Catecholamine Inactivation

Catabolic processes are just as important for the proper functioning of cells and organisms as are anabolic processes. This is no less true for neurotransmitters such as the catecholamines.

The catecholamines epinephrine, norepinephrine, and dopamine are inactivated by oxidation reactions catalyzed by monoamine oxidase (MAO) (**Figure 1**). Catecholamines must be transported out of the synaptic cleft before inactivation because MAO is located in nerve endings. (The process by which neurotransmitters

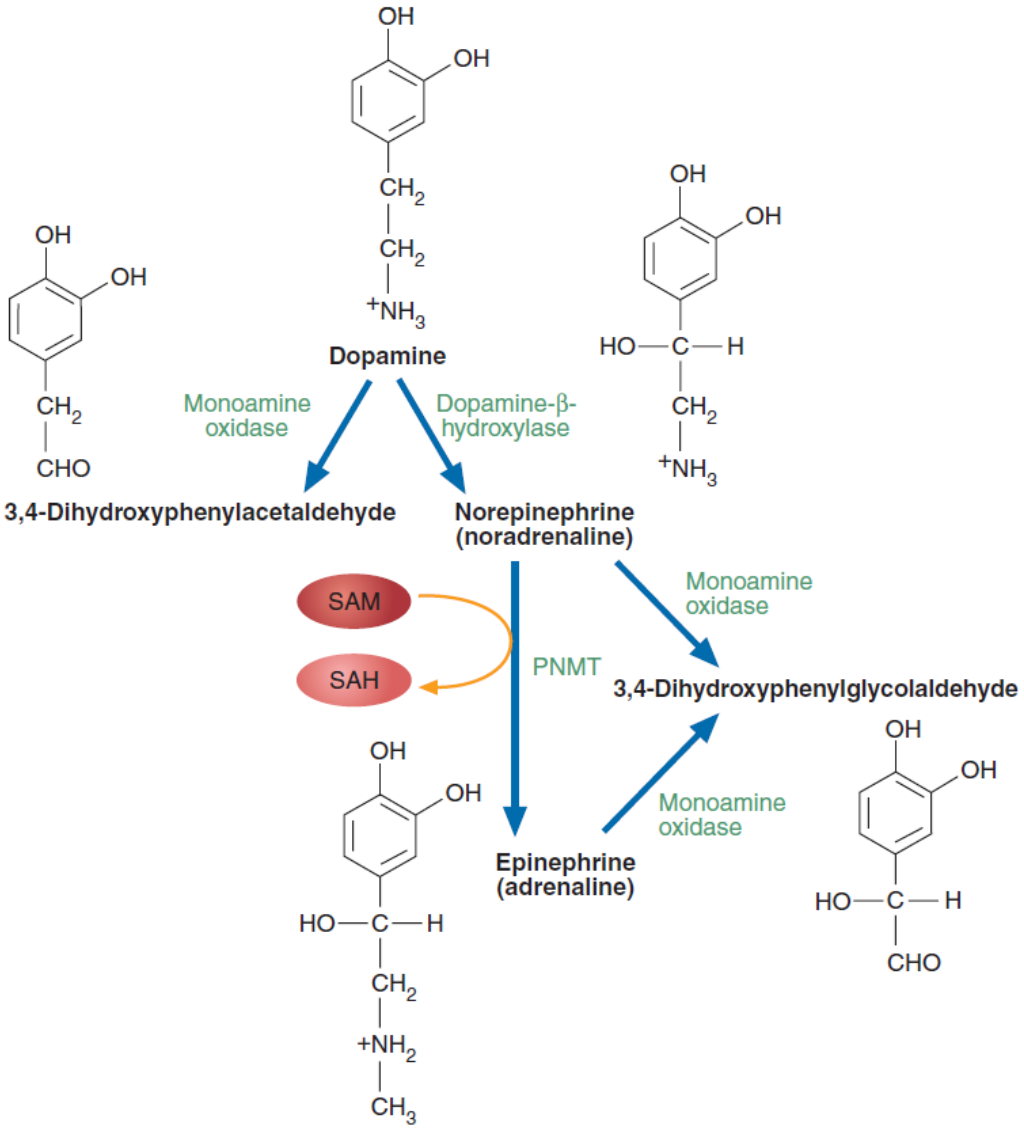

FIGURE 1

Inactivation of the Catecholamines

Monoamine oxidase is a flavoprotein that catalyzes the oxidative deamination of amines to form the corresponding aldehydes; O_2 is the electron acceptor, and NH_3 and H_2O_2 are the other products. (PNMT = phenylethanolamine-*N*-methyltransferase)

are transported back into nerve cells so that they can be reused or degraded is referred to as *reuptake*.) Epinephrine, released as a hormone from the adrenal gland, is carried in the blood and is catabolized in non-neural tissue (perhaps the kidney). Catecholamines are also inactivated in methylation reactions catalyzed by catechol-*O*-methyltransferase (COMT). These two enzymes (MAO and COMT) work together to produce a large variety of oxidized and methylated metabolites of the catecholamines.

KEY CONCEPT

Information transfer in animals requires that after their release, neurotransmitters be quickly degraded or removed from the synaptic cleft.