

# Response of pyromania to biological treatment in a homeless person

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**Abstract:** Pyromania has been associated with abnormalities of impulsivity, social estrangement, cognitive flexibility, and executive function. We aim to investigate whether psychopharmacological interventions increase cognitive test performance and decrease frequency of serious clinical incidents during inpatient admission for pyromania. This is a case study of a 20-year-old homeless male who met DSM-IV criteria for pyromania. Neuropsychological testing was administered on psychiatric admission and repeated 5-months later following psychopharmacological treatment with olanzapine and sodium valproate. Baseline neuropsychological assessment revealed impairments in attention, verbal/visual memory, and executive functions, whereas visuospatial skills were intact. Five-month follow-up neuropsychological assessment showed substantial improvement on cognitive tests, while visuospatial skills remained within the normal range. A decrease in frequency of serious clinical incidents occurred during the course of inpatient admission. Fire-setting behavior abated. Psychopharmacological treatment may have facilitated improvement in cognitive test performance, social-adaptive functioning, and decreased aggressive behavior. It might have a more specific role in the treatment of mental disorders characterized by impulsive dangerousness.

**Keywords:** pyromania, olanzapine, sodium valproate, neuropsychological assessment, psychopharmacological treatment, homelessness, executive function

## Introduction

Pyromania is a complex disorder involving multiple domains of cognition, behavior, and personality (Haessler et al 2000; Lowenstein 2001). Little is known about the relationship between fire-setting behaviors and psychosis, although Repo (1998) found some evidence for a link with paternal alcoholism and maternal psychosis. Here we report the case of a man with longstanding pyromania, whose behavior abated in the context of psychopharmacological treatment.

## Method

A 20-year-old homeless white male (JO) was informally admitted to a psychiatric unit after reports of fire-setting behavior (eg, laughing while setting individuals on fire with lighter fluid). As a child, he had set fire to a hillside barn, which would have had significant consequences for a village further up the hill had it not been extinguished. When admitted to the unit he was found to be grossly cognitively impaired. However, collateral information indicated that previously he was an average student, completing 10 years of education. He did not exhibit behavioral problems during the last several years of his education. The patient had brief periods of manual labor employment, the longest lasting 3 months. He denied having had any long-term relationships. He has had limited contact with his mother. The patient's father was a heavy drinker and committed suicide two years previously, several months

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after losing his business. Police databases did not show a formal forensic history for the patient.

On admission to the ward, JO was noted to have low mood associated with anhedonia, reduced motivation, and cognitive depressive symptoms. He also had persecutory delusional ideas; thinking that others talked about him and mocked him. He admitted to fleeting visual and auditory hallucinations. These consisted of hearing “breathing” in his bedroom and seeing blood on the wall. In addition, he stated that he had seen “ghost-like people that looked like water”. During a diagnostic interview the patient indicated that he had problems with memory, including difficulty remembering names, phone numbers, appointments, directions, and recent events.

Routine cognitive examination revealed difficulty with word finding and reading retention. Manual motor tasks were adequate. He was casually dressed, but dishevelled and had a blunted affect, paucity of facial expression, and poverty of speech. Significantly, he scored in the impaired range (18 correct of 30 items) on the Mini Mental Status Examination (MMSE) (Folstein et al 2002), doing poorly on measures of short-term memory, concentration, and orientation in time. He seemed to be making a genuine effort to complete the tests, and he appeared perplexed at his inability to answer questions. From the diagnostic interview it was apparent that fire setting did not occur as an accident during a confusional state such as alcoholism or drug intoxication. Moreover, fire setting did not occur during an acute manic episode or psychotic episode in specific response to a delusional idea or commands from hallucinated voices. The patient did not meet the criteria for conduct disorder, as most of his behavioral problems were limited to verbal outbursts. As a child he did not make the association between fire setting and the potential harm it might present to others.

His characteristic ward behavior was described as being withdrawn with poverty of speech. However, during an interview, a rapid change in affect occurred when questioned about what he did for entertainment. The patient began to laugh and smile indicating that he “enjoyed putting lighter fluid on people and setting them on fire”. The patient continued to be animated while discussing violent topics (eg, what it would be like to drop objects from motorway bridges to cause an accident). He was also at times sexually inappropriate toward female staff and talked of his wish to travel to a foreign country for “loads of sex”. On another occasion, he asked a female mental health worker if she

could arrange for prostitutes dressed as nurses to visit the inpatient ward.

Previously, JO had experienced two episodes of collapse for which he was admitted to hospital. On both occasions he had normal CT scans and a normal EEG. These collapses were attributed to illicit drug use, probably opiates. He had experimented with other drugs including marijuana but did not evidence signs of dependence. During the current admission, however, nursing staff observed 2 generalized tonic-clonic seizures. Routine bloods were normal as were lumbar puncture (including testing for new variant Creutzfeldt-Jakob disease [nvCJD]), HIV screening, and EEG. Testing for nvCJD was undertaken due to the severity of JO’s cognitive impairments. An MRI examination demonstrated evidence of generalized cerebral atrophy. JO was initially treated with an anticonvulsant sodium valproate (300 mg bd, increased to 800 mg bd; serum levels confirmed dose in therapeutic range). No further seizures were observed. Olanzapine was commenced 5 days after sodium valproate. Neuropsychological tests were administered on admission and were repeated 5-months later. Olanzapine 10 mg was started after baseline testing and maintained throughout the 5-month psychiatric hospitalization. Perceptual abnormalities and paranoia resolved following the introduction of olanzapine. While behavioral disturbance gradually abated, cognitive function gradually improved (see below).

The neuropsychological test battery was designed to assess multiple domains of cognition including premorbid intelligence (National Adult Reading Test), sustained attention and concentration (Continuous Performance Test), cognitive flexibility and executive function (Verbal Fluency), language (Boston Naming Test), verbal memory (Rey Auditory Verbal Learning Test), visual memory (Rey Complex Figure Test), and visuospatial function (Parietal Lobe Test) (Nelson and Willison 1991; Seidman et al 1997; Mitrushina et al 1999). Frequency of serious clinical incidents (eg, self-harm, threatening behavior, and verbal abuse) were noted by the treating psychiatrists, nurses, and mental health workers and documented in the medical charts.

## Results

Baseline neuropsychological assessment revealed impairments in attention, verbal/visual memory, and executive functions, whereas visuospatial and language skills were average (Table 1). Five-month follow-up neuropsychological inpatient assessment showed substantial

**Table 1** Neuropsychological test performance

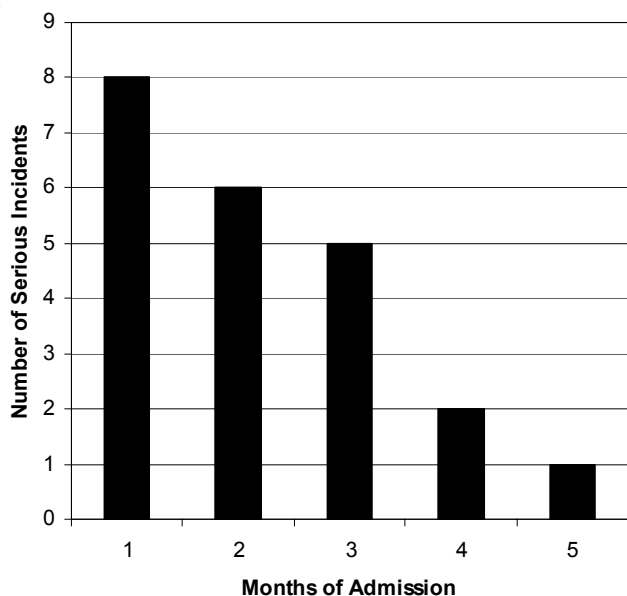
Test name	Baseline test	Post test
NART	107	107
Continuous Performance Test	17	24
Letter Fluency	17	27
Boston Naming	45	48
Parietal Lobe	13	13
Rey Complex Figure – Copy	35	35
Rey Complex Figure – Recall	11	11.5
Rey Auditory Verbal Learning – Trial 5	4	8
Rey Auditory Verbal Learning – Recall	3	7

NOTE: Increasing scores on above tests would represent improvements in cognition.

improvement on cognitive tests, while visuospatial and language skills remained within the normal range. Performance on the MMSE improved (from his previous score of 18/30 to 29/30). Figure 1 shows a histogram of serious clinical incidents. The frequency of such reports declined during the course of inpatient admission; there was a significant negative correlation between the number of serious incidents and duration of admission (Pearson product moment correlation:  $r=0.99$ ,  $p<0.01$ ). JO was discharged to an independent living facility, with weekly monitoring by social workers and no further fire setting (3 years post discharge) (Figure 1).

## Discussion

JO is a patient whose violent behavior had previously been attributed to his personality, but in whom marked change



**Figure 1** Frequency histogram of serious clinical incidents during the course of inpatient admission.

occurred as a result of proper treatment of an intercurrent seizure disorder and psychosis. He underwent detailed examination as a result of his significant cognitive impairment at admission (even warranting screening for nvCJD and HIV dementia). We cannot be sure which of his treatments impacted upon his fire-setting behavior, but it seems plausible that biological treatments curtailed this dangerous behavior.

Our findings are consistent with a meta-analysis of randomized controlled trials that showed olanzapine to be associated with decreases in impulsivity, aggression, and disorganization in patients with psychosis (Davis and Chen 2001). However, Geddes et al (2000, 2002) caution that follow-up is essential to monitor atypical drugs' short-term benefits, since there has been little reliable evidence of long-term efficacy. It is unlikely that the improvement in cognition and decrease in serious clinical incidents that we observed could be accounted for by co-prescription of sodium valproate, because prior research has shown the effect of the latter on cognition to be negligible (Goldberg and Burdick 2001). On the other hand, studies of olanzapine have shown improved neuropsychological test performance, in the context of psychosis (Purdon et al 2000; Cuesta et al 2001; Kinon et al 2001). In addition, olanzapine has shown a reduction of psychopathological symptoms in first-episode psychosis (Lieberman et al 2003).

Our findings of improved attention and executive functioning (increase in the continuous performance task and verbal fluency) suggest possible modulation of frontotemporal and frontosubcortical systems by the psychopharmacological intervention (probably olanzapine) (Hager et al 1998; McPherson and Cummings 2002), as well as a potential psychopharmacological treatment of pyromania. The patient's difficulty with pre-treatment sexual aggressiveness was also consistent with research on orbitomedial frontal dysfunction (Malloy et al 1993). The improvements in executive functioning and adaptive behavior are consistent with prior research in psychosis, where neuropsychological functioning plays an important role in moderating psychosocial functioning and one's subjective experience (Brekke et al 2001).

On multiple occasions in the presence of clinical nursing staff, psychologists, and psychiatrists during the first three weeks of JO's admission, it was clear that an intense interest in fire setting was closely associated with affective arousal, followed by feelings of gratification and tension reduction. While he was accused of setting an individual on fire before

this current hospitalization, we suspect (authors' psychodynamic conjecture) that individuals were not the primary "object" of his activity, rather the "idea" of fire setting in general triggered an overall increase in arousal and behavioral activity. This tended to temporarily lift him out of his general state of lethargy.

In the current case study, administration of psychotropic medications (olanzapine and sodium valproate) was associated with remission from psychosis that was accompanied by significant improvements in cognition and adaptive function. Specifically, the patient showed enhanced performance on measures of attention and executive control, manifest clinically as a cessation of fire-setting behaviors. The anticonvulsant successfully treated the seizure disorder. Though preliminary, our data suggest that atypical antipsychotics might have a role in the management of disorders of impulse control warranting further study. In addition, our patient demonstrates the importance of thorough investigation of disordered conduct (particularly in the presence of cognitive impairment; Spence et al 2004). Homelessness represents a serious challenge to the mental health resources; however, careful post-hospitalization discharge to a semi-independent living facility with monitoring by community workers may have contributed to the success of our patient's treatment.

## Acknowledgments

Treatment of this patient was not funded by a drug company.

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