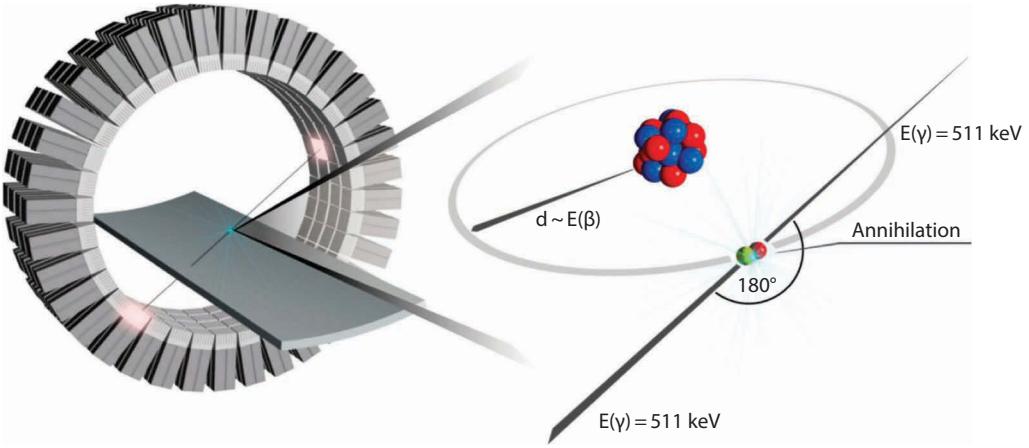

FIGURE 8.2 Basic physical principle of positron emission tomography (PET). Coincident detection of numerous photon pairs (after annihilation) in a PET scanner provides the raw data for the PET images. (Reprinted with permission from Piel, M., Vernaleken, I., and Rösch, F., Positron emission tomography in CNS drug discovery and drug monitoring, *J. Med. Chem*., 57, 9232–9258. Copyright 2014 American Chemical Society.)

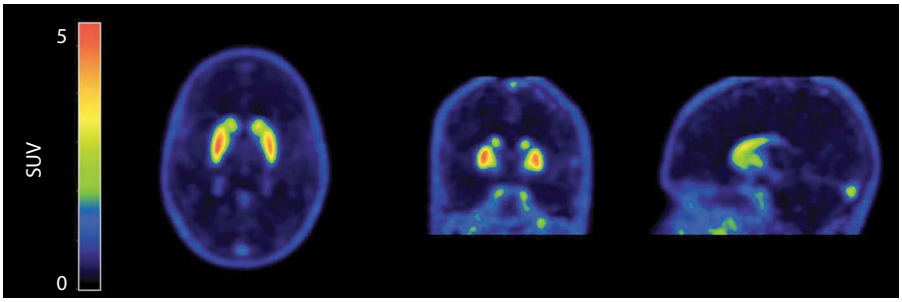

FIGURE 8.3 PET image of [^{11}C]Lu AE92686 in the human brain visualizing phosphodiesterase 10A. This research was originally published in JNM. (From Kehler, J. et al., *J. Nucl. Med*., 55(9), 1513, 2014. Figure 6. Copyright by the Society of Nuclear Medicine and Molecular Imaging, Inc.)

The PET ligand used in these experiments [^{11}C]Lu AE92686 was developed in the pharmaceutical industry to be able to quantify the occupancy of potential drug candidates.

8.4.2 General Requirements for a PET Ligand

The ideal PET ligand has to fulfill other criteria than those that apply to drug molecules. The efficacy of a drug (i.e., its ability to evoke a pharmacological/biological response) is crucial for its success, whereas the relative affinity/selectivity (i.e., a compound's ability to bind to a given target in preference to others) is much more important for a PET ligand used for imaging of a specific target. Drugs that interact with several targets may be very effective in the clinic, but for imaging purposes, the ability of a PET ligand to bind to a single target is important to simplify the interpretation of the final images. An effective drug does not necessarily make a good PET ligand and vice versa. Therefore, separate approaches have to be taken when developing compounds into either drugs or PET ligands.