The catatonic syndrome is a remarkable constellation of motor and behavioral signs and symptoms that often occur in relation to neuromedical insults. Structural brain lesions, intrinsic brain disease, and other systemic disorders that affect the brain, as well as idiopathic psychiatric disorders, have been associated with catatonia. This syndrome was first described by Kahlbaum in 1874. Kraepelin was influenced by Kahlbaum and included catatonia in the group of deteriorating psychotic disorders he named “dementia praecox.” Bleuler adopted Kraepelin’s view that catatonia was subsumed in this category of severe idiopathic deteriorating psychoses, which he renamed “the schizophrenias.”

Both Kraepelin and Bleuler recognized the fact that catatonic symptoms could emerge as part of mania or depression. It was also well known that catatonia could occur secondary to neurologic, toxic–metabolic, and infectious etiologies. Nevertheless, catatonia was identified exclusively with schizophrenia as late as the Diagnostic and Statistical Manual of Mental Disorders-III, revised edition (DSM-III-R). This limitation changed in the DSM-IV, thanks in large part to the work of Fink and Taylor. We now have criteria for “catatonic disorder due to a general medical condition,” mood disorder with catatonic features, and the catatonic type of schizophrenia.

**CATATONIA SUBTYPES**

When dealing with catatonia, the clinician must also be aware of the subtypes that have been described. Catatonic withdrawal is characterized by the presentation of psychomotor retardation, whereas catatonic excitement is characterized by psychomotor hyperactivity. These subtypes may alternate in the course of a catatonic episode. Kraepelin wrote of a “periodic” catatonia with onset in adolescence characterized by intermittent excited states, followed by catatonic stuporous stages, and a remitting and relapsing course. This disorder was elaborated on by Gjessing in 1932. Two years later, Stauder described lethal catatonia distinguished by rapid onset of a manic delirium, high temperatures, catatonic stupor, and a greater than 50% mortality rate.

In 1986, Mann et al. published a review of the world literature on lethal catatonia extending back to the pre-neuroleptic era. Pre-neuroleptic era cases classically began with a period of intense motor excitement lasting night and day for an average of 8 days. The behavior of these patients was often bizarre and violent, and they refused nourishment. They would sometimes display intermittent mutism, posturing, catalepsy, and rigidity interspersed with their excite-
ment. Thought disorder with disorganized incoherent speech as well as delusions and hallucinations was also commonly displayed. Fever rose rapidly during this hyperactive stage and there would also be diaphoresis and tachycardia. The next stage (exhaustion) would be characterized by stupor, with continued high temperatures.

Terminal rigidity and posturing were noted in Stauder's series of 27 cases, although others reported cases of flaccidity. There were cases in the pre-neuroleptic era in which the whole clinical course of lethal catatonia was characterized by catatonic stupor and rigidity without an early excitement phase. Pre-neuroleptic lethal catatonia was fatal in 75% to 100% of the cases.

Kraepelin believed that lethal catatonia was a syndrome with various neuromedical and psychiatric etiologies, and the review by Mann et al. of 292 cases since 1960 supports this concept. Most of the patients in this series had received neuroleptics at some point during their treatment. Of these patients, 60.3% died, whereas 39.7% survived. The "classic" hyperactive form of lethal catatonia was found in 69% of these cases. Patients either presented with catatonic excitement or it developed early on. Stupor typically followed. High fever, altered consciousness, autonomic instability, anorexia, electrolyte imbalance, cyanosis, and associated catatonic signs such as posturing, stereotypes, and mutism were present from the early stages.

In the more recent literature, 31% of the patients presented with a primarily stuporous course. In this group, stupor and fever emerged only after neuroleptics were begun. The clinical features of the presentation in both the classic cases once stupor and rigidity emerge and those primarily with catatonic stupor are similar to neuroleptic malignant syndrome (NMS), which itself has a substantial mortality rate. Indeed, the symptoms of 65 predominantly stuporous patients (22%) were clinically indistinguishable from NMS.

Phillbrick and Rumans have also recently reviewed this "lethal" form of catatonia. They suggest using the term "malignant catatonia" (not all cases are lethal) to describe cases characterized by autonomic instability or hyperthermia in contradistinction to "simple, nonmalignant catatonia." The causes of malignant catatonia are the same as those of simple catatonia. Pernicious catatonia is another term that has been used to describe this catatonic variant.

Introduction of neuroleptics as causative agents is an important consideration because NMS is currently considered by many to be a severe form of neuroleptic-induced catatonia and thus another variant of the larger catatonic syndrome. NMS is a syndrome of autonomic dysfunction with tachycardia and elevated blood pressure, fever, rigidity, mutism, and stupor associated with the use of neuroleptics. In 1985, it was suggested that NMS is to lethal catatonia what neuroleptic-induced catatonia is to simple catatonia. Moreover, if neuroleptic-induced catatonia is a form of the catatonic syndrome, then NMS is a form of malignant catatonia with a similar pathophysiology. Gofforth and Carroll observed the overlap in diagnoses between catatonia and NMS. Among 27 cases of NMS, all met the DSM-IV diagnostic criteria for catatonia, whereas 24 met stricter research criteria. The authors concluded that the two syndromes are identical, with NMS presenting as a more severe iatrogenic variant of malignant catatonia. Fink also arrived at this equivalence after reviewing the literature.

Although there may be a few subtle differences in presentation (eg, there is a behavioral prodrome in many patients with lethal catatonia and hyperthermia may begin in the stumporous stage of lethal catatonia as opposed to its occurrence in the stuporous rigidity stage of NMS), NMS and lethal catatonia appear to be part of a single syndrome. Indeed, although early reports suggested that the level of creatine phosphokinase is increased in NMS and not in psychiatric (primary) lethal catatonia, a survey of 13 cases of primary malignant catatonia revealed that creatine phosphokinase levels were elevated in 9 of 9 cases in which they were tested.

In 1991, Rosebush and Mazurek found decreased serum iron levels in NMS and suggested a role for lowered iron stores in reducing dopamine (DA) receptor function. Supporting the hypothesis that NMS is a severe variant of catatonia, Carroll and Gofforth reported a similar decrease of serum iron in 3 of 12 catatonic
episodes, with NMS developing in 2 of the 3 episodes; the third, without neuroleptic exposure, did not progress to NMS. Lee prospectively studied 50 patients with catatonia, and serum iron was measured in 39 episodes. A low serum iron level was found in 17 (44%) of the episodes and was associated with lethal catatonia and poorer responses to benzodiazepines. In 7 episodes of lethal catatonia, all patients had low levels of serum iron. Neuroleptics were used in 5 cases and all 5 progressed to NMS.

Providing further support for the relationship between primary "psychogenic" catatonia and neuroleptic-induced catatonia, White and Robins reported 5 consecutive cases of NMS that were all preceded by a catatonic state in patients who had not received prior neuroleptic treatment and had no prior psychiatric history. They agreed that "psychogenic" catatonia can predispose to neuroleptic catatonia, such as NMS. White has concluded that NMS and lethal catatonia are not separate disorders. Mann and Caroff also view lethal catatonia as a syndrome with NMS representing "a neuroleptic-induced iatrogenic form of organic lethal catatonia."

MANAGEMENT AND TREATMENT

Whatever its cause, catatonia is accompanied by significant morbidity and mortality from systemic complications, and many of the physical illnesses responsible for catatonia are potentially hazardous. Thus, expeditious diagnosis, management, and treatment are especially important. If a neuromedical condition is found, then specific treatment is directed toward that illness. Occasionally psychiatric therapies will be used to treat catatonia as a behavioral manifestation of a medical illness. For example, electroconvulsive therapy (ECT) has been used to treat patients with lupus who have catatonia. Response to treatment in acute primary catatonia is usually good, with a 67% improvement rate at discharge. Patients with manic features respond particularly well. Long-term recovery rates range from 33% to 75%. ECT remains a powerfully effective treatment for catatonia. Fink has pointed out that fatality rates were 50% or more prior to the introduction of ECT. Often only 2 or 3 treatments suffice to clear the catatonic states; however, a course of 4 to 6 treatments is usually given to prevent relapse. Nevertheless, patients' families are often reluctant to agree to ECT because of its unwarranted stigma and fear of side effects.

Intravenous amobarbital is successful in some patients for quickly clearing catatonic stupor. These effects tend to be short lived, however, and patients lapse back into catatonia. Repeated intravenous doses lead to oversedation and oral amobarbital does not appear to prolong benefits.

Neuroleptics had been used frequently in the past in the treatment of catatonia. In addition to the variable response of catatonia to these drugs, neuroleptics may complicate matters given their association with NMS and reports that their use precipitates catatonic reactions. This approach can lead to therapeutic futility when an increasingly catatonic patient receiving neuroleptic medication is considered increasingly psychotic, prompting an increase in the antipsychotic dose, which may then worsen catatonia. Moreover, among the 292 patients with malignant catatonia reviewed by Mann et al., 78.4% of those treated with a neuroleptic alone died compared with an overall mortality rate of 60.3%. In 18 additional cases reviewed by Philbrick and Rummans, only 1 patient received a neuroleptic alone and this patient also died. Neuroleptics are contraindicated during an acute episode of malignant catatonic stupor.

In 1983, Lew and Tollefson reported on the usefulness of intravenous diazepam. Also in 1983, Fricchione et al. reported on the benefit of intravenous lorazepam in neuroleptic-induced catatonic states (including NMS) and suggested its use in primary psychiatric catatonia. McEvoy and Lohr had already successfully tried intravenous diazepam in 2 catatonic psychotic patients whose conditions had not improved with haloperidol regimens. In both patients, catatonia had preceded haloperidol treatment. Rosebush et al. diagnosed the catatonic syndrome 15 times in 12 patients during a 1-year period. Lorazepam (1 to 2 mg orally, intramuscularly, or intravenously) was administered to every patient. Twelve episodes (80%) resulted in a complete and dramatic response to lorazepam treatment within 2 hours, 1 showed a partial response, and 2 showed no response. Adverse
effects were infrequent. A central nervous system abnormality was evident in 8 of 12 responders, suggesting that a beneficial response to lorazepam is not limited to patients with psychogenic catatonia.

Bush et al.,34 recently studied the use of lorazepam and ECT in the treatment of catatonia. Twenty-eight prospectively identified patients entered their open-trial protocol of parenteral lorazepam, oral lorazepam (1 to 2 mg orally 2 to 3 times a day), or both for 3 to 5 days, with referral for ECT if lorazepam failed. Sixteen of 21 patients (76%) who received a complete trial of lorazepam (11 with initial 2-mg intravenous challenge) had resolution of catatonic signs. All 4 patients referred for ECT (after failing lorazepam therapy) responded promptly. In the benzodiazepine treatment of catatonia, Bush et al.,34 specifically suggest a trial of lorazepam (2 mg intramuscularly or intravenously) with monitoring of respiratory status. In some patients who respond to parenteral lorazepam, a switch to regular oral doses of lorazepam or diazepam (10 to 40 mg/d) maintains the therapeutic effect. Sometimes higher doses are required. With a drug distribution that is less rapid and less extensive to tissues, a relatively high plasma level can be maintained, thus prolonging the clinical benefit of intravenous lorazepam.4 In its intramuscular deltoid form, lorazepam is more reliably absorbed than other intramuscular benzodiazepines.4 Lorazepam given by mouth or via nasogastric tube in a daily dose of 6 to 20 mg has been used effectively. Diazepam (10 to 50 mg/d) or clonazepam (1 to 5 mg/d) has also been used successfully, as has midazolam.4 If lorazepam is unsuccessful within 5 days, ECT should be considered as a definitive treatment.4

In a study of lorazepam treatment for NMS, rigidity and fever abated in 24 to 48 hours, whereas secondary features of NMS were relieved within 64 hours without adverse effects.35 For lethal catatonia, the clinician should not wait for 5 days to begin ECT if lorazepam does not briskly reverse the process. In reviewing the literature on the use of ECT in lethal catatonia, Mann et al. found that 40 of 41 patients in one series13 survived when treated with ECT. In another series,36 although 16 of 19 patients who had received ECT within 5 days of symptom onset survived, 0 of 14 who had received ECT after 5 days did not.

In the review by Philbrick and Rummans15 of 18 cases of lethal catatonia, 11 of 13 patients treated with ECT survived, whereas only 1 of 5 not treated with ECT did. In terms of NMS, there have been 39 reported cases of ECT treatment, and benefit was noted in 34 of these patients. The message is clear—when a patient presents with malignant catatonia of any type, it is imperative that ECT be used expeditiously. Although an initial trial of lorazepam, a dopaminergic agent, or both is reasonable for malignant catatonia, ECT must be instituted early (ie, within 5 days) if the medication trial is unsuccessful. Muscle relaxants, calcium channel blockers, carbamazepine, anticholinergic drugs, lithium, thyroid medication, and corticosteroids have had anecdotal success in catatonia.15 Adrenocorticotropic hormone and corticosteroids have been reported to work in cases of lethal catatonia.13 Dopaminergic agents have been used successfully in NMS.37 Bromocriptine and amantadine are DA agonists and antiparkinsonian medications that have been recommended for use in the treatment of NMS. In a retrospective review of 734 cases, Sakbas et al.38 concluded that these agents and the muscle relaxant dantrolene were helpful, producing improvement and, in the case of bromocriptine and dantrolene, a significant reduction in mortality. In a prospective study of 20 patients, Rosebush et al.39 found that bromocriptine and dantrolene were not efficacious. Another DA agonist, lisuride, has been used intravenously with success in 4 patients with NMS, 3 of whom had failed to respond to other dopaminergic agents.40 Back in 1985, when suggesting that psychogenic catatonia and neuroleptic-induced catatonia (including NMS) share a common pathophysiology, one of us (GF) said that, “A clearer test of possible common pathophysiology (rather than using ECT or benzodiazepines as probes) would involve using specific dopaminergic or GABA-ergic drugs in psychogenic catatonia untreated by neuroleptic medication.”37 Accordingly, it is of interest that 2.5 mg of bromocriptine orally twice a day was used successfully for a 16-year-old girl whose catatonia preceded any neuroleptic exposure,41 and that
Rogers used L-dopa to treat a patient with a 50-year history of severe catatonic schizophrenia (without neuroleptics for 5 years) with improvement in catatonic akinesia and without worsening of positive symptoms. Neppe also successfully used L-dopa to treat catatonic stupor. Dopaminergic agents appear to have use in catatonia and NMS. The table outlines recommendations for the treatment of catatonia, lethal catatonia, and NMS.

**NEUROPATHOPHYSIOLOGY**

What kind of neuropathophysiology could be responsible for a syndrome that, as we have seen, can emerge as a final common pathway in most, if not all, of the major organic and psychiatric brain disorders? On the basis of similarities in symptomatology and therapeutic mechanisms, we have suggested a close relationship between the catatonias with and without neuroleptics onboard. The conclusion is that "similar symptomatology in neuroleptic catatonia (including NMS) and psychogenic catatonia may reflect a common pathophysiology involving DA and GABA neurons in mesostriatal, mesolimbic, and hypothalamic systems."7

In the mesostriatal and mesocorticolimbic systems, the long feedback loops from DA neurons are regulated by GABA pathways. Given its extensive projections to both limbic and motor structures, the nucleus accumbens may be a hub involved in the linkage of motivation and movement. By extrapolating from animal evidence that GABA antagonists lead to catalepsy and GABA agonists protect against catalepsy, and from the hypotheses that neuroleptic-induced catatonias may result from reduced DA and GABA activity in the mesostriatum, it has been proposed that primary psychogenic catatonia results from a similar destabilization. GABA-A agonist agents could potentially be restorative by inhibiting the sensitive pars reticulata inhibitory GABA-B neurons, resulting in disinhibition of neighboring pars compacta DA cells with a resultant striatal DA agonism.17

ECT may be effective in catatonia on the basis of this GABA–DA interaction. Sackheim et al. proposed that the neural state following ECT is produced by increased GABA transmission. They cite animal studies in which the concentration of GABA in the striatum becomes elevated subsequent to ECT. Some investigators believe that ECT may increase the sensitivity of postsynaptic DA receptors to available DA.17

Kish et al. described the neuropathophysiological findings in 3 patients who died of fatal hyperthermia from catatonia and NMS. They found reduced norepinephrine concentrations in the hypothalamus of all 3 patients, and they speculated that this depletion was a product of hyperthermia and hypothalamic stress exhaustion. However, they also found evidence of a reduced level of the DA metabolite homovanillic acid (HVA) in the striatum of 1 patient, the lack of an elevated HVA:DA ratio in another, and a reduced striatal level of HVA in the third, although that patient had been receiving a monoamine oxidase inhibitor that could have affected these results. They postulated that there had been a reduced ability of the DA system to respond to stress, neuroleptic-induced hypodopaminergic postsynaptic activity, or both. This is supported by the work of Nishijima and Ishiguro, who found significantly lower levels of HVA in the cerebrospinal fluid of

**TABLE**

<table>
<thead>
<tr>
<th>Treatment of Catatonia</th>
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<tbody>
<tr>
<td><strong>A. Simple catatonia (including neuroleptic-induced catatonia)</strong></td>
</tr>
<tr>
<td>↓ Lorazepam (or other BZ) treatment</td>
</tr>
<tr>
<td>↓ (if still catatonic)</td>
</tr>
<tr>
<td>Dopamine agonist</td>
</tr>
<tr>
<td>↓ (if still catatonic)</td>
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<tr>
<td>ECT</td>
</tr>
<tr>
<td><strong>B. Lethal catatonia (including NMS)</strong></td>
</tr>
<tr>
<td>↓ Lorazepam (or other BZ) treatment</td>
</tr>
<tr>
<td>and/or</td>
</tr>
<tr>
<td>Dopamine agonist ± dantrolene</td>
</tr>
<tr>
<td>↓ (if still catatonic)</td>
</tr>
<tr>
<td>ECT (should be instituted prior to day 5 of syndrome)</td>
</tr>
</tbody>
</table>

BZ = benzodiazepine; ECT = electroconvulsive therapy; NMS = neuroleptic malignant syndrome.

8 patients with NMS during the active phase of the illness and after recovery, suggesting that decreased DA metabolism may make patients prone to NMS. In line with our impression that NMS represents a severe form of catatonia, there are recent findings by Northoff et al.\(^4\) in 18 neuroleptically naive, acutely catatonic patients that show plasma HVA concentrations were significantly higher in those who responded to lorazepam than in those who did not respond to lorazepam. The latter patients also happened to score significantly higher on scales of extrapyramidal symptoms. NMS has been postulated to be secondary to DA blockade in the mesostriatum, which is responsible for the motor disorder; the mesolimbic system, which is responsible for the mutism; and the preoptic anterior hypothalamus, which is responsible for the hyperthermia.\(^4\)

It is known that in rats, the application of the DA agonist apomorphine in the prefrontal cortex will increase the ability of haloperidol to produce catalepsy.\(^5\) This finding suggests that if stress dramatically increases DA activity in the mesocorticolimbic system, it will have feedback effects in the ventral tegmental and nigral DA areas, resulting in catatonic withdrawal and catalepsy. There is animal evidence that prefrontal cortical DA synthesis and metabolism are accelerated by even mild stress, suggesting an increase in impulse flow in dopaminergic neurons projecting to the prefrontal cortex. These increases in DA synthesis and metabolism are antagonized by diazepam.\(^5\) Also, electroconvulsive stimulation causes a rapid rise in diazepam binding site density in the rat cerebral cortex and when applied for a long time, it potentiates diazepam effects and upregulates benzodiazepine receptors in the rat frontal cortex.\(^5\) Sequential or concurrent lorazepam and ECT have been used successfully in the treatment of catatonia, perhaps because of this synergism of their effects.\(^5\)

In the kind of compensatory catatonia marked by early higher HVA levels, lorazepam may have a better chance of reestablishing restitutive balance between mesocorticolimbic and mesostriatal DA systems. In patients in whom the stress condition is so severe that it causes depolarization inactivation in both the ventral tegmentum and the substantia nigra, HVA levels will be lower, reflecting severe hypodopaminergia. This finding may reflect the set of conditions that occur in NMS and in other more obligate catatonias, which may be less responsive to lorazepam. In these patients, ECT may be needed.

Taylor\(^1\) concluded that the catatonic syndrome is primarily a frontal lobe disorder, whereas Rogers cites evidence that it is primarily a basal ganglia disorder.\(^4\) We have proposed that the catatonic syndrome is actually a disorder of basal ganglia–thalamo(limbic) cortical circuits.\(^4\)\(^,\)\(^5\) In particular, the “orbitofrontal,” the “dorsolateral prefrontal,” the “anterior cingulate–medial orbitofrontal,” and the “motor” circuits would be major candidates for involvement. Each circuit has cortical/limbic, striatal, pallidal/nigral, and thalamic nodal points with the loops closed by thalamocortical connections. Any neuromedical or psychiatric disturbance significant enough to disrupt the GABA–DA balance in the mesostriatal–mesocorticolimbic medial forebrain bundle DA tracts with terminal fields in the nucleus accumbens, the anterior cingulate, and the prefrontal cortex system anywhere along the circuitry will potentially set off a catatonic response. Using functional magnetic resonance imaging and magnetoencephalography, Northoff et al. recently presented findings indicating that in primary psychogenic catatonia there is reduced activity in the medial orbitofrontal cortex during negative emotional stimulation, suggesting that perhaps psychogenic catatonia has its initiation there.\(^5\) In so far as cerebellar and brainstem disorders will also disturb this circuitry, they will also have the potential to cause catatonia. Hypodopaminergia in the tuberoinfundibular DA system and in the mesolimbic or mesostriatal DA system may precipitate NMS with its hyperthermia and reactive hyperadrenergism.\(^5\)

The restitutive hypothesis of DA receptor activity may offer an explanation for the relationship of catatonia, lethal catatonia, and NMS as proposed in 1985.\(^1\)\(^,\)\(^2\)\(^,\)\(^6\) It assumes that the dopaminergic system is involved in protecting against the emergence of psychotic symptoms through physiological downregulation of DA receptors in the face of psychological or biological events that would tend to destabilize the system.\(^5\) The dopaminergic system then may stabi-
lize mental homeostasis by spontaneous down-regulation of its own function. In some patients, this downregulation is sufficient to maintain a nonpsychotic state. Often, however, the biological or psychological stresses are so severe that down-regulation is not adequate to prevent psychosis. In some patients, treatment with neuroleptics will help in remission of symptoms by producing a further decrease in dopaminergic activity. Still others, however, will not benefit from neuroleptic treatment. Indeed, the further decrease in dopaminergic activity by DA blockade may lead to neuroleptic-induced catatonia.

We may partially account for these different pathways to catatonia if we employ the restitutive hypothesis, taking the limbic system in general and the hyperdopaminergic mesolimbic DA system in particular as a starting point for psychosis. The hyperdopaminergic mesolimbic system will adjust itself in such a way as to attempt restoration of homeostasis (ie, downregulation of DA receptors). As Friedhoff points out, an adjustment will likely affect other brain systems. The ones likely to be rapidly adjusted are the mesostriatal system with GABA-ergic feedback from the nucleus accumbens through the globus pallidus to the pars reticulata of the substantia nigra, and the hypothalamic DA system, which may have cell bodies in the substantia nigra. They too may then downregulate. If these areas become hypodopaminergic to a relatively large degree, yet psychosis continues, psychogenic and then lethal catatonia may ensue. Use of catapleticogenic neuroleptics could hasten the catatonia in this situation through DA blockade, and decreased GABA in the ventral tegmentum and the substantia nigra will worsen this trend.

There is an animal model of catatonia that bears this out. Stevens et al. instilled bicuculline, a GABA-A antagonist, into the ventral tegmentum area of cats. Slinking, hiding, evidence of fear, staring, sniffing, and a catatonic stance were noted. “Waxy flexibility of the limbs developed and animals stood absolutely still, staring for many minutes at the walls.” When bicuculline was given in the ventral tegmentum area after systemic haloperidol, marked dystonic postures were produced. Picrotoxin, an antagonist at the chloride channel of the benzodiazepine–GABA-A recognition site, was administered in the ventral tegmentum area as well. Smaller doses induced fear and staring, whereas larger doses produced prolonged severe dystonia, especially following haloperidol. In the rat, microinjection of the GABA-A agonist muscimol into the ventral tegmentum area produces a dose-dependent increase in motor activity. This effect is antagonized by ventral tegmentum area administration of bicuculline or by haloperidol administration. It is well established that neuroleptics inhibit the conditioned avoidance response. This is thought to be related to decreased dopaminergic activity in the nucleus accumbens and the striatum. Stress is known to produce an increase in medial prefrontal cortical DA release, which, in turn, is thought to reduce DA activity in subcortical DA terminal fields in mesolimbic and mesostriatal systems. In a test of the restitutive hypothesis, Friedhoff et al. have been able to show that rats undergoing twice daily tailshock stress for 8 days displayed conditioned avoidance response inhibition, along with a reduction in nucleus accumbens DA use. The findings provide support for an endogenous DA-dependent system that mimics the effects of neuroleptics in the context of repeated stress-induced medial prefrontal cortical hyperdopaminergia. When such a system down-regulates too much because of neuromedical insult, primary psychiatric dysfunction, neuroleptic medication, or a combination of all three, catatonic stupor may occur.

**CONCLUSION**

Catatonia is a serious and fascinating medical syndrome. It calls for diagnostic rigor and knowledgeable treatment on the part of the physician who seeks to reattach to his or her community the individual separated in his or her catatonic illness. At the same time, as we further our understanding of this unique syndrome, we stand to gain valuable insight into how motivation and movement are mediated in the brain.

**REFERENCES**


CATATONIA. LETHAL CATATONIA, AND NEUROLEPTIC MALIGNANT SYNDROME


