ALS
A Guide for the Non-Neurologist

Shafeeq Ladha, MD
Director, Gregory W. Fulton ALS and Neuromuscular Center
Barrow Neurological Institute

1

2

Standard Batting Show Minors | Games by Position | Share & more ▾ | Glossary

Year	Age	Tm	Lg	G	PA	AB	R	H	2B	3B	HR	RBI	SB	CS	BB	SO	BA
1923	20	NYY	AL	13	29	26	6	11	4	1	1	8	0	0	2	5	.423
1924	21	NYY	AL	10	13	12	2	6	1	0	0	5	0	0	1	3	.500
1925	22	NYY	AL	126	497	437	73	129	23	10	20	68	6	3	46	49	.295
1926	23	NYY	AL	155	697	572	135	179	47	**20**	16	109	6	5	105	73	.313
1927	24	NYY	AL	***155***	717	584	149	218	***52***	18	47	***173***	10	8	109	84	.373
1928	25	NYY	AL	154	678	562	139	210	**47**	13	27	***147***	4	11	95	69	.374
1929	26	NYY	AL	154	694	553	127	166	32	10	35	125	4	3	122	68	.300
1930	27	NYY	AL	**154**	**703**	581	143	220	42	17	41	**173**	12	14	101	63	.379
1931	28	NYY	AL	155	***738***	619	***163***	**211**	31	15	***46***	***185***	17	12	117	56	.341
1932	29	NYY	AL	***156***	708	596	138	208	42	9	34	151	4	11	108	38	.349
1933 ★	30	NYY	AL	152	687	593	***138***	198	41	12	32	140	9	13	92	42	.334
1934 ★	31	NYY	AL	***154***	690	579	128	210	40	6	***49***	***166***	9	5	109	31	***.363***
1935 ★	32	NYY	AL	149	673	535	**125**	176	26	10	30	120	8	7	***132***	38	.329
1936 ★	33	NYY	AL	**155**	719	579	***167***	205	37	7	***49***	152	3	4	***130***	46	.354
1937 ★	34	NYY	AL	***157***	700	569	138	200	37	9	37	158	4	3	***127***	49	.351
1938 ★	35	NYY	AL	***157***	689	576	115	170	32	6	29	114	6	1	107	75	.295
1939 ★	36	NYY	AL	8	33	28	2	4	0	0	0	1	0	0	5	1	.143

BARROW Neurological Institute

3

BARROW Neurological Institute

4

What is ALS?

- Amyotrophic Lateral Sclerosis (ALS)
  - Also known as Lou Gehrig's Disease
  - Described in early 1800's
- Progressive neurological disorder
- Disease of the "motor neuron"
- Lifetime risk is 1 in 2000
- Affects 3-5 per 100,000 people

BARROW Neurological Institute

5

ALS Types

- Sporadic ALS
  - Most common ~ 90% of all cases
  - Multiple mechaisms
- Familial ALS
  - 10% of all cases
  - Inherited in autosomal dominant pattern
  - May not have a family history
  - *C9orf72, SOD1, TARDBP, FUS, ATX2* are common causes

BARROW Neurological Institute

6

What are the symptoms?

- **Weakness** of voluntary muscles
  - May start anywhere in the body
- Breathing difficulties
- Swallowing difficulties
- Speech changes
- Muscle twitching (fasciculations)
- Muscle wasting (atrophy)

BARROW Neurological Institute

7

What Are Not Symptoms?

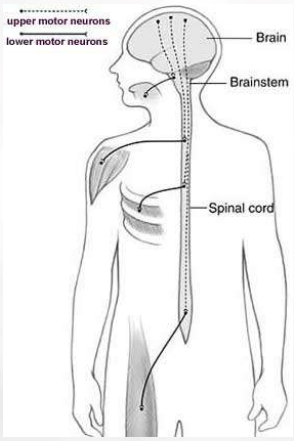
- Numbness
- Visual symptoms
- Pain early in the disease
- Bowel or bladder disturbances
- Memory or thinking difficulties

BARROW Neurological Institute

8

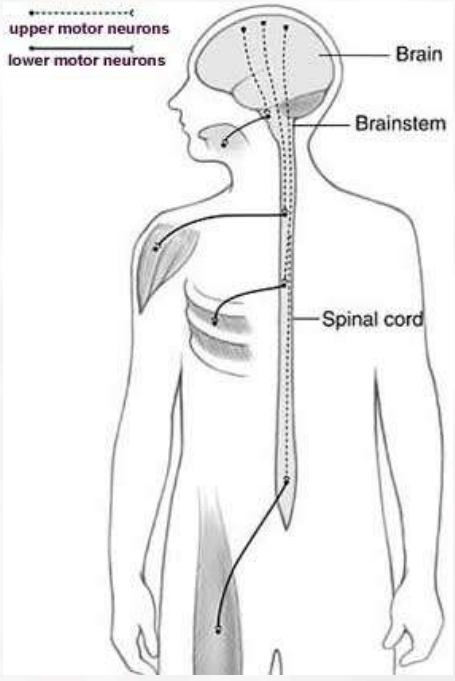
Motor Neurons

- Types
  - Upper motor neurons (UMN)
  - Lower motor neurons (LMN)
- Directly control the voluntary muscles
  - Arms
  - Legs
  - Facial
  - Breathing
  - Swallowing



BARROW Neurological Institute

9

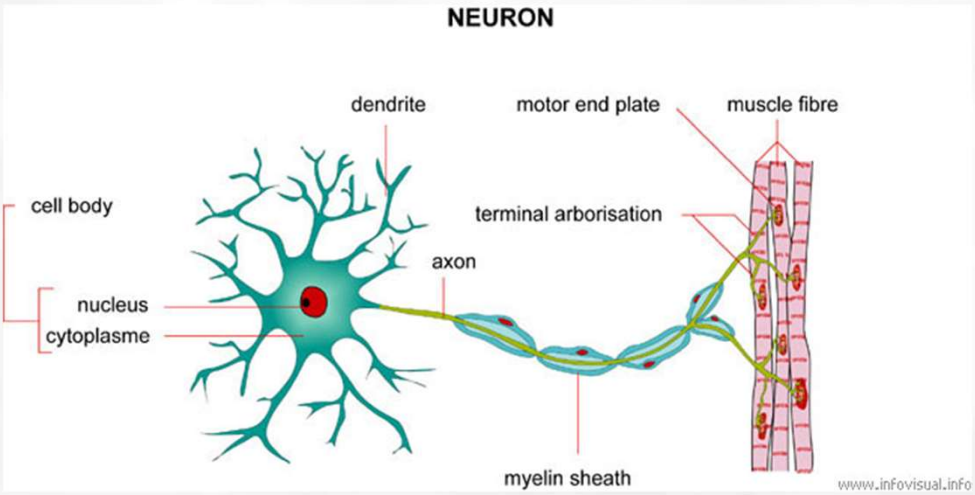


Courtesy of the ALS Society of Ontario

BARROW Neurological Institute

10

Motor Neuron



BARROW Neurological Institute

11

Exam signs of motor neuron damage

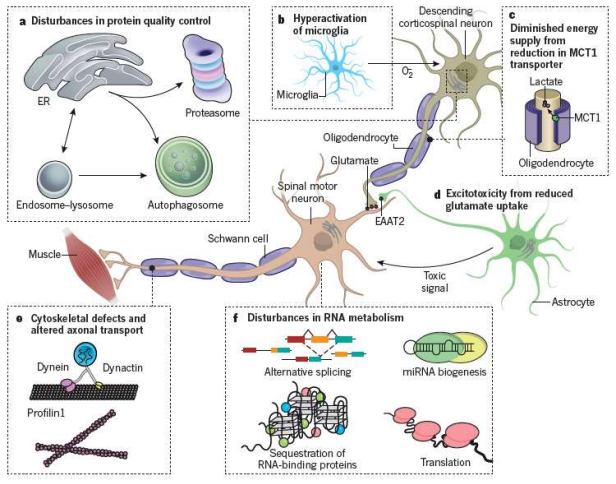
- Upper motor neurons
  - Hyperreflexia
  - Spasticity
  - Slow, strained speech (Spastic Dysarthria)
  - Slowed tongue movements
- Lower motor neurons
  - Atrophy
  - Hyporeflexia
  - Fasciculations
  - EMG abnormalities

BARROW Neurological Institute

12

ALS Mechanisms

- Multiple mechanisms
  - Neuroinflammation
  - Oxidative stress
  - Genetic
  - Dysfunction of protein processing
  - Disordered energetics
  - Environmental factors
    - Military Service
      - Veterans 2x as likely develop ALS
    - Smoking?
    - Pesticides?
    - Extreme exercise?



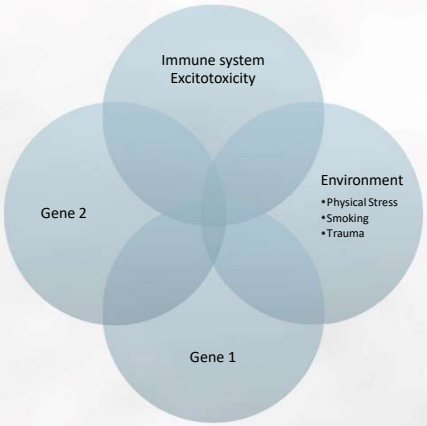
Taylor, J et al. *Nature* 2016. 539: 197-206.

BARROW Neurological Institute

13

Current Understanding

- No single cause of the disease in most cases
  - Multiple common variables must all be present



BARROW Neurological Institute

14

Diagnosis

- There is no simple test to diagnose ALS
- **Painless, asymmetric, progressive weakness without sensory loss**
- Clinical features
  - Exam: UMN signs + LMN signs
  - EMG can confirm LMN involvement
  - Disease must be progressive
- Research Criteria:
  - Definite: 3 segments with UMN + LMN signs
  - Probable: 2 segments with UMN + LMN signs
- No other explanation for the symptoms

BARROW Neurological Institute

15

Most Common Misdiagnoses

- Radiculopathies
  - Focal, asymmetric weakness but…
    - Sensory symptoms, pain, absence of more widespread neuro changes
- Carpal tunnel syndrome
  - Focal, asymmetric weakness but…
    - Sensory more than sensory changes (profound sensory loss prior to atrophy)
    - Provoking situations
- Myasthenia gravis
  - Painless, speech difficulties but…
    - Usually worse with use but with periods of normalcy
    - Tends to be nasal rather than slow and strained as in ALS

Painless, asymmetric, progressive weakness without sensory loss

BARROW Neurological Institute

16

Progression

- Relentless
  - Steady not sudden (linear)
  - Often from one area to the adjacent area of the body
  - Eventually affects breathing and swallowing

BARROW Neurological Institute

17

Common Referrals

- Otolaryngology
- Spine surgeon
- Hand surgeon
- Rheumatologist
- Neurologist

- Frequent unnecessary surgery or procedures
- Average delay in diagnosis is 12-15 months

BARROW Neurological Institute

18

Workup

- Good exam
  - Reflexes
  - Fasciculations
  - Focal atrophy
- MRI of appropriate spinal area
- EMG/NCS
- CPK level (often mildly elevated in ALS)

- Refer to neuromuscular specialist

BARROW Neurological Institute

19

Not Necessary

- Lyme titers
- Heavy metals
- Hair analysis
- Mold testing
- Steroids

BARROW Neurological Institute

20

Treatment

- Disease modifying therapy
  - Riluzole (1994)
  - Edaravone (2017)
  - *Relyvrio (2022)- Withdrawn 2024*
  - Tofersen (2022)- Only for SOD1 familial ALS
  - Modestly slow disease

- Symptomatic treatment
  - Multidisciplinary care
    - Prolongs life
    - Improves quality of life
  - Quality of life primary goal

BARROW Neurological Institute

21

Treatment

- Multidisciplinary clinic
  - Physician
  - Physical therapist
  - Occupational therapist
  - Speech therapist
  - Respiratory therapist
  - Dietician
  - Social worker
  - Mobility specialist

BARROW Neurological Institute

22

Treatment

- Daily activities
  - Power mobility
  - Dressing
  - Bathing
  - Toileting
  - Eating
- Breathing
  - Bipap
  - Cough-assist device
  - The Vest
- Nutritional
  - Feeding tube
  - Caloric intake
- Therapy
  - Stretching
  - Range of motion
  - Modest exercise
- Communication
  - Speech generator
- Medication

Maximize quality of life

BARROW Neurological Institute

23

Treatment

- Sialorrhea
  - Anticholinergics
    - TCA, atropine drops, etc.
  - Salivary gland Botox
  - Suction
- Cramps
  - Benzodiazepines
  - Mexiletine
  - Baclofen
- Pseudobulbar affect
  - Dextromethorphan/Quinidine
  - SSRI
- Psychosocial
  - Counseling
  - Pharmacotherapy
    - Anxiety and depression
  - Support groups

Maximize quality of life

BARROW Neurological Institute

24

Respiratory and Nutrition

- Not used for prolonging life
- Respiratory
  - Improves sleep
  - Higher energy levels
- Nutrition
  - Disease progresses more rapidly when there is weight loss
  - Weakness, shortness of breath, swallowing difficulty all complicate
  - Usually combine pleasure eating with feeding tube

BARROW Neurological Institute

25

Durable Medical Equipment

- Types
  - Power wheelchair with tilt and recline
  - Four-wheeled walker
  - AFO Braces
  - Hospital bed with alternating pressure pad
- Documentation requirements change frequently
- Insurance companies' coverage varies

BARROW Neurological Institute

26

Impact

- Emotional and financial impact
  - Families
    - Disruption of family relationships
      - Caregiver-Dependent
      - Guilt
      - Loss of ability to communicate
      - Lost income
    - Concerns about inheritance 
    - Inability to stay in home
    - Need for psychological care

BARROW Neurological Institute

27

Impact

- Societal Financial Impact
  - Businesses
    - Disability
    - Lost productivity
  - Healthcare
    - Chronic disease
    - Expensive adaptive equipment

BARROW Neurological Institute

28

End of Life

- Hospice vs. tracheostomy/ventilation
- Most patients elect for home hospice
- Death
  - Respiratory failure
  - Aspiration
  - Falls
  - Death With Dignity Act

BARROW Neurological Institute

29

Palliative Challenges

PEG and Bipap	Prolonging life or comfort care
Riluzole/Edaravone/Relyvrio	Cost Prolongation of life
DME	Cost

BARROW Neurological Institute

30

Misconceptions

- ALS is caused by head trauma or concussions
  - Most patients have no history of significant head trauma
  - Non-traumatic sports may have a higher risk
  - Media reports sensationalized
- ALS only affects elderly men
  - The male to female ratio is close to 60/40
  - The peak age is 55-65 but it can occur at any age, including childhood

BARROW Neurological Institute

31

Misconceptions

- People with ALS become demented
  - 20% of patients suffer from frontotemporal dementia
  - Speech problems do not indicate cognitive state
  - Patients can make their own decisions
- ALS is a painful disease
  - Physical pain is uncommon until later in the disease
  - Most pain is related to joint problems or immobility

BARROW Neurological Institute

32

Misconceptions

- Patients with ALS only live 2 years
  - Extremely variable
  - Patients can have rapid or slow course
  - Death is mainly determined by involvement of breathing and swallowing muscles
- Stem cells are worth a shot
  - Most stem cell therapies are costly to the patient
  - We are not able to control stems cells yet
  - We are not able to deliver stem cells to the right spots yet

BARROW Neurological Institute

33

Summary

- ALS in humans is a complex disorder which is likely caused by many factors
- Progressive weakness without loss of sensation or cognitive function eventually affects vital muscles
- The disease impact is broader than the individual
  - Quality of life management central to care
- More research than ever is occurring and is fueled by awareness

BARROW Neurological Institute

34

Useful links and references

* Guide for PCP's*: https://als.ca/wp-content/uploads/2017/02/A-Guide-to-ALS-Patient-Care-For-Primary-Care-Physicians-English.pdf

* Amyotrophic lateral sclerosis and palliative care: where we are, and the road ahead. Muscle Nerve . 2012 Mar;45(3):311-8.

Practice parameter AAN: http://www.alsa.org/healthcare-professionals/practice-parameter.html

Muscular Dystrophy Association sponsors clinics and research for ALS: www.mdausa.org:

Community support for patients and their families: www.alsa.org

Investigates the validity of fad treatments : www.alsuntangled.com

Lists legitimate clinical trials available in the United States: www.clinicaltrials.gov

Shameless plug: www.supportbarrow.org/ALS

BARROW Neurological Institute

35