intoxicated (DWI). In national surveys, the strategy of the *designated driver* appears to be effective at preventing unsafe driving by drinkers at risk for DWI. Complete abstinence is recommended for people with a history of alcohol use disorder, other serious medical conditions (e.g., liver disease), and pregnancy.

Nonpharmacologic Therapies

Pharmacologic agents are complementary and adjunctive to the traditional approaches of abstinence, group therapy, coping mechanisms, and behavior modification. The most widely employed behavioral approach is the 12-step program administered by Alcoholics Anonymous (AA), with which the recovering alcoholic moves through 12 specific steps aided by his or her attendance at regular meetings within a self-help peer group. Cognitive behavioral therapy is based on the principle that the alcoholic first must identify the internal and external cues to drinking so that he or she can develop effective countermeasures for drinking behavior. Motivation enhancement therapy is a four-session, brief contact intervention program that encourages self-awareness and behavioral changes in the alcoholic. These therapies provide similar efficacy.

Considerations for Drug Interventions

If desired, medications can be administered in conjunction with behavioral modification. Disulfiram, naltrexone, and acamprosate have been approved by the U.S. Food and Drug Administration (FDA) for adjunctive therapy.

Disulfiram (Antabuse) inhibits aldehyde dehydrogenase (i.e., the enzyme that converts acetaldehyde to acetate), resulting in a 5- to 10-fold increase in serum acetaldehyde concentrations when alcohol is consumed. This produces uncomfortable symptoms (e.g., facial flushing, tachycardia, nausea, vomiting, and headache), which act to deter alcohol consumption. Because of low medication compliance and limited efficacy, disulfiram is rarely prescribed.

Naltrexone is an opioid receptor antagonist. In clinical trials, a combination of naltrexone and psychosocial intervention reduced the number of drinking days, induced a longer period of abstinence from ethanol, and decreased the relapse rate in heavy drinkers when compared with psychosocial intervention alone. Naltrexone is administered orally in a dose of 50 mg daily for 12 weeks, although larger doses (i.e., 100 to 150 mg daily) and a longer duration of administration may improve its success in preventing relapse. In 2006, the FDA approved a once-a-month injectable form of naltrexone (380 mg) for the treatment of alcohol use disorders; this form appears to be more effective than the pill form at maintaining abstinence, since it eliminates the problem of medication compliance.

Naltrexone can be initiated while the individual is still drinking, thereby permitting treatment to be provided in a community-based setting without the need for enforced abstinence or detoxification. Some recovering alcoholics develop nausea when it is initiated. Because hepatic toxicity may occur at high doses (≥300 mg), periodic testing of liver function is recommended. Naltrexone is contraindicated in subjects receiving opioids, given that opiate withdrawal is an unintended adverse effect of the drug.

Acamprosate (Campral), a structural analog of γ-amino butyric acid (GABA), decreases excitatory glutamatergic neurotransmission during alcohol withdrawal. The recommended dosage is 666 to 1000 mg 3 times daily, and its most common side effects are diarrhea and intestinal cramping. In placebo-controlled trials involving almost 7000 alcoholic patients, acamprosate reduced relapse rates and increased abstinence from ethanol. In comparative trials, it did not appear to be as efficacious as naltrexone. Acamprosate should be used once abstinence is achieved; since it is not metabolized by the liver, it can be given safely to individuals with alcoholic liver disease.

The use of several other pharmacologic agents has been associated with a reduction in alcohol consumption, including ondansetron (a selective serotonin reuptake inhibitor), topiramate (an anticonvulsant), baclofen (a GABA agonist), nalmefene (an opioid antagonist), and varenicline (a nicotinic acetylcholine-receptor and dopamine partial agonist), but none of these agents has been approved by the FDA for treatment of alcohol dependence.

Fetal Alcohol Spectrum Disorders

Alcohol freely crosses the placenta and is teratogenic. It is a leading preventable cause of birth defects with mental deficiency, with up to 1 in 100 children in the United States being born with fetal alcohol spectrum disorders (FASDs). The scope of disabilities and malformations varies and depends on the amount of alcohol consumed, the frequency of exposure, the stage of fetal development when alcohol is present, maternal parity, nutrition, genetic susceptibility, and individual variation in maternal and fetal alcohol metabolism.

The term *fetal alcohol spectrum disorder* (FASD) is used to characterize the full range of prenatal alcohol damage, varying from mild to severe and encompassing a broad array of physical defects and cognitive, behavioral, and emotional deficits. It includes conditions such as fetal alcohol syndrome (FAS), alcohol-related neurodevelopmental disorder (ARND), and alcohol-related birth defects (ARBDs).

FAS, the most severe form of FASD, is characterized by (a) growth retardation (i.e., height or weight ≥10th percentile); (b) neurodevelopmental abnormalities (i.e., microcephaly, hyperactivity, irritability, altered motor skills, learning disabilities, seizure disorders, and mental retardation), and (c) dysmorphic facial features (i.e., short palpebral fissures, smooth philtrum, and a thin upper lip). Children with typical dysmorphic facial features who lack the other features have partial FAS. Children with ARBDs have typical facies associated with FAS as well as anomalies in other organs (i.e., cardiac, renal, skeletal, auditory) but no growth retardation or neurodevelopmental abnormalities. Children with ARND exhibit behavioral or cognitive abnormalities in the absence of dysmorphic facial features.

Although the damage from prenatal exposure to alcohol cannot be reversed, children with FASDs benefit from early diagnosis and aggressive intervention with physical, occupational, speech and language, and educational therapies. Early recognition can also benefit the impaired mother, resulting in access to alcohol treatment and a better social situation for the entire family.