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Editorial: Neuroinflammation and neurodegeneration from bench to bedside

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Editorial on the Research Topic
Neuroinflammation and neurodegeneration from bench to bedside

The capacity for homeostasis and defense possessed by neuroglia plays a crucial role in neuropathology. In one way or another, glia plays a role in every kind of neurological disorder. Pathological remodeling, atrophy/degeneration, and finally astrogliosis are all stages that occur in injured astrocytes (1). Reactive phenotypes resulting from astrogliosis have been shown to have either neurotoxic or neuroprotective effects (2). Microglia are continually scanning the brain for damage or pathogen-associated molecular patterns (3), and depending on what they find, they may switch between neuroprotective and neurotoxic phenotypes. Oligodendroglia and their progenitors, also known as "NG2 glies," respond to sickness by proliferating, undergoing Wallerian degeneration, and myelinating (remyelinating) (4). When working together, astrocytes, oligodendrocytes, and neurogranin-2 (NG2-glia), as well as ependymal cells, form macroglia, whereas microglia constitute the CNS's resident phagocytes. Reactive microgliosis and astrogliosis are examples of glial dysfunction that have been associated with alpha-synucleinopathies. Microglial activity has been linked to pathogenic processes in Neurodegenerative Disorders and shown to correlate with disease severity. Microglial activation and gliosis are both very prevalent in the brains of persons with Parkinson's disease. Pathogenic alpha-Syn, a dark pigment found in neurons, and neuromelanin (NM) have been related to microgliosis and Parkinson's disease. NM is only able to elicit a response from catecholaminergic neurons, such as dopaminergic and epinephrinergic neurons (5).

This editorial summarizes the contributions to the Frontiers Research Topic "*Neuroinflammation and neurodegeneration from bench to bedside*." The articles included three original research papers along with a review article by a total of 16 authors from eight countries. These articles range from a brain imaging study performed on patients for the detection of brain regions responsible for chronic pain in osteoarthritis (Chatterjee et al.) to a study exploring medical records of surgically treated and histologically diagnosed choroid meningioma (CM) patients (Bie et al.) and comprehensive neurological profiling of children and adolescents with Mucopolysaccharidosis type III (MPS III) syndrome (also called Sanfilippo syndrome) (Valle et al.) and critical review of Edible bird's nest (EBN) as a proposed natural supplement with neuroprotective benefits and potential cognitive enhancer (Loh et al.).

Neuroinflammation From Bench To Bedside

John Morser,S. -I. Nishikawa

Neuroinflammation From Bench To Bedside:

Neuroinflammation — From Bench to Bedside H. Kettenmann,G. Burton,U. Moenning,2002-05-15 This book deals with the subject of neuroinflammation and attempts to take the reader on a journey from the bench to the bedside The microglia and their response to brain injury as well as the importance of the chemokine family are discussed The relevance of neuroinflammation in experimental models of BSE scrapie and vCJD as well as Alzheimer s disease stroke and multiple sclerosis is investigated before proceeding to clinical aspects of neuroinflammation and its involvement in human disease pathophysiology The book provides an excellent introduction to the field of neuroinflammation and its involvement in human neurodegenerative disease **Neuroinflammation — From Bench to Bedside** H. Kettenmann,G. Burton,U. Moenning,2012-12-25 Inflammatory processes have been implicated in the pathophysiology of a variety of neurodegenerative diseases such as Alzheimer s disease stroke and mUltiple sclerosis It is now widely accepted that the brain considered to be an immunologically privileged organ can exhibit immune and autoimmune responses and it is these responses that may in fact be responsible for many neural pathologies The participants of the workshop VI Preface Research over the past decade has demonstrated the pivotal role of the microglia in the neuroinflammatory process and more recent work in the field of chemokines has firmly established their important role in the pathogenesis of inflammatory disease states Inevitably with the wealth of research being conducted in the field of neuroinflammation comes the hope of identifying novel targets for therapeutic intervention in the inflammatory process which may im pact on neurodegenerative diseases The meeting Neuroinflammation From Bench to Bedside aimed to cover the whole spectrum of research currently being pursued in this exciting field literally taking the participants from the bench study ing the importance of the microglia in the inflammatory process and the involvement in particular of the rapidly expanding chemokine family in the pathophysiology of neurodegenerative diseases to the bedside and the possibilities for novel treatment of disorders as di verse as multiple sclerosis Alzheimer s disease stroke and variant Creutzfeldt Jakob disease vCJD Neuroinflammation in Stroke Ulrich Dirnagl,Bernd Elger,2013-04-17 The successful treatment of acute stroke remains one of the major challenges in clinical medicine Over the last decades the understanding of stroke pathophysiology has greatly improved while the therapeutic options in stroke therapy remain very limited Today hyperacute mechanisms of damage such as excitotoxicity can be discriminated from delayed ones such as inflammation and apoptosis Targeting of inflammation has already been successfully applied in various stroke models but translation into a clinically efficacious strategy has not been achieved so far In this book leading experts in basic cerebrovascular research as well as stroke treatment review the current evidence for and against an important role for inflammation in stroke and explore the potential of treating or modulating inflammation in stroke therapy

Neuroinflammation as a Target for Intervention in Subarachnoid Hemorrhage Fernando Testai,J. Marc Simard,2020-01-10 Aneurysmal subarachnoid hemorrhage SAH is a stroke subtype that affects preponderantly young adults

This condition carries a mortality of approximately 30 50% and a rate of permanent neurological disability of 30% In addition a substantial number of patients with an apparent good outcome suffer from residual neurocognitive impairment which though subtle prevents them from returning to work and having a normal life Based on these data it has been estimated that SAH is responsible for almost a quarter of all the years lost because of stroke The calcium channel blocker nimodipine remains the only pharmacological treatment for SAH This drug however has limited effectiveness and its use in clinical practice may be limited due to hypotension Therefore novel and effective treatments for this condition are desperately needed The outcome in SAH has been associated with early brain injury vasospasm and delayed cerebral ischemia Mechanistically these processes are characterized by micro and macro vascular dysfunction microthrombi formation blood brain barrier BBB dysregulation brain edema and neural cell survival Soon after SAH there is a robust inflammatory response characterized by pyrexia leukocytosis and upregulation of adhesion molecules and cytokines in the periphery and in the CNS Observational studies have shown that patients with more severe inflammatory responses experience worse outcomes after SAH At the molecular level different proinflammatory intracellular signaling pathways including mitogen activated protein kinase and nuclear factor kappa are activated in cerebral vessels after experimental SAH and their inhibition has been shown to decrease the occurrence of vasospasm In addition clinical and preclinical data have linked cytokine upregulation interleukins IL 1B IL 6 and IL 8 tumor necrosis factor and monocyte chemoattractant protein 1 enhanced expression of adhesion molecules selectins integrins and ICAM and neutrophil activation to vasospasm of large cerebral arteries microvascular dysregulation and cell death Moreover immune cells regulate hemostasis and secrete active proteases including matrix metalloproteinase 9 which promote microthrombosis and induce blood brain barrier dysfunction respectively In this context it has been suggested that an enhanced inflammatory burden might contribute to brain injury in SAH through numerous downstream mechanisms On the other hand growing evidence demonstrates that neuroinflammation may influence the proliferation and migration of progenitor cells that participate of synaptic plasticity neurogenesis and neurorepair **Neuroinflammation, Gut-Brain Axis and Immunity in Neuropsychiatric Disorders** Yong-Ku Kim,2023-03-22 This book reviews the relationship between cytokines glia and neurons in the pathophysiology of neuropsychiatric disorders and examines the mechanisms of action of the drugs used for the treatment of these disorders Increasing evidence has suggested that glia perform important roles in various brain functions but much remains to be learned about these crucial cells and their interplay with neurons In addition a better understanding of the interaction between inflammatory mediators such as cytokines and the activated immune response will be of critical importance for the development of new therapeutic strategies These key areas are the focus of this book which documents the latest research findings in the field Evidence is provided for the role of inflammation induced toxic metabolites from the tryptophan pathway in a wide range of neuropsychiatric disorders including depression schizophrenia and Alzheimer s disease In presenting state

of the art knowledge on the interactions between cytokines glia and neurons the book will help to pave the way for the development of novel targets for the prevention and treatment of neuropsychiatric disorders **Neuroinflammation and Cognition** Ashok Kumar,Brandi K Ormerod,Yogesh Dwivedi,Jakob W Streit,2019-03-22 Aging is one of the major risk factors for the onset and progression of various neurodegenerative diseases Neuroinflammation is a common feature of virtually every central nervous system disease and is acknowledged as a likely mediator of cognitive impairments Systemic inflammation levels are augmented with advanced age and neurodegeneration The influence of age on neuroinflammatory responses including glial activation increased production of proinflammatory cytokines and aberrant neuronal signaling could magnify the deterioration of the central nervous system microenvironment in disease and may contribute to enhanced cognitive impairment This eBook is a collection of highly informative original research articles providing comprehensive aspect of neuroinflammation and possible therapeutic interventions in rescuing cognitive impairments **Mechanisms of Neuroinflammation and Inflammatory Neurodegeneration in Acute Brain Injury** Arthur Liesz,Christoph Kleinschnitz,2015-11-13 Mechanisms of brain immune interactions became a cutting edge topic in systemic neurosciences over the past years Acute lesions of the brain parenchyma particularly induce a profound and highly complex neuroinflammatory reaction with similar mechanistic properties between differing disease paradigms like ischemic stroke intracerebral hemorrhage ICH and traumatic brain injury TBI Resident microglial cells sense tissue damage and initiate inflammation activation of the endothelial brain immune interface promotes recruitment of systemic immune cells to the brain and systemic humoral immune mediators e g complements and cytokines enter the brain through the damaged blood brain barrier These cellular and humoral constituents of the neuroinflammatory reaction to brain injury contribute substantially to secondary brain damage and neurodegeneration Diverse inflammatory cascades such as pro inflammatory cytokine secretion of invading leukocytes and direct cell cell contact cytotoxicity between lymphocytes and neurons have been demonstrated to mediate the inflammatory collateral damage in models of acute brain injury Besides mediating neuronal cell loss and degeneration secondary inflammatory mechanisms also contribute to functional modulation of neurons and the impact of post lesional neuroinflammation can even be detected on the behavioral level The contribution of several specific immune cell subpopulations to the complex orchestration of secondary neuroinflammation has been revealed just recently However the differential vulnerability of specific neuronal cell types and the molecular mechanisms of inflammatory neurodegeneration are still elusive Furthermore we are only on the verge of characterizing the control of long term recovery and neuronal plasticity after brain damage by inflammatory pathways Yet a more detailed but also comprehensive understanding of the multifaceted interaction of these two supersystems is of direct translational relevance Immunotherapeutic strategies currently shift to the center of translational research in acute CNS lesion since all clinical trials investigating direct neuroprotective therapies failed To advance our knowledge on brain immune communications after

brain damage an interdisciplinary approach covered by cellular neuroscience as well as neuroimmunology brain imaging and behavioral sciences is crucial to thoroughly depict the intricate mechanisms **Regenerative and Cell Therapy** A. Keating,K. Dicke,N. Gorin,R. Weber,H. Graf,2007-01-19 This book gives an updated review of the state of the art in regenerative cell therapy in the fields of cardiology hematology pediatrics neurology orthopedics and infectious diseases The book emphasizes clinical advances as proof of concept in cell therapy based on the revolutionizing observation that regeneration can occur throughout the body even in highly differentiated organs like the heart and the neuronal system It provides examples of breakthroughs in the clinical implementation of adult stem cell therapy **New Molecular Mechanisms of Estrogen Action and Their Impact on Future Perspectives in Estrogen Therapy** Kenneth S. Korach,Alexander Hillisch,Karl Heinrich Fritzemeier,2004-06-21 From our current knowledge it is obvious that estrogen action in volves more than reproduction and fertility Rather estrogens affect and influence a number of other organ systems such as the immune cardiovascular and central nervous system as well as the gastrointes tinal tract urinary tract and skeleton The importance of estrogens and estrogen receptor activity is appreciated from the spectrum of significant physiological dysfunctions that occur when there is a loss The participants of the workshop VI Preface of the hormone or the receptor activity Loss of estrogen however for instance during menopause occurs with time and results in a variety of clinical conditions We know that the developmental loss of estrogen as seen in clinical cases of aromatase gene mutations and experimental models has dramatic effects in both men and women alike The evidence that these effects are mediated through the estrogen receptor s is based on similar but not always identical phenotypes as observed in experimental animal models of estrogen receptor mutations as well as the single clinical case of an estrogen receptor alpha mutant patient Developing an understanding of the spectrum of estrogen in a variety of tissues related to the condition of estrogen loss is a major and highly active clinical as well as basic scientific research area Following the discovery of a second estrogen receptor and possible receptor ligand independent activity as well as the genomic and non genomic actions of estrogen it is clear that the mechanisms of the effects of estrogen are multifaceted **Neuroinflammation, Resolution, and Neuroprotection in the Brain** Akhlaq A. Farooqui,2021-09-15 Neuroinflammation Resolution and Neuroprotection in the Brain discusses the molecular aspects of neuroinflammation in neurological disorders The book examines the effect of diet and exercise on neuroinflammatory diseases Chapters focus on bioactive lipids cytokines and chemokines as well as the involvement of neuroinflammation resolution and neuroprotection in neurotraumatic diseases neurodegenerative diseases and neuropsychiatric diseases The comprehensive information in this monograph will help readers understand molecular cross talk among mediators of phospholipid sphingolipid and cholesterol metabolism The book s goal is to jumpstart more studies on molecular mechanisms and the therapeutic aspects of neurological disorders in human subjects Discusses the molecular aspects of neuroinflammation resolution and neuroprotection Examines the role of diet and exercise on neuroinflammatory

diseases Provides cutting edge research on signal transduction processes Explores the treatment of neurological disorders caused by neuroinflammation **Translational Neuroimmunology, Volume 7** Nima Rezaei,Niloufar Yazdanpanah,2023-06-16 Translational NeuroImmunology Neuroinflammation updates on bench to bedside studies on neurological disorders that have immunological etiologies The book covers neuroimmunology and the principles of autoimmune and autoinflammatory neurological disorders with multiple sclerosis as the main focus The immunopathology genetics and epigenetics microbiome diagnosis and treatment of multiple sclerosis will be explained in ten chapters A chapter also examines distinct aspects of pericytes with final discussions on the neurologic manifestations diagnostic approaches and treatments of the various neuroimmune disorders and lessons learned from translational research on non human primates and zebrafish All sections are presented in an accessible practical format making this volume a valuable resource for immunologists neurologists and researchers in translational biomedical research Gives an introduction on neuroimmunological diseases from bench to bedside Encourages the development of immunologic approaches to analyze the interaction and specific properties of nervous tissue elements during development and disease Focuses on understanding and therapeutically manipulating immunological responses to injury degeneration and autoimmunity in the central nervous system Proves changes in relevant immune and inflammatory reactions at the cellular and molecular level during the development of nervous system diseases **Neuroinflammation and Neurodegeneration** Phillip K. Peterson,Michal Toborek,2014-07-08 State of the art reviews by experts in the fields of neuroscience immunology microbiology infectious diseases and pharmacology addressing the convergence of the immune system neuroinflammation and the loss of neurons neurodegeneration Many of the diseases that are discussed in the book are of epidemic proportion e g Alzheimer s disease Parkinson s disease stroke viral encephalitides and substance abuse In addition to discussions of the involvement of neuroinflammation and neurodegeneration in these disorders scientific reviews are presented on the cells and mediators that participate in defense of and damage to the nervous system With rare exception no or inadequate treatment exists for the diseases discussed in this book An underlying premise of the book is that understanding of their shared pathogenic mechanisms will lead to improved therapies Given the rapid evolution of the field of Neuroimmune Pharmacology readers will find this book to be the most timely and authoritative reference on the subject of each of its chapters Annual Update in Intensive Care and Emergency Medicine 2018 Jean-Louis Vincent,2018-03-28 The Annual Update compiles reviews of the most recent developments in experimental and clinical intensive care and emergency medicine research and practice in one comprehensive reference book The chapters are written by well recognized experts in these fields The book is addressed to everyone involved in internal medicine anesthesia surgery pediatrics intensive care and emergency medicine The Histone Code and Beyond Shelley L. Berger,O. Nakanishi,Bernhard Haendler,2007-01-19 Methylation of DNA at cytosine residues as well as post translational modifications of histones including phosphorylation acetylation methylation and ubiquitylation

contribute to the epigenetic information carried by chromatin These changes play an important role in the regulation of gene expression by modulating the access of regulatory factors to the DNA The use of a combination of biochemical genetic and structural approaches has allowed demonstration of the role of chromatin structure in transcriptional control The structure of nucleosomes has been elucidated and enzymes involved in DNA or histone modifications have been extensively characterized Since deregulation of epigenetic marks has been reported in many cancers a better understanding of the underlying molecular mechanisms bears the promise that new drug targets may soon be found The newest developments in this quickly developing field are presented in this book **The Neurobiology and Treatment of OCD: Accelerating Progress** Naomi A. Fineberg,Trevor W. Robbins,2021-07-20 The book highlights important new research approaches of clinical relevance written by prominent researchers in the field of OCD and related disorders A broad range of topics is covered beginning with a description of the phenotypic features of the OCD followed by chapters on developmental aspects animal models genetic and biological models including neuro inflammation functional neuroimaging correlates and information processing accounts Finally existing and novel treatment approaches are covered including clinical and pharmacogenetic treatment models In this way the volume brings together the key disciplines involved in the neurobiological understanding of OCD to provide an update of the field and outlook to the future Together the volume chapters provide focused and critical reviews that span a broad range of topics suitable for both students and established investigators and clinicians interested in the present state of OCD research The Immunological Consequences of Regulated Cell Death in Infection and Inflammation Bart Tummers,Hamid Kashkar,Julie Magarian Blander,2022-11-14 The Promises and Challenges of Regenerative Medicine John Morser,S. -I. Nishikawa,2007-01-19 Presents the advances in stem cell research This book discusses the analysis and use of stem cells in basic biology and their application in clinical practice **From Morphological Imaging to Molecular Targeting** Markus Schwaiger,Ludger Dinkelborg,Hermann Schweinfurth,2004-06-16 The current progress in molecular medicine allows the identification of a plethora of new and often human specific drug targets An early in vivo validation of specific ligands binding to these targets in humans is needed to assess their potential for targeted imaging and radiotherapy Radiopharmaceuticals are uniquely suitable for such target validation studies The purpose of the Ernst Schering Research Foundation Workshop 48 was to offer a forum for an open exchange on the state of the art in the early development of such radiopharmaceuticals Experts from academia industry and regulatory authorities provided contributions covering the identification of targets the necessary preclinical studies on the safety of ligands as well as their validation in human clinical trials Opportunities and Challenges of the Therapies Targeting CNS Regeneration H.D. Perez,B. Mitrovic,A. Baron Van Evercooren,2007-01-19 The therapeutic options for the treatment of Multiple Sclerosis MS and other neurodegenerative and traumatic diseases such as spinal cord injury Alzheimer s Parkinson s disease etc have experienced enormous progress over recent years Despite these encouraging developments

available therapies are only partially effective and the ultimate goal is still far from being attained Improved understanding of the cellular and molecular mechanisms of the pathogenesis of neurodegeneration and demyelination has led to a variety of new therapeutic targets and approaches In addition to modulation of the inflammatory process MS and classical neuroprotection stroke AD therapeutic approaches focusing on active remyelinization and neuronal regeneration have become increasingly important Based on current concepts this book summarizes new therapeutic approaches **Animal Models of T Cell-Mediated Skin Diseases** T. Zollner,Harald Renz,Khusru Asadullah,2007-01-19 Pharmaceutical companies are spending increasing amounts of money on drug discovery and development Nevertheless attrition rates in clinical development are still very high and up to 90% of new compounds fail in clinical phase I III trials which is partially due to lack of clinical efficacy This indicates a strong need for highly predictive in vitro and in vivo models The 50th International Workshop of the Ernst Schering Research Foundation focussed on Animal Models of T Cell Mediated Skin Diseases Such animal models should have impact not only on inflammatory dermatoses but also on other inflammatory disorders due to their model character The current volume summarises recent advances in animal research that are important for anti inflammatory drug discovery

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