SUMMARY AND CONCLUSION

PET has been widely used to study many aspects of brain physiology and various central nervous system disorders. There are a number of radiopharmaceuticals labeled with positron-emitting isotopes, including carbon-11([^{11} C]), fluorine-18 ([^{18} F]), and nitrogen-13 ([^{13} N]), that can be used to measure cerebral blood flow (CBF), cerebral metabolism, and neurotransmitter systems.18- FDG, the most commonly used radiopharmaceutical, is relatively easy to produce and use and can provide high-resolution images of cerebral glucose metabolism .

PET relies on a computerized reconstruction technique to produce tomographic images that represent the spatial distribution of radionuclides in the brain. Neuronal activity is the basis of brain functioning and is associated with ion channel-related activity. Under normal conditions, neuronal activity is directly associated with cerebral blood flow (CBF) and cerebral metabolic rate of glucose (CMR^{gluc}). Therefore, the 2 major techniques to assess cerebral activity involve measuring regional CBF (rCBF) or cellular glucose metabolism. A third and increasingly important PET strategy involves the use of specific receptor- binding radioligands that can be used to identify the distribution of unique receptors within the brain .

For epilepsy, PET has been very successful in both pediatric and adult patients for identifying epileptic foci within the brain. Particularly for those patients with intractable epilepsy and who are potential candidates for surgery, PET is specifically approved for that indication. Diagnostic information to identify whether there are either single or multiple foci given the electrical activation of an epileptic cascade is provided by PET used in conjunction with an EEG

(electroencephalogram) recording. The CT component helps to identify specific anatomic landmarks.

The role of PET imaging in identifying the epileptic focus inbetween the attacks has proven to be an important tool particularly in patients with foci in the temporal lobe, considered for respective surgery.

According to our current research concerning the application of PET/CT in epilepsy disorders, the following conclusions are addressed:

1-The overall concordance rate among the various imaging methods, including ictal video/EEG, MR imaging, PET, and ictal SPECT, is approximately two thirds or less in lateralizing the epileptogenic focus.

2-Each technique has its own advantages, and they play complementary roles.

3- PET is the most sensitive in lateralization of the epileptogenic area, even though it provides an approximate location of the epileptogenic zone, which by itself is not adequate for epilepsy surgery.

4-PET and/or ictal SPECT may well be complementary tools in patients with inconclusive lateralization on ictal video/EEG and MR imaging.