

SPECT IMAGING: FRIEND OR FOE

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Introduction

SPECT Scan in Psychiatry:

SPECT Scan in psychiatry has been used as a research tool for almost 20 years. More recently the use of SPECT Scans in daily clinical practice has been brought to the table. Currently approximately a dozen or so Psychiatrists are employing this powerful tool across the U.S. But is its use too premature for its time or is this technique better kept for research purposes? There are plenty of critics which acknowledge its potential but argue that it is not ready for prime time yet. This review focuses on these core issues. Whether SPECT Scan use in Psychiatry will be embraced by professional societies remains to be seen but through knowledge of this re-emerging neuroimaging technique is important as we may see this more frequently in the next few years.

Neuropsychiatric Uses:

1. Substance Abuse, Toxicity, Chronic Illness

Commonly show decreased overall perfusion: Benzodiazepines, alcohol, carbon monoxide poisoning, environmental toxins, infectious disease.

2. Traumatic Brain Injuries (TBI)

Evaluating individual symptomatology and developing targeted treatment plans.

3. Cognitive Decline

SPECT may assist in the early and late diagnoses of Alzheimer's Dementia as well as with the differential diagnosis of dementias.

4. Depression and Anxiety

Can help in detecting a hyperfrontality pattern which is associated with a common presenting theme.

5. Aggression and Impulsivity

Assist in detecting a hypofrontality pattern which can further influence selection in pharmacotherapy.

6. Memory and Temporal Lobe Abnormalities

Identifying areas of increased or decreased perfusion in the temporal lobes which is associated with behavior and memory.

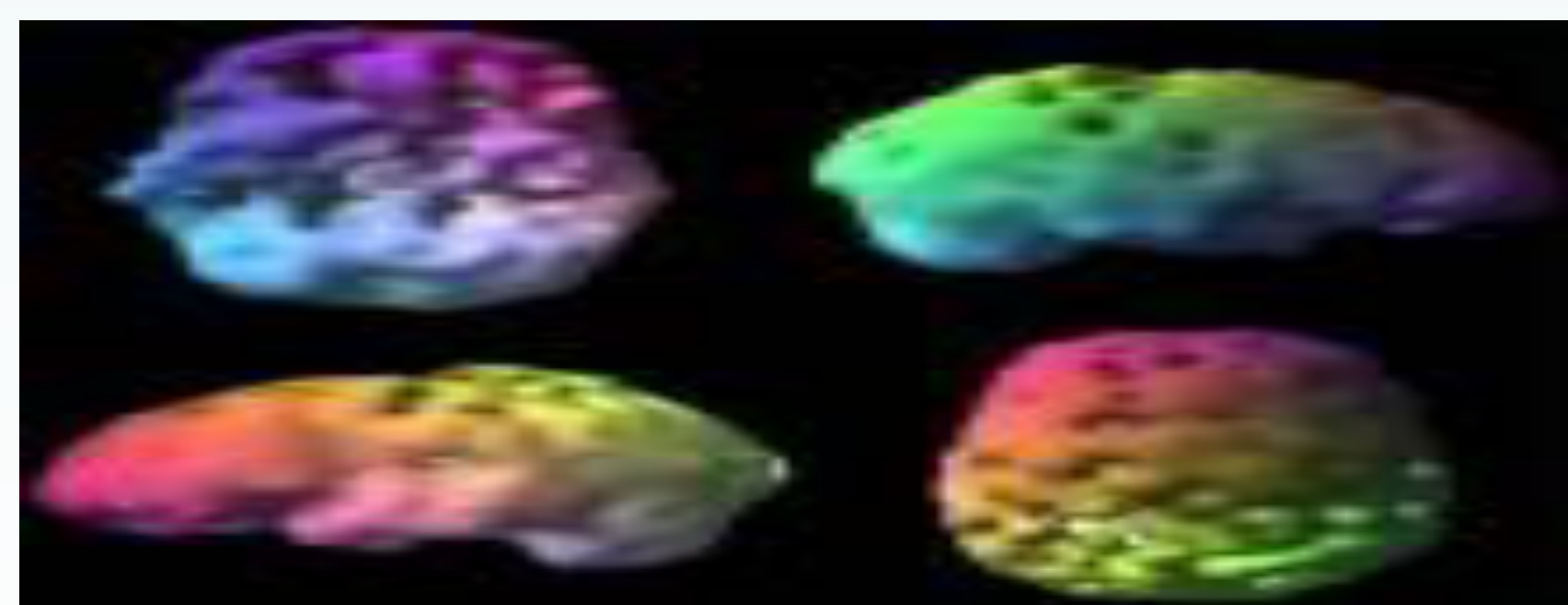


Fig 1: Swiss cheese, shriveled appearance indicating decreased perfusion. Often seen in toxicity, illness or insult to the brain; (substance abuse, environmental poisoning, infectious diseases, carbon monoxide poisoning)

IMAGES

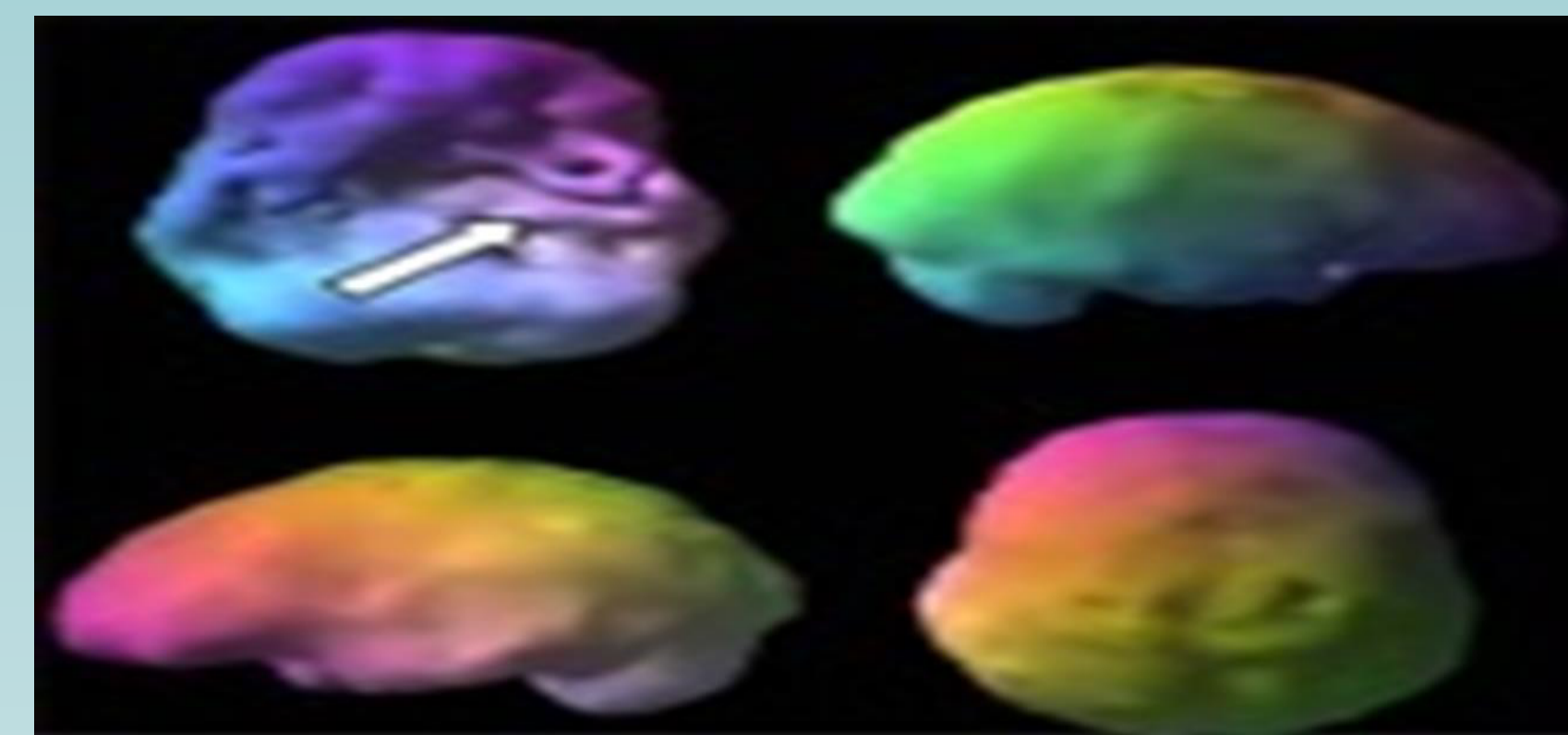


FIG 4: Asymmetric Decreased Left Frontal Lobe Perfusion due to Trauma. Traumatic Brain Injury patients

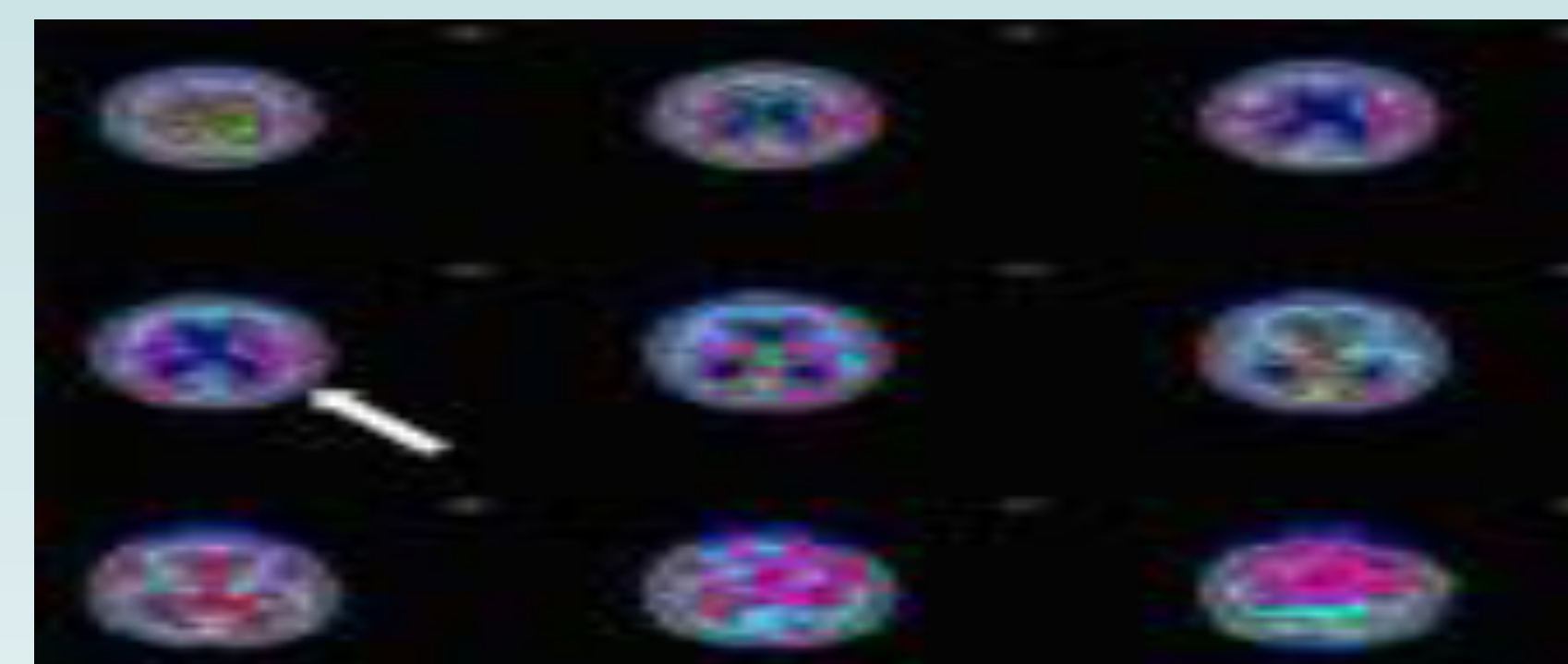


FIG 5: Ventricular Enlargement in lobster pattern associated with Normal Pressure Hydrocephalus.

- Can differentiate from other forms of dementia.
- Alzheimer's Disease – decrease activity in posterior cingulate gyrus, parietal and medial temporal lobes.
- Frontotemporal dementia – deficits in frontal and temporal lobes.
- Lewy Body Dementia – absence of dementia pattern and increased limbic activity.

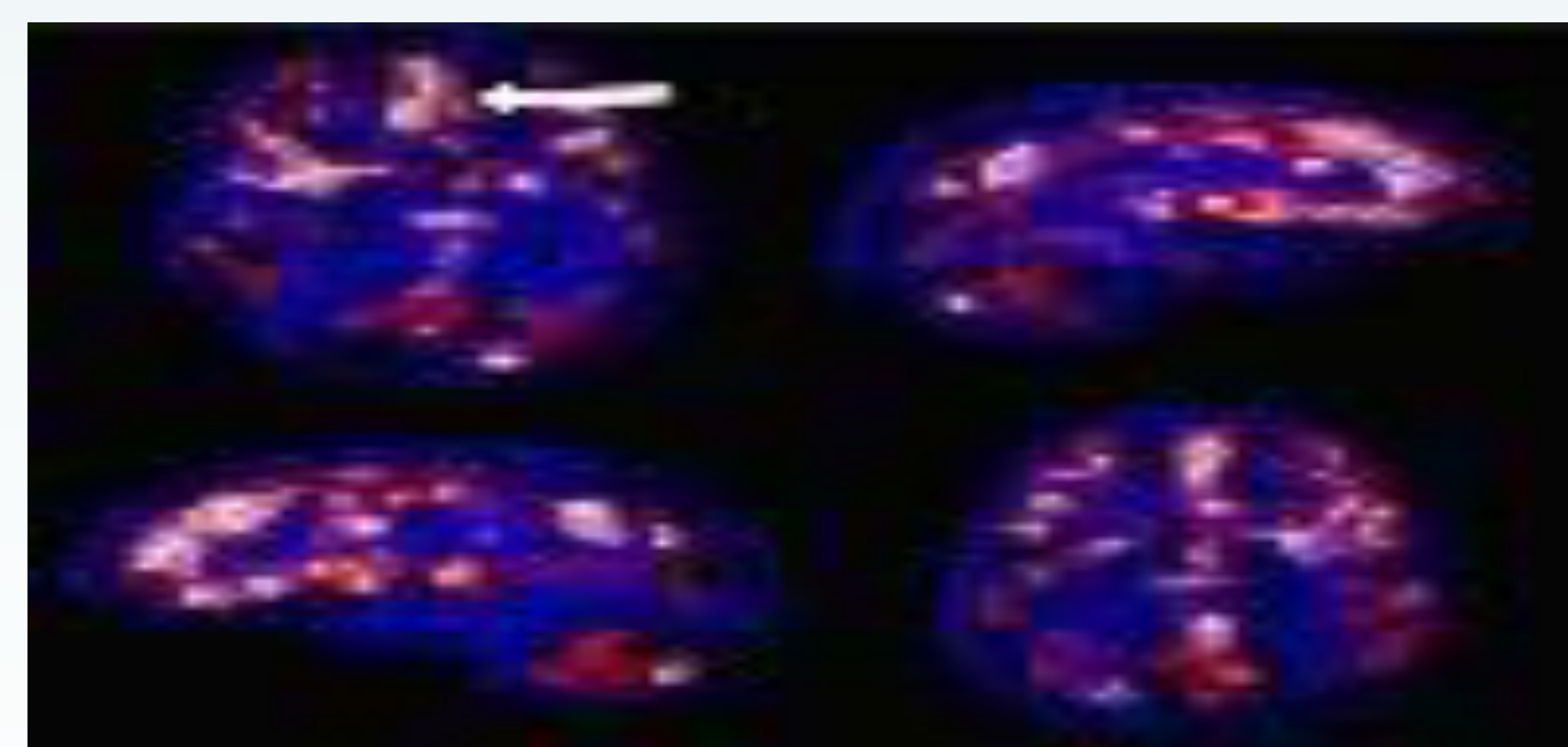


FIG 6: Severe hyperfrontality – associated with cognitive inflexibility, negative behaviors, and thoughts. Seen in OCD, PTSD, anxiety disorders, autism, and mood disorders

PROS AND CONS OF SPECT IMAGING

| | PROS | CONS |
|--------------------|--|---|
| RESOLUTION | Current SPECT Cameras have multi-headed gamma detectors with fan beam collimators which can produce image resolutions of 6mm | |
| COST | Costs 400,000 dollars vs CT/PET between 1.5-3 million dollars | |
| IMAGE QUALITY | | Need additional software to produce 3D images – without it the SPECT slices are somewhat miniscule and tend to be deemed useless. |
| COLLABORATION | Psychiatrists need to work more closely with radiologists to interpret images | Psychiatrists and radiologists lack training in the area of using SPECT for neuropsychiatric purposes. |
| RADIATION EXPOSURE | | Deemed an issue but no different from Head CT or Nuclear Bone Scan. However perfusion arterial MRI and QEEG technique use no radiation but provide limited information and have high level of signal noise. |

DISCUSSION

SPECT provides clinicians with a mechanism to further explore neural circuits specific to Psychotic disorders. It may aid in the diagnosis and clinical management of patients. While SPECT provides us with a better understanding of the behavioral subcircuits its clinical application may still need to be further explored. Future direction for SPECT may need to include more research on mood and behavioral centers in the brain. In addition a better and more complete analysis of psychotropics effect on cerebral blood flow should be conducted. Whether SPECT imaging will continue to prove useful in the research realm or possibly impact the current DSM nosology will remain to be seen but on thing is certain; We will only truly know the more we look at the brain just as every other discipline in medicine continues to do so.