MOTOR NEURONE DISEASE **MEDICAL APPENDIX**

(Amyotrophic Lateral Sclerosis, Progressive Spinal Muscular Atrophy, Progressive Bulbar Palsy)

DEFINITIONS

1. **Motor neurone disease** is a term applied to a group of diseases characterised by degenerative changes which are most marked in the anterior horn cells of the spinal cord, the motor nuclei of the brain stem and the corticospinal tracts.

2. When lower motor neurone lesions predominate, the term **progressive muscular atrophy** is generally used.

3. When muscles innervated from the medulla are first affected, the disease is called **progressive bulbar palsy.**

4. The most common (accounting for 80% in some cases) and serious of the conditions is **amyotrophic lateral sclerosis.** In the US the terms, amyotrophic lateral sclerosis and motor neurone disease tend to be synonymous. Here, signs of corticospinal tract disease predominate at first with little or no evidence of lower motor neurone involvement. With time in most cases, there is evidence of both upper and lower motor neurone lesions, with the latter often more severe in upper limbs.

CLINICAL MANIFESTATIONS

5. Motor neurone diseases may be hereditary (rare) or acquired. Hereditary spinal muscular atrophy usually has clinical onset in infancy or childhood. Based on clinical pattern, rate of progression, and age of onset about 15 separate genetic types have been identified. There is also a familial form of amyotrophic lateral sclerosis.

6. The most common form of motor neurone disease in adults is amyotrophic lateral sclerosis. This occurs sporadically. It is typically a disease of late middle-life, usually appearing between the ages of 50 and 70, occasionally as early as the third decade or as late as the eighth. There is a male preponderance.

7. The commonest presentation is with weakness and wasting of the muscles of one hand. Some more generalized weakness of the arm may be found and, characteristically, fasciculation is present in the muscles of the upper arm and shoulder girdle, often bilaterally. Painful cramps are common, particularly in the forearm muscle with complaints of paraesthesiae and pain. Evidence of lower motor neurone involvement is usually accompanied by a paradoxical increase in tendon reflexes, indicating loss of cortical motor neurones.

8. More uncommonly, the condition presents with weakness or wasting involving one lower limb, often with loss of tendon reflexes and suggesting spinal root compression. It is particularly in such cases that the effect of fatigue on the development of symptoms is most obvious, weakness rapidly increasing on exertion.

9. Progressive bulbar palsy presents with dysarthria and, a little later, dysphagia. Speech becomes slurred, with occasional choking on fluids.

AETIOLOGY

10. Motor neurone disease is a condition of unknown aetiology. Because of the low frequency of motor neurone disease, case control studies of reasonable statistical power on risk factors are limited. Thus no clearly defined risk factors have been positively identified. A number of studies report increased risk for amyotrophic lateral sclerosis in rural populations, particularly in farmers and handlers of animal hides and carcasses. There is evidence in some studies of clustering eg. by time of onset, geographical location or occupation. Two particularly interesting clusters include the 1973-84 Skarasborg, Sweden epidemic and the pocket of high incidence in Guam. These have been intensively investigated without conclusive results. It has been postulated that motor neurone disease occurs in a genetically susceptible subset of the population. The disease is then precipitated by exposure to environmental agents.

11. There is no consistent relationship with any systemic disease.

12. No HLA tissue type association has been confirmed. However, families showing dominant, recessive, or occasionally X-linked recessive inheritance have been described. In these forms the condition is generally more chronic and less disabling.

13. Retrospective case/control studies have suggested an increased incidence where there has been trauma to the limbs. There is evidence that the trauma may be physical, including the use of vibrating tools, chemical or via electric shocks. Some studies have reported an association with chemical solvents, and geochemical exposure to iron, lead, or selenium. Results however of such studies are not consistent and there are difficulties with study size and design.

14. A viral aetiology has been suggested and in some cases there is a history of antecedent poliomyelitis 2 or more decades earlier. In most such patients the progressive disease that subsequently develops is much more benign than true motor neurone disease. Attempts to transmit the disease to animals have failed and no viral agent has been detected.

CONCLUSION

15. **Motor neurone disease** is a disease characterised by degenerative changes in the central nervous system, leading to weakness and wasting of the musculature supplied by the nerve tissue involved. The cause is unknown. At present no definite environmental factor has been identified.

REFERENCES

Harding, A E. Motor Neurone Disease. In: Walton J (Ed). 1993. Brain's Diseases of the Nervous System. 10th Ed. 1993. Oxford. Oxford University Press. p443-449.

Donaghy M. Motor Neurone Disease. In: Weatherall D J, Ledingham J G G, Warrell D A (Eds). Oxford Textbook of Medicine. 3rd Ed. 1996. Oxford. Oxford University Press. p24.165 4087-4090.

Layzer R B. Hereditary and acquired intrinsic Motor Neurone Disease. In: Bennett JC and Ph F (Eds). 1996. Cecil Textbook of Medicine. p2053-2055.

Williams A C (Ed). Motor Neurone Disease. London. Chapman and Hall. 1994.

December 2000