

Amyotrophic Lateral Sclerosis (ALS/Lou Gehrig's Disease)



- ALS is a neurodegenerative disease involving the death of motor neurons in the spinal chord, brainstem, and brain.
- The disease involves both the upper motor neurons and the lower motor neurons.
- The average age of onset of ALS is 56 years in individuals with no family history of the disease, and 46 years in individuals with affected family members
- Duration of the disease averages three years, and fatality typically results from failure of the respiratory muscles.

- The clinical features of ALS vary in the its early stages.
 - Asymmetric focal weakness (stumbling and poor handgrip)
 - Speech impairment
 - Difficulty eating and swallowing
 - Muscle cramps
 - Hyperreflexia (abnormal increase in the reflexes)
- Atrophy and weakness eventually affect muscles.
- Classical diagnosis of the disease is based on these clinical features and electrodiagnostic testing (a technique that evaluates and records physiologic properties of muscles at rest while contracting).

- Classical treatment of ALS is palliative (treating the symptoms, not the disease itself).
- Some individuals benefit from care administered by a team composed of a neurologist, nurse, pulmonologist, speech therapist, physical therapist, respiratory therapist, and nutritionist.
- Tricyclic antidepressants and anticholinergic agents reduce oral secretions.
- Swallowing can be aided by thickening liquids and pureeing solid foods.
- Assistant devices such as walkers, wheelchairs, and hospital beds aid in daily life.

- 1991-team of researchers linked familial ALS to chromosome 21
- 2 years later, SOD1 gene identified as being associated with many cases.
- 15-20% of ALS1 (familial ALS) stem from mutations in the superoxide dismutase-1 gene (SOD1; 147450) on chromosome 21q22.1.
- The enzyme coded for by SOD1 removes dangerous superoxide radicals from cells by converting them into non-harmful substances.
- Most cases of ALS1 follow autosomal dominant inheritance, but rare cases of autosomal recessive inheritance have been reported.

- Diagnosis of ALS based on the presence of:

- Evidence of LMN degeneration
- Evidence of UMN degeneration
- Progressive spread of symptoms within a region or to other regions
- Absence of evidence of other disease processes that might explain the LMN and UMN degeneration
- Absence of neuroimaging evidence of other disease processes that might explain clinical and electrophysiologic signs.

- Definite diagnosis of ALS is dependent on brainstem and spinal chord pathology.
- Once the diagnosis of ALS has been made, molecular genetic testing of SOD1 gene is used with individuals with a positive or incomplete family history.
- This helps to establish the mode of inheritance for genetic counseling purposes.

- Clinical Trial of SB-509:

- SB-509 contains the gene for a protein. When injected into the muscle, it enters the muscle and nerve cells around injection site and causes these cells to produce a protein, that in turn causes cells to increase production of vascular endothelial growth factor. This may increase VEGF proteins and may protect and repair the damaged nerves and muscles caused by ALS.

- Far Infrared Irradiation for Control, Management and Treatment of ALS

- Observations indicate that, far infrared rays provide energy to the body, improve the autonomic functions of the nervous system, restore the functions of the endocrine system, strengthen the immune system, improve blood circulation and increase the level of oxygen in the cells and promote the regeneration of muscle cells, nerves and brain cells.
- Researches postulate that far infrared with wavelength between 5 to 20 microns, could prevent, control, or possibly lead to rehabilitation of ALS victims.

- Xaliproden: a nonpeptide compound that reduces the tissue, neurochemical, and functional degeneration produced in various models of neurodegeneration-more studies are needed.
- Mutations in the ALS2, SETX, SOD1, and VAPB genes cause ALS
- Mutation ins ANG, NEFH, PRPH, SMN1, and SMN2 can increase the risk of developing ALS

ALS