not a prominent feature. A major criterion for diagnosing later ADHD is a previous diagnosis of childhood ADHD. Some studies indicate that children with ADHD are more likely to have learning disabilities, mood disorders, and substance abuse disorders as adolescents and adults as well as continuing difficulties in structured settings such as school or work.

TYPES OF STIMULANTS

Most CNS stimulants act by facilitating initiation and transmission of nerve impulses that excite other cells. The drugs are somewhat selective in their actions at lower doses but tend to involve the entire CNS at higher doses. The major groups are amphetamines and related drugs, analeptics, and xanthines.

Amphetamines increase the amounts of norepinephrine, dopamine, and possibly serotonin in the brain, thereby producing mood elevation or euphoria, increasing mental alertness and capacity for work, decreasing fatigue and drowsiness, and prolonging wakefulness. Larger doses, however, produce signs of excessive CNS stimulation, such as restlessness, hyperactivity, agitation, nervousness, difficulty concentrating on a task, and confusion. Overdoses can produce convulsions and psychotic behavior. Amphetamines also stimulate the sympathetic nervous system, resulting in increased heart rate and blood pressure, pupil dilation (mydriasis), slowed gastrointestinal motility, and other symptoms. In ADHD, the drugs reduce behavioral symptoms and may improve cognitive performance.

Amphetamines are Schedule II drugs under the Controlled Substances Act and have a high potential for drug abuse and dependence. Prescriptions for them are nonrefillable. These drugs are widely sold on the street and commonly abused (see Chap. 15).

Amphetamine-related drugs (methylphenidate and dexmethylphenidate) have essentially the same effects as the amphetamines and are also Schedule II drugs.

Analeptics are infrequently used (see doxapram and modafinil, below).

Xanthines stimulate the cerebral cortex, increasing mental alertness and decreasing drowsiness and fatigue. Other effects include myocardial stimulation with increased cardiac output and heart rate, diuresis, and increased secretion of pepsin and hydrochloric acid. Large doses can impair mental and physical functions by producing restlessness, nervousness, anxiety, agitation, insomnia, cardiac dysrhythmias, and gastritis.

Indications for Use

Amphetamines and methylphenidate are used in the treatment of narcolepsy and ADHD. Dexmethylphenidate is indicated only for ADHD. One analeptic is used occasionally to treat respiratory depression; the other one is approved only for treatment of narcolepsy. Caffeine (a xanthine) is an ingredient in nonprescription analgesics and stimulants that promote wakefulness (eg, No-Doz). A combination of caffeine and sodium benzoate is occasionally used as a respiratory stimulant in neonates.

Contraindications to Use

Central nervous system stimulants cause cardiac stimulation and thus are contraindicated in clients with cardiovascular disorders (eg, angina, dysrhythmias, hypertension) that are likely to be aggravated by the drugs. They also are contraindicated in clients with anxiety or agitation, glaucoma, or hyperthyroidism. They are usually contraindicated in clients with a history of drug abuse.

INDIVIDUAL CENTRAL NERVOUS SYSTEM STIMULANTS

Individual drugs are described below; dosages are listed in Drugs at a Glance: Central Nervous System Stimulants.

Amphetamines and Related Drugs

Amphetamine, dextroamphetamine (Dexedrine), and methamphetamine (Desoxyn) are closely related drugs that share characteristics of the amphetamines as a group. They are more important as drugs of abuse than as therapeutic agents.

Methylphenidate (Ritalin) is chemically related to amphetamines and produces similar actions and adverse effects. It is well absorbed with oral administration. In children, peak plasma levels occur in about 2 hours with immediate-release tablets and about 5 hours with extended-release tablets. Half-life is 1 to 3 hours, but pharmacologic effects last 4 to 6 hours. Most of a dose is metabolized in the liver and excreted in urine.

Dexmethylphenidate (Focalin) is very similar to methylphenidate and the amphetamines. It is well absorbed with oral administration and reaches peak plasma levels in 1 to 1.5 hours. It is metabolized in the liver and excreted in urine.

Analeptics

Doxapram (Dopram) is occasionally used by anesthesiologists and pulmonary specialists as a respiratory stimulant. Although it increases tidal volume and respiratory rate, it also increases oxygen consumption and carbon dioxide production. Limitations include a short duration of action (5 to 10 minutes after a single intravenous [IV] dose) and therapeutic dosages near or overlapping those that produce convulsions. Endotracheal intubation and mechanical ventilation are safer and more effective in relieving respiratory depression from depressant drugs or other causes.

Modafinil (Provigil) is a newer drug for treatment of narcolepsy. Its ability to promote wakefulness is similar to that of amphetamines and methylphenidate, but its mechanism of action is unknown. Like other CNS stimulants, it also has