

# *A Neuropsychiatric, Neuroradiological, and Neuropsychological Profile of a Cohort of Patients with Vascular Dementia*

Moises Gaviria, MD

*University of Illinois at Chicago  
Advocate Christ Medical Center*

Sandra Horowitz, MD

*Northwestern Memorial Hospital  
High Tech Medical Center*

Rhonda DePaul, MS4

*University of Illinois at Chicago*

Neil Pliskin, PhD, ABPP-CN

*University of Illinois at Chicago*

# Selection Criteria and the Patient Profile

- A cohort of 40 patients were selected after referral by their PCP to the outpatient psychiatric clinic affiliated with Advocate Christ Medical Center.
- Selected patients met the diagnostic criteria for small vessel disease according to the *Operational Definitions for the NINDS-AIREN Criteria for Vascular Dementia*.<sup>1</sup>
- 48% female, 52% male
- Age range 42-95, mean 75.62

<sup>1</sup>*Stroke*. 2003;34:1907-1912.

# Methods

- All qualified patients underwent:
  - Evaluation by a neuropsychiatrist
  - MR-Imaging -- These results were then evaluated and classified by the severity (according to a modified Fazekas scale<sup>1</sup>) and location of the lesions
  - Neuropsychological testing with special emphasis on executive functions

<sup>1</sup> 1987 AJR 149:351-356; AJNR 8: 421-426.

# Methods

- Chief complaints were separated as primary, secondary and tertiary, and subclassified into four major categories –
  1. Cognitive Decline -- includes memory impairment, confusion
  2. Depression and Apathy
  3. Agitation -- includes irritability, anxiety
  4. Falls -- patients presented with psychiatric complaints, however frequent falling was their main concern
- The neuropsychological and neuroradiological data were correlated with the chief complaints and cardiovascular risk factors evident at the initial patient presentation.

# Fazekas Scale

**GRADE 1:** PVH: pencil-thin lining or “caps” in frontal, occipital, or lateral bands

DWMH: punctate foci

**GRADE 2:** PVH: smooth “halo”

DWMH: beginning confluence of foci

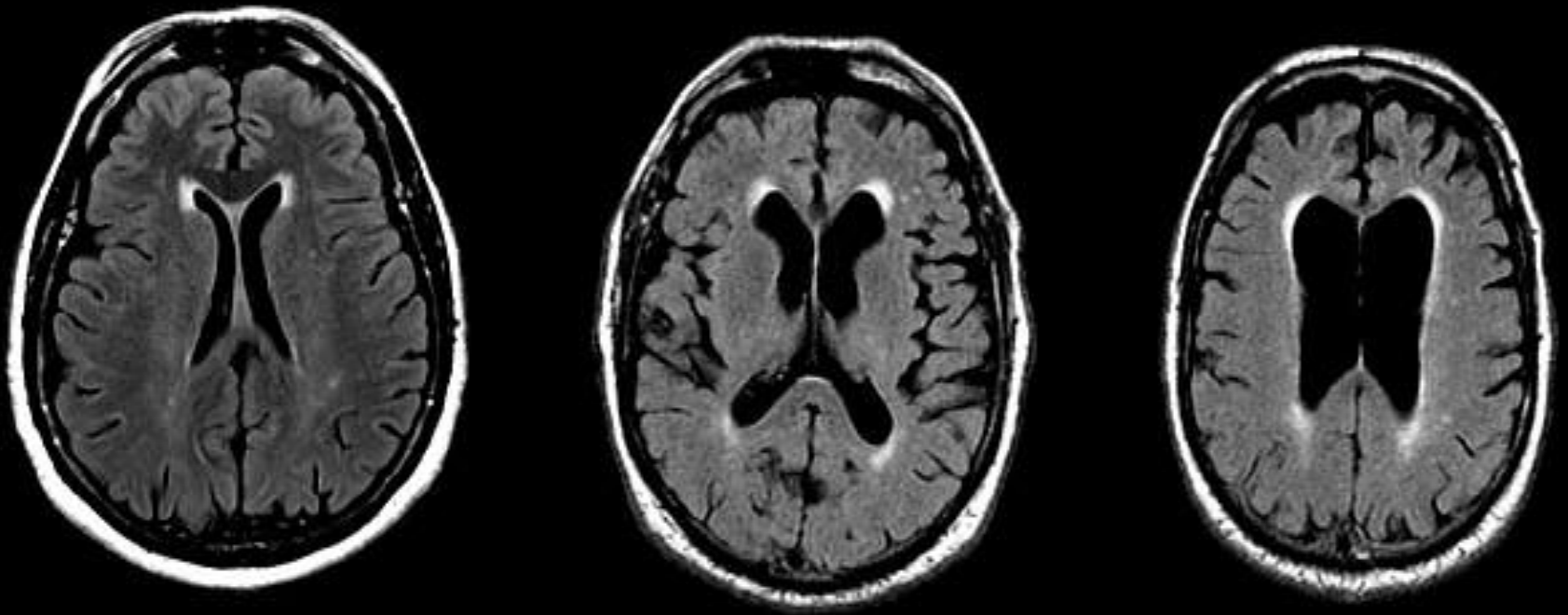
**GRADE 3:** PVH: irregular PVH extending into the deep white matter

DWMH: Large confluent areas

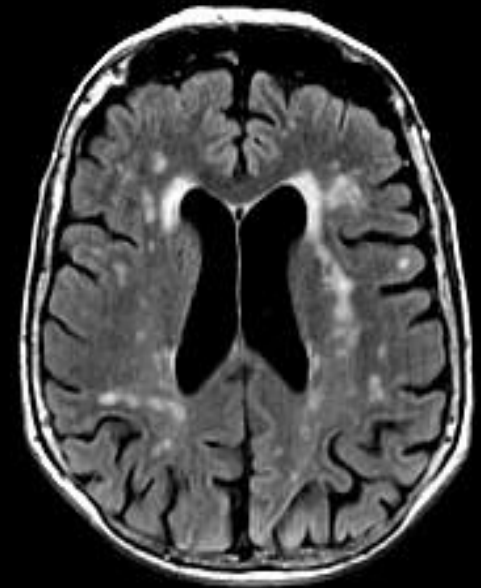
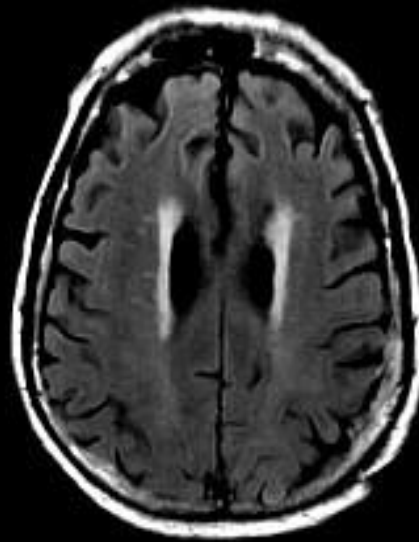
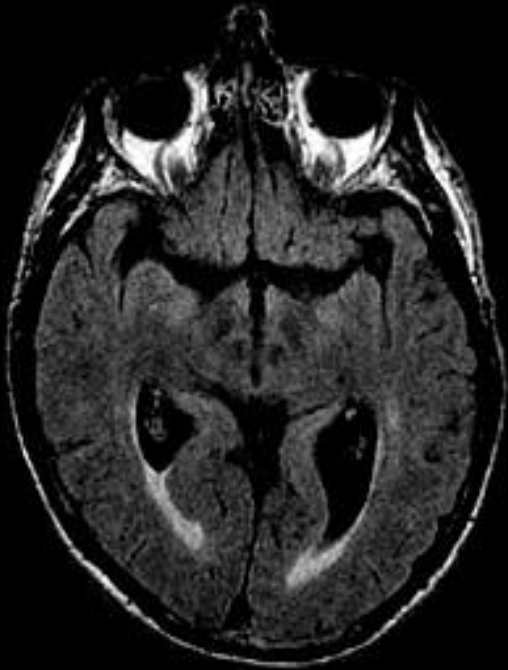
PVH = Periventricular Hyperintensities

DWMH = Deep white matter hyperintensities

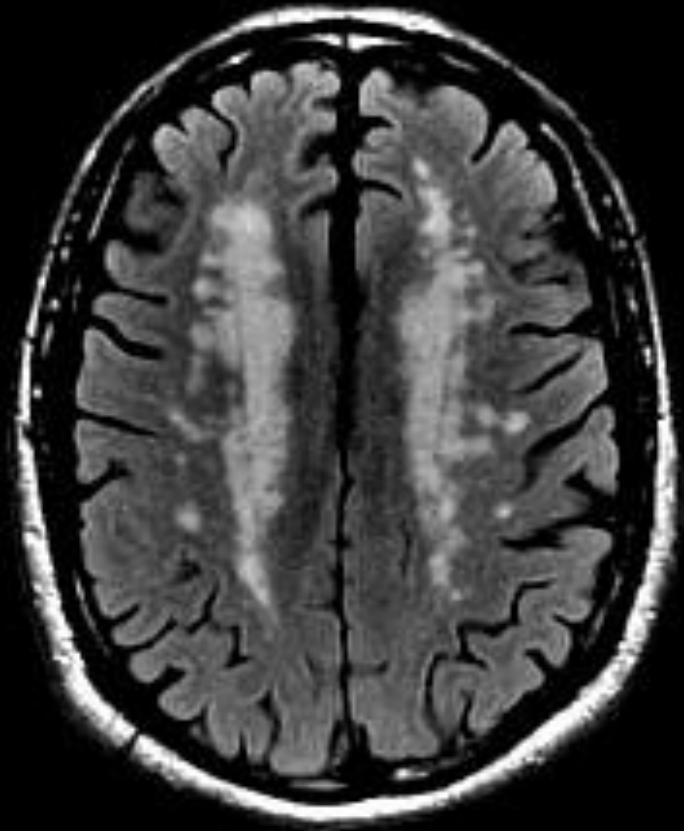
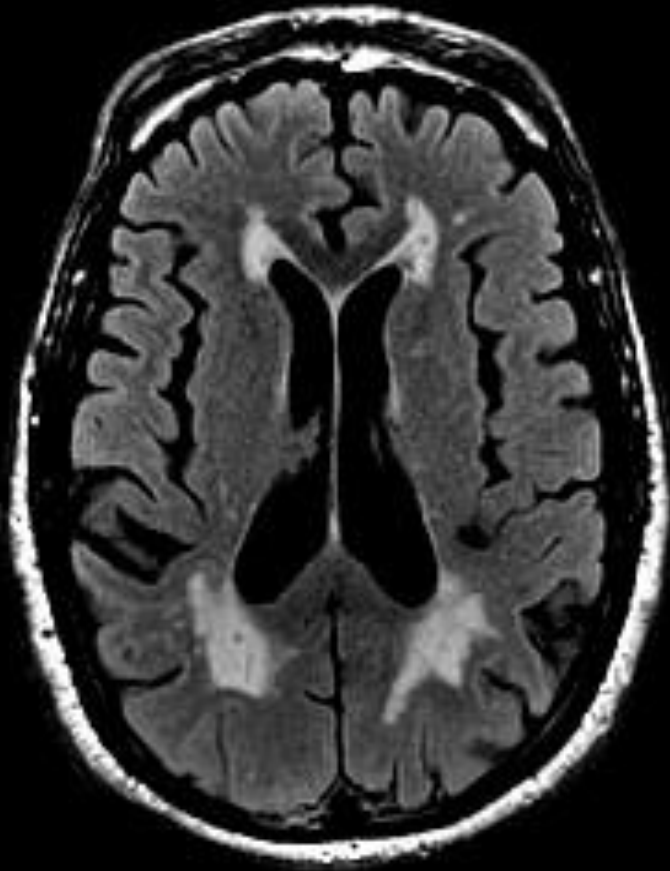
# Fazekas Scale: *GRADE 1* (Mild)



# Fazekas Scale: *GRADE 2* (Moderate)



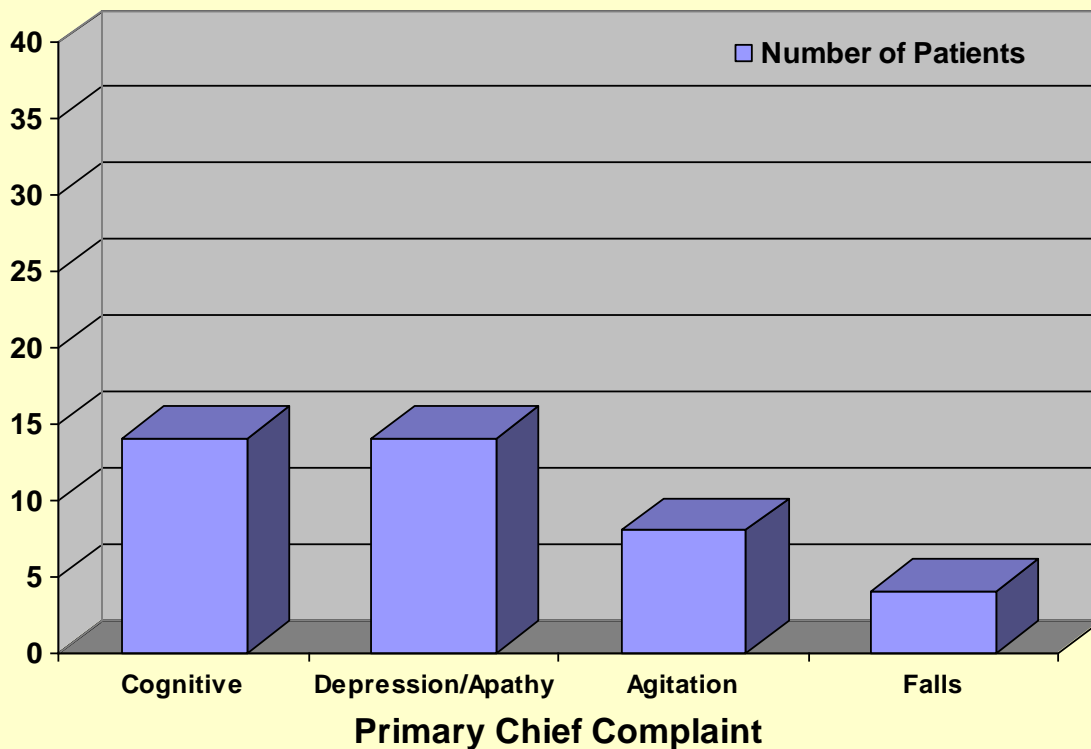
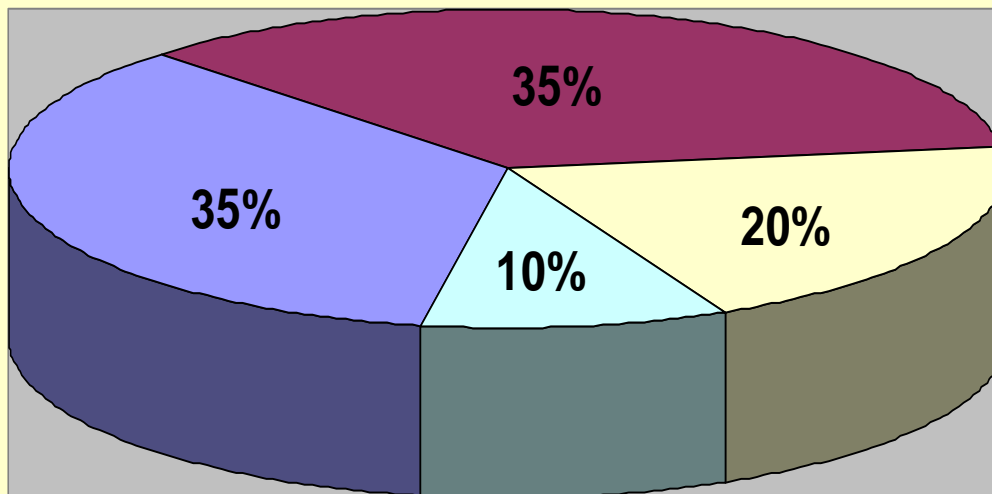
# Fazekas Scale: *GRADE 3* (Severe)



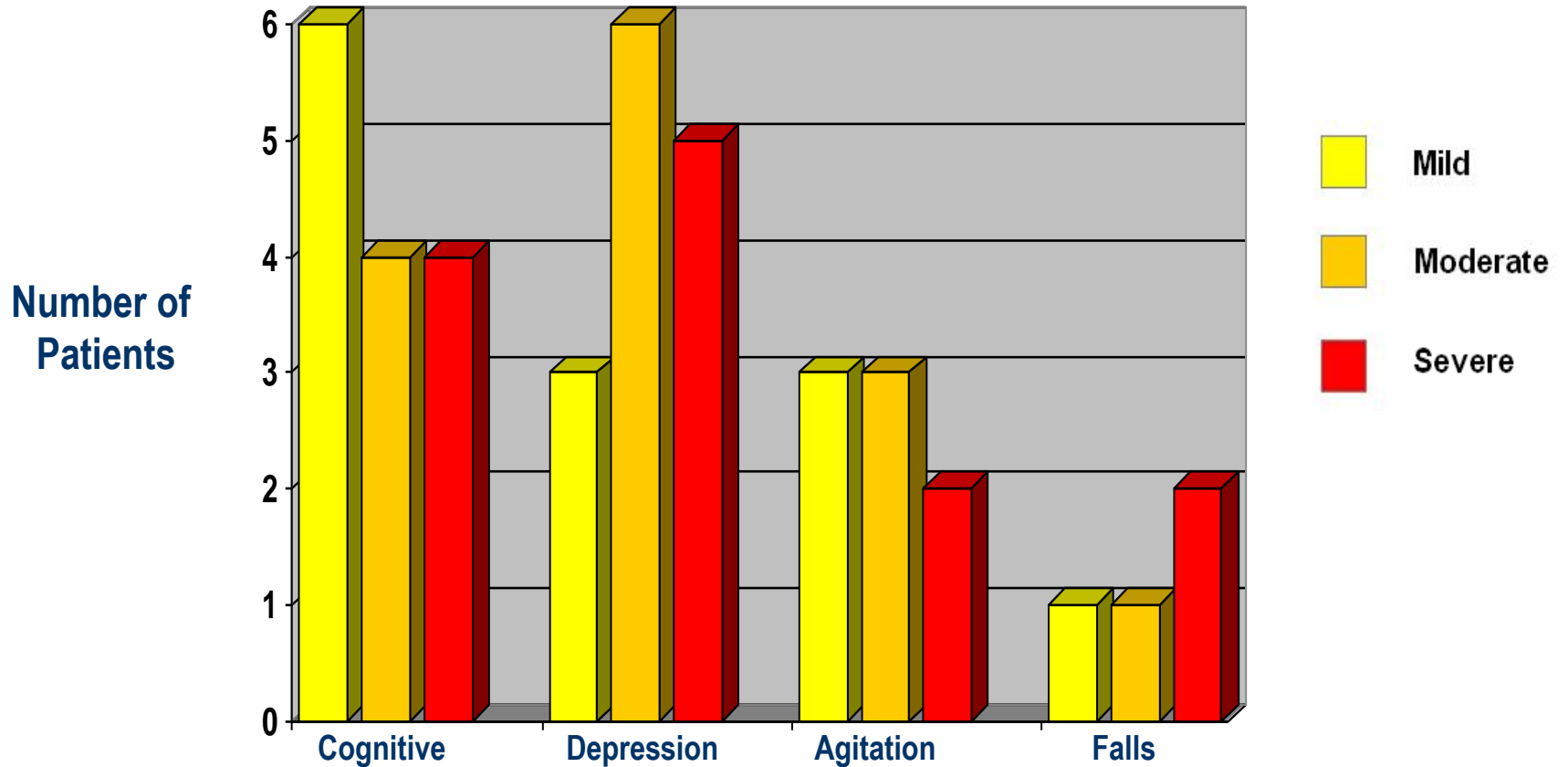


# Chief Complaint at Presentation

- Cognitive
- Depression/Apathy
- Agitation
- Falls



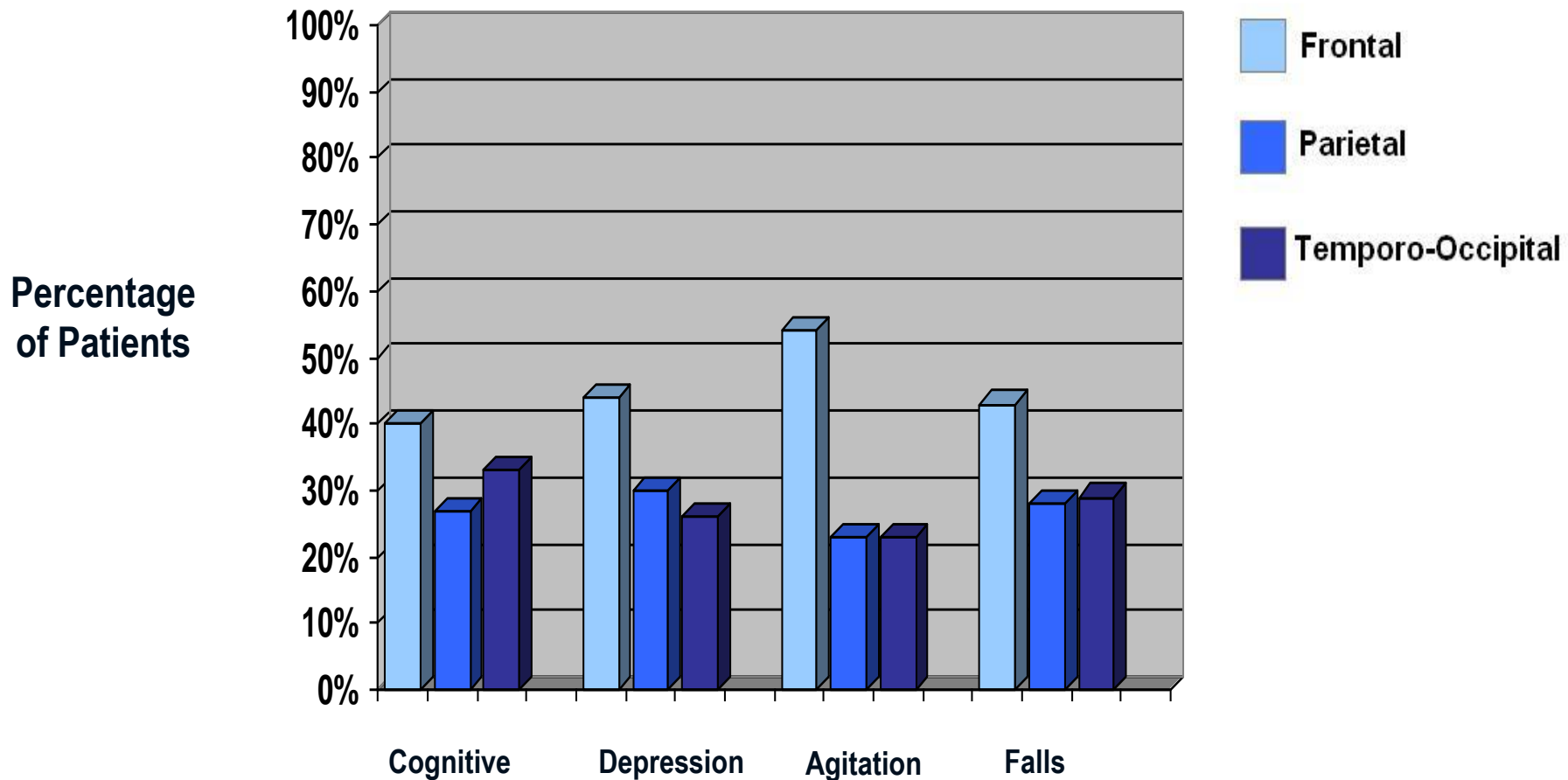
## Chief Complaints Correlated with Severity of T2 Hyperintensities<sup>1</sup> Evident on MRI



Primary Chief Complaints and Severity of T2 Hyperintensities

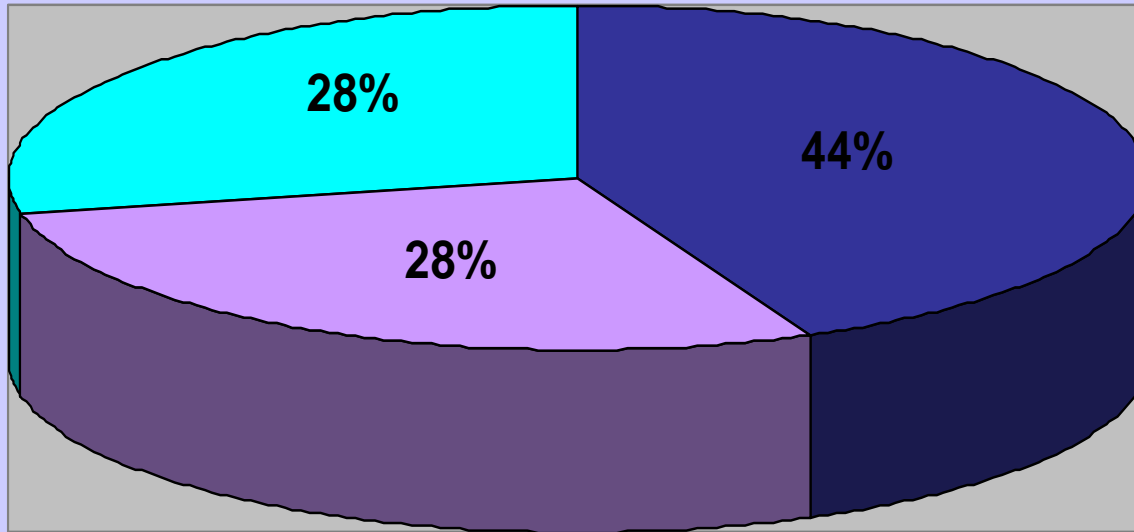
<sup>1</sup> Severity classified according to the Fazekas Scale

# Chief Complaints Correlated with Location of T2 Hyperintensities on MRI



Chief Complaints and Location of T2 Hyperintensities

# Distribution of T2 Hyperintensities



- Frontal
- Parietal
- Temporo-Occipital

# Cardiovascular Risk Factors

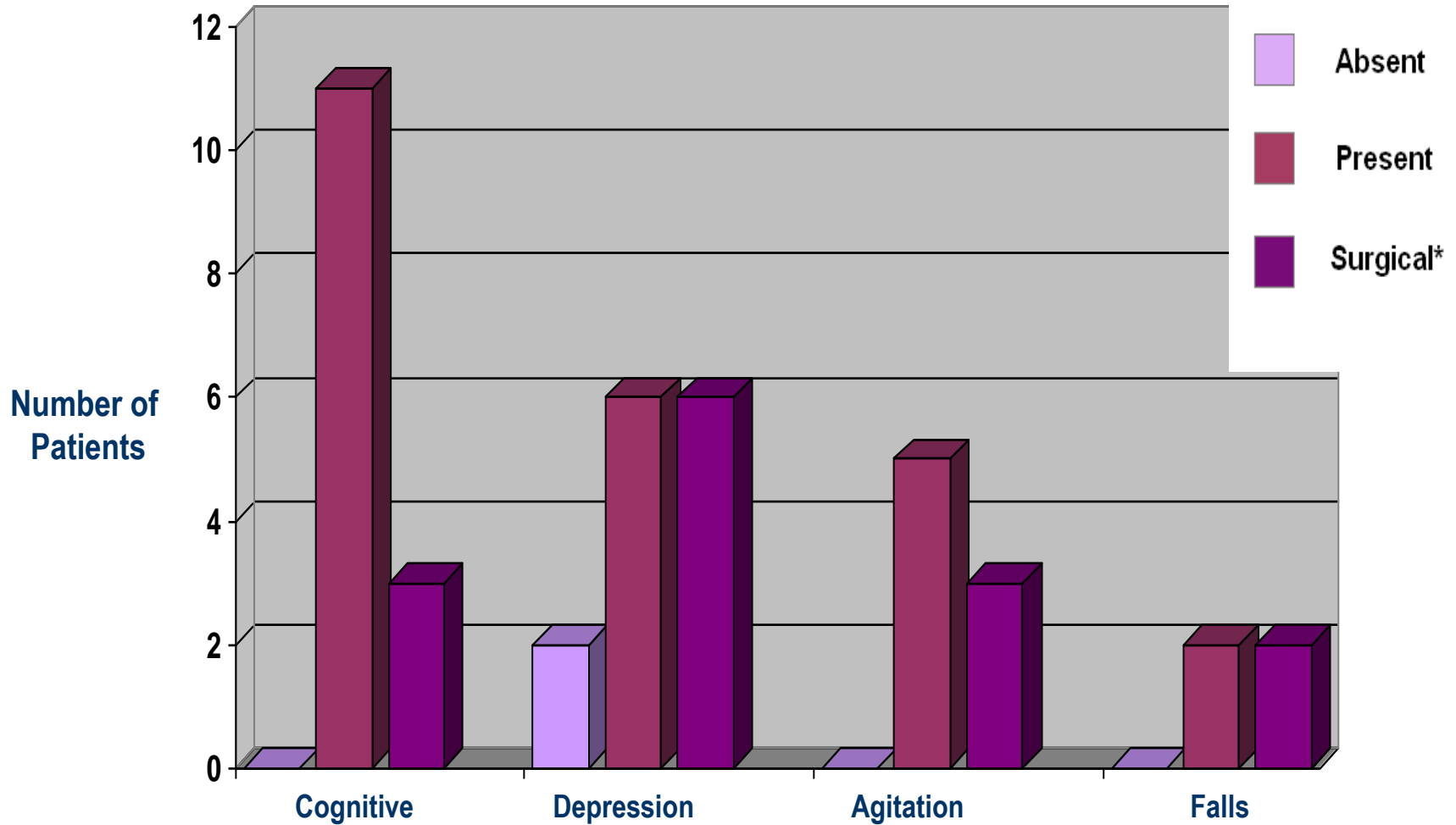
Of our cohort of patients, 5% had no clinically recognized cardiovascular risk factors, 60% had diagnosed risk factors, most commonly hypertension and hyperlipidemia, and 35% had severe enough cardiovascular pathology that surgical intervention was required.

Moderate risk factors in this patient group included HTN; HL; CAD; DM; afib; history of MI or PE; valvular disease and history or presence of an aneurysm.

Surgical intervention in this patient population included CABG, stent placement, CEA and angioplasty.

Overall, this particular group of patients suffered from multiple significant comorbidities.

# Chief Complaints Correlated with Severity of Cardiovascular Risk Factors



## Chief Complaints and Severity of Cardiovascular Risk Factors

\* Indicates surgical intervention for CV pathology, including: CABG, stent placement, CEA and angioplasty

# Executive Dysfunction

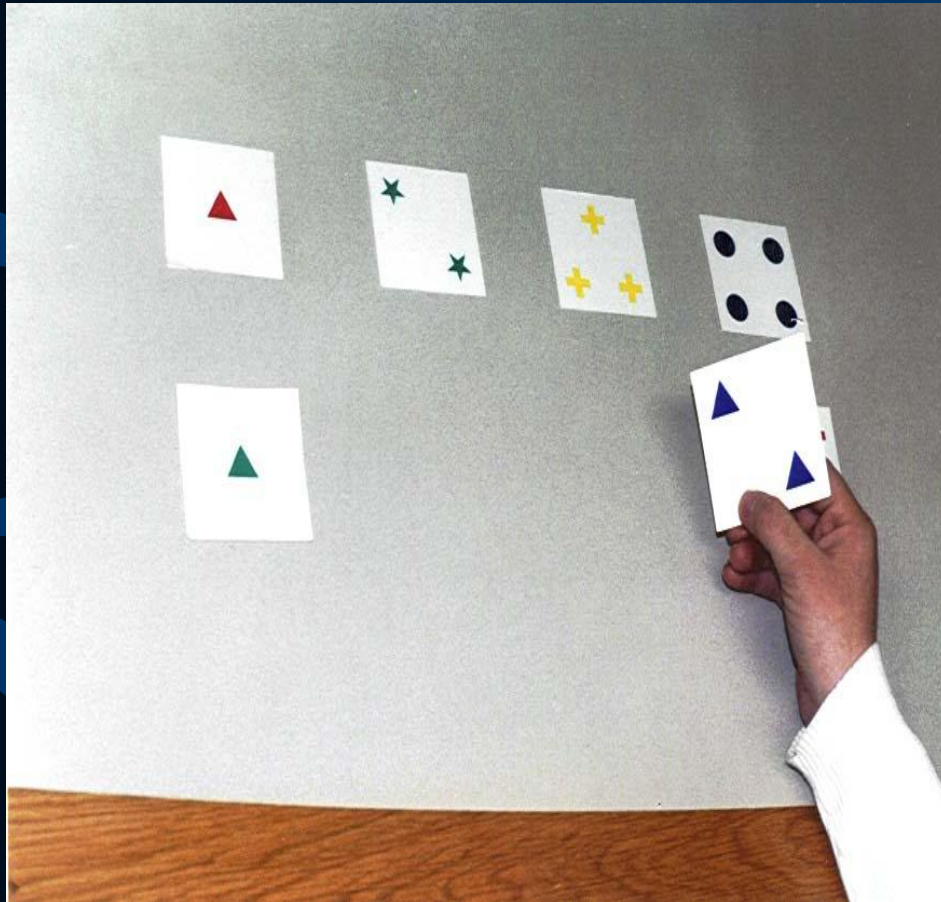
Executive dysfunction can be defined as impairment in the activities of daily living, such as decision making, organization, abstract reasoning, error correction or trouble shooting, event planning or completion of a sequence of events.

This is a dysfunction involving higher order cognitive functions resulting from loss of the integrity of frontal and subcortical systems.

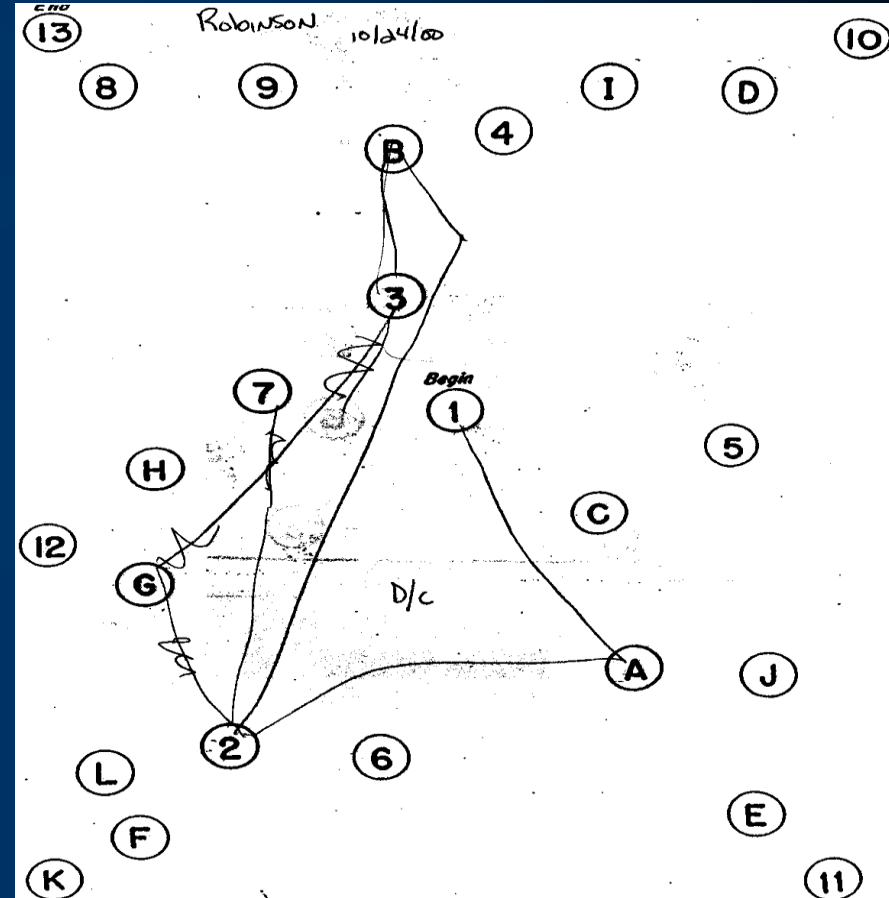
Of our cohort of patients with Small Vessel Disease, 53% were found to have executive dysfunction following evaluation by a neuropsychiatrist and neuropsychological testing.

Of those with executive dysfunction, 48% were male and 52% female.  
Age range 46-92, mean age 77.

Tests used in the neuropsychological evaluation to aid in the diagnosis of executive dysfunction in our patients included the Wisconsin Card Sorting Test, Trail Making Test, Verbal Fluency Test and Category Test.



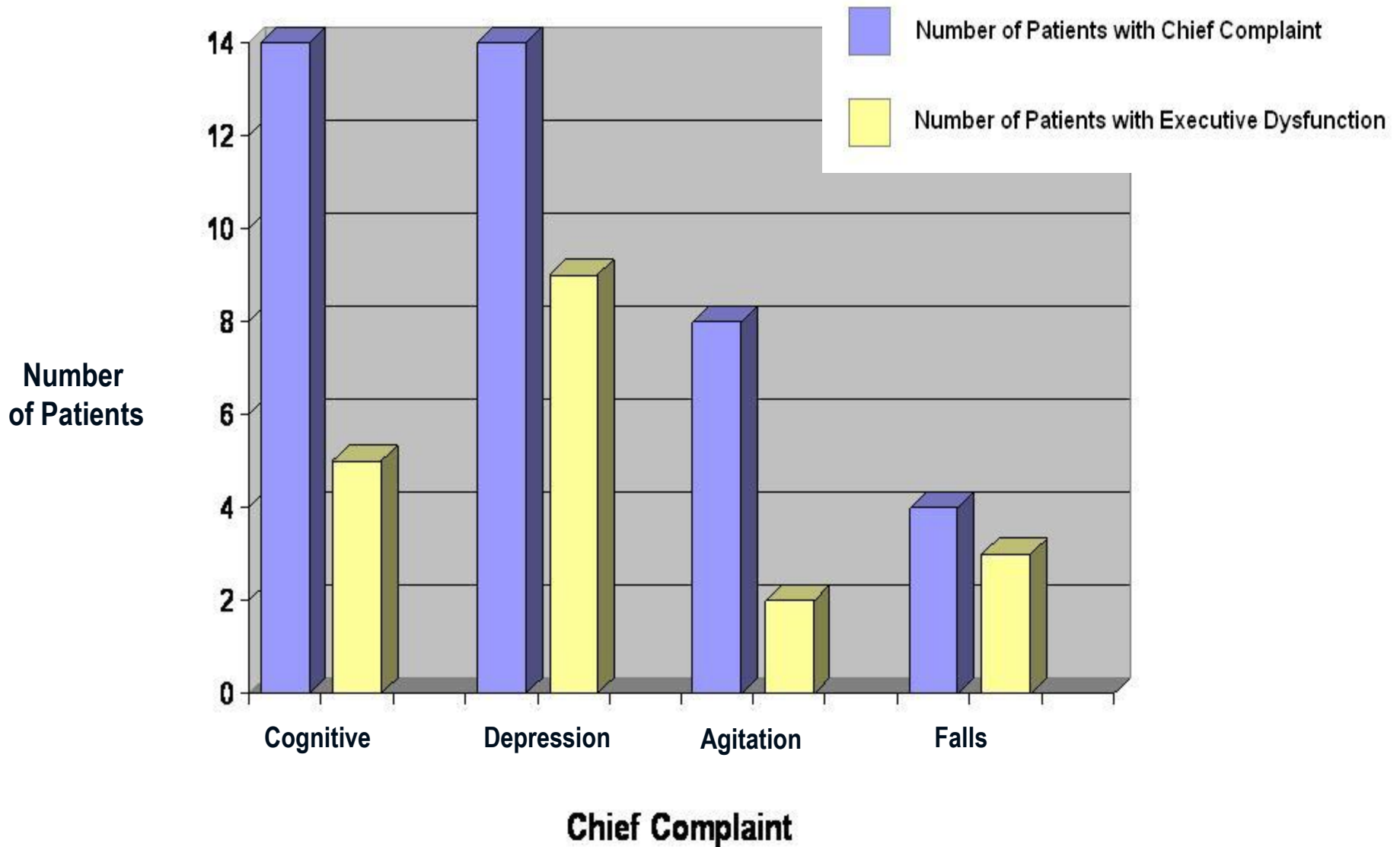
Wisconsin Card Sorting Test



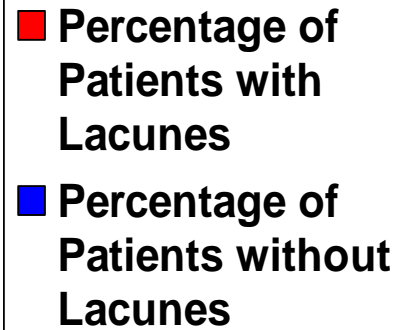
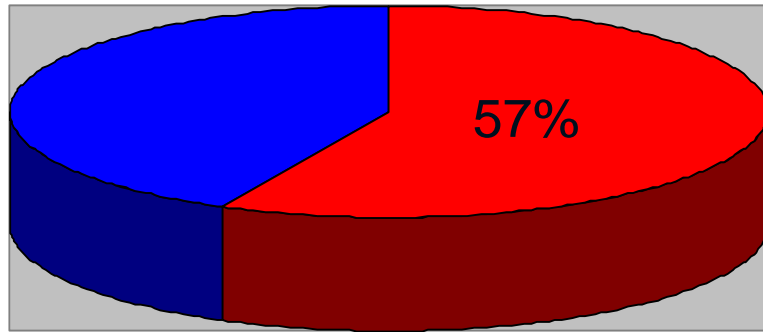
Trail Making Test



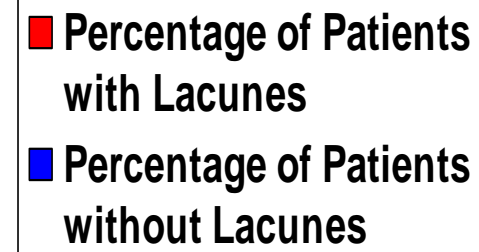
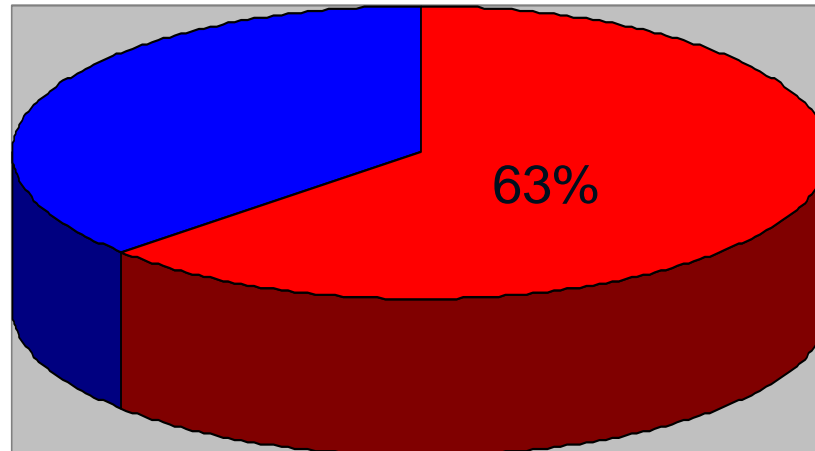
# Chief Complaint and Presence of Executive Dysfunction



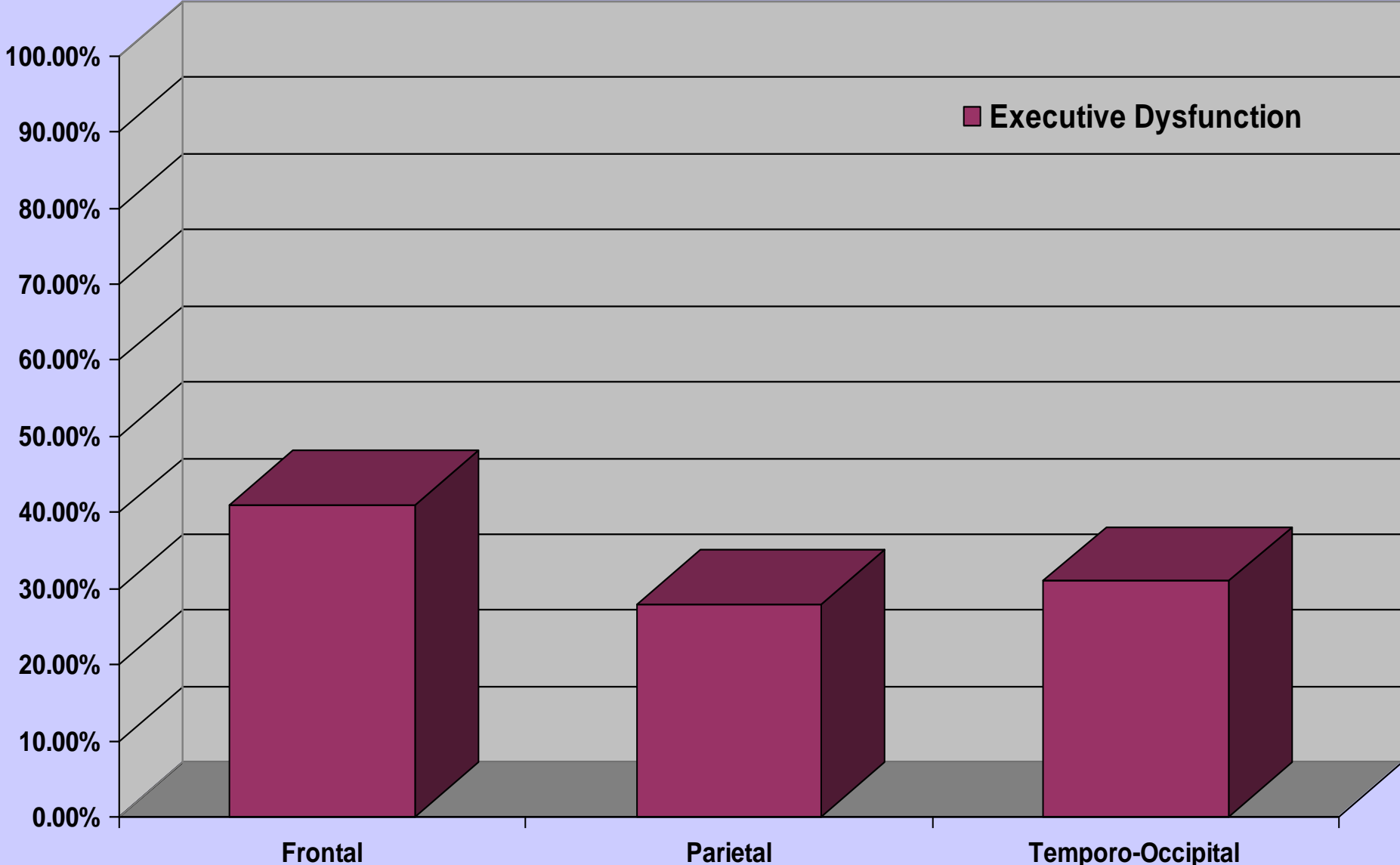
## Presence of Lacunes in Patients without Executive Dysfunction



## Presence of Lacunes in Patients with Executive Dysfunction



# Location of T2 Hyperintensities in Patients with Executive Dysfunction



# Conclusions

- Patients with small vessel disease who are referred to a psychiatric clinic may have a different profile than patients presenting to most other specialties.
- Because this group of patients presented with multiple cardiovascular risk factors, it is a convenient sample rather than a random sample.
- There seems to exist a correlation between the presence of depression/apathy and frequent falls as chief complaints with executive dysfunction.
- Hyperintensities located in the frontal lobe were the most frequent finding in this cohort of patients and their respective chief complaints.

# Conclusions

- There is a correlation between executive function and lesion location as well as CV risk and lesion location.
- There appears to be a pattern in which patients who presented with falls as their primary chief complaint more commonly exhibited greater severity in burden of hyperintensities.
- Lesion burden, and its relation to executive dysfunction, may prove to be a useful concept in the investigation of vascular dementia in the future.
- Psychiatrists, cardiologists and internists should receive training, and be able to actively participate in, the recognition, diagnosis, treatment and prevention of small vessel disease.

Questions?

# References

*Operational Definitions for the NINDS-AIREN Criteria for Vascular Dementia. Stroke. 2003;34:1907-1912*

Fazekas, et al. *1987 AJR 149:351-356; AJNR 8: 421-426.*

Sachdev, et al. *WMH are related to physical disability and poor motor function. J Neurol Neurosurg Psychiatry 2005; 76:362-367.*

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Wen, W and Sachdev, P. *The topography of WMH on brain MRI in healthy 60- to 64-year-old individuals. NeuroImage 22 (2004) 144-154.*