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tablets. Metoprolol is available in 50- and 100-mg tablets and 50-, 100-, and 200-mg sustained-release tablets. Atenolol is available in 25-, 50-, and 100-mg tablets. Acebutolol is available in 200- and 400-mg capsules. For the treatment of chronic disorders, propranolol administration is usually initiated at 10 mg by mouth three times a day or 20 mg by mouth twice daily. The dosage can be raised by 20 to 30 mg a day until a therapeutic effect emerges. The dosage should be leveled off at the appropriate range for the disorder under treatment. The treatment of aggressive behavior sometimes requires dosages up to 80 mg a day, and therapeutic effects may not be seen until the person has been receiving the maximal dosage for 4 to 8 weeks. For the treatment of social phobia, primarily the performance type, the patient should take 10 to 40 mg of propranolol 20 to 30 minutes before the performance. Pulse and blood pressure (BP) readings should be taken regularly, and the drug should be withheld if the pulse rate is below 50 beats per minute or the systolic BP is below 90 mm Hg. The drug should be temporarily discontinued if it produces severe dizziness, ataxia, or wheezing. Treatment with β-receptor antagonists should never be discontinued abruptly. Propranolol should be tapered by 60 mg a day until a dosage of 60 mg a day is reached, after which the drug should be tapered by 10 to 20 mg a day every 3 or 4 days. The clinical guidelines for the other drugs listed in this chapter are similar to propanolol, taking into consideration the different doses used. For example, if propanolol is prescribed initially at the lowest available dose (e.g., 10 mg) then metoprolol should be prescribed at its lowest available dose (e.g., 50 mg). REFERENCES Antonelli-Incalzi R, Pedone C. Respiratory effects of beta-adrenergic receptor blockers. Curr Med Chem. 2007;14(10):1121. Baker JG. The selectivity of beta-adrenoceptor antagonists at the human beta1, beta2 and beta3 adrenoceptors. Br J Pharmacol. 2005;144(3):317. Ballesteros J, Callado LF. Effectiveness of pindolol plus serotonin uptake inhibitors in depression: A meta-analysis of early and late outcomes from randomised controlled trials. J Affect Disord. 2004;79(1–3):137. Compendium of Pharmaceuticals and Specialties. Ottawa: Canadian Pharmacist Association; 2007. Das RK, Freeman TP, Kamboj SK. The effects of N-methyl D-aspartate and B-adrenergic receptor antagonists on the reconsolidation of reward memory: A meta-analysis. Neurosci Biobehav Rev. 2013;37(3):240–255. de Quervain DJ, Aerni A, Roozendaal B. Preventive effect of beta-adrenoceptor blockade on glucocorticoid-induced memory retrieval deficits. Am J Psychiatry. 2007;164(6):967. McAinsh J, Cruickshank JM. Beta-blockers and central nervous system side effects. Pharmacol Ther. 1990;46(2):163. McIntyre RS. β-Adrenergic receptor antagonists. In: Sadock BJ, Sadock VA, Ruiz P, eds. Kaplan & Sadock’s Comprehensive Textbook of

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Anticholinergic drugs block the actions of atropine. In the clinical practice of psychiatry, the anticholinergic drugs are primarily used to treat medication-induced movement disorders, particularly neuroleptic-induced Parkinsonism, neuroleptic-induced acute dystonia, and medication-induced postural tremor. ANTICHOLINERGICS Pharmacologic Actions All anticholinergic drugs are well absorbed from the gastrointestinal (GI) tract after oral administration, and all are sufficiently lipophilic to enter the central nervous system (CNS). Trihexyphenidyl (Artane) and benztropine (Cogentin) reach peak plasma concentrations in 2 to 3 hours after oral administration, and their duration of action is 1 to 12 hours. Benztropine is absorbed equally rapidly by intramuscular (IM) and intravenous (IV) administration; IM administration is preferred because of its low risk for adverse effects. All six anticholinergic drugs listed in this section (Table 29.5-1) block muscarinic acetylcholine receptors, and benztropine has some antihistaminergic effects. None of the available anticholinergic drugs has any effect on the nicotinic acetylcholine receptors. Of these drugs, trihexyphenidyl is the most stimulating agent, perhaps acting through dopaminergic neurons, and benztropine is the least stimulating and thus is least associated with abuse potential. Table 29.5-1 Anticholinergic Drugs Therapeutic Indications The primary indication for the use of anticholinergics in psychiatric practice is for the treatment of neuroleptic-induced Parkinsonism, characterized by tremor, rigidity, cogwheeling, bradykinesia, sialorrhea, stooped posture, and festination. All of the available anticholinergics are equally effective in the treatment of Parkinsonian symptoms. Neuroleptic-induced Parkinsonism is most common in elderly persons and is most frequently seen with high-potency dopamine receptor antagonists (DRAs), for example, haloperidol (Haldol). The onset of symptoms usually occurs after 2 or 3 weeks of treatment. The incidence of neuroleptic-induced Parkinsonism is lower with the

newer antipsychotic drugs of the serotonin–dopamine antagonist (SDA) class. Another indication for the use of anticholinergics is for the treatment of neurolepticinduced acute dystonia, which is most common in young men. The syndrome often occurs early in the course of treatment; is commonly associated with high-potency DRAs (e.g., haloperidol); and most commonly affects the muscles of the neck, tongue, face, and back. Anticholinergic drugs are effective both in the short-term treatment of dystonias and in prophylaxis against neuroleptic-induced acute dystonias. Akathisia is characterized by a subjective and objective sense of restlessness, anxiety, and agitation. Although a trial of anticholinergics for the treatment of neurolepticinduced acute akathisia is reasonable, these drugs are not generally considered as effective as the β-adrenergic receptor antagonists, the benzodiazepines, and clonidine (Catapres). Precautions and Adverse Reactions The adverse effects of the anticholinergic drugs result from blockade of muscarinic acetylcholine receptors. Anticholinergic drugs should be used cautiously, if at all, by persons with prostatic hypertrophy, urinary retention, and narrow-angle glaucoma. The anticholinergics are occasionally used as drugs of abuse because of their mild moodelevating properties, most notably, trihexyphenidyl. The most serious adverse effect associated with anticholinergic toxicity is anticholinergic intoxication, which can be characterized by delirium, coma, seizures, agitation, hallucinations, severe hypotension, supraventricular tachycardia, and peripheral manifestations (flushing, mydriasis, dry skin, hyperthermia, and decreased bowel sounds). Treatment should begin with the immediate

discontinuation of all anticholinergic drugs. The syndrome of anticholinergic intoxication can be diagnosed and treated with physostigmine (Antilirium, Eserine), an inhibitor of anticholinesterase, 1 to 2 mg IV (1 mg every 2 minutes) or IM every 30 or 60 minutes. Because physostigmine can lead to severe hypotension and bronchial constriction, it should be used only in severe cases and only when emergency cardiac monitoring and life-support services are available. Drug Interactions The most common drug–drug interactions with the anticholinergics occur when they are coadministered with psychotropics that also have high anticholinergic activity, such as DRAs, tricyclic and tetracyclic drugs, and monoamine oxidase inhibitors (MAOIs). Many other prescription drugs and over-the-counter cold preparations also induce significant anticholinergic activity. The coadministration of those drugs can result in a lifethreatening anticholinergic intoxication syndrome. In addition, anticholinergic drugs can delay gastric emptying, thereby decreasing the absorption of drugs that are broken down in the stomach and usually absorbed in the duodenum (e.g., levodopa [Larodopa] and DRAs).

Laboratory Interferences No known laboratory interferences have been associated with anticholinergics. Dosage and Clinical Guidelines The six anticholinergic drugs discussed in this chapter are available in a range of preparations (see Table 29.5-1). Neuroleptic-induced Parkinsonism. For the treatment of neuroleptic-induced parkinsonism, the equivalent of 1 to 3 mg of benztropine should be given one to two times daily. The anticholinergic drug should be administered for 4 to 8 weeks, and then it should be discontinued to assess whether the person still requires the drug. Anticholinergic drugs should be tapered over a period of 1 to 2 weeks. Treatment with anticholinergics as prophylaxis against the development of neuroleptic-induced parkinsonism is usually not indicated, because the onset of its symptoms is usually sufficiently mild and gradual to allow the clinician to initiate treatment only after it is clearly indicated. In young men, prophylaxis may be indicated, however, especially if a high-potency DRA is being used. The clinician should attempt to discontinue the antiparkinsonian agent in 4 to 6 weeks to assess whether its continued use is necessary. Neuroleptic-induced Acute Dystonia. For the short-term treatment and prophylaxis of neuroleptic-induced acute dystonia, 1 to 2 mg of benztropine or its equivalent in another drug should be given IM. The dose can be repeated in 20 to 30 minutes, as needed. If the person still does not improve in another 20 to 30 minutes, a benzodiazepine (e.g., 1 mg IM or IV lorazepam [Ativan]) should be given. Laryngeal dystonia is a medical emergency and should be treated with benztropine, up to 4 mg in a 10-minute period, followed by 1 to 2 mg of lorazepam, administered slowly by the IV route. Prophylaxis against dystonias is indicated in persons who have had one episode or in persons at high risk (young men taking high-potency DRAs). Prophylactic treatment is given for 4 to 8 weeks and then gradually tapered over 1 to 2 weeks to allow assessment of its continued need. The prophylactic use of anticholinergics in persons requiring antipsychotic drugs has largely become a moot issue because of the availability of SDAs, which are relatively free of parkinsonian effects. Akathisia. As mentioned, anticholinergics are not the drugs of choice for this syndrome. The β-adrenergic receptor antagonists and perhaps the benzodiazepines and clonidine are preferable drugs to try initially. REFERENCES Ahmad S. Anticholinergics and amantadine. In: Sadock BJ, Sadock VA, Ruiz P, eds. Kaplan & Sadock’s Comprehensive

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Revision #1
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