for solvent-induced chronic toxic encephalopathy a systematic review. *Int Arch Occup Environ Health* 73: 362–368.
- WORLD HEALTH ORGANIZATION. 1985. *Chronic effects of organic solvents on the central nervous system and diagnostic criteria*. Copenhagen.
- WORLD HEALTH ORGANIZATION. 1992. *The ICD-10 Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines*. World Health Organization, Geneva.