

Annotated Bibliography

Falkai, P., Schmitt, A., & Andreasen, N. (2018). Forty years of structural brain imaging in mental disorders: is it clinically useful or not? *Dialogues in Clinical Neuroscience*, 20(3), 179-186.

The use of PET/SPECT is well established, and the use of nuclear medicine has helped in the diagnosis of mental health disorders. This is important to determine areas of the human brain affected by different disorders. In recent years, there is a possible decline in the use of these scans, is noted. The authors talk about the pros and cons of using brain imaging in the diagnosis.

This article gives a good look into the different diagnostic tools for mental health disorders. It lacks in the knowledge of how new radiopharmaceutical agents are being made to help better aid with mental health disorder diagnosis. It is a good summary for what has been done, and also the conflicts between utilizing Nuclear Medicine or only psychiatric areas of healthcare. More specifically whether nuclear medicine is a tool that can be used as an advantage for mental health disorder diagnosis and treatment.

Fond, G., Garosi, A., Faugere, M., Campion, J., Lancon, C., Boyer, L., Richieri, R., & Guedj, E. (2022). Peripheral inflammation is associated with brain SPECT perfusion changes in schizophrenia. *European Journal of Nuclear Medicine and Molecular Imaging*. 49. 905-912.

Peripheral inflammation of the brain is common in schizophrenic patients, and SPECT scans are able to determine inflammation by utilizing brain scans. This was a study done with one hundred and thirty seven stabilized patients diagnosed with schizophrenia. The study of choice was a SPECT perfusion using ⁹⁹Tc-HMPAO, a radionuclide that aids in

displaying abnormalities within the brain. The study was done to better assess how the brain looks and functions if there is a pathology present.

This journal article shows evidence the use of nuclear medicine is demonstrating a correlation between pathologies and mental health disorders. The research data itself finding notes correlations specifically with schizophrenia and brain inflammation. It is beneficial to have statistical numbers that show effectiveness, or lack of brain scans in diagnosis of mental health disorders.

Henderson, T. A., Van-Lierop, M., McLean, M., Uszler, J. M., Thornton, J. F., Siow, Y., Patel, D. G., Cardaci, J., & Cohen P. (2020). Functional neuroimaging in psychiatry— aiding in diagnosis and guiding treatment: What the american psychiatric association does not know. *Frontiers in Psychiatry*. 11(278). 1-19.

SPECT is not a standard of care for the determining functioning of the brain. There have been brief discoveries in the uses of SPECT, specifically with Alzheimer's disease.

Psychiatry is a field of study that has failed to utilize the scientific method. It tends to not strive away from the DSM and like tools for diagnosis.

This provides conflicting research because it discusses how the American Psychiatric Association (APA) denies the benefit to neuroimaging. The research bring in conflicting views. The article also provides figures and data to confirm the uses of neuroimaging gives a better insight to all aspects of how the brain is functioning.

Johns Hopkins. (n.d.). Divisions of psychiatric neuroimaging. Retrieved from

<https://www.hopkinsmedicine.org/psychiatry/research/neuroimaging/>

Neuroimaging consisting of MRI, fMRI, PET, and DTI, which aids in the understanding of brain function. These studies can be used to aid in the detection of Alzheimer's,

Parkinson's, bipolar disorders, and eating disorders. This webpage presents multiple research studies done for human brain networking, conducted by researchers around the United States.

This site is good for finding many different advancements within research, which might soon hit for clinical trial, or are in trials currently. It also focuses on many different types of mental disorders, so it is not limiting to one specific area.

McCluskey, S. P., Plisson, C., Rabiner, E. A., & Howes, O. (2019). Advances in CNS PET: The state-of-the-art for new imaging targets for pathophysiology and drug development.

European Journal of Nuclear Medicine and Molecular Imaging. (47). 451-489.

Minimal treatments have been developed for central nervous system (CNS) disorders.

CNS disorders correlate with mental health disorders. A lack of research and clinical trails result in poor understandings of vivo pathoshysiologic that are underlined by

neurological and psychiatric disorders. The article discusses how there are new

developments within PET tracers to pair with the CNS, and how some of these new

tracers have recently become available for in-human imaging. Between 2013 and 2018, the study reported, that there were 40 PET tracers being developed to target the CNS.

This is important for the purpose of Nuclear Medicine to be more than just a confirmation tool. Drugs also contribute to mental health disorders by being able to disrupt the CNS.

This article shows evidence for the use of tracers to be beneficial to help decrease the risk of disruption. It provides more insight, other than just drug induced, mental health

disorders.

Pagani, M., Carleton, S., & Ostacoli, L. (2019). PET and SPECT in psychiatry: The past and the future. *European Journal of Nuclear Medicine and Molecular Imaging.* (46). 1985-1987.

Throughout the years, there have been many technical advancements to allow for both research and clinical investigations to have access to a plethora of different avenues to help aid in mental health disorders. This journal first looked at ^{18}F -FDG along with eye movement desensitization and reprocessing (EMDR) therapy. This was used to help with post traumatic stress disorder (PTSD), which was also able to be converted into using for SPECT. Instead of using ^{18}F -FDG, SPECT uses ^{99}Tc -HMPAO [9, 10] or ^{99}Tc -ECD [11]. This article explained how there was a lengthy examination time.

This article provides additional research about using nuclear medicine to help with disease progression. The limitation is that it only focuses on Post Traumatic Stress Disorder (PTSD), but it does also shows evidence about why many members of the healthcare community are not utilizing Nuclear Medicine scans. It shows data to support how it can help aid in treatment and predicting outcomes as well.

Shackett, P. (2022). *Nuclear medicine technology: procedures and quick references*.

Philadelphia, PA: Welters Kluwer. (3).

This is a book that is a overview of a plethora of different exams used in Nuclear medicine and PET. The author overviews of how brain scans work. Looking at both PET and normal brain scans, comparing the disorders. It is used as a reference guide for Nuclear Medicine technologists who need a refresher on certain studies done within the scope of practice.

This book allows a quick and detailed reference to brain scans, and showing how they are performed. It also presents a few therapeutic uses for Nuclear Medicine. This book is designed for technologists to use in the clinical setting. It also explains in detail how a normal brain scan would appear, and what would cause it to appear abnormal.

Takahat, K., Seki, C., Kimura, Y., Kubota, M., Ichise, M., Sano, Y., Yamamoto, Y., Tagai, K., Shimada, H., Kitamura, S., Matusuoka, K., Endo, H., Shinotoh, H., Kawamura, K., Zhang, M., Takado, Y., & Higuchi, M. (2022). First-in-human in vivo imaging and quantification of monoacylglycerol lipase in the brain: a PET study with ^{18}F -T-401. *European Journal of Nuclear Medicine and Molecular Imaging*. (49). 3150-3161

Monocylglycerol lipase (MAGL) is a substance that regulates cannabinoids neurotransmission and the pro-inflammatory arachidonic acid pathway, by degrading endocannabinoids, and is commonly used as an anti-inflammatory agent. This study took seven healthy males that endured a one hundred and twenty minute dynamic ^{18}F -T-401 PET scan with arterial blood sampling. The subjects then were given MAGL. PET brain scans were used to evaluate the affects. The results showed rapid uptake with gradual washout from the brain. The MAGL with brain scans were done multiple times to evaluate the effectiveness.

This article provides a timeline of the length of brain scan studies. This study was done to demonstrate how a pathology could cause neuropsychiatric disorders. The use of MAGL and brain scans are only used to measure and detect what part of the brain is being affected. There is still much more to be done to improve the drug, but this study shows the reliability.