

| | |
|-------------------------|---|
| 1. Record Nr. | UNINA9910495252103321 |
| Autore | Opris Ioan |
| Titolo | Modern approaches to augmentation of brain function // Ioan Opris, Mikhail A. Lebedev, Manuel F. Casanova |
| Pubbl/distr/stampa | Cham, Switzerland : , : Springer International Publishing, , [2021] ©2021 |
| ISBN | 3-030-54564-4 |
| Descrizione fisica | 1 online resource (747 pages) |
| Collana | Contemporary Clinical Neuroscience |
| Disciplina | 616.890072 |
| Soggetti | Neurosciences - Research Neurociències Investigació mèdica Llibres electrònics |
| Lingua di pubblicazione | Inglese |
| Formato | Materiale a stampa |
| Livello bibliografico | Monografia |
| Nota di contenuto | Intro -- Foreword -- Preface -- Human Intellectual Capacity and Its Growth -- Modern Approaches to Brain Augmentation -- Part I: Stimulating the Brain -- Part II: Brain-Computer Interfaces -- Part III: Augmenting Cognitive Function -- Part IV: Futuristic Approaches to Augmentation -- Part V: Augmenting Behavior -- Part VI: Augmenting Cognition and Emotion -- Part VII: Pharmacological Augmentation -- Contents -- Part I: Stimulating the Brain -- Using Electrical Stimulation to Explore and Augment the Functions of Parietal-Frontal Cortical Networks in Primates -- 1 Introduction -- 2 Electrical Stimulation: A Selective and Brief History -- 3 The Action-Specific Parietal-Frontal Network of Primates -- 4 The Functions of the Action-Specific Domains in Primates -- 5 The Basal Ganglia: Further Steps in the Action Selection Hierarchy -- 6 Using Electrical Stimulation to Augment Action Selection -- References -- Spinal Cord Injury and Epidural Spinal Cord Stimulation -- 1 Introduction: Revisiting Low Expectations for Neurological Recovery After "Complete" SCI -- 2 Reinterpreting the Lack of Apparent Success of Drugs, Cell Transplants, and Biologics -- 2.1 Early Neuromodulation: Electrical Stimulation of Muscle to Restore Function -- 2.2 Spinal Cord Stimulation -- 3 |

Concepts that Supported the Testing of Epidural Stimulation for Recovery in SCI -- 3.1 Discomplete Spinal Cord Injury -- 3.2 Early ES Observations in SCI Subjects to Treat Spasticity -- 3.3 Neuroplasticity -- 3.4 The Emerging Understanding of Intraspinal Connectivity -- 3.5 Intraspinal Circuits for Reciprocating Activity -- 3.6 Spontaneous Locomotor Activity Observed After Chronic Human SCI -- 4 Epidural Electrical Stimulation, Spinal Cord Injury, and Locomotion -- 4.1 Locomotor Activity Resulting from Electrical Epidural Stimulation -- 4.2 Locomotor Training and Sensory Input. 4.3 Reported Effects of ES on Autonomic Functions -- 5 Transcutaneous Stimulation -- 6 Potential ES Synergies -- 7 The Essential Role of Spinal Cord Repair Research -- 8 Conclusions -- References -- Neurostimulator for Hippocampal Memory Prosthesis -- 1 Introduction -- 2 Materials and Design -- 2.1 Stimulation Pattern Generator Circuit -- 2.2 Stimulus Artifact Suppression Technique -- 2.3 Electrochemical Properties -- 2.4 System Architecture -- 2.5 Power Calculation -- 2.6 System Cost -- 3 Experimental Methods -- 3.1 Design Characterization -- 3.2 In Vivo Evaluation -- 4 Notes -- References -- Modern Approaches to Augmenting the Brain Functions -- 1 Introduction -- 2 Augmentation Approaches -- 2.1 Neuromodulation -- 2.2 Brain-Computer Interfaces -- 2.3 Futuristic Transfer of Brain Ability -- 3 Augmenting Brain Functions -- 3.1 Sensory Augmentation -- 3.2 Motor Augmentation -- 3.3 Augmentation of Cognition -- 3.4 Augmentation of Emotions -- 4 Clinical Applications -- 4.1 Autism -- 4.2 Depression -- 4.3 Alzheimer's Disease -- 4.4 Post-traumatic Stress Disorder (PTSD) -- 4.5 Drug Addiction -- 4.6 Parkinson's Disease -- 4.7 Seizures -- 5 Technology for Brain Augmentation -- 5.1 Neural Engineering -- 5.2 Optogenetic Augmentation of Brain Function -- 5.3 Neural Nanotechnology -- 5.4 Neural Spintronics -- 5.5 Tools Advances Based on the Interaction with the Brain -- 5.6 Devices for Brain Augmentation -- 6 Ethical Issues -- 7 Conclusion -- References -- Part II: Brain-Computer Interfaces -- Brain Machine Interfaces Within a Critical Perspective -- 1 Introduction -- 2 Roles in Cognition and Behavior -- 3 Sensory-Motor Functions -- 4 Ontological Criticalities -- 5 Interfacing With the Neural Code -- 6 Cascades of Complex Factors -- 7 Neuroprosthesis and Historical Attempts -- 8 Conclusions -- References.

An Implantable Wireless Device for ECoG and Cortical Stimulation -- 1 Introduction -- 2 Preliminary Experience in Primates -- 3 Clinical Applications of Wireless ECoG: Preliminary Experience in Epilepsy Surgery -- 4 Conclusions -- References -- BCI Performance Improvement by Special Low Jitter Quasi-Steady-State VEP Paradigm -- 1 Introduction -- 2 Materials and Methods -- 2.1 Continuous Loop Averaging Deconvolution (CLAD) -- 2.2 Stimulator and Stimuli Design -- 2.3 EEG Recording and Signal Processing -- 2.4 Classification -- 3 Results -- 3.1 ANOVA Results -- 3.2 SSVEP Vs. QSS-VEP Comparison -- 4 Discussions -- 5 Conclusion -- References -- Communication with Brain-Computer Interfaces in Medical Decision-Making -- 1 Introduction -- 2 Decoding and Communicating -- 3 Extracortical and Intracortical BCIs for Communication -- 4 Ethical Issues in BCI-Based Communication -- 5 A Case Study -- 6 Conclusion -- References -- Part III: Augmenting Cognitive Function -- Neuroprotection and Neurocognitive Augmentation by Photobiomodulation -- 1 Introduction -- 2 Part 1: Animal Studies-Prevention of Neurodegeneration and Behavioral Deficits by Photobiomodulation -- 2.1 Objectives of Animal Studies of Neuroprotection by Photobiomodulation -- 2.2 Significance

of Animal Studies of Neuroprotection by Photobiomodulation -- 2.3
Cytochrome Oxidase as a Molecular Target of Photobiomodulation --
2.4 In Vitro Neuroprotective Effects of Cytochrome Oxidase Stimulation
by Photobiomodulation -- 2.5 In Vivo Light Delivery and Dosing
Considerations -- 2.6 Mitochondrial Dysfunction in Neurodegenerative
Disorders and Therapeutic Role of Photobiomodulation -- 2.7
Photobiomodulation Prevents Impairment of Visual Function in a Rat
Model of Optic Neuropathy Induced by Mitochondrial Dysfunction --
2.8 Photobiomodulation Prevents Structural Retinal Damage
in the Model of Optic Neuropathy.
2.9 Protective Effects of Photobiomodulation Are Not Related
to Photodegradation of Rotenone -- 2.10 Preservation of Visual
Function and Retinal Structure Are Not Mediated by Isoflurane Exposure
-- 2.11 Photobiomodulation Prevents Decreases in Cell Respiration
in Brain Homogenates In Vitro -- 2.12 Photobiomodulation Increases
Brain Antioxidant Capacity in a Dose-Response Manner In Vivo -- 2.13
A Single Dose of Photobiomodulation Enhances Brain Cytochrome
Oxidase Activity in a Hormetic Fashion In Vivo -- 2.14 Fractionated
Photobiomodulation Increases Brain Cytochrome Oxidase Activity
in a Dose-Response Manner In Vivo -- 3 Part 2: Human Studies-
Augmentation of Neurocognitive Functions by Photobiomodulation --
3.1 Introduction and Objectives of the Human Studies -- 3.2
Significance of Human Cognitive Enhancement by Photobiomodulation
-- 3.3 Cytochrome Oxidase as Molecular Target for Human Cognitive
Enhancement -- 3.4 Need to Investigate How TILS Affects Human
Neurocognitive Function -- 3.5 Overview of Our Approach for Human
Cognitive Enhancement by Photobiomodulation -- 3.6 Cognitive-
Enhancing Effects of TILS of the Human Prefrontal Cortex -- 3.6.1
Cognitive Benefits of TILS in Older Participants -- 3.7
Neurophysiological Effects of TILS of the Human Prefrontal Cortex -- 4
Conclusions -- References -- Avoiding Partial Sleep: The Way
for Augmentation of Brain Function -- 1 Sleep and "Human Factor" -- 2
Peculiarities of Sleep Deprivation Effects -- 3 Modern Theories of Sleep
-- 4 Phenomenon of Partial (Local) Sleep -- 5 Partial Sleep
and Cognitive Impairments After Sleep Deprivation -- 6 Whether
Cortical EEG Reflects Peculiarity of Brain Activity in Wakefulness
and Sleep, or Just Pattern of the Cortical Afferent Flow? -- 7 Which
Signals Could Provide Periodic and Synchronous Afferentation During
Sleep?.
8 Experimental Validation of the Visceral Hypothesis of Sleep -- 9 The
Visceral Sleep Theory and Observations of "Slow-Wave" Activity
in the Cortical Slabs and Slices -- 10 The Pathways for the Visceral
Afferentation to the Cerebral Cortex During Sleep -- 11 K-Complexes
and Visceral Afferentation, Use Dependency, and Sleep Homeostasis --
12 Mechanism of Sleep Initiation and Features of Local Sleep -- 13
Conclusion -- References -- Augmentation of Brain Functions
by Nanotechnology -- 1 Nanotechnologies in Neuroscience -- 2
Nanoparticles -- 3 Nanoparticle Formulations in the Diagnosis
and Therapy of Alzheimer's Disease -- 4 Multimodal Nanoparticles
Labeling of Neurons -- 4.1 Quantum Dots -- 5 Nanoparticle-Based
Therapeutics for Brain Injury -- 6 Nanotherapeutic Approaches -- 6.1
Exosomes as a Communication Tool -- 7 Overcoming BBB to Treat
Neurodegenerative Diseases -- 8 Neuromodulation of the Brain -- 9
Noninvasive Neuromodulation by Magneto-Electric Nanoparticles -- 10
Nanoelectrical and Chemical Stimulation -- 11 Neuroengineering -- 12
Sensors -- 12.1 Magnetic Tunneling Junctions Sensor -- 12.2 Optical
Probes for Neurobiological Sensing and Imaging -- 13 Biosensors --
14 Neuronal Recording -- 15 Multisite Attenuated Intracellular

Recordings by Extracellular Multielectrode Arrays -- 16 Interface
Microelectrodes for Ultrasensitive Monitoring of Alzheimer's Disease --
17 Resistive Memory Devices -- 18 Brain-Machine Interfaces -- 19
Conclusion -- 20 Future Directions -- References -- The Impact
of Aging and Age-Related Comorbidities on Stroke Outcome in Animal
Models and Humans -- 1 Introduction -- 2 The Risk of Cerebral
Ischemia Increases with Age -- 3 Cerebral Ischemia and Comorbidities
-- 4 Stroke Models Using Aged Animals Are Clinically More Relevant --
5 Age-Dependent Recovery from Cerebral Ischemia.
6 Spontaneous Stroke Recovery in Aged Patients and Animals.
