Cured Epilepsy is More than Absence of Seizures: Quality of Life After Epilepsy Surgery

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Outcome Measures in Epilepsy

Medical measures

- Morbidity

Psychosocial measures

- Quality of life
- Marital status
- Employment
- Psychological state
- Educational attainment

Psychosocial outcome largely determines whether patients perceive that treatment is successful

Quality of Life

- Standardized measures can be used in a variety of disease states and treatments to assess QOL
  - Generally measures 3 domains: physical function and health, social function, and psychological state
  - There are various subscales within these domains
- QOL is measured by self-report surveys
  - Disease specific and non-disease specific surveys
  - Value in disease specific surveys; e.g., loss of control has different meaning in epilepsy than diabetes
  - QOLIE-31, QOLIE-89, SF-36 are specific for epilepsy
- Used to compare outcomes, economic measures, disability and survival value between different disease states and treatments
  - Quality adjusted life-years, cost-utility analyses

QOL: Mood and Seizure Frequency

- Study of mood/NP variables on QOLIE[1]
  - Study of QOLIE-89 and BDI, MMPI-2, EFA Concerns Index, WAIS-III, verbal selective reminding test in 135 patients at Univ of Florida
  - BDI accounted for 45% of variance, while 2 MMPI scales accounted for 12%
  - Conclusion: Depression is major determinant of QOL scores
- Study of seizure frequency and QOL[2]
  - 139 subjects completed SF-36, reported seizure frequency and co-morbid conditions
  - Seizure-free subjects reported similar QOL to general population
  - Patient with 1-5 seizures in preceding 4 weeks were worse, and patients with 6 or more seizures were even worse; co-morbid status was irrelevant

1. Loring et al Epilepsy and Behav 2004 2. Leidy et al. Neurology 2009

Comparison of Seizure Frequency or Depression vs QOL

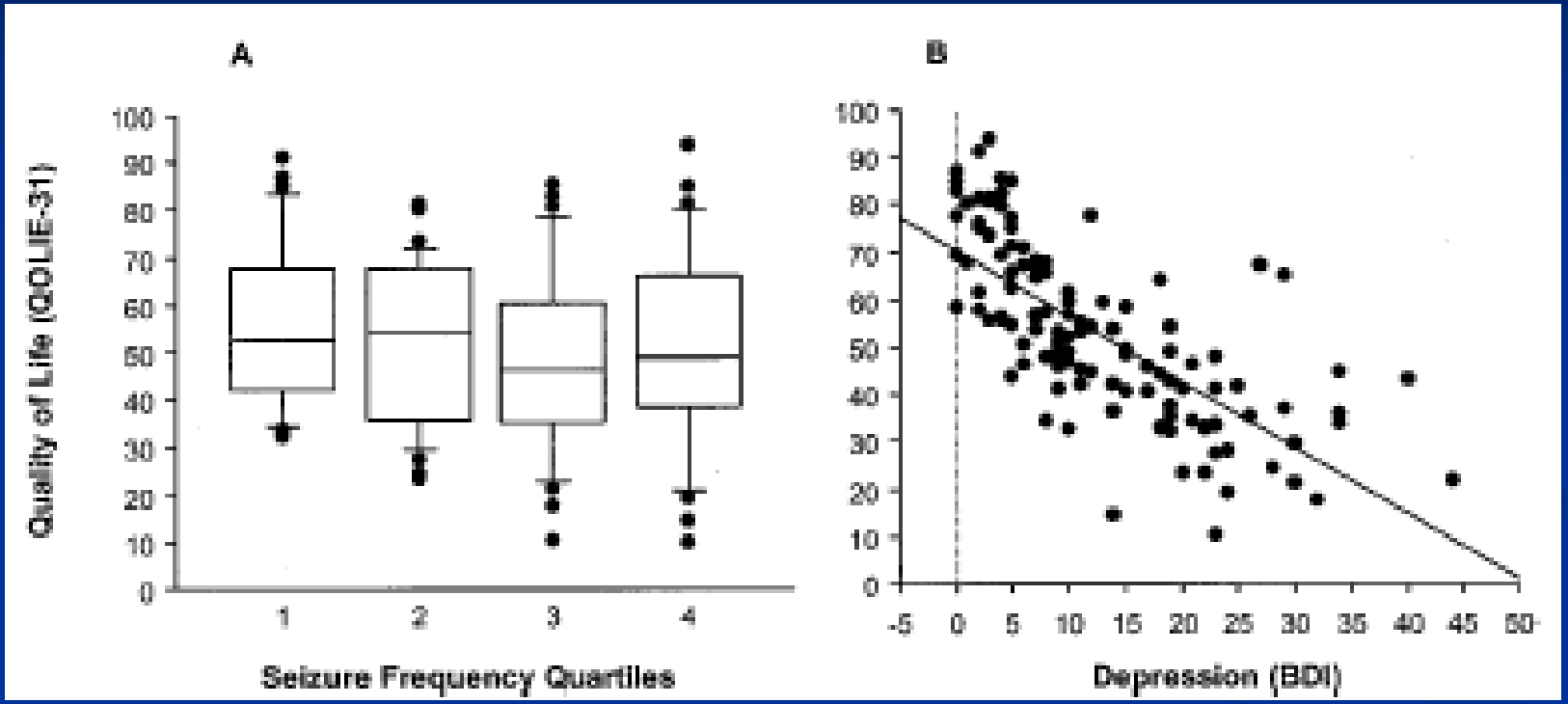


Figure A) Seizure Frequency vs QOL
1 – 1 - 17 seizures per year
2 – 18 – 35 seizures per year
3 – 36 – 143 seizures per year
4 - > 143 seizures per year

Figure B) Depression score (BDI) vs QOL
BDI score less than 10 is considered normal

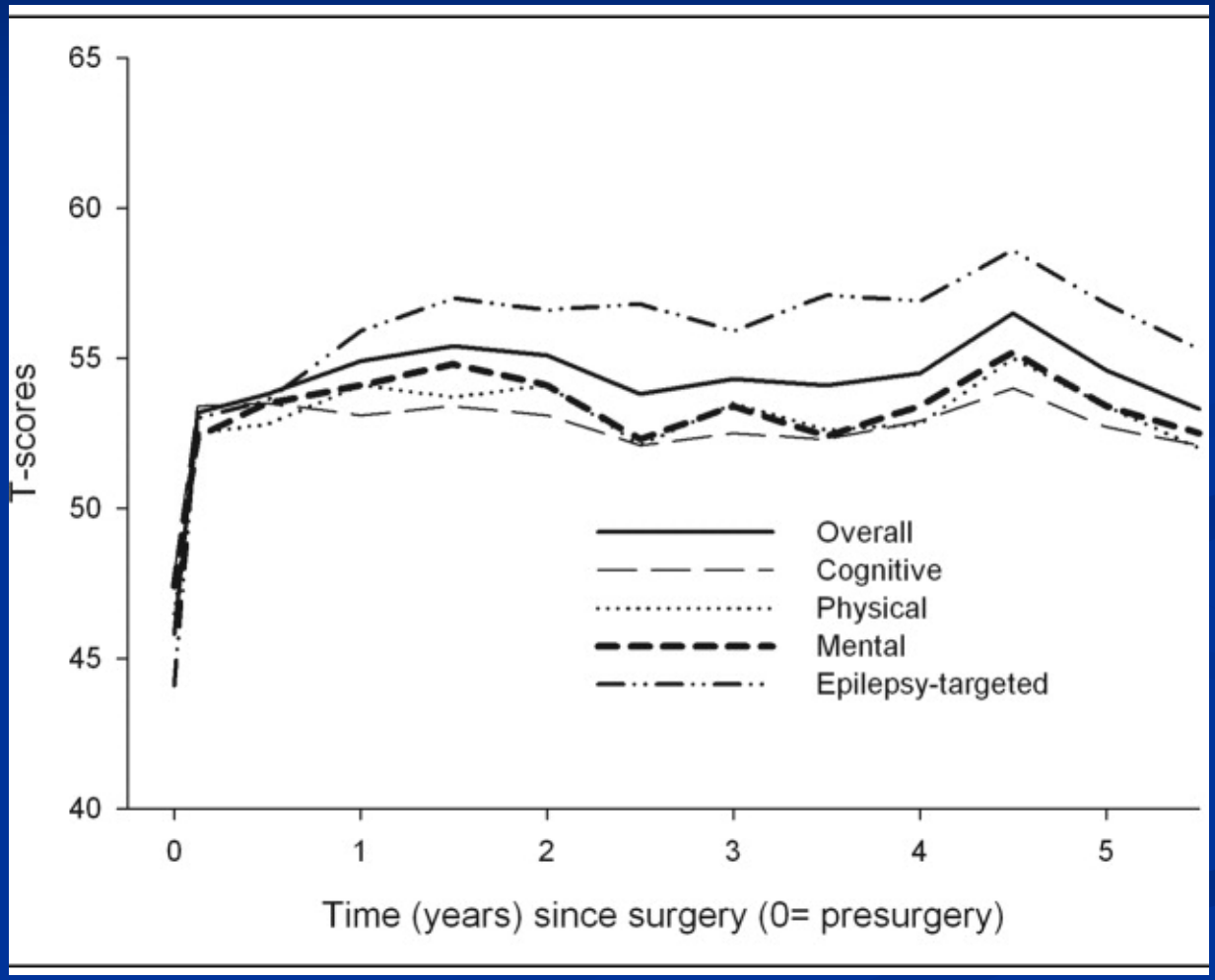
Boylan, L et al. Neurology. 2004: 62:258-261

Quality of Life in Epilepsy: Multivariable Analysis

- A multivariate study at TJU assessed impact of mood/anxiety, seizure-related, and social/demographic variables on QOLIE-31 in 435 outpatients with epilepsy
- Mood (BDI-II) was the dominant factor determining QOL
  - BAI, seizure control, driving played subsidiary roles in some of the subscales
  - Seizure control contributed modestly to statistical model when mood was considered
- Therefore, the QOLIE instrument is overly influenced by mood, and may not measure “quality of life”
  - Similar to QOL scales in cancer, HIV, asthma, diabetes and stroke
- Is seizure control important? Yes, but statistics obscure

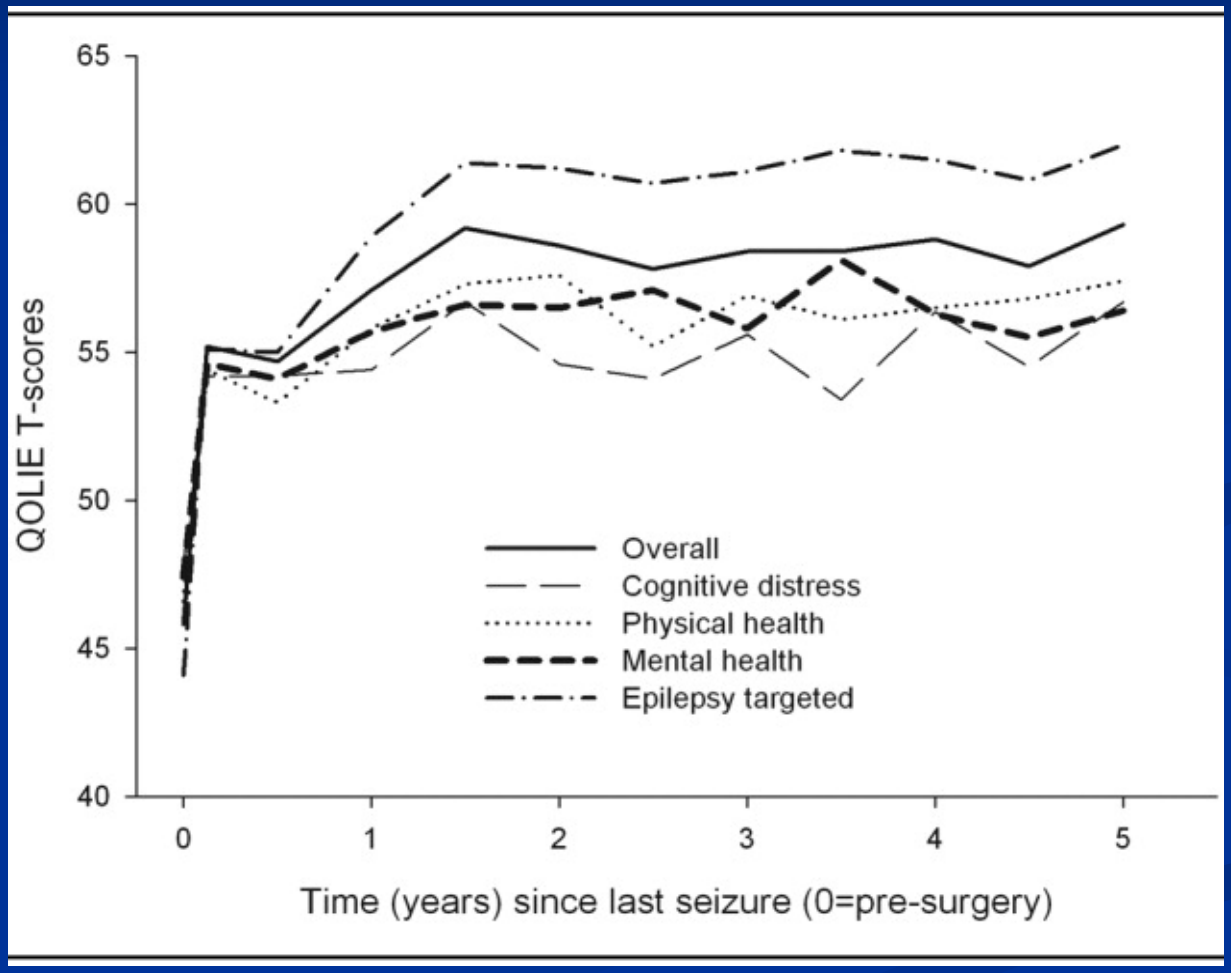
Tracy et al. Neurology 2007

QOL After Surgery: Changes over Time



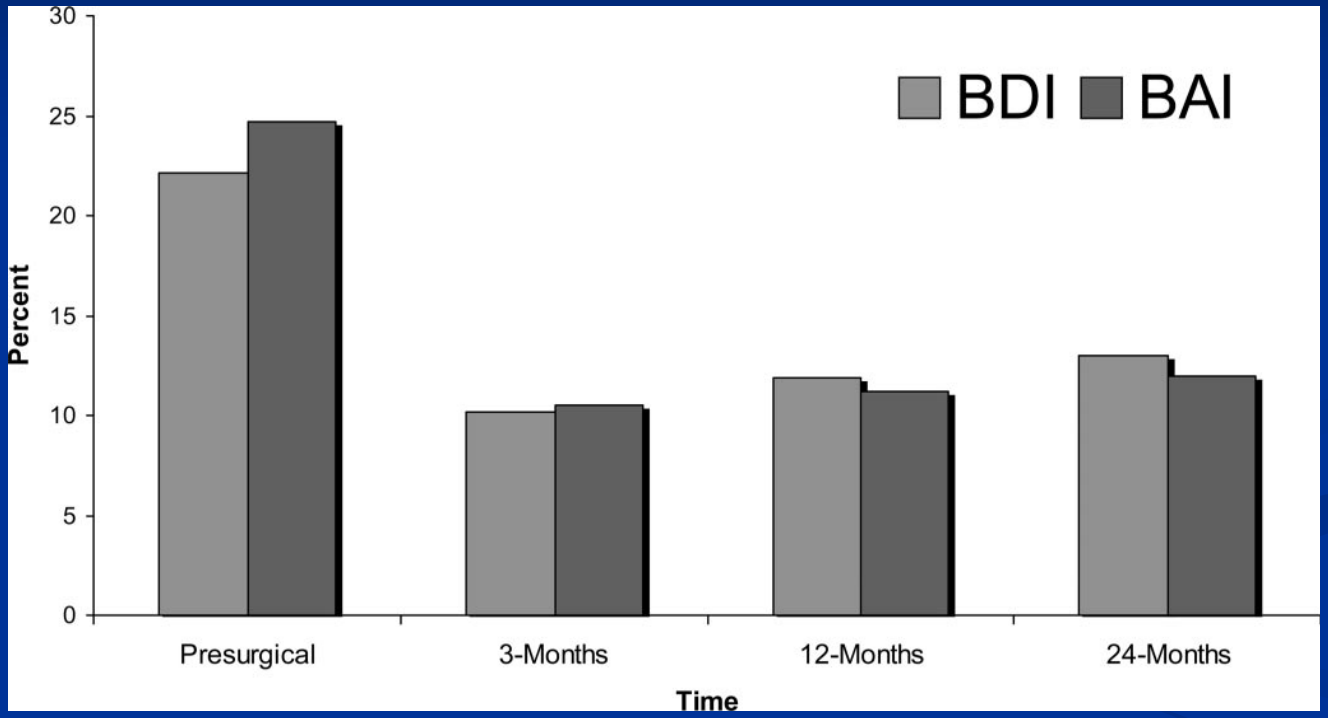
Spencer et al. Ann Neurol 2007

QOL After Surgery: Time Since Last Seizure



Spencer et al. Ann Neurol 2007

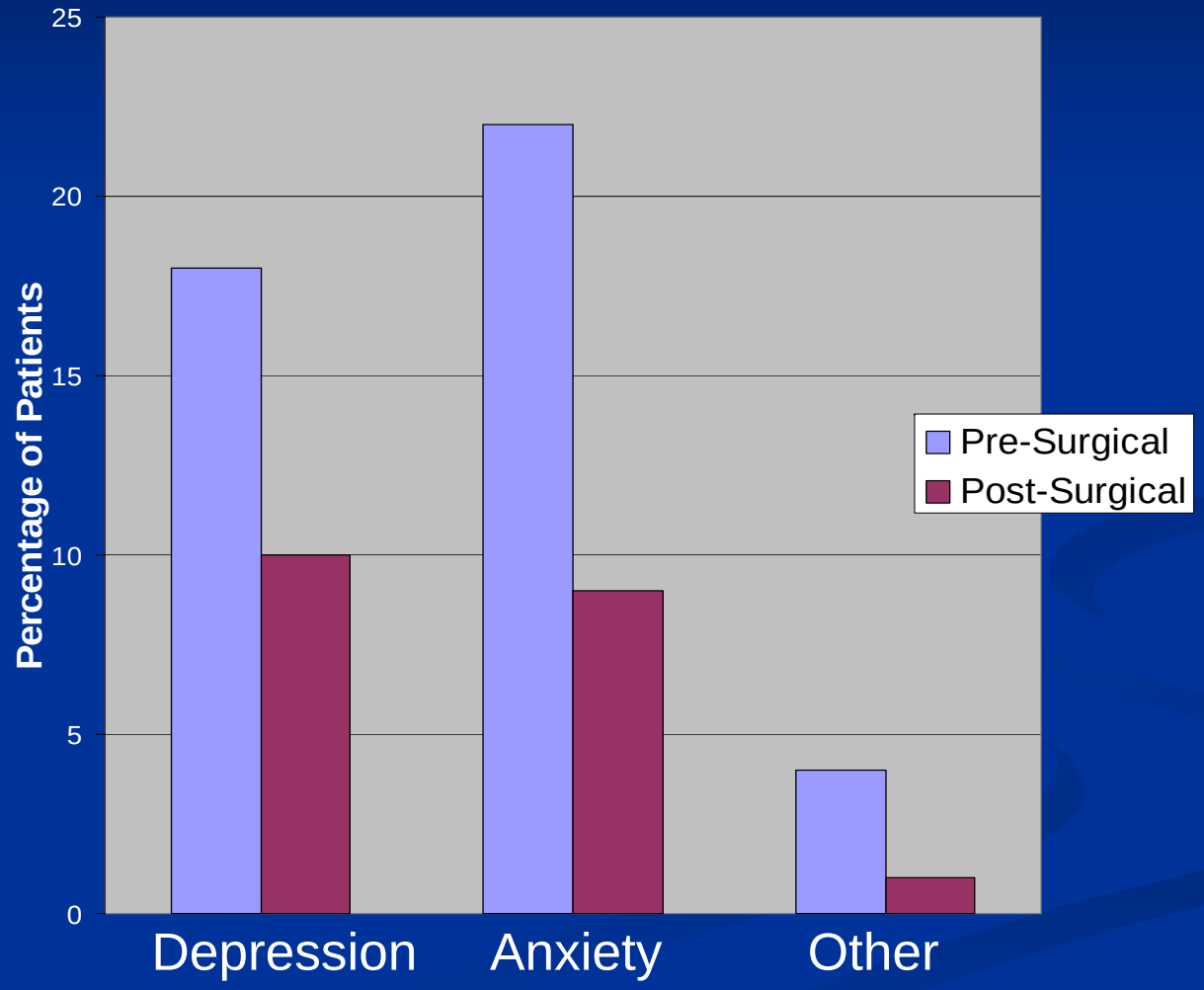
Changes in Depression and Anxiety after Resective Surgery for Epilepsy



Percentage of patients having either moderate or severe anxiety or depression symptoms, based on the Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI).

Devinsky et al. J Neur. 2005: 65:1744-1749

Depression and Anxiety by CIDI 2 Years after Resection for Epilepsy



Devinsky et al. Neurology 2005

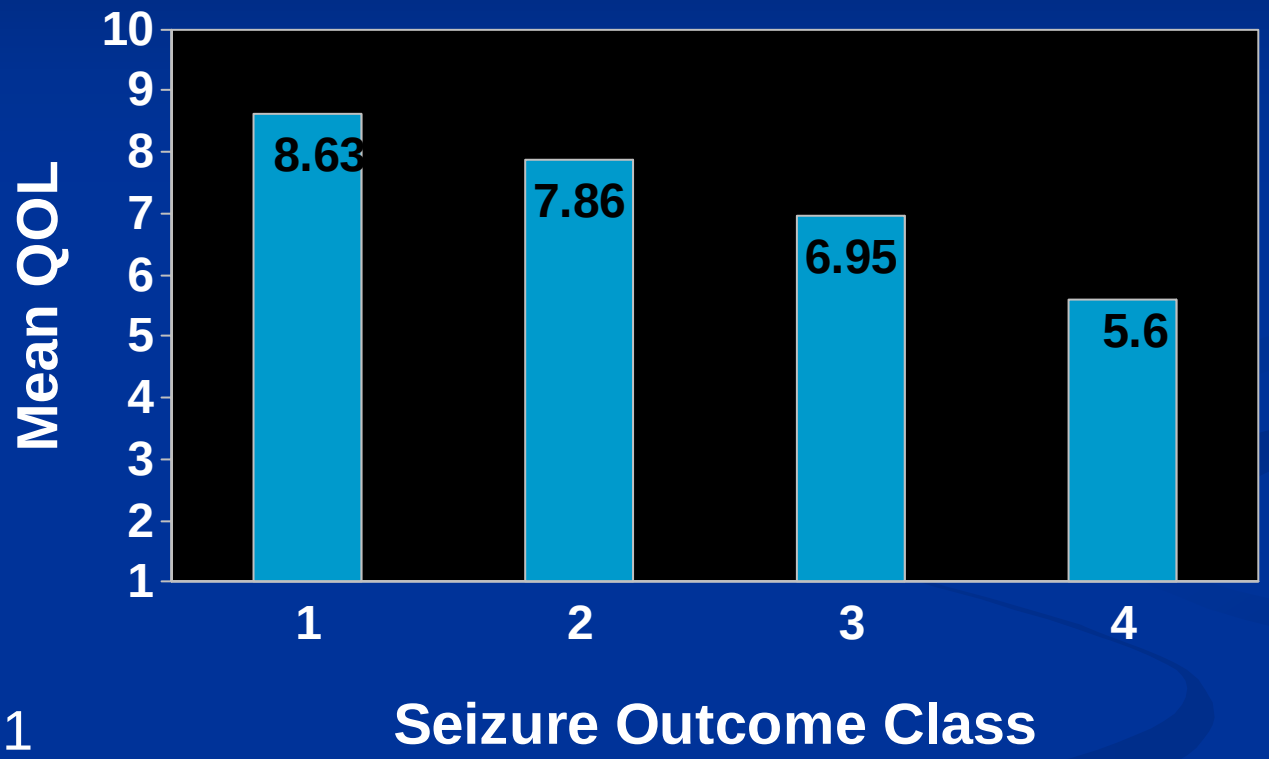
CIDI = Composite international Diagnostic Interview

Depression and Anxiety 2 Years after Resection for Epilepsy

- Association found between postoperative seizure relief and BDI and BAI scores
  - Depression in 17.6% of patients with seizures, and 8.2% of seizure-free patients ($p = .021$)
  - Anxiety in 14.7% of patients with seizures, and 8.2% of seizure-free patients ($p = .09$)
- No relationship between side of surgery or location (temporal vs extratemporal) and BDI or BAI score before or after surgery
- With CIDI, females more likely to experience depression ($p < .05$) and anxiety than males ($p < .01$)

Devinsky et al. Neurology 2005

Seizure Outcome and QOL Global Rating Scale



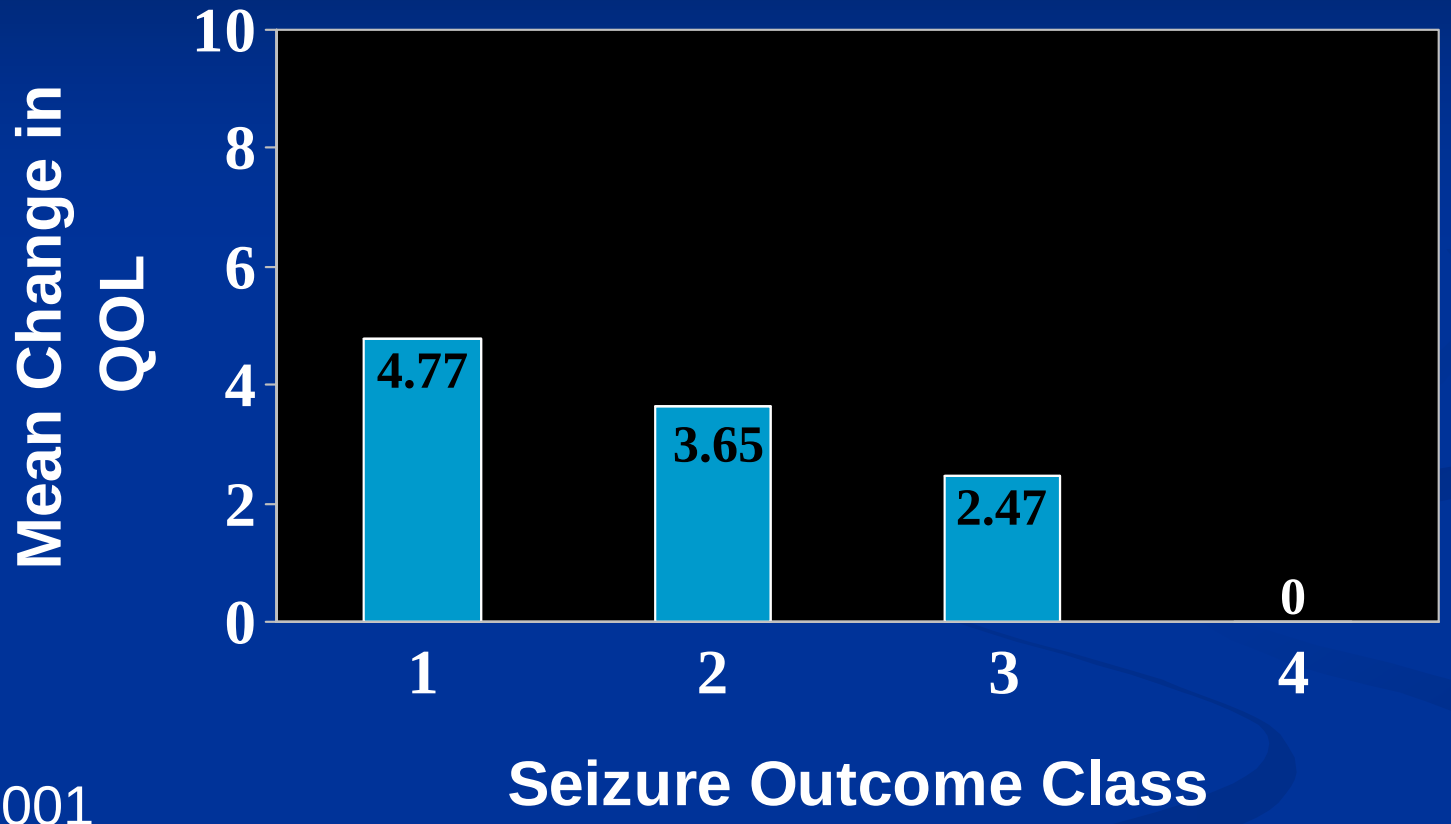
p < .0001

Tukey Honesty

Sign Diff: Classes 1 vs. 3, 1 vs. 4, and 2 vs. 4

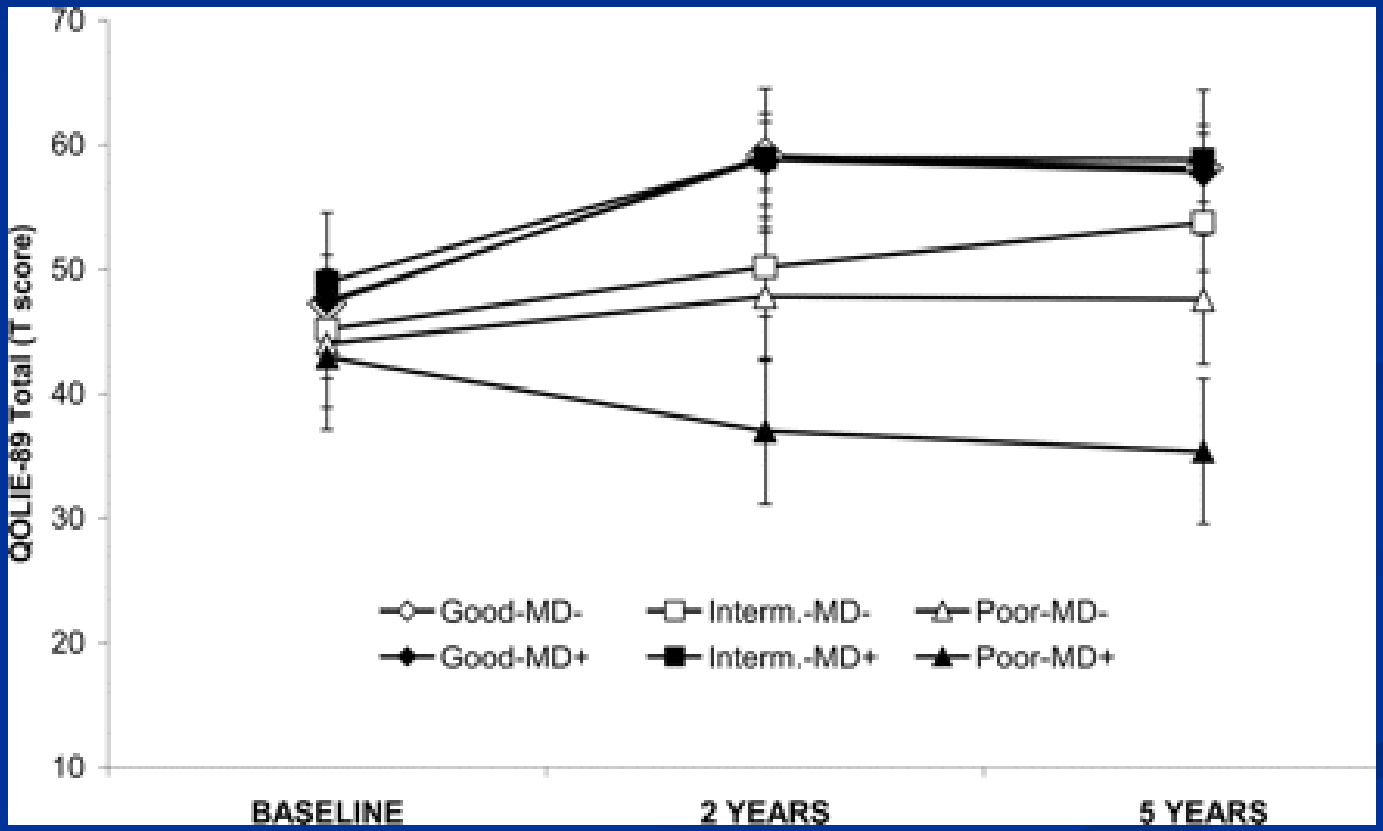
M. Sperling (unpublished)

Change in QOL after Surgery and Seizure Outcome



p < .0001
Tukey Honesty
Sign Diff: Classes 1 vs. 3, 1 vs. 4, and 2 vs. 4
M. Sperling (unpublished)

Relation of Seizure Control and Memory to QOL



Langfitt et al. Neurology 2007

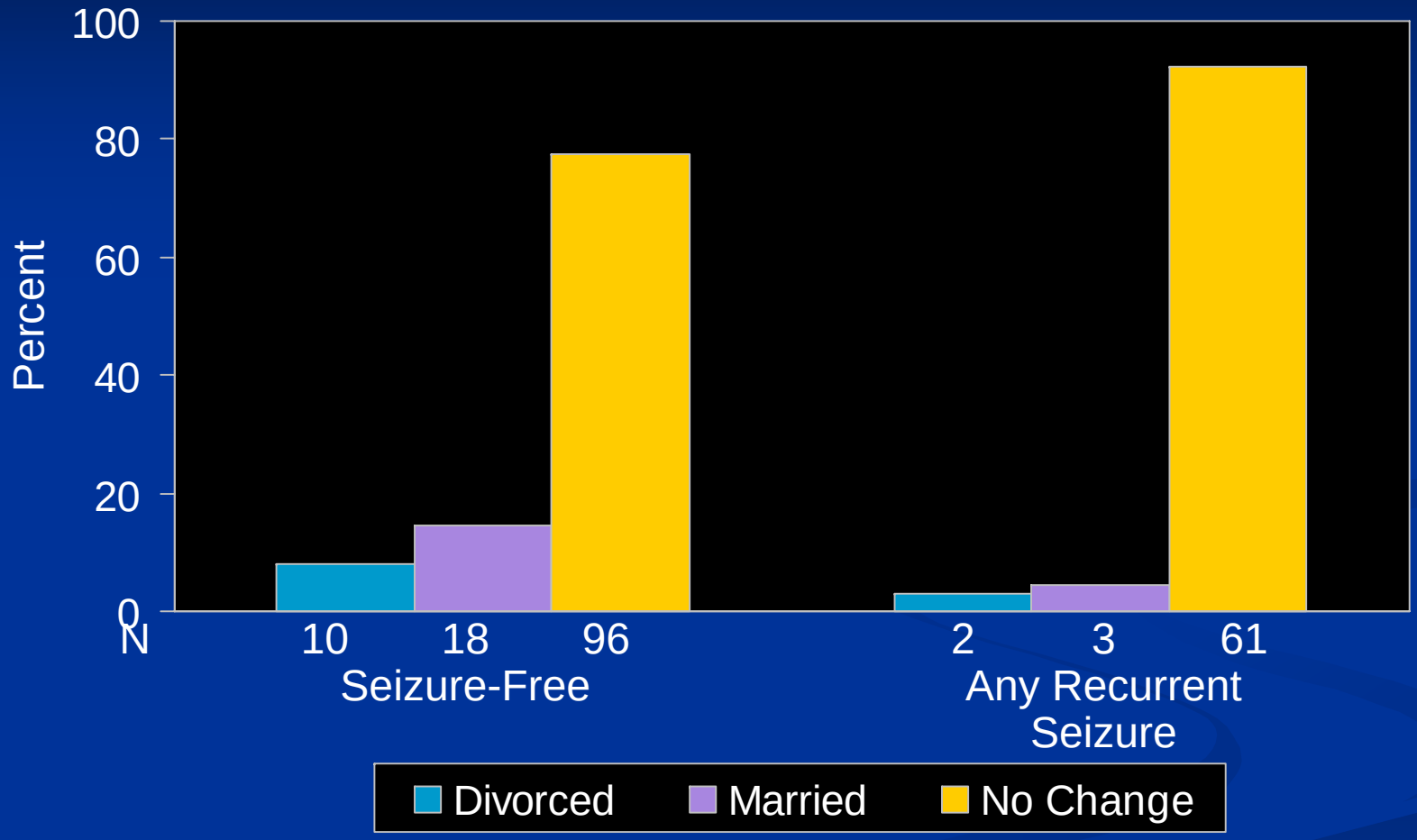
QOL: Conclusion

- Present QOL instruments are largely a measure of mood
- QOL scores are largely determined by mood, but seizure control influences mood
- A better instrument must be constructed that is not so heavily weighted by psychological state
- While the concept of QOL is ambiguous, QOL scores are used to value treatments for various conditions – a modified measure that contains objective measures not heavily influenced by mood is needed

Marital Status

- Direct measure of socialization, though influenced by group behavior and society
- Related to seizure control
- Reduced in patients with refractory seizures
- Age of seizure onset and gender specific influences (pre-pubertal onset of epilepsy, male gender)
- Socialization improved with seizure relief

Postoperative Seizure Control and Marital Status



p = .004

Minimum 4 years follow-up, n = 190

Carran MA et al. Epilepsia 40:1755, 1999

Employment

- Affected by recurrent seizures
- Increased levels of unemployment, underemployment in people with epilepsy
- Among employed persons with epilepsy, income is reduced
- Improved outcome with seizure relief

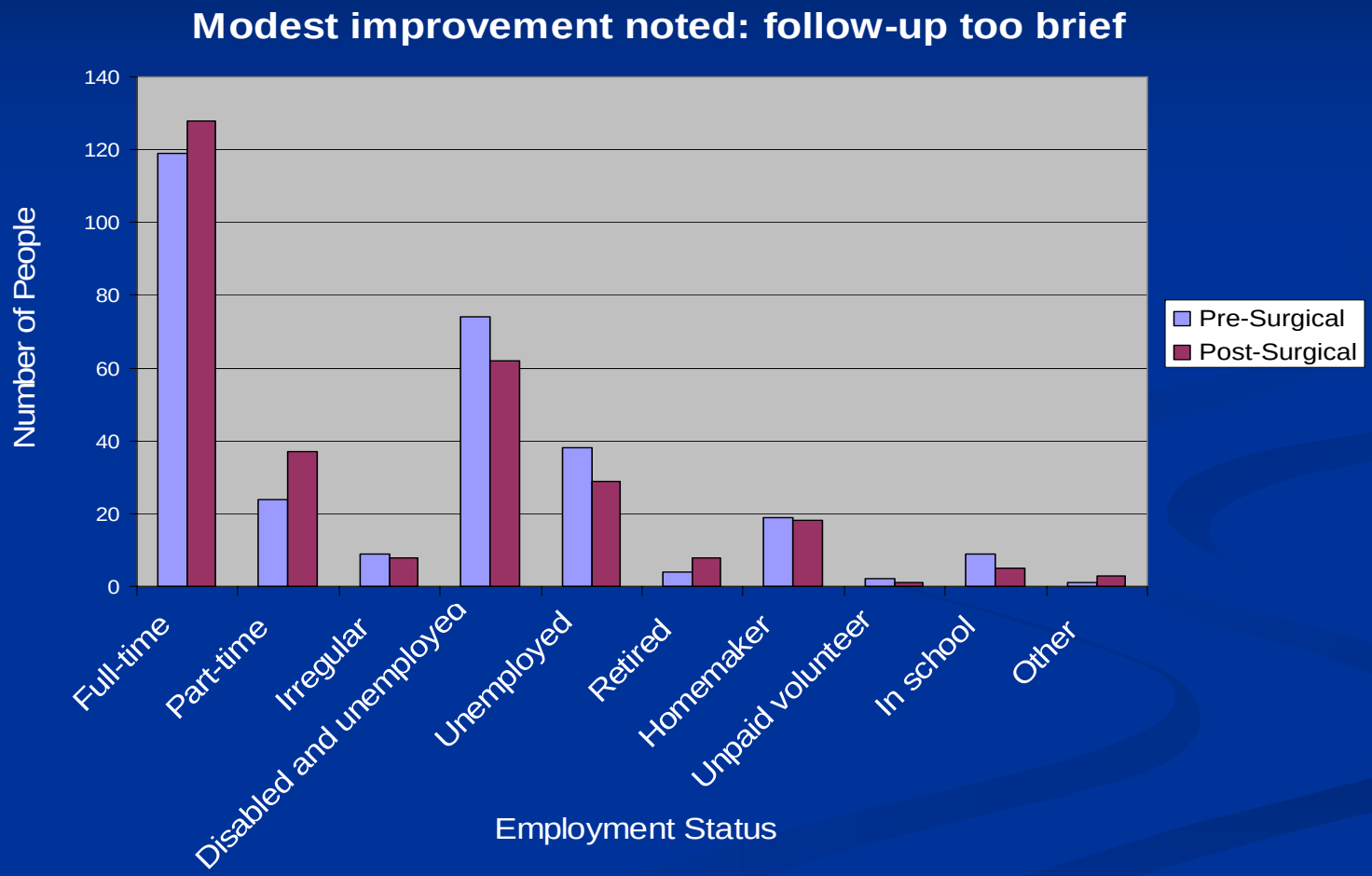
Employment vs Seizure Control

	Number of Seizures in Past Year		
	None (N=232)	<1/mo (N=119)	≥1/mo (N=140)
Employment			
Full/part-time	59%	43%	23%
Unemployed	11%	13%	15%
Permanent sick	8%	22%	37%
Other	22%	22%	25%

$p < 0.001$

Jacoby A et al. Epilepsia 37:148, 1996

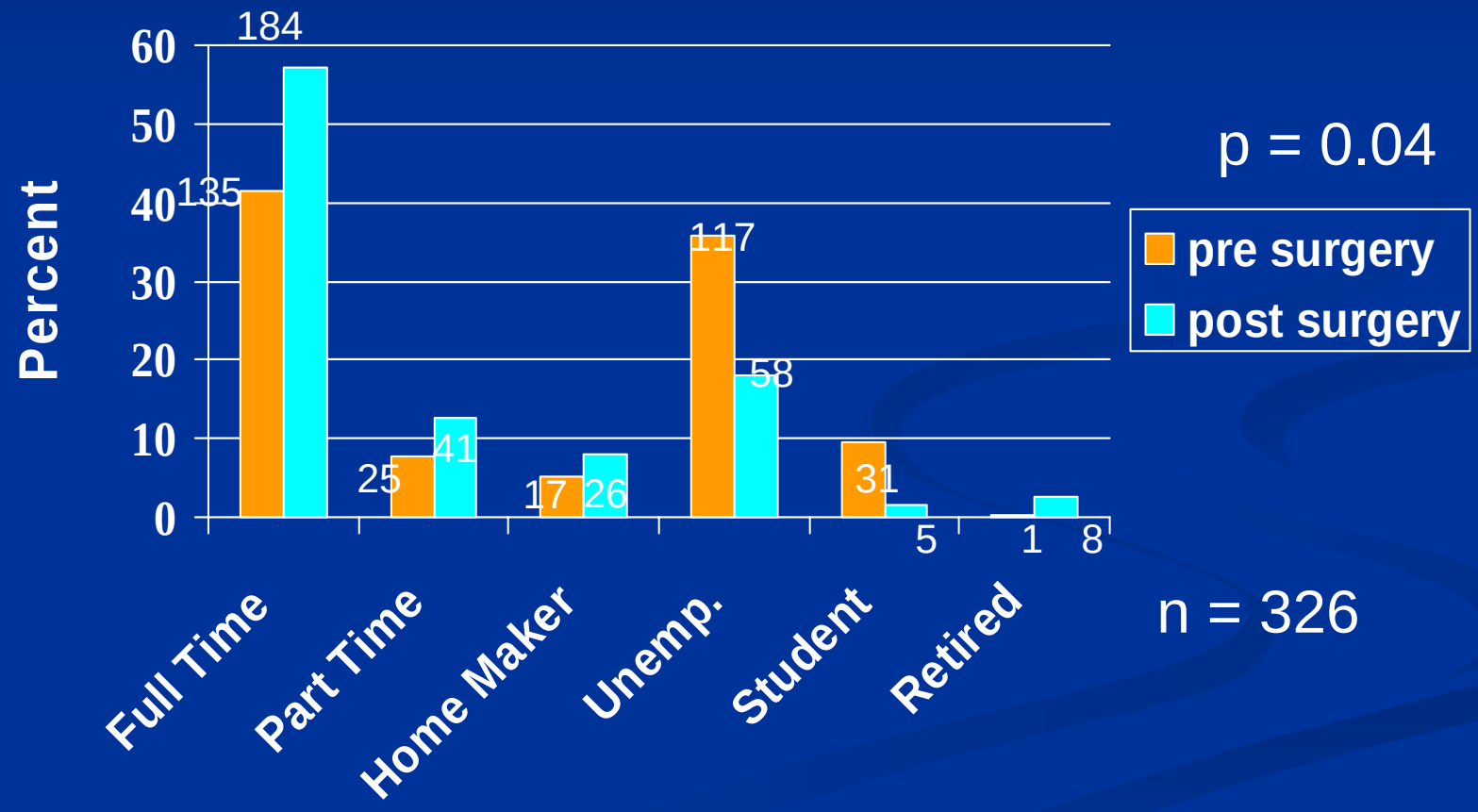
Employment Outcome 2 Years After Resective Epilepsy Surgery



Improvement in status related to seizure control and race, not education or age

Chin et al. Epilepsia 2007

Employment Before and After Epilepsy Surgery



Outcome measured at least 4 years after surgery

M Sperling, unpublished data

Variables Related to Postoperative Employment:
n = 308

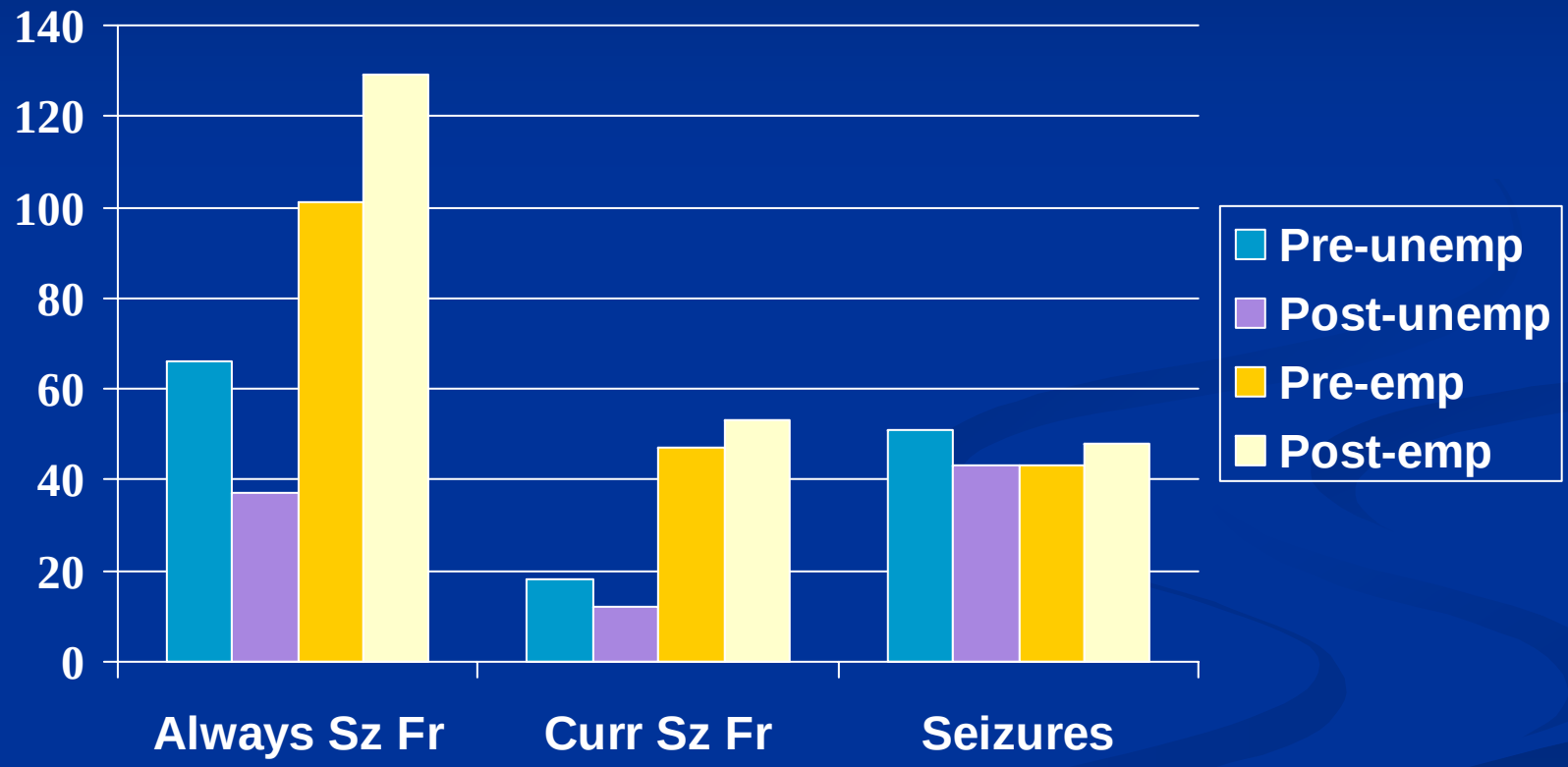
Job preop	$p < .0001$
Postop seizures	$p = .0007$
Age at surgery	$p < .0001$
Gender	$p = .001$
Housing	$p = .04$

Marital status, driving, IQ not related

M Sperling, unpublished data

Employment by Seizure Status

Number of Patients



Significant change in postop employment only for patients who were always seizure free

M Sperling, unpublished data

Psychological Development

- Related to various factors
  - Age of epilepsy onset
  - Family milieu
  - Seizure type and frequency
  - Presence of co-existing neurological and psychiatric symptoms
- Early intervention leads to favorable outcome

Educational Attainment

- Reduced educational levels in people with epilepsy
- Influenced by co-existing neurologic and psychiatric conditions
- Relationship between seizure status and educational level

Outcome of Childhood Epilepsy: Educational Status in Early Adulthood

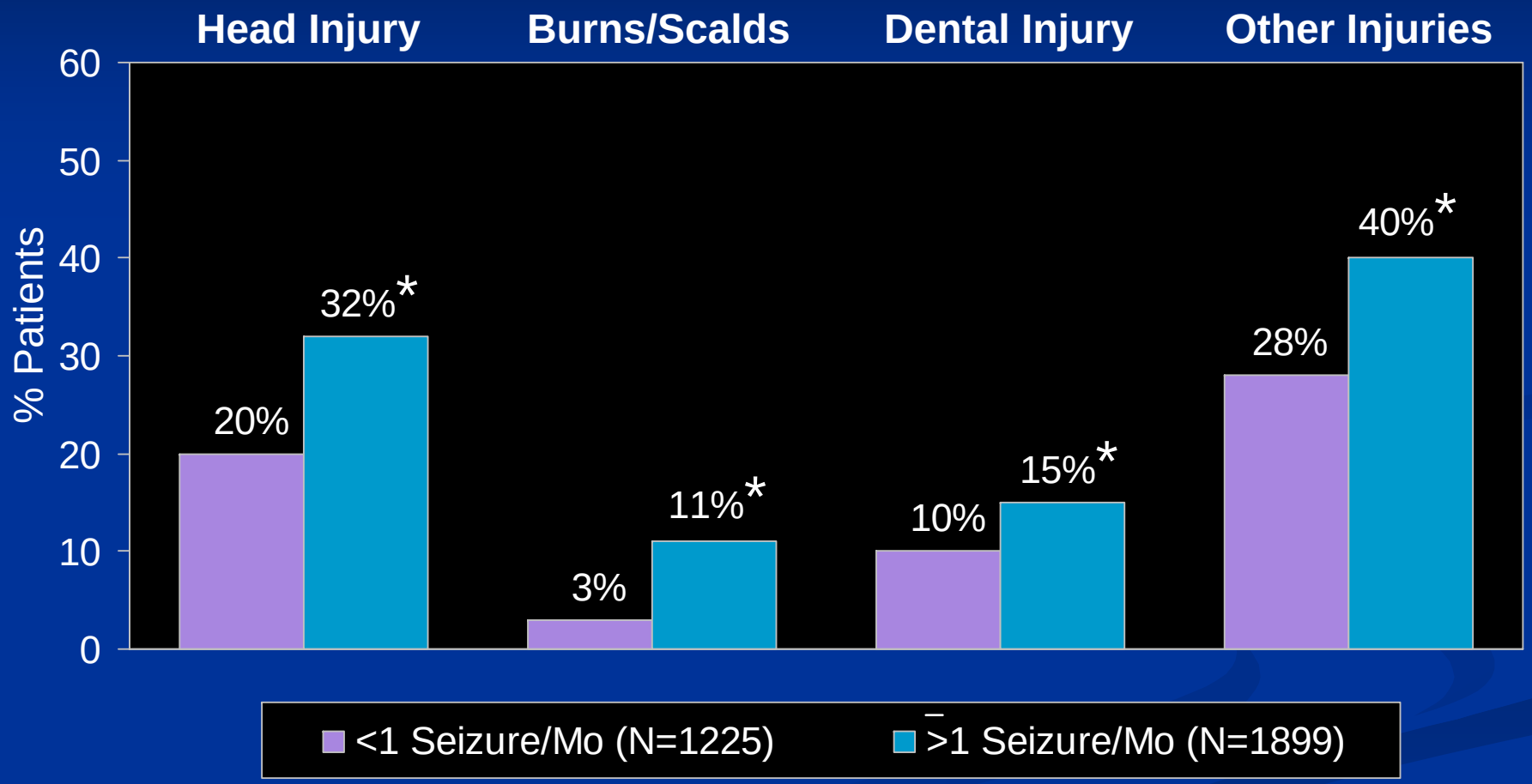
	Patients (N=81)	Controls (N=211)	P
Basic education			<0.001
None or auxiliary school	20%	2%	
Comprehensive school	53%	47%	
High school	27%	51%	
Vocational training and further education			<0.01
None	27%	11%	
Basic	50%	57%	
Advanced/university	23%	32%	

Kokkonen J et al. J Neurol Neurosurg Psychiatry 62:265, 1997

Morbidity

- Various types
  - Cognitive, psychiatric, bodily injury
  - Progressive with recurrent seizures
- Related to level of seizure control
- Related to seizure type
- Influenced by seizure control

Seizure-Related Injuries vs Seizure Frequency (n = 3124)



*p < 0.001

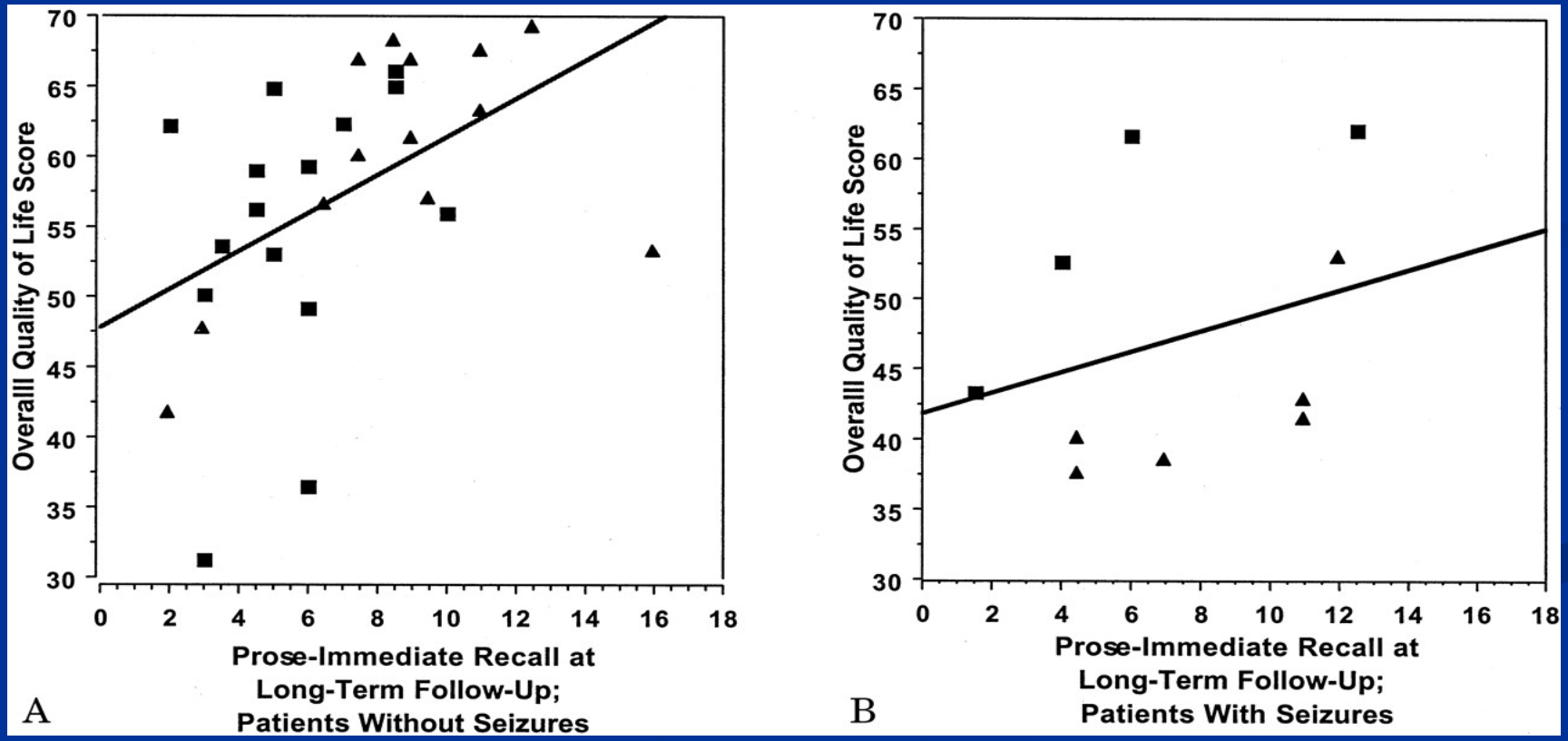
Baker GA et al. Epilepsia 38:353, 1997

Conclusion

- Seizure control is important for normal psychosocial function
  - Seizure-free patients do best
  - Adverse consequences of uncontrolled epilepsy extend far beyond the medical realm
  - This applies whether patients are treated with medication or surgery
- Quality of life, as we understand it, is influenced by multiple factors
  - Existing scales overly determined by mood
  - New scales needed
- Our mandate: ABOLISH SEIZURES WHENEVER POSSIBLE

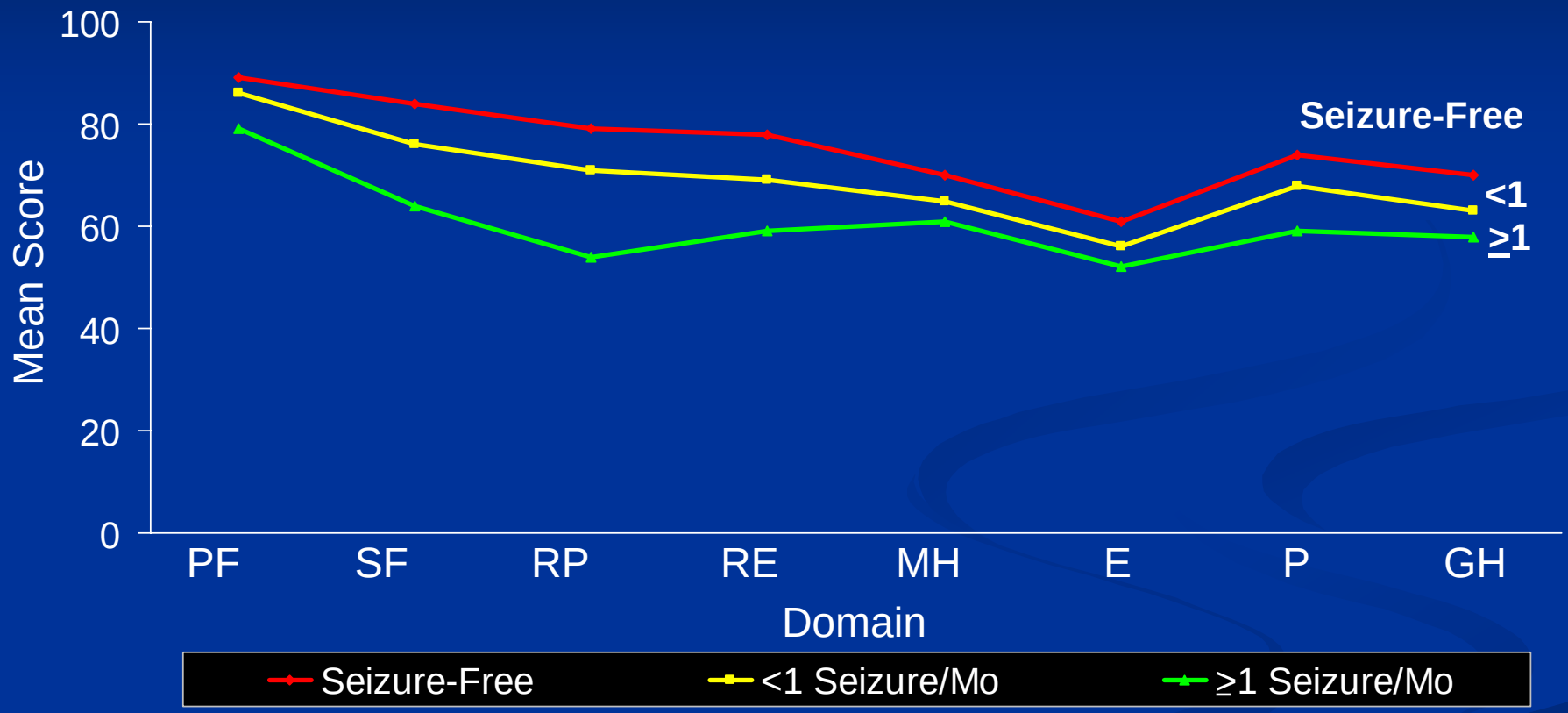
Overall Quality of Life Scores of Temporal Lobe Surgery Patients Plotted Against a Verbal Memory Score, Prose–Immediate Recall

(A) Patients who were seizure free at the long-term follow-up (n = 34);
(B) patients who had at least one seizure the previous year (n = 10)
triangle = left temporal lobe patients; square = right temporal lobe patients



Rausch et al. Neurology 2003

Health status versus seizure frequency (n=5211)



Baker GA et al. Epilepsia 38:439, 1997