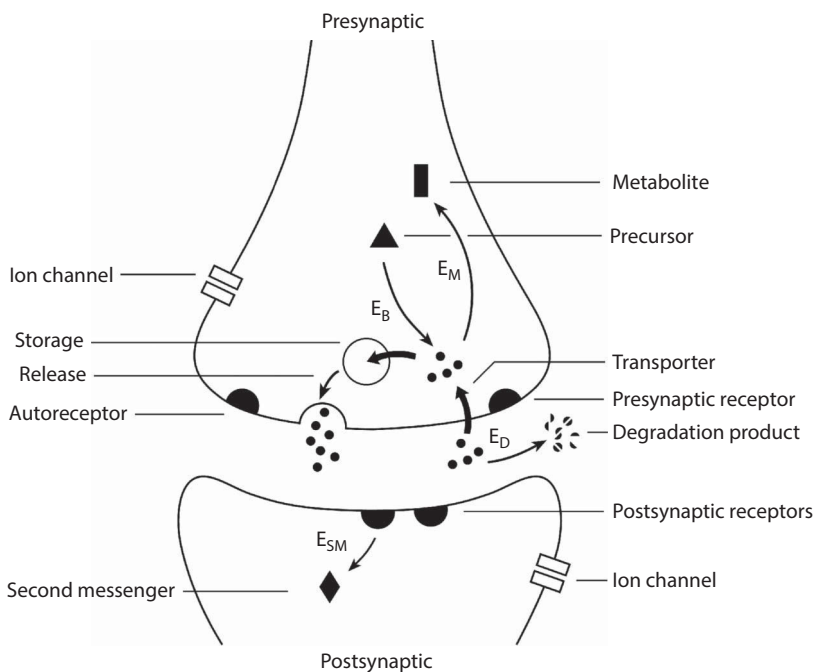


### 12.1.1 SYNAPTIC PROCESSES AND MECHANISMS

Receptors are located in a complex, integrated, and highly interactive environment which can be further illustrated by the processes and mechanisms of synapses (Figure 12.2). The synapses are key elements in the interneuronal communication in the peripheral and in the central nervous system (CNS). In the CNS, each neuron has been estimated to have synaptic contact with several thousand other neurons, making the structure and function of the CNS extremely complex.

The receptor is activated upon release of the signaling molecule and it is evidently equally important to be able to stop the signaling again. This is often achieved by transporters situated in the vicinity of the receptor, which move the signaling molecule from the extracellular to the intracellular space, where it is either stored or metabolized (see Chapters 14, 15, and 18). Blockade of a transporter or a metabolic enzyme will cause an elevation of the extracellular concentration of the signaling molecule and lead to increased receptor activation, and transporters and metabolic enzymes can thus be viewed as indirect receptor targets. Synaptic functions may also be facilitated by stimulation of the neurotransmitter biosynthesis, for example, by administration of a biochemical precursor. Transport mechanisms in synaptic storage vesicles (Figure 12.2) are also potential sites for pharmacological intervention. Autoreceptors normally play a key role as a negative feedback mechanism regulating the release of certain neurotransmitters, making this class of presynaptic receptors therapeutically interesting.

Pharmacological stimulation or inhibition of the above-mentioned synaptic mechanisms are, however, likely to affect the function of the entire neurotransmitter system. Activation of neurotransmitter receptors may, in principle, represent the most direct and selective approach to stimulate of a particular neurotransmitter system. Furthermore, activation of distinct subtypes of receptors operated



**FIGURE 12.2** Generalized schematic illustration of processes and mechanisms associated with an axosomatic synapse in the CNS. E, enzymes, metabolic ( $E_M$ ), biosynthetic ( $E_B$ ), degradation ( $E_D$ ), second messenger ( $E_{SM}$ ); •, neurotransmitter.