

sive resolution of his depression. Within 2 weeks of beginning treatment with aripiprazole, he reported improved mood, interest, energy, and concentration. Suicidal and homicidal ideation, hopelessness, and auditory hallucinations abated, and he developed a positive affect. His Global Assessment of Functioning Scale score went from 50 to a present score of 75. His Clinical Global Improvement ratings went from “no change” to “very much improved.” Mr. A stated that he was happy and better able to tolerate stress and indicated that his “life [had] improved substantially.” Lamotrigine and sertraline were also tapered and discontinued. He was currently taking aripiprazole, 30 mg/day, as monotherapy, with no manic or depressive episodes over the last 12 months.

This is the first case report, to our knowledge, of an antidepressant response to aripiprazole in schizoaffective disorder. Aripiprazole replaced “polypharmacy” in this schizoaffective patient, reducing drug costs, the risk of drug interactions, and potential adverse drug effects (3). Aripiprazole deserves further study for the treatment of depression in schizoaffective disorder and bipolar disorder.

#### References

1. Potkin SG, Saha AR, Kujawa MJ, Carson WH, Ali M, Stock E, Stringfellow J, Ingenito G, Marder SR: Aripiprazole, an antipsychotic with a novel mechanism of action, and risperidone vs placebo in patients with schizophrenia and schizoaffective disorder. *Arch Gen Psychiatry* 2003; 60:681–690
2. Casey D, Carson W, Anutosh S, Liebeskind A, Ali M, Jody D: Switching patients to aripiprazole from other antipsychotic agents: a multicenter randomized study. *Psychopharmacology (Berl)* 2003; 166:391–399
3. Marder SR, McQuade RD, Stock E, Kaplita S, Marcus R, Safferman AZ, Saha A, Ali M, Iwamoto T: Aripiprazole in the treatment of schizophrenia: safety and tolerability in short-term, placebo-controlled trials. *Schizophr Res* 2003; 61:123–136

JOSEPH R. ERRICO, M.D.  
WILLIAM R. YATES, M.D.  
Tulsa, Okla.

### Benztropine Equivalents for Antimuscarinic Medication

TO THE EDITOR: Michael J. Minzenberg, M.D., et al. (1) are to be congratulated for developing a benzotropine equivalent table, as we previously did (2), by reviewing in vitro studies and asking experienced clinicians. However, measuring serum antimuscarinic activity may provide better knowledge (3).

The in vitro literature (1, 2) suggests that haloperidol has negligible antimuscarinic binding activity (10 g of haloperidol equals 1 mg of benzotropine) (2). Although our senior pharmacologist also concluded that the clinical antimuscarinic binding activity of haloperidol was negligible (2), the psychiatrists working with Dr. Minzenberg et al. proposed that 13 mg of haloperidol equals 1 mg of benzotropine (1). Our recent study (3) also suggested that haloperidol probably has negligible antimuscarinic clinical activity. The mean serum antimuscarinic activity in pmol/ml in 16 patients taking haloperidol was 0.40 (95% confidence interval [CI]=0.30–0.51). This low serum antimuscarinic activity appeared to represent nonspecific antimuscarinic binding (the “noise” of the measuring system) since haloperidol levels (or doses) were not correlated with serum antimuscarinic activity.

Clozapine differs in that its in vitro tables suggest that 1 mg of benzotropine equals 15 mg (2) or 8 mg (1) of clozapine; the clinical tables suggest that 1 mg of benzotropine equals 375 mg (2) or 85 mg (1) of clozapine. Our recent study agreed that clozapine probably has important antimuscarinic activity (3). The mean serum antimuscarinic activity in 20 patients taking antiparkinsonian medications with mean doses of two benzotropine equivalents was approximately 1 pmol/ml (1.05, 95% CI=0.66–1.44) (3). The antimuscarinic activity of 100 mg/day of clozapine in 17 patients was approximately 1 pmol/ml (1.38, 95% CI=0.83–1.93). The mean antimuscarinic activity of 300 mg/day of clozapine in 25 patients was approximately 2 pmol/ml (1.91, 95% CI=1.42–2.40). The mean antimuscarinic activity of 600 mg/day of clozapine in 27 patients was approximately 3 pmol/ml (2.81, 95% CI=2.16–3.46).

To estimate clozapine equivalence, one can approximate that 1 benzotropine equivalent equals 0.5 pmol/ml of serum antimuscarinic activity. Using the serum muscarinic activity data of the three clozapine doses, one can estimate that 1 mg of benzotropine equals 50 mg of clozapine (obtained from the 100-mg data) to 75 mg of clozapine (obtained from the 300-mg data) to 100 mg of clozapine (obtained from the 600-mg data). Thus, the clozapine equivalent of 1 mg/day of benzotropine ranges from 50 to 100 mg/day of clozapine. The misleading fact that clozapine is an agonist for some muscarinic receptors, the M<sub>4</sub>, and may cause hypersalivation instead of dry mouth may confound clinicians.

#### References

1. Minzenberg MJ, Poole JH, Benton C, Vinogradov S: Association of anticholinergic load with impairment of complex attention and memory in schizophrenia. *Am J Psychiatry* 2004; 161:116–124
2. de Leon J, Canuso C, White AO, Simpson GM: A pilot effort to determine benzotropine equivalents of anticholinergic medications. *Hosp Community Psychiatry* 1994; 45:606–607
3. de Leon J, Odom-White A, Josiassen RC, Diaz FJ, Cooper TB, Simpson GM: Serum muscarinic activity during clozapine treatment. *J Clin Psychopharmacol* 2003; 23:336–341

JOSE DE LEON, M.D.  
Lexington, Ky.

### Cognition, Copyright, and the Classroom

TO THE EDITOR: Many psychiatrists are unaware that the Mini-Mental State Examination (MMSE) is protected by copyright. Its 20 questions were published in 1975 in the *Journal of Psychiatric Research* (1). This journal's copyright notice forbids unauthorized reproduction of the examination. However, clinical experience suggests that unauthorized copies are routinely distributed to trainees and staff. We recently became aware of this while preparing an article for publication.

The notion of granting authors exclusive rights to their work goes back to the 1700s, when the United States and the United Kingdom enacted their first copyright laws, largely covering maps, charts, and books (2). Today, copyright protection is afforded by most countries (3): a Chinese court ordered a Beijing-based school to pay U.S. publishers \$1.2 million for copying the Test of English as a Foreign Language and the Graduate Management Admission Test (4).

Much has happened since 1975. The MMSE has become the most widely accepted test of cognitive status, the *Journal*