Lina Machtoub | Yu Kasugai

AMYOTROPHIC LATERAL SCLEROSIS

Advances and Perspectives of Neuronanomedicine

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Contents

Preface vii

1 Clinical Features of Amyotrophic Lateral Sclerosis 1
1.1 What Is Amyotrophic Lateral Sclerosis? 1
1.2 ALS Signs and Symptoms 3
1.3 The Different Types of ALS 6
1.3.1 Familial ALS (Hereditary) 7
1.3.2 Familial ALS: Signs and Symptoms 13
1.3.3 How to Manage Familial ALS? 14
1.3.4 Sporadic ALS (Acquired) 14
1.3.5 Sporadic ALS: Signs and Symptoms 15
1.4 ALS: Clinical Case Studies 19

2. Environmental Factors 25
2.1 What Environmental Factors Are Suspect in ALS? 25
2.2 Toxic Metals and Solvents 27
2.3 The Possible Effects of Exercise or Pesticides 28
2.4 Environmental Influences of Viruses 28
2.5 BMAA Neurotoxic Effects 29
2.6 Are Toxins in Seafood Causing ALS? 30

3 Diagnostic Criteria of Amyotrophic Lateral Sclerosis 35
3.1 Steps in the Diagnosis of ALS 35
3.1.1 History and Physical Exam 37
3.1.2 Electrophysiology Studies 37
3.1.3 Radiology Studies 41
3.2 Electrophysiology in the Revised EEC 47
3.3 Nerve Conduction Studies 47
3.4 Clinical Features in the Diagnosis of ALS 48

3.5 Inconsistent Clinical Features 50
3.6 ALS Electrophysiological Features 51
3.7 ALS Neuroimaging Features 55

4 Perspectives of Neuronanomedicine 59
4.1 Nanomedicine and Neurological Disorders 59
4.2 CNS Neuroprotective Potentials 64
4.3 Nanocarriers and CNS-Targeted Drug Delivery 68
4.4 Applications Based on Cell-Mediated Drug Delivery 77
4.5 CNS Nano-Based Diagnostic Approaches 80
4.5.1 Proposed in vitro Nanodiagnostic Approaches 83
4.5.2 Proposed in vivo Nanodiagnostic Approaches 84
4.5.2.1 Nano-based optical imaging 86
4.5.2.2 SECARS microscopy 87
4.6 Inflammation and Neurodegeneration: Can We Measure Neuroprotection and Repair through Imaging Techniques? 88
4.7 Constraints in the Treatment of Neurodegenerative Diseases: Future Directions 91

5 Novel Therapeutic Approaches 99
5.1 Conventional Treatments for ALS 99
5.2 Occupational Therapy and Supportive Therapy 100
5.3 Cell Replacement Therapy and Future Challenges 102
5.4 Stem Cell Transplantation Therapy 113
5.5 Clinical Applications of Cell Transplant Therapy 116
5.6 Trials of Other Cell Sources for Stem Cell Therapy 119
5.7 Stem Cell Therapy: Clinical Trials 122
5.8 Induced Pluripotent Stem (iPS) Cell Therapy 124
5.9 Gene Therapy and Future Challenges 127

List of Abbreviations 143
Index 147

Preface

Amyotrophic lateral sclerosis (ALS) is one of the most devastating motor system neurodegenerative diseases, causing around 10,000 deaths each year. The neuropathology of ALS, which leads to muscle weakness, is mostly confined to motor neurons in the cerebral cortex, motor nuclei of the brainstem, and anterior horns of the spinal cord.

The major goal in treating ALS, currently, is to recognize the onset of the disease early in order to initiate appropriate therapy and delay functional and cognitive losses. Upon the discovery of mutated SOD1 in ALS, many hypotheses have been proposed on how mutant SOD1 could cause neurodegeneration, including aberrant redox chemistry, mitochondrial damage, excitotoxicity, microglial activation and inflammation, as well as SOD1 aggregation. Recently, the implication of biocompatible nanotechnologies set the stage for an evolutionary leap in diagnostic imaging and therapy. In this scope, the book provides a comprehensive overview of the hypotheses and the molecular mechanisms associated with the inflammatory processes in motor neuron disorders and presents the latest research studies on ALS, highlighting the recent findings using newly developed imaging modalities and the innovative approaches of highly sensitive molecular imaging. In addition, by using recently developed surface-enhanced nanoimaging microscopy, the book offers new perspectives on neuroimaging and insights into early diagnosis and promising therapeutic strategies.

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