

# Recent advances in cell adhesion molecules and extracellular matrix proteins: potential clinical implications

Shaker A. Mousa and David A. Cheresh

The roles of cell adhesion molecules (CAMs) and extracellular matrix proteins (ECMs) in various pathological processes leading to both acute and chronic disease states have recently been documented. The authors report on the development of various therapeutic and diagnostic candidates based on the key role of CAMs in a range of diseases, and discuss the structure-function aspects of cell adhesion and signaling of the different CAMs/ECMs.

Several physiological processes, including cell activation, migration, proliferation and differentiation, require direct contact between cells or extracellular matrix proteins. Cell-cell and cell-matrix interactions are mediated through several different families of cell adhesion molecules (CAMs), including the selectins, the integrins, the cadherins and the immunoglobulins. Newly discovered CAMs, together with the discovery of new roles for integrins, selectins and immunoglobulins in certain disease states, provide great opportunities for the development of therapeutic, and perhaps diagnostic, modalities<sup>1</sup>.

Intensified R&D efforts, directed at manipulating CAM activity through the use of monoclonal antibodies, peptides, peptidomimetics and nonpeptide small molecules, continue

to broaden the scope of key clinical applications (Table 1). This article focuses on current advances in the discovery and development of novel anti-CAM agents for potential therapeutic and diagnostic applications.

## Roles of CAMs in disease states

Cell adhesion molecules play highly significant roles both in normal and in various pathophysiological disease states. For this reason, the selection of a specific and relevant CAM to target a certain disease condition without interfering with other normal cellular functions is a very important prerequisite for ultimate success in developing truly active and safe therapeutic strategies<sup>2-7</sup>. Recent breakthroughs with animal models, the latest advances in the understanding of the signaling pathways, transcriptional regulation and the structure-function aspects of CAMs, as well as the role of CAMs and extracellular matrix proteins (ECMs) in cellular migration, spreading, proliferation and survival, have highlighted the potential for novel strategies based on CAM function.

There have been exciting advances in understanding several CAMs; most notably, the  $\alpha_v\beta_3$ ,  $\alpha_v\beta_5$ ,  $\alpha_5\beta_1$  and  $\alpha_{v\beta_3}$  integrin receptors and their direct relationships to different disease states represent tremendous therapeutic and diagnostic opportunities<sup>1-8</sup>. Potential roles for specific CAMs in different disease states, including cardiovascular, cancer, inflammatory, ocular, pulmonary, bone, central nervous system, kidney and gastrointestinal system disorders, have been suggested, including the following examples:

**Shaker A. Mousa\***, The Dupont Merck Pharmaceutical Experimental Station, Wilmington, DE 19880-0400, USA. **David A. Cheresh**, The Scripps Research Institute, La Jolla, CA 10668, USA. \*tel: +1 302 695 8418, fax: +1 302 695 7407

# Recent Advances In Adhesion

**Mohamed Chahine, Jean-François  
Desaphy**



## **Recent Advances In Adhesion:**

**Recent Advances in Prolactin Research** Maria Diakonova, PhD, 2014-12-03 Recent Advances in Prolactin Research summarizes the current knowledge of prolactin PRL PRL receptor PRL dependent signaling pathways the role of PRL in oncogenesis and PRL crosstalk with other oncogenic factors The chapters are written by experts in these fields and focus on identifying and reviewing timely experimental findings that provide new insights into the expanding role of PRL in the pathophysiology associated with a variety of human conditions Prolactin is a peptide hormone that is best known for its role in lactation Prolactin also has an influence on hematopoiesis and angiogenesis and is involved in the regulation of blood clotting through several pathways Although PRL was discovered more than 80 years ago the understanding of PRL signaling and its relationship to various pathologies is still very incomplete PRL is not only a pituitary hormone with an important role in reproduction but PRL also acts as a cytokine modulating a wide variety of physiological processes For example data gathered during the last decade have demonstrated that locally produced PRL acts as the autocrine paracrine factor and plays a contributory role during breast oncogenesis In fact the scientific and clinical communities have suggested that the manipulation of the PRL axis may lead to the successful treatment of breast cancer However recent work has demonstrated that the role of the PRL axis is much more complex than first envisaged *Recent Advances in Adhesion Science and Technology in Honor of Dr. Kash Mittal* Wojciech (Voytek) Gutowski, Hanna Dodiuk, 2013-12-31 The surface of an object is the first thing we see or touch Nearly every article or object we encounter at home in industry land transportation aerospace or the medical field in some way uses an adhesive a sealant or a decorative coating Adhesion science provides the technology and the know how behind these applications **Recent Advances in** **Recent advances in crop protection** P.Parvatha Reddy, 2012-09-14 In the recent years the need to increase food production to meet the demands of rapidly increasing population from a limited land resource necessitated the use of intensive farming systems with the inputs like narrow genetic base high dose of fertilizers pesticides irrigation monocropping etc which led to the development of diseases and pest The effect of changing global climate particularly the sharp increase in CO<sub>2</sub> concentration has increased the susceptibility of plants to pathogens and pests Because of the chemicalization of agriculture the age old eco friendly pest management practices like sanitation crop rotation mixed cropping adjustment of date of planting fallowing summer ploughing green manuring composting etc are not being practiced affecting the crops adversely This has encouraged researchers to look for eco friendly and novel approaches for pest management The information on recent advances in crop protection involving bacteria fungi nematodes insects mites and weeds is scattered The book delves upon the most latest developments in crop protection such as avermectins bacteriophages biofumigation biotechnological approaches bio priming of seeds disguising the leaf surface use of non pathogenic strains plant defense activators plant growth promoting rhizobacteria pathogenesis related proteins strobilurin fungicides RNA interference and variety of mixtures cultivar mixtures multilines soil solarization

biointensive integrated pest management among several others fusion protein based biopesticides seed mat technology and environmental methods This book is a ready reference for students policy makers scientists researchers and extension workers

**Recent Advances in Epilepsy Research** Devin K. Binder, Helen E. Scharfman, 2013-03-14 Epilepsy research has entered an exciting phase as advances in molecular analysis have supplemented in vitro and in vivo electrophysiologic and phenotypic characterization Recent Advances in Epilepsy Research sets forth a series of chapter reviews by researchers involved in these advances This volume is a composite profile of some exciting recent investigations in select areas of enquiry Key features neurogenetics of seizure disorders new developments in cellular and molecular neurobiology of seizure disorders the role of growth factors in seizures new advances in the roles of metabotropic glutamate receptors and GABA receptors and transporters gap junctions neuroimmunology of epilepsy malformations of cortical development neurogenesis new animal models of epilepsy and the use of brain stimulation to treat epilepsy This book should be of interest to a wide variety of audiences including graduate students in neurobiology and related disciplines neuroscientists medical students neurologists neurosurgeons and industry including pharmaceutical companies and medical device companies There are many ideas in this book that will lead ingenious innovators in academia and industry to develop new and better therapies

Recent Advances in Structural Integrity Analysis - Proceedings of the International Congress (APCF/SIF-2014) Lin Ye, 2015-02-10 The proceedings of the International Congress c include about 120 papers selected out of 160 papers submitted for presentations at APCF SIF 2014 to be held in Sydney Australia December 9 12 2014 and uniting the Asian Pacific Conference on Fracture and Strength 2014 APCFS 2014 with the International Conference on Structural Integrity and Failure SIF 2014 The congress will be hosted by The University of Sydney and co organized by Australia Fracture Group AFG the Chinese Mechanical Engineering Society Materials Institution CMES MI the Korean Society of Mechanical Engineers Materials and Fracture Division KSME MFD and The Japanese Society of Mechanical Engineers Materials and Mechanics Division JSME MMD The congress follows the series of the previous very successful APCF and SIF international forums in particular APCFS 2012 Busan and the 8th SIF Melbourne 2013 Characterisations of complex mechanisms of damage accumulation and failure Application of new multi scale modelling approaches in problems associated with structural integrity Development of more accurate technologies for structural damage assessment

**Recent Advances in Fracture Mechanics** W.G. Knauss, R.A. Schapery, 2013-06-29 The papers in this volume represent a considerable cross section of the field of fracture mechanics a testimony to the breadth of interest that Mel and Max Williams friends share with them Several are expanded versions of papers that were given in special sessions honoring them at the 1997 Ninth International Conference on Fracture Mechanics in Sydney Australia The subjects treated in this volume can be classified as follows dynamic fracture problems as viewed primarily from a classical continuum point of view analysis of relatively general crack geometrics fracture problems of polymers and other relatively ductile materials scaling rules that allow extension of results

obtained at one size to be translated into behavior at different size scales problems dealing with interactions that produce complex stress fields fracture problems directly appropriate to composite materials analysis of stress concentrations in anisotropic elastic solids and the problem of cracks in thin plates bending This volume will be of interest to engineers and scientists working on all aspects of the physics and mechanics of fracture

*Recent advances in voltage-gated sodium channels, their pharmacology and related diseases* Mohamed Chahine, Jean-François Desaphy, It is our pleasure to co edit a Research Topic on voltage gated sodium channels pharmacology and related diseases We are in a process to inviting submissions of novel research article state of the art review papers and viewpoints on this topic All the papers will follow a peer review process according to the guidelines of Frontiers in Pharmacology Voltage gated sodium channel play a critical role in electrical signalling in many excitable cells such as neurons skeletal muscle cells and cardiac myocytes They are responsible for the initiation and the propagation of action potential allowing integration of higher processes They are formed by one alpha subunit that forms the pore of the channel and one or several regulatory subunits Sodium channels are the target for local anaesthetics antiarrhythmic drugs and anticonvulsants This class of ion channels is prime target to several toxins Recently a number of mutations in sodium channels that often results in alterations of rapid channel gating have been identified and linked to human diseases Such channelopathies cause periodic paralysis myotonia long QT syndrome and other cardiac conductance disturbances pain hemiplegic migraine and epilepsy Sodium channels play also a negative role in malignant cellular proliferation chronic pain and other diseases Considering these crucial physiological and pathological implications it is not surprising that sodium channels have been and still are key targets for drug development This Research Topic of Frontiers of Pharmacology of Ion Channels and Channelopathies will focus on this important class of ion channels how they operate their pharmacology and their implication in diseases

Recent Advances in Contact Mechanics Georgios E. Stavroulakis, 2012-10-19 Contact mechanics is an active research area with deep theoretical and numerical roots The links between nonsmooth analysis and optimization with mechanics have been investigated intensively during the last decades especially in Europe The study of complementarity problems variational quasivariational and hemivariational inequalities arising in contact mechanics and beyond is a hot topic for interdisciplinary research and cooperation The needs of industry for robust solution algorithms suitable for large scale applications and the regular updates of the respective elements in major commercial computational mechanics codes demonstrate that this interaction is not restricted to the academic environment The contributions of this book have been selected from the participants of the CMIS 2009 international conference which took place in Crete and continued a successful series of specialized contact mechanics conferences

Recent Advances in Laser Processing of Materials Jacques Perriere, Eric Millon, Eric Fogarassy, 2006-03-29 Laser materials interaction and processing is an established and growing field within the materials science community By taking a detailed look at the fundamentals of laser matter interaction Recent Advances in Laser Processing of Materials

charts the recent progress of laser materials interaction and processing in various emerging materials science domains With special emphasis placed on nanostructures and future developments this book provides an interdisciplinary support for basic and applied photo assisted processing research Coverage includes laser assisted synthesis of new materials nanoparticles nanotubes active molecules new phases laser assisted surface transformation nanostructuring lithography etching laser assisted bulk material transformation doping marking crystallisation Laser assisted synthesis of new materials nanoparticles nanotubes active molecules new phases Laser assisted surface transformation nanostructuring lithography etching Laser assisted bulk material transformation doping marking crystallisation      Recent Advances in Adhesion Lieng-Huang Lee,1973

**New Trends in Physics and Physical Chemistry of Polymers** Lieng-Huang Lee,2012-12-06 Between June 6 10 1988 the Third Chemical Congress of North America was held at the Toronto Convention Center At this rare gathering fifteen thousand scientists attended various symposia In one of the symposia Professor Pierre Gilles de Gennes of College de France was honored as the 1988 recipient of the American Chemical Society Polymer Chemistry Award sponsored by Mobil Chemical Corporation For Professor de Gennes this international setting could not be more fitting For years he has been a friend and a lecturer to the world scientific community Thus for this special occasion his friends came to recount many of his achievements or report new research findings mostly derived from his theories or stimulated by his thoughts In this volume of Proceedings titled New Trends in Physics and Physical Chemistry of Polymers we are glad to present the revised papers for the Symposium and some contributed after the Symposium In addition we intend to include most of the lively discussions that took place during the conference This volume contains a total of thirty six papers divided into six parts primarily according to the nature of the subject matter Adsorption of Colloids and Polymers Adhesion Fractal and Wetting of Polymers Dynamics and Characterization of Polymer Solutions Diffusion and Interdiffusion of Polymers Entanglement and Reptation of Polymer Melts and Networks Phase Transitions and Gel Electrophoresis      Recent Advances in Oral Immunity Avi-Hai Hovav,Asaf Wilensky,Jean-Pierre Allam,2021-08-03 The oral mucosa is a challenging environment from an immunological perspective containing discrete niches with a unique architecture and function that requires precise adjustment of the immune system Being the port of entry to the gastrointestinal and respiratory tracts the oral cavity is also constantly challenged by antigens derived from air and food Moreover the oral cavity is the sole tissue of the body harboring a hard surface i e the tooth that is exposed to the hostile external environment resulting in the formation of a complex biofilm that has local and systemic effects To deal with such challenges the oral immune system aims to prevent the invasion of pathogens harmful antigens and to tolerate non pathogenic counterparts in order to maintain homeostasis In recent years numerous studies have addressed these fundamental issues revealing sophisticated mechanisms engaged by the immune system to maintain oral mucosal homeostasis and to combat various immunological insults Some of these studies have identified novel immunological mechanisms emphasizing the uniqueness of the oral immune system and the necessity to

further investigate its functions      Fundamentals of Adhesion and Interfaces D. S. Rimai, L. P. DeMejo, K. L.

Mittal, 2020-05-18 No detailed description available for Fundamentals of Adhesion and Interfaces      **Particle Adhesion and Removal** K. L. Mittal, Ravi Jaiswal, 2015-01-06 The book provides a comprehensive and easily accessible reference source covering all important aspects of particle adhesion and removal The core objective is to cover both fundamental and applied aspects of particle adhesion and removal with emphasis on recent developments Among the topics to be covered include 1 Fundamentals of surface forces in particle adhesion and removal 2 Mechanisms of particle adhesion and removal 3 Experimental methods e g AFM SFA SFM IFM etc to understand particle particle and particle substrate interactions 4 Mechanics of adhesion of micro and nanoscale particles 5 Various factors affecting particle adhesion to a variety of substrates 6 Surface modification techniques to modulate particle adhesion 7 Various cleaning methods both wet dry for particle removal 8 Relevance of particle adhesion in a host of technologies ranging from simple to ultra sophisticated

**Recent Advances in Arthroplasty** Samo Fokter, 2012-01-27 The purpose of this book was to offer an overview of recent insights into the current state of arthroplasty The tremendous long term success of Sir Charnley s total hip arthroplasty has encouraged many researchers to treat pain improve function and create solutions for higher quality of life Indeed and as described in a special chapter of this book arthroplasty is an emerging field in the joints of upper extremity and spine However there are inborn complications in any foreign design brought to the human body First in the chapter on infections we endeavor to provide a comprehensive up to date analysis and description of the management of this difficult problem Second the immune system is faced with a strange material coming in huge amounts of micro particles from the tribology code Therefore great attention to the problem of aseptic loosening has been addressed in special chapters on loosening and on materials currently available for arthroplasty      **Recent Advances in Pharmacotherapeutics** Mr. Rohit

Manglik, 2024-03-24 Explores newly approved drugs novel treatment approaches drug repurposing and cutting edge research in therapeutic drug development      Handbook of Industrial Chemistry and Biotechnology James A. Kent, Tilak V.

Bommaraju, Scott D. Barnicki, 2017-08-01 This widely respected and frequently consulted reference work provides a wealth of information and guidance on industrial chemistry and biotechnology Industries covered span the spectrum from salt and soda ash to advanced dyes chemistry the nuclear industry the rapidly evolving biotechnology industry and most recently electrochemical energy storage devices and fuel cell science and technology Other topics of surpassing interest to the world at large are covered in chapters on fertilizers and food production pesticide manufacture and use and the principles of sustainable chemical practice referred to as green chemistry Finally considerable space and attention in the Handbook are devoted to the subjects of safety and emergency preparedness It is worth noting that virtually all of the chapters are written by individuals who are embedded in the industries whereof they write so knowledgeably      **Paint and Coating Testing**

**Manual** ,      **Complications in Gynecological Surgery** Peter O'Donovan, 2008-10-30 Risk management is a relatively new

process that can sometimes evoke feelings of suspicion among clinicians. However, when used proactively, it offers the opportunity to act at the root cause of an incident to expose deficiencies in the system rather than in individuals. This process encourages a supportive approach to patients, relatives, and staff. The overall aim should be to learn lessons rather than to attribute blame.

**References**

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*Recent Advances on Waterborne Epoxy Coatings* Sukanya Pradhan, Srikanta Moharana, Smita Mohanty, 2025-05-26. This book explains the fundamentals of waterborne coatings and current market trends that have an impact on the industry. The recent advancements in the field of waterborne epoxy coatings are thoroughly reviewed in the book. With special focus on the critical elements required to improve the properties of the system by the incorporation of various additives and their applications, it introduces the reader to the field's advancements while also explaining the applications, procedures, and synthesis and characterization techniques that are illustrated throughout. Insights into current research trends and issues are also hinted at. The book can be a valuable reference for researchers and professionals interested in waterborne epoxy coatings and allied fields.



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