

Methodology article

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## LIMPIC: a computational method for the separation of protein MALDI-TOF-MS signals from noise

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### Abstract

**Background:** Mass spectrometry protein profiling is a promising tool for biomarker discovery in clinical proteomics. However, the development of a reliable approach for the separation of protein signals from noise is required. In this paper, LIMPIC, a computational method for the detection of protein peaks from linear-mode MALDI-TOF data is proposed. LIMPIC is based on novel techniques for background noise reduction and baseline removal. Peak detection is performed considering the presence of a non-homogeneous noise level in the mass spectrum. A comparison of the peaks collected from multiple spectra is used to classify them on the basis of a detection rate parameter, and hence to separate the protein signals from other disturbances.

**Results:** LIMPIC preprocessing proves to be superior than other classical preprocessing techniques, allowing for a reliable decomposition of the background noise and the baseline drift from the MALDI-TOF mass spectra. It provides lower coefficient of variation associated with the peak intensity, improving the reliability of the information that can be extracted from single spectra. Our results show that LIMPIC peak-picking is effective even in low protein concentration regimes. The analytical comparison with commercial and freeware peak-picking algorithms demonstrates its superior performances in terms of sensitivity and specificity, both on in-vitro purified protein samples and human plasma samples.

**Conclusion:** The quantitative information on the peak intensity extracted with LIMPIC could be used for the recognition of significant protein profiles by means of advanced statistic tools: LIMPIC might be valuable in the perspective of biomarker discovery.

# Limpic Mechanisms The Continuing Evoluti

**DOMESICK, NAUTA**



## **Limbic Mechanisms The Continuing Evolution:**

Limbic Mechanisms K. Livingston, 2013-12-11 This volume records the proceedings of a Limbic System Symposium held at the University of Toronto November 5-6th 1976 as a satellite event to the Sixth Annual Meeting of the Society of Neuroscience The Symposium was designed in part as a tribute to James Papez on the 40th anniversary of the publication of his epochal paper A Proposed Mechanism of Emotion Papers by MacLean Yakovlev and Angevine provide personal recollections of Papez and an assessment of the significant contribution he made to breaking down the still formidable barriers that separate our concepts of brain mind emotion and behavior Against this background subsequent speakers presented new information that further illuminates the anatomical physiological and biochemical mechanisms underlying limbic system function Viewed in juxtaposition this new information from disparate fields of neuroscience provides an increasingly coherent picture of the neuronal organization subserving a dynamic limbic system that we can now begin to visualize in operational and transactional terms The final section of the symposium focusses on the recently identified kindling phenomenon which is viewed as a general model of neural plasticity and more particularly as a model of experimentally induced limbic system dysfunction Using this model it is possible to display analyse and experimentally manipulate long lasting changes in limbic system activity which develop over extended periods of time and are expressed in a variety of behavioral end points involving learning and memory seizure activity and changes in emotionality and behavior *Indexes to the Epilepsy Accessions of the Epilepsy Information System* J. Kiffin Penry, 1978 **Discoveries in the Human Brain** Louise H. Marshall, Horace W. Magoun, 2013-03-09 You can climb back up a stream of radiance to the sky and back through history up the stream of time 1 Robert Frost topics that he judged to be important in brain his From the last years of the second millennium tory leading into the end of the century and as we can look back on antecedent events in neuro undertaken in response to the enthusiasm generated by science with amazement that so much of modern history was anticipated or even said or done in an earlier time That surprise can be tional meetings of a series of large posters for which matched by appreciation for what the pioneer Magoun wrote a 27 page brochure The posters investigators with no inkling that they were created were viewed by a multitude of young neuroscientists who contributed to its emergence as a discipline who wanted more as well as by mature investigators who were warmly pleased to see familiar names and faces from the past The acclaim was reductionist atmosphere in which research at the molecular level is producing breathtaking new accompanied by a veritable deluge of requests for knowledge throughout biology the student may find an illustrated expanded publication The Evolutionary Neuroethology of Paul MacLean Gerald A. Cory Jr., Russell Gardner Jr., 2002-12-30 In the mid 20th century integrative efforts began concerning the brain and its social and humanistic functions These efforts were led by Paul D MacLean's integrative research and thought As the century ended however such efforts were lost in the surge of new effort

in brain and genome research Nobel Prizes were awarded on biochemical and cellular findings relevant to psychiatry Findings on these levels seemed to provide ultimate answers By contrast Cory Gardner and their contributors provide a more comprehensive view by extending MacLean's findings and integrative theory Supported by new findings and extended by critical analyses of current work the collection provides foundations for more integrative efforts that the editors and contributors believe will prevail increasingly in coming decades Looked at from another vantage point therapeutic social economic and political sciences have proceeded without operating theories congruent with or based on brain functions Across species perspectives have been lacking This collection redresses this problem and leads the way toward more comprehensive 21st century research on the one hand and practical applications on the other Multiple approaches extend from modeling efforts to across species comparisons to the basic science of psychiatry to theoretical explanations of political and economic systems But most important these essays abolish the Berlin wall that currently separates the brain from its social functions A major guide for scholars students and researchers involved in the neurobehavioral sciences for psychologists psychiatrists and others involved with human clinical sciences and for social scientists concerned with the impact of the nervous system and its function      **Scientific Directory and Annual Bibliography** National Institutes of Health (U.S.),1979 Each issue lists papers published during the preceding year      **Sensitization in the Nervous System** Charles D. Barnes,2024-11-01 Sensitization is a concept of learning and memory that has grown out of experiments on simple animals Interest in sensitization has grown tremendously in the last several years fueled mainly by evidence of the molecular basis of sensitization in invertebrates on the one hand and the study of cocaine abuse which produces behavioral sensitization on the other Because the rapid advance of information across such a broad range of research areas has made an integrated approach necessary this volume combines findings on sensitization across the phylogenetic scale      Clinical Neuroanatomy Hans J. ten Donkelaar,2020-06-18 Connections define the functions of neurons information flows along connections as well as growth factors and viruses and even neuronal death can progress through connections Accordingly knowing how the various parts of the brain are interconnected to form functional systems is a prerequisite for properly understanding data from all fields in the neurosciences Clinical Neuroanatomy Brain Circuitry and Its Disorders bridges the gap between neuroanatomy and clinical neurology It focuses on human and primate data in the context of brain circuitry disorders which are so common in neurological practice In addition numerous clinical cases are presented to demonstrate how normal brain circuitry can be interrupted and what the effects are Following an introduction to the organization and vascularization of the human brain and the techniques used to study brain circuitry the main neurofunctional systems are discussed including the somatosensory auditory visual motor autonomic and limbic systems the cerebral cortex and complex cerebral functions In this 2nd edition apart from a general updating many new illustrations have been added and more emphasis is placed on modern techniques such as diffusion magnetic resonance imaging dMRI and network analysis Moreover a developmental ontology based on the

prosomic model is applied resulting in a more modern subdivision of the brain The new edition of Clinical Neuroanatomy is primarily intended for neurologists neuroradiologists and neuropathologists as well as residents in these fields but will also appeal to neuro anatomists and all those whose work involves human brain mapping

**Environmental Illness** Herman Staudenmayer,2018-02-06 Environmental illness certain health professionals and clinical ecologists claim it impacts and inhibits 15 percent of the population Its afflicted are led to believe environmental illness EI originates with food chemicals and other stimuli in their surroundings as advocates call for drastic measures to remedy the situation What if relief proves elusive and the patient is sent on a course of ongoing costly and ineffective treatment Several hundred individuals who believed they were suffering from EI have been evaluated or treated by Herman Staudenmayer since the 1970s Staudenmayer believed the symptoms harming his patients actually had psychophysiological origins based more in fear of a hostile world than any suspected toxins contained in the environment Staudenmayer's years of research clinical work and successful care are now summarized in Environmental Illness Myth Reality Dismissing much of the information that has attempted to defend EI and its culture of victimization Staudenmayer details the alternative diagnoses and treatments that have helped patients recognize their true conditions and finally overcome them often after years of prolonged suffering

*Neuroscience and Crime* Hans J. Markowitsch,2020-08-24 Until recently jurisprudence largely ignored neuroscientific findings The advent of sophisticated methodologies in the neurosciences in particular brain imaging techniques reduced this unawareness and findings pointing to clear and unequivocal relations between brain structure and brain function on the one side and personality dimensions on the other led to a growing interest of jurisprudence in brain research The Special Issue is intended to provide an overview over the most recent findings and technological refinements in the field of crime related neuroscientific investigations It covers genetics functional brain imaging mind reading lie detection and many other topics

*Neuropharmacology Methods in Epilepsy Research* Steven L. Peterson,2019-05-07 There is an estimated 2.5 million epileptics in the US and perhaps some 40 million worldwide As research has become increasingly molecular in scope fewer scientists are trained in the US on basic integrated epilepsy techniques One frustration in neuroscience today is the application of state of the art molecular biology techniques to inappropriate animal models of epilepsy frequently resulting in inconclusive results Epilepsy research will be increasingly undertaken by scientists well trained in reductionist methodology but who may be unfamiliar with integrated whole animal techniques This situation appears even more difficult considering there has been no updated textbook on experimental models of epilepsy over the last twenty years until now *Neuropharmacology Methods in Epilepsy Research* describes fundamental methodologies and procedures in this field representing the only detailed text concerning experimental models of epilepsy published in the last 20 years This guide studies the reproduction of well characterized and readily interpretable experimental models of epilepsy to which state of the art molecular biology techniques can be applied Each chapter features Introduction providing a brief background and

historical account of the techniques and their use Methodology describing equipment solutions species electrodes as well as considering variations of techniques and stimulation parameters Interpretations demonstrating the relevance of techniques to epilepsy as well as describing what exactly is being studied and how the data is appropriately applied to understanding epilepsy Topics include electroshock chemoconvulsions kindling audiogenic seizures focal seizures and brain slice preparations Discussions also include Recently developed seizure models including status epilepticus and massed trial simulations Influence of circadian and diurnal rhythms on convulsive activity Behavioral and cognitive deficits associated with anticonvulsant drug testing Technical approaches i e slice models microdialysis techniques intracranial implant surgery audiogenic seizure testing kindling paradigms and the rhythmic nature of seizures This unique text provides a thorough reference for the diverse methodologies within this area of neuropharmacological research providing the basis for on going cellular and molecular investigations as well as novel therapeutic approaches to the treatment of epilepsy **Neurobiology**

**of the Trace Amines** Alan A. Boulton, Glen B. Baker, William G. Dewhurst, Merton Sandler, 2013-03-12 Many of the trace amines more correctly called biogenic amines have been known for decades but because of their tiny concentrations 0.01-100 ng/g in brain it was only after the development of sophisticated analytical techniques such as mass spectrometry that they could be identified and quantitated in nervous tissue There are now more than 20 of them and most are related to the catecholamines and 5-hydroxytryptamine both structurally and metabolically Their pharmacological and physiological properties make them prime candidates for a transmitter or neuromodulator role and many of them elicit profound behavioral syndromes after injection one of them phenylethylamine has even been referred to as nature's amphetamine In the clinical sphere several have been shown to be involved in Parkinsonism schizophrenia depression agoraphobia aggression hyperkinesia migraine hypertensive crises hypertyrosinemia hepatic encephalopathy epilepsy and cystic fibrosis Thus the research reported here on these intriguing new substances will be of great interest to psychiatrists neurologists biochemists pharmacologists physiologists psychologists behaviorists and indeed to all those working in the neurosciences and related fields today **ACKNOWLEDGMENTS** This book is based on the proceedings of Trace Amines and the Neurosciences a meeting held at the University of Alberta Edmonton July 19-21 1983 This meeting was organized as a Satellite Meeting of the Ninth Meeting of the International Society for Neurochemistry held in Vancouver July 10-15 1983 International organizers of the satellite meeting were Drs A. A. Boulton Saskatoon W. G. Dewhurst Edmonton G. B. Baker Edmonton and M. Sandler London

Neuroanatomy DOMESICK, NAUTA, 2013-04-17 I received my first introduction to the brain sciences in 1936 and 1937 for me the second and third years of the 7 year medical school curriculum at the University of Leiden During those years my interest in the subject was aroused in particular by the brilliant lectures of the physiologist G. C. Rademaker a prominent former member of the Rudolf Magnus school and the neurohistologist S. T. Bok noted especially for his histometric studies of the cerebral cortex Fascinated as I was by everything I learned about the brain from these outstanding teachers toward the

end of their courses I began to notice conspicuous gaps that separated neurophysiology from neuroanatomy In fact I could or thought I could detect a reasonable concordance between the two sciences only in case of some sensory and somatic motor systems For most other functions anatomical substrates seemed either poorly defined or as in the case of the central viscerocr endocrine system hardly recognized at all With all the arrogance of which a 20 year old student is capable I concluded that what the brain sciences needed was a new and more complete anatomy that emphasized in particular the continuity of and convergences or interconnections between individual conduction systems And I wistfully mused that perhaps at some time in the future I could make such an endeavour part of my own career

**Drugs, Neurotransmitters, and Behavior** Leslie L. Iversen, Susan D. Iversen, Solomon H. Snyder, 2013-06-29 Volume 18 of the Handbook of Psychopharmacology represents the first of a series of volumes intended to bring earlier sections of the work up to date Volumes 7 8 and 9 published in 1977 and 1978 dealt with principles of behavior drugs and neurotransmitters and neuroanatomy In subsequent volumes dedicated to these issues a mixture of topics will be covered in a given volume covering both advances in basic knowledge in these three areas of the subject and reviews of theoretical and methodological issues deemed to be of particular relevance at present L L S D S H S vii CONTENTS CHAPTER 1 Behavior as a Measure of Adverse Responses to Environmental Contaminants BERNARD WEISS 1 Special Perspectives 1 1 1 Pharmacology and Toxicology 1 1 2 Origins of Behavioral Toxicology 2 1 3 Special Problems 2 2 Specific Substances 5 2 1 Heavy Metals 5 2 2 Volatile Solvents 20 2 3 Pesticides 33 2 4 Air Pollutants 36 2 5 Nonspecific Poisons 42 2 6 Food Additives 44 3 Future Prospects 47 3 1 Chemical Waste 47 3 2 Susceptible Populations 48 3 3 The Statistics of Risk 49 3 4 Screening 49 3 5 Implications for Psychopharmacology 51 4 References 51 CHAPTER 2 State Dependent Learning and Drug Discriminations DONALD A OVERTON 1 Introduction 59 2 Description of State Dependent Learning 59 ix x CONTENTS 3 History of Development of Knowledge about SDL 60 3 1 Nineteenth Century Reports The Prefrontal Cortex: Its Structure, Function and Pathology J.P.C. de Bruin, M.A. Corner, M.G.P. Feenstra, C.G. Van Eden, H.B.M. Uylings, 1991-03-05 Thanks to a resurgence of interest and a recent proliferation of research techniques much new and illuminating data has emerged during the last decade relating to the prefrontal cortex particularly in primates and rodents In view of this progress the 16th International Summer School of Brain Research was held in Amsterdam The Netherlands from 28 August to 1 September 1989 devoted to the topic of The Prefrontal Cortex Its Structure Function and Pathology The edited proceedings embodied in this 85th volume of Progress in Brain Research fall into three sections the first of which following two introductory chapters discusses the present knowledge of the organization of prefrontal cortical systems In the second section developmental and plasticity aspects in rodent and human cortex are considered whilst the third section deals extensively with the functional aspects characteristic for the prefrontal cortex in primates rats and rabbits The last section reviews several topics on dysfunction of prefrontal cortex in rat and man including a historical review on psychosurgery

**Molecular and Cellular Aspects of the Drug Addictions** Avram Goldstein, 2012-12-06 In 1970 I gave

up the chairmanship of the Department of Pharmacology at Stanford University School of Medicine to devote full time to basic and clinical research on problems of drug addiction In 1971 I developed the method of radioligand binding that led to the important characterization of opioid receptors in several laboratories The extraordinary specificity of these receptors for morphine and related opiates suggested the likelihood that there were naturally occurring morphine like molecules in the brain and other tissues The systematic search for these molecules culminated in 1979 in the discovery by my group of the dynorphin peptides one of the three families of opioid peptides the first of which the enkephalin family had been discovered in Aberdeen Scotland in 1975 I also became involved in clinical research on the pharmacologic treatment of heroin addicts for which I established the first large methadone maintenance treatment program in California My basic and clinical research experience convinced me that an institution encompassing laboratory research studies on normal human volunteers and treatment research under a single roof could expedite progress in understanding the drug addictions That concept was transformed into reality by the founding in 1974 of the Addiction Research Foundation of Palo Alto California The funds for construction of a laboratory were provided by a generous grant from the Drug Abuse Council a consortium of several foundations the president of which was Thomas L Bryant

**The Central Nervous System of Vertebrates** Rudolf Nieuwenhuys, Hans J. ten Donkelaar, Charles Nicholson, 2014-11-14 This comprehensive reference is clearly destined to become the definitive anatomical basis for all neuroscience research The book provides a complete overview and comparison of the structural organization of all vertebrate groups ranging from amphioxus and lamprey through fishes amphibians and birds to mammals The large specialised section of the work devoted to the CNS of the various vertebrate groups is preceded by introductory chapters on neurons cell masses fibre tracts morphogenesis methodology and techniques Although focusing on structure the authors provide functional correlations throughout This monumental work is and will remain unique the only source of such brilliant illustrations at both the macroscopic and microscopic levels

*Phylogeny and Development of Catecholamine Systems in the CNS of Vertebrates* Wilhelmus J. A. Smeets, Anton Reiner, 1994-10-13 A thorough analysis of catecholamine systems in a wide range of vertebrates by experts The book will be of interest to researchers and postgraduates of neuroscience neurobiology zoology medicine and physiology

Current Catalog National Library of Medicine (U.S.), 1979 Includes subject section name section and 1968 1970 technical reports

The Neuroscience of Psychotherapy: Healing the Social Brain (Second Edition) Louis J. Cozolino, 2010-04-26 Here Cozolino illustrates how the brain's architecture is related to the problems passions and aspirations of human beings As the book argues all forms of psychotherapy are successful to the extent to which they enhance change in relevant neural circuits

**The Neuroscience of Psychotherapy: Building and Rebuilding the Human Brain (Norton Series on Interpersonal Neurobiology)** Louis J. Cozolino, 2002-09-17 We are now beginning to learn that many forms of psychotherapy developed in the absence of any scientific understanding of the brain are supported by neuroscientific findings Written for psychotherapists and others



interested in the relationship between brain and behavior this book encourages us to consider the brain when attempting to understand human development mental illness and psychological health BOOK JACKET

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In some sort of used by screens and the ceaseless chatter of instantaneous conversation, the melodic beauty and emotional symphony created by the published term frequently fade into the background, eclipsed by the persistent sound and disruptions that permeate our lives. Nevertheless, situated within the pages of **Limpic Mechanisms The Continuing Evoluti** an enchanting fictional value filled with fresh thoughts, lies an immersive symphony waiting to be embraced. Constructed by an elegant musician of language, that charming masterpiece conducts readers on a mental journey, skillfully unraveling the concealed songs and profound impact resonating within each cautiously constructed phrase. Within the depths of this emotional evaluation, we shall discover the book is main harmonies, analyze its enthralling publishing style, and surrender ourselves to the profound resonance that echoes in the depths of readers souls.

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