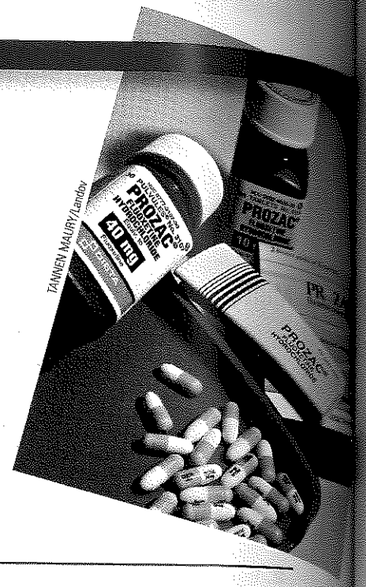
Module 73

The Biomedical Therapies



Module Learning Objectives

- **73-1** Identify and describe the drug therapies, and explain how double-blind studies help researchers evaluate a drug's effectiveness.
- **73-2** Describe the use of brain stimulation techniques and psychosurgery in treating specific disorders.
- **73-3** Describe how, by taking care of themselves with a healthy lifestyle, people might find some relief from depression, and explain how this reflects our being biopsychosocial systems.

Psychotherapy is one way to treat psychological disorders. The other, often used with serious disorders, is biomedical therapy—physically changing the brain's functioning by altering its chemistry with drugs, or affecting its circuitry with electroconvulsive shock, magnetic impulses, or psychosurgery. Primary care providers prescribe most drugs for anxiety and depression, followed by psychiatrists and, in some states, psychologists.

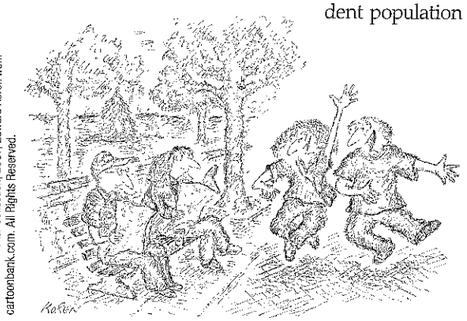
psychopharmacology the study of the effects of drugs on mind and behavior.

Drug Therapies

73-1 What are the drug therapies? How do double-blind studies help researchers evaluate a drug's effectiveness?

By far the most widely used biomedical treatments today are the drug therapies. Since the 1950s, discoveries in **psychopharmacology** (the study of drug effects on mind and behavior) have revolutionized the treatment of people with severe disorders, liberating hundreds of thousands from hospital confinement. Thanks to drug therapy—and to efforts to minimize involuntary hospitalization and to support people through community mental health programs—the resident population of mental hospitals is a small fraction of what it was a half-century ago. For some unable to care for themselves, however, release from hospitals has meant homelessness, not liberation.

Drug or placebo effect? For many people, depression lifts while taking an antidepressant drug. But people given a placebo may experience the same effect. Double-blind clinical trials suggest that, especially for those with severe depression, antidepressant drugs do have at least a modest clinical effect.



"Our psychopharmacologist is a genius."

Almost any new treatment, including drug therapy, is greeted by an initial wave of enthusiasm as many people apparently improve. But that enthusiasm often diminishes after researchers subtract the rates of (1) normal recovery among untreated persons and (2) recovery due to the placebo effect, which arises from the positive expectations of patients and mental health workers alike. So, to evaluate the effectiveness of any new drug, researchers give half the patients the drug, and the other half a similar-appearing placebo. Because neither the staff nor the patients know who gets which, this is called a *double-blind procedure*. The good news: In double-blind studies, some drugs have proven useful.

Antipsychotic Drugs

The revolution in drug therapy for psychological disorders began with the accidental discovery that certain drugs, used for other medical purposes, calmed patients with *psychoses* (disorders in which hallucinations or delusions indicate some loss of contact with reality). These **antipsychotic drugs,** such as chlorpromazine (sold as Thorazine), dampened responsiveness to irrelevant stimuli. Thus, they provided the most help to patients experiencing positive symptoms of schizophrenia, such as auditory hallucinations and paranoia (Lehman et al., 1998; Lenzenweger et al., 1989).

The molecules of most conventional antipsychotic drugs are antagonists; they are similar enough to molecules of the neurotransmitter dopamine to occupy its receptor sites and block its activity. This finding reinforces the idea that an overactive dopamine system contributes to schizophrenia.

Antipsychotics also have powerful side effects. Some produce sluggishness, tremors, and twitches similar to those of Parkinson's disease (Kaplan & Saddock, 1989). Long-term use of antipsychotics can produce *tardive dyskinesia*, with involuntary movements of the facial muscles (such as grimacing), tongue, and limbs. Although not more effective in controlling schizophrenia symptoms, many of the newer-generation antipsychotics, such as risperidone (Risperdal) and olanzapine (Zyprexa), have fewer of these effects. These drugs may, however, increase the risk of obesity and diabetes (Buchanan et al., 2010; Tiihonen et al., 2009).

Antipsychotics, combined with life-skills programs and family support, have given new hope to many people with schizophrenia (Guo, 2010). Hundreds of thousands of patients have left the wards of mental hospitals and returned to work and to near-normal lives (Leucht et al., 2003).

AP® Exam Tip

The discussion of drug therapies is a great opportunity for you to review information about neurotransmitters and brain function. See Unit III if you need to brush up on these topics.

FYI

Perhaps you can guess an occasional side effect of L-dopa, a drug that raises dopamine levels for Parkinson's patients: hallucinations.

Antianxiety Drugs

Like alcohol, **antianxiety drugs,** such as Xanax or Ativan, depress central nervous system activity (and so should not be used in combination with alcohol). Antianxiety drugs are often used in combination with psychological therapy. One antianxiety drug, the antibiotic D-cycloserine, acts upon a receptor that, in combination with behavioral treatments, facilitates the extinction of learned fears. Experiments indicate that the drug enhances the benefits of exposure therapy and helps relieve the symptoms of posttraumatic stress disorder and obsessive-compulsive disorder (Davis, 2005; Kushner et al., 2007).

A criticism sometimes made of the behavior therapies—that they reduce symptoms without resolving underlying problems—is also made of drug therapies. Unlike the behavior therapies, however, these substances may be used as an ongoing treatment. "Popping a Xanax" at the first sign of tension can create a learned response; the immediate relief reinforces a person's tendency to take drugs when anxious. Antianxiety drugs can also be addicting. After heavy use, people who stop taking them may experience increased anxiety, insomnia, and other withdrawal symptoms.

Over the dozen years at the end of the twentieth century, the rate of outpatient treatment for anxiety disorders, obsessive-compulsive disorder, and posttraumatic stress disorder nearly doubled. The proportion of psychiatric patients receiving medication during that time increased from 52 to 70 percent (Olfson et al., 2004). And the new standard drug treatment for anxiety disorders? Antidepressants.

Antidepressant Drugs

The **antidepressants** were named for their ability to lift people up from a state of depression, and this was their main use until recently. The label is a bit of a misnomer now that these drugs are increasingly being used to successfully treat anxiety disorders, obsessive-compulsive disorder, and posttraumatic stress disorder. These drugs are agonists; they work by increasing the availability of certain neurotransmitters, such as norepinephrine or serotonin, which

antipsychotic drugs drugs used to treat schizophrenia and other forms of severe thought disorder.

antianxiety drugs drugs used to control anxiety and agitation.

antidepressant drugs drugs used to treat depression, anxiety disorders, obsessive-compulsive disorder, and posttraumatic stress disorder. (Several widely used antidepressant drugs are *selective serotonin reuptake inhibitors—SSRIs.)*

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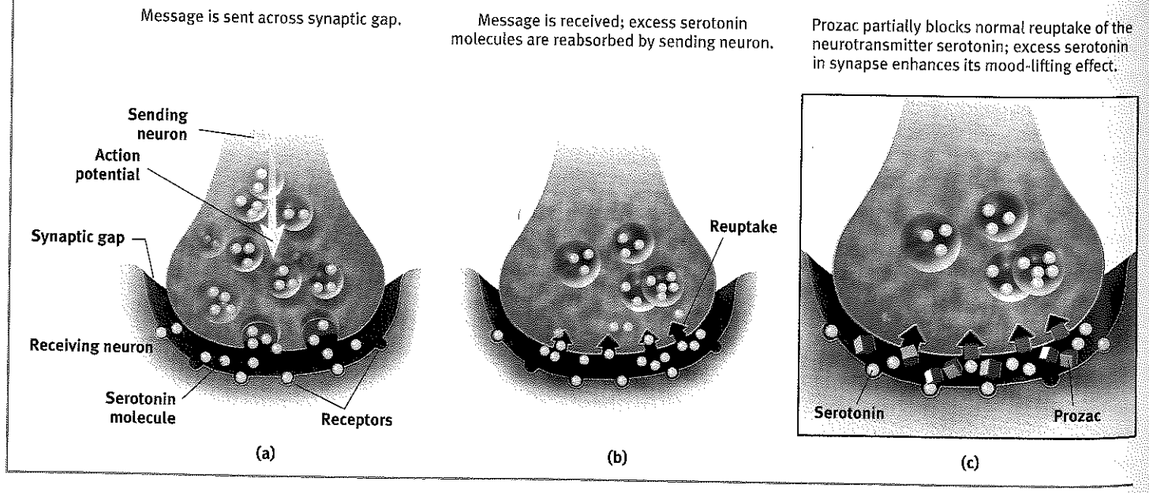
elevate arousal and mood and appear scarce when a person experiences feelings of depression or anxiety. Fluoxetine, which tens of millions of users worldwide have known as Prozac, falls into this category of drugs. The most commonly prescribed drugs in this group, including Prozac and its cousins Zoloft and Paxil, work by blocking the reabsorption and removal of serotonin from synapses (**FIGURE 73.1**). Given their use in treating disorders other than depression—from anxiety to strokes—this group of drugs is most often called *SSRIs (selective serotonin reuptake inhibitors)* rather than antidepressants (Kramer, 2011). Some of the older antidepressant drugs work by blocking the reabsorption or breakdown of both norepinephrine and serotonin. Though effective, these dual-action drugs have more potential side effects, such as dry mouth, weight gain, hypertension, or dizzy spells (Anderson, 2000; Mulrow, 1999). Administering them by means of a patch, bypassing the intestines and liver, helps reduce such side effects (Bodkin & Amsterdam, 2002).

After the introduction of SSRI drugs, the percentage of patients receiving medication for depression jumped dramatically, from 70 percent in 1987, the year before SSRIs were introduced, to 89 percent in 2001 (Olfson et al., 2003; Stafford et al., 2001). From 1996 to 2005, the number of Americans prescribed antidepressant drugs doubled, from 13 to 27 million (Olfson & Marcus, 2009). Between 2002 and 2007 in Australia, antidepressant drug use increased 41 percent (Hollingworth et al., 2010).

Be advised: Patients with depression who begin taking antidepressants do not wake up the next day singing "It's a beautiful day"! Although the drugs begin to influence neurotransmission within hours, their full psychological effect often requires four weeks. One possible reason for the delay is that increased serotonin promotes *neurogenesis*—the birth of new brain cells, perhaps reversing stress-induced loss of neurons (Becker & Wojtowicz, 2007; Jacobs, 2004).

Antidepressant drugs are not the only way to give the body a lift. Aerobic exercise, which calms people who feel anxious and energizes those who feel depressed, does about as much good for some people with mild to moderate depression, and has additional positive side effects (more on this topic later in this module). Cognitive therapy, by helping people reverse their habitual negative thinking style, can boost the drug-aided relief from depression and reduce the post-treatment risk of relapse (Hollon et al., 2002; Keller et al., 2000; Vittengl et al., 2007). Better yet, some studies suggest, is to attack depression (and anxiety) from both below and above (Cuijpers et al., 2010; Walkup et al., 2008). Use antidepressant drugs (which work, bottom-up, on the emotion-forming limbic system) in conjunction with cognitive-behavioral therapy (which works top-down, starting with changed frontal lobe activity).

Figure 73.1
Biology of antidepressants
Shown here is the action of Prozac, which partially blocks the reuptake of serotonin.



Researchers generally agree that people with depression often improve after a month on antidepressants. But after allowing for natural recovery and the placebo effect, how big is the drug effect? Not big, report Irving Kirsch and his colleagues (1998, 2002, 2010). Their analyses of double-blind clinical trials indicate that the placebo effect accounted for about 75 percent of the active drug's effect. In a follow-up review that included unpublished clinical trials, the antidepressant drug effect was again modest (Kirsch et al., 2008). The placebo effect was less for those with severe depression, which made the added benefit of the drug somewhat greater for them. "Given these results, there seems little reason to prescribe antidepressant medication to any but the most severely depressed patients, unless alternative treatments have failed," Kirsch concluded (BBC, 2008). A newer analysis confirms that the antidepressant benefit compared with placebos is "minimal or nonexistent, on average, in patients with mild or moderate symptoms." For those folks, aerobic exercise or psychotherapy is often effective. But among patients with "very severe" depression, the medication advantage becomes "substantial" (Fournier et al., 2010).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"If this doesn't help you don't worry, it's a placebo."

"No twisted thought without a twisted molecule." -ATTRIBUTED TO PSYCHOLOGIST RALPH GERARD

Mood-Stabilizing Medications

In addition to antipsychotic, antianxiety, and antidepressant drugs, psychiatrists have *mood-stabilizing drugs* in their arsenal. For those suffering the emotional highs and lows of bipolar disorder, the simple salt *lithium* can be an effective mood stabilizer. Australian physician John Cade discovered this in the 1940s when he administered lithium to a patient with severe mania and the patient became perfectly well in less than a week (Snyder, 1986). After suffering mood swings for years, about 7 in 10 people with bipolar disorder benefit from a long-term daily dose of this cheap salt, which helps prevent or ease manic episodes and, to a lesser extent, lifts depression (Solomon et al., 1995). It also protects neural health, thus reducing bipolar patients' vulnerability to significant cognitive decline (Kessing et al., 2010).

Lithium also reduces bipolar patients' risk of suicide—to about one-sixth of bipolar patients not taking lithium (Tondo et al., 1997). Lithium amounts in drinking water have also correlated with lower suicide rates (across 18 Japanese cities and towns) and lower crime rates (across 27 Texas counties) (Ohgami et al., 2009; Schrauzer & Shrestha, 1990, 2010; Terao et al., 2010). Although we do not fully understand why, lithium works. And so does Depakote, a drug originally used to treat epilepsy and more recently found effective in the control of manic episodes associated with bipolar disorder.

"Lithium prevents my seductive but disastrous highs, diminishes my depressions, clears out the wool and webbing from my disordered thinking, slows me down, gentles me out, keeps me from ruining my career and relationships, keeps me out of a hospital, alive, and makes psychotherapy possible." -KAY REDFIELD JAMISON, *AN UNQUIET MIND*, 1995

Brain Stimulation

73-2 How are brain stimulation and psychosurgery used in treating specific disorders?

Electroconvulsive Therapy

A more controversial brain manipulation occurs through shock treatment, or **electroconvulsive therapy (ECT).** When ECT was first introduced in 1938, the wide-awake patient was strapped to a table and jolted with roughly 100 volts of electricity to the brain, producing racking convulsions and brief unconsciousness. ECT therefore gained a barbaric image, one that lingers. Today, however, the patient receives a general anesthetic and a muscle relaxant (to prevent injury from seizures) before a psychiatrist delivers 30 to 60 seconds of electrical current (**FIGURE 73.2** on the next page). Within 30 minutes, the patient awakens and remembers nothing of the treatment or of the preceding hours. After three such sessions each week for two to four weeks, 80 percent or more of people receiving ECT improve markedly, showing some memory loss for the treatment period but no discernible brain damage.

electroconvulsive therapy (ECT) a biomedical therapy for severely depressed patients in which a brief electric current is sent through the brain of an anesthetized patient.

FYI
The medical use of electricity is an ancient practice. Physicians treated the Roman Emperor Claudius (10 B.C.E.–54 C.E.) for headaches by pressing electric eels to his temples.

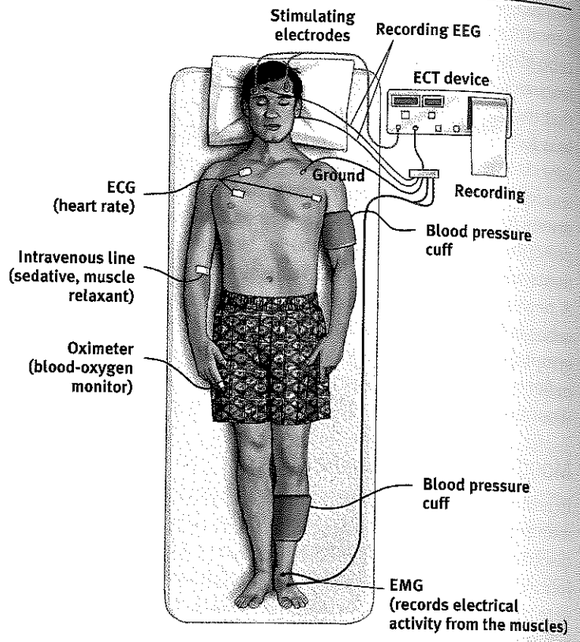

Figure 73.2
Electroconvulsive therapy Although controversial, ECT is often an effective treatment for depression that does not respond to drug therapy. "Electroconvulsive" is no longer accurate because patients are now given a drug that prevents injurious seizures.

Rick Friedman/Corbis

ECT proponent In her book, *Shock: The Healing Power of Electroconvulsive Therapy* (2006), Kitty Dukakis writes, "I used to . . . be unable to shake the dread even when I was feeling good, because I knew the bad feelings would return. ECT has wiped away that foreboding. It has given me a sense of control, of hope."

Study after study confirms that ECT is an effective treatment for severe depression in "treatment-resistant" patients who have not responded to drug therapy (Bailine et al., 2010; Fink, 2009; UK ECT Review Group, 2003). An editorial in the *Journal of the American Medical Association* concluded that "the results of ECT in treating severe depression are among the most positive treatment effects in all of medicine" (Glass, 2001).

How does ECT alleviate severe depression? After more than 70 years, no one knows for sure. One recipient likened ECT to the smallpox vaccine, which was saving lives before we knew how it worked. Others think of it as rebooting their cerebral computer. But what makes it therapeutic? Perhaps the shock-induced seizures calm neural centers where overactivity produces depression. ECT, like antidepressant drugs and exercise, also appears to boost the production of new brain cells (Bolwig & Madsen, 2007).

Skeptics have raised one other possible explanation for how ECT works: as a placebo effect. Most ECT studies have failed to contain a control condition in which people are randomly assigned to receive the same general anesthesia and simulated ECT without the shock. When given this placebo treatment, note John Read and Richard Bentall (2010), the positive expectation is therapeutic, though a Food and Drug Administration (2011) research review concludes that ECT is more effective than a placebo, especially in the short run.

ECT is now administered with briefer pulses, sometimes only to the brain's right side and with less memory disruption (HMHL, 2007). Yet no matter how impressive the results, the idea of electrically shocking people still strikes many as barbaric, especially given our ignorance about why ECT works. Moreover, about 4 in 10 ECT-treated patients relapse into depression within six months (Kellner et al., 2006). Nevertheless, in the minds of many psychiatrists and patients, ECT is a lesser evil than severe depression's misery, anguish, and risk of suicide. As research psychologist Norman Endler (1982) reported after ECT alleviated his deep depression, "A miracle had happened in two weeks."

Alternative Neurostimulation Therapies

Two other neural stimulation techniques—magnetic stimulation and deep-brain stimulation—are raising hopes for gentler alternatives that jump-start neural circuits in the depressed brain.

MAGNETIC STIMULATION

Depressed moods seem to improve when repeated pulses surge through a magnetic coil held close to a person's skull (**FIGURE 73.3**). The painless procedure—called **repetitive transcranial magnetic stimulation (rTMS)**—is performed on wide-awake patients over several weeks. Unlike ECT, the rTMS procedure produces no seizures, memory loss, or other serious side effects. (Headaches can result.)

repetitive transcranial magnetic stimulation (rTMS) the application of repeated pulses of magnetic energy to the brain; used to stimulate or suppress brain activity.

Initial studies have found "modest" positive benefits of rTMS (Daskalakis et al., 2008; George et al., 2010; López-Ibor et al., 2008). How it works is unclear. One possible explanation is that the stimulation energizes the brain's left frontal lobe, which is relatively inactive during depression (Helmuth, 2001). Repeated stimulation may cause nerve cells to form new functioning circuits through the process of long-term potentiation. (See Module 32 for more details on long-term potentiation.)

FYI

A meta-analysis of 17 clinical experiments found that one other stimulation procedure alleviates depression: massage therapy (Hou et al., 2010).

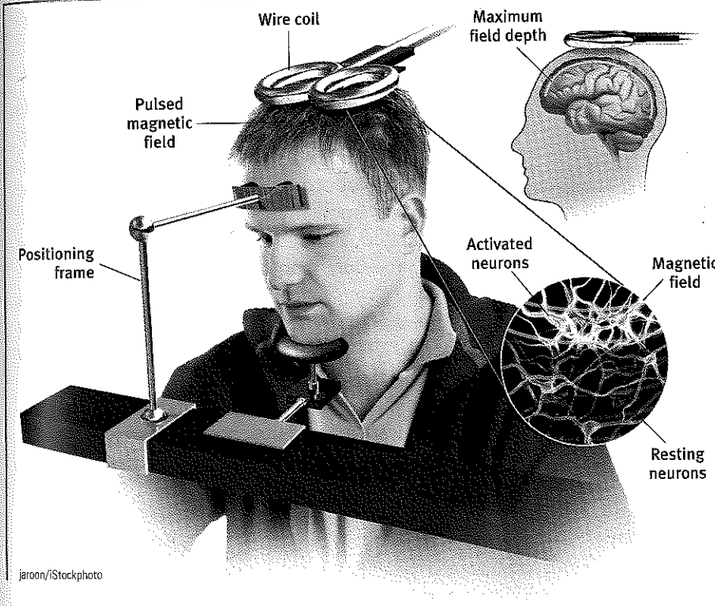

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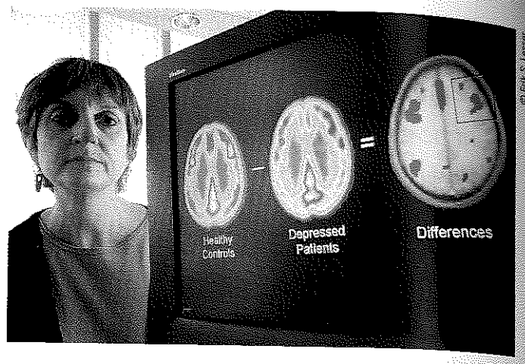
Figure 73.3
Magnets for the mind Repetitive transcranial magnetic stimulation (rTMS) sends a painless magnetic field through the skull to the surface of the cortex. Pulses can be used to stimulate or dampen activity in various cortical areas. (From George, 2003.)

DEEP-BRAIN STIMULATION

Other patients whose depression has resisted both drugs that flood the body and ECT that jolts at least half the brain have benefited from an experimental treatment pinpointed at a depression center in the brain. Neuroscientist Helen Mayberg and her colleagues (2005, 2006, 2007, 2009) have been focusing on a neural hub that bridges the thinking frontal lobes to the limbic system. This area, which is overactive in the brain of a depressed or temporarily sad person, calms when treated by ECT or antidepressants. To experimentally excite neurons that inhibit this negative emotion-feeding activity, Mayberg drew upon the deep-brain stimulation technology sometimes used to treat Parkinson's tremors. Among an initial 20 patients receiving implanted electrodes and a pacemaker stimulator, 12 experienced relief, which was sustained over three to six years of follow-up (Kennedy et al., 2011).



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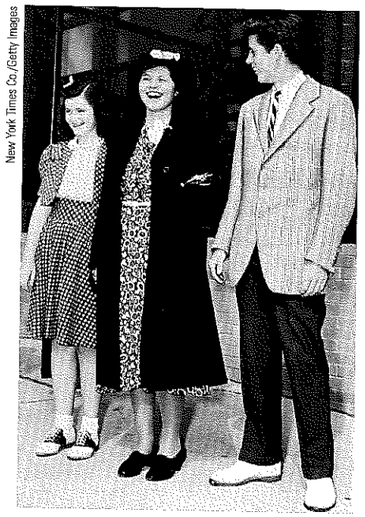
A depression switch? By comparing the brains of patients with and without depression, researcher Helen Mayberg identified a brain area that appears active in people who are depressed or sad, and whose activity may be calmed by deep-brain stimulation.

psychosurgery surgery that removes or destroys brain tissue in an effort to change behavior.

lobotomy a psychosurgical procedure once used to calm uncontrollably emotional or violent patients. The procedure cut the nerves connecting the frontal lobes to the emotion-controlling centers of the inner brain.

Some felt suddenly more aware and became more talkative and engaged; others improved only slightly if at all. Future research will explore whether Mayberg has discovered a switch that can lift depression. Other researchers are following up on reports that deep-brain stimulation can offer relief to people with obsessive-compulsive disorder (Rabins et al., 2009).



New York Times Co./Getty Images

Failed lobotomy This 1940 photo shows Rosemary Kennedy (center) at age 22 with brother (and future U.S. president) John and sister Jean. A year later her father, on medical advice, approved a lobotomy that was promised to control her reportedly violent mood swings. The procedure left her confined to a hospital with an infantile mentality until her death in 2005 at age 86.

Psychosurgery

Because its effects are irreversible, **psychosurgery**—surgery that removes or destroys brain tissue—is the most drastic and the least-used biomedical intervention for changing behavior. In the 1930s, Portuguese physician Egas Moniz developed what became the best-known psychosurgical operation: the **lobotomy.** Moniz found that cutting the nerves connecting the frontal lobes with the emotion-controlling centers of the inner brain calmed uncontrollably emotional and violent patients. In what would later become a crude but easy and inexpensive procedure that took only about 10 minutes, a neurosurgeon would shock the patient into a coma, hammer an icepick-like instrument through each eye socket into the brain, and then wiggle it to sever connections running up to the frontal lobes. Between 1936 and 1954, tens of thousands of severely disturbed people were "lobotomized" (Valenstein, 1986).

Although the intention was simply to disconnect emotion from thought, a lobotomy's effect was often more drastic: It usually decreased the person's misery or tension, but also produced a permanently lethargic, immature, uncreative person. During the 1950s, after some 35,000 people had been lobotomized in the United States alone, calming drugs became available and psychosurgery was largely abandoned. Today, lobotomies are history. But more precise, microscale psychosurgery is sometimes used in extreme cases. For example, if a patient suffers uncontrollable seizures, surgeons can deactivate the specific nerve clusters that cause or transmit the convulsions. MRI-guided precision surgery is also occasionally done to cut the circuits involved in severe obsessive-compulsive disorder (Carey, 2009, 2011; Sachdev & Sachdev, 1997). Because these procedures are irreversible, they are controversial and neurosurgeons perform them only as a last resort.

Therapeutic Lifestyle Change

73-3 How, by taking care of themselves with a healthy lifestyle, might people find some relief from depression, and how does this reflect our being biopsychosocial systems?

The effectiveness of the biomedical therapies reminds us of a fundamental lesson: We find it convenient to talk of separate psychological and biological influences, but everything psychological is also biological (**FIGURE 73.4**). Every thought and feeling depends on the functioning brain. Every creative idea, every moment of joy or anger, every period of depression emerges from the electrochemical activity of the living brain. The influence is two-way: When psychotherapy relieves obsessive-compulsive behavior, PET scans reveal a calmer brain (Schwartz et al., 1996).

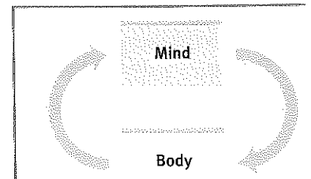


Figure 73.4
Mind-body interaction The biomedical therapies assume that mind and body are a unit: Affect one and you will affect the other.

Anxiety disorders, obsessive-compulsive disorder, posttraumatic stress disorder, major depression, bipolar disorder, and schizophrenia are all biological events. As we have seen over and again, *a human being is an integrated biopsychosocial system.* For years, we have considered the health of our bodies and minds separately. That neat separation no longer seems valid. Stress affects body chemistry and health. And chemical imbalances, whatever their cause, can produce schizophrenia, depression, and other mental disorders.

That lesson is being applied by Stephen Ilardi (2009) in training seminars promoting *therapeutic lifestyle change.* Human brains and bodies were designed for physical activity and social engagement, they note. Our ancestors hunted, gathered, and built in groups, with little evidence of disabling depression. Indeed, those whose way of life entails strenuous physical activity, strong community ties, sunlight exposure, and plenty of sleep (think of foraging bands in Papua New Guinea, or Amish farming communities in North America) rarely experience depression. For both children and adults, outdoor activity in natural environments—perhaps a walk in the woods—reduces stress and promotes health (NEEF, 2011; Phillips, 2011). "Simply put: humans were never designed for the sedentary, disengaged, socially isolated, poorly nourished, sleep-deprived pace of twenty-first-century American life."

The Ilardi team was also impressed by research showing that regular aerobic exercise and a complete night's sleep boost mood and energy. So they invited small groups of people with depression to undergo a 12-week training program with the following goals:

- *Aerobic exercise,* 30 minutes a day, at least 3 times weekly (increasing fitness and vitality, stimulating endorphins)
- *Adequate sleep,* with a goal of 7 to 8 hours a night (increasing energy and alertness, boosting immunity)
- *Light exposure,* at least 30 minutes each morning with a light box (amplifying arousal, influencing hormones)
- *Social connection,* with less alone time and at least two meaningful social engagements weekly (satisfying the human need to belong)
- *Antirumination,* by identifying and redirecting negative thoughts (enhancing positive thinking)
- *Nutritional supplements,* including a daily fish oil supplement with omega-3 fatty acids (supporting healthy brain functioning)

sturti/Getty Images

Healthier lifestyles Researchers suggest that therapeutic lifestyle change can be an effective antidote for people with depression.The changes include managing sleep time, spending more time outdoors (or with a light box), getting more exercise, and developing more social connections.

In one study of 74 people, 77 percent of those who completed the program experienced relief from depressive symptoms, compared with 19 percent in those assigned to a treatment-as-usual control condition. Future research will seek to replicate this striking result of lifestyle change, and also to identify which of the treatment components (additively or in some combination) produce the therapeutic effect. In the meantime, there seems little reason to doubt the truth of the Latin adage, *Mens sana in corpore sano:* "A healthy mind in a healthy body."

TABLE 73.1 on the next page summarizes some aspects of the biomedical therapies we've discussed.

Table 73.1 Comparing Biomedical Therapies

Therapy	Presumed Problem	Therapy Aim	Therapy Technique
Drug therapies	Neurotransmitter malfunction	Control symptoms of psychological disorders.	Alter brain chemistry through drugs.
Brain stimulation	Severe, "treatment-resistant" depression	Alleviate depression that is unresponsive to drug therapy.	Stimulate brain through electroconvulsive shock, magnetic impulses, or deep-brain stimulation.
Psychosurgery	Brain malfunction	Relieve severe disorders.	Remove or destroy brain tissue.
Therapeutic lifestyle change	Stress and unhealthy lifestyle	Restore healthy biological state.	Alter lifestyle through adequate exercise, sleep, and other changes.

Before You Move On

▶ ASK YOURSELF

If a troubled friend asked, how would you summarize the available biomedical therapies?

▶ TEST YOURSELF

How do researchers evaluate the effectiveness of particular drug therapies?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 73 Review

73-1 What are the drug therapies? How do double-blind studies help researchers evaluate a drug's effectiveness?

- *Psychopharmacology*, the study of drug effects on mind and behavior, has helped make drug therapy the most widely used biomedical therapy.
- *Antipsychotic drugs*, used in treating schizophrenia, block dopamine activity. Side effects may include tardive dyskinesia (with involuntary movements of facial muscles, tongue, and limbs) or increased risk of obesity and diabetes.
- *Antianxiety drugs*, which depress central nervous system activity, are used to treat anxiety disorders, obsessive-compulsive disorder, and posttraumatic stress disorder. These drugs can be physically and psychologically addictive.
- *Antidepressant drugs*, which increase the availability of serotonin and norepinephrine, are used for depression, with modest effectiveness beyond that of placebo drugs. The antidepressants known as selective serotonin reuptake inhibitors (SSRIs) are now used to treat other disorders, including strokes, anxiety disorders, obsessive-compulsive disorder, and posttraumatic stress disorder.
- Lithium and Depakote are mood stabilizers prescribed for those with bipolar disorder.
- Studies may use a double-blind procedure to avoid the placebo effect and researchers' bias.

73-2 How are brain stimulation and psychosurgery used in treating specific disorders?

- *Electroconvulsive therapy (ECT)*, in which a brief electric current is sent through the brain of an anesthetized patient, is an effective treatment for severely depressed people who have not responded to other therapy.
- Newer alternative treatments for depression include *repetitive transcranial magnetic stimulation (rTMS)* and, in preliminary clinical experiments, deep-brain stimulation that calms an overactive brain region linked with negative emotions.
- *Psychosurgery* removes or destroys brain tissue in hopes of modifying behavior.
  - Radical psychosurgical procedures such as the *lobotomy* were once popular, but neurosurgeons now rarely perform brain surgery to change behavior or moods.
  - Brain surgery is a last-resort treatment because its effects are irreversible.

73-3 How, by taking care of themselves with a healthy lifestyle, might people find some relief from depression, and how does this reflect our being biopsychosocial systems?

- Depressed people who undergo a program of aerobic exercise, adequate sleep, light exposure, social engagement, negative-thought reduction, and better nutrition often gain some relief.
- In our integrated biopsychosocial system, stress affects our body chemistry and health; chemical imbalances can produce depression; and social support and other lifestyle changes can lead to relief of symptoms.

Multiple-Choice Questions

1. Which neurotransmitter is affected by antipsychotic medications?

a. Epinephrine
b. Dopamine
c. Norepinephrine
d. Acetylcholine
e. Serotonin

2. Which of the following is most effectively treated with electroconvulsive therapy (ECT)?

a. Psychosis
b. Schizophrenia
c. Obsessive-compulsive disorder
d. Depression
e. Generalized anxiety disorder

3. Which of the following was the purpose of lobotomies?

a. To alleviate depression
b. To minimize delusions and hallucinations
c. To "erase" troubling memories
d. To recover repressed memories
e. To separate the reasoning centers of the brain from the emotional centers

Practice FRQs

1. Identify the category of drugs used to treat schizophrenia and the category of drugs used to treat obsessive-compulsive disorder. Then explain what each of these two categories of drugs does inside the brain.

Answer

2 *points:* Antipsychotic medications are the preferred drug treatment for schizophrenia. They work by blocking dopamine receptors.

2 *points:* Antidepressant medications are the preferred drug treatment for obsessive-compulsive disorder. They work by blocking the reuptake of serotonin.

2. Briefly describe four therapeutic lifestyle changes advocated by Stephen Ilardi, and describe their benefits.

(4 points)