Cytokine Induced Cytokine Production By Cells

Olives and Olive Oil in Health and Disease Prevention, Second Edition expands the last releases content and coverage, including new sections on materials in packaging, the Mediterranean diet, metabolic syndrome, diabetic health, generational effects, epigenetics, glycemic control, ketogenic diet, antioxidant effects, the use of olive oil in protection against skin cancer, oleuropein and ERK1/2 MAP-Kinase, oleocanthal and estrogen receptors, and oleocanthal and neurological effects. The book is a valuable resource for food and health researchers, nutritionists, dieticians, pharmacologists, public health scientists, epidemiologists, food technologists, agronomists, analytical chemists, biochemists, biologists, physicians, biotechnologists and students. Continues the tradition of exploring olives and olive oil from general aspects down to a detailed level of important micro-and micronutrients Explains how olive oil compares to other oils Details the many implications for human health and disease, including metabolic health, cardiovascular health and effects on tissue and body systems

It is only during the last decade that the functions of sinusoidal endothelial cells, Kupffer cells, hepatic stellate cells, pit cells and other intrahepatic lymphocytes have been better understood. The development of methods for isolation and co-culturing various types of liver cells has established that they communicate and cooperate via secretion of various intercellular mediators. This monograph summarizes multiple data that suggest the important role of cellular cross-talk for the functions of both normal and diseased liver. Special features of the book include concise presentation of the majority of detailed data in 19 tables. Original schemes allow for the clear illustration of complicated intercellular relationships. This is the first ever presentation of the newly emerging field of liver biology, which is important for hepatic function in health and disease and opens new avenues for therapeutic interventions.

Cytokine Storm Syndromes, including HLH and MAS, are frequently fatal disorders, particularly if not recognized early and treated during presentation. The genetics of Cytokine Storm Syndromes are being defined with many of the risk alleles giving rise to mutations in the perforin-mediated cytolytic pathway used by CD8 cytotoxic T cells and natural killer cells. These are being studied using murine models. Up to 10% of the general population may carry risk alleles for developing Cytokine Storm Syndromes, and Cytokine Storm Syndromes are being increasingly recognized around the world in pediatric and adult hospitals. A variety of infectious, rheumatic, and oncologic triggers are commonly associated with Cytokine Storm Syndromes, but understanding this disorder is critical for all researchers and physicians to ensure timely and appropriate therapy. This textbook, the first of its kind, addresses all aspects of the disorder – from genetics, pathophysiology, and ongoing research, to clinical presentations, risk factors, and treatment.

Leading researchers synthesize scattered experimental data to help develop an intimate understanding of how cytokines and chemokines are involved in the pathogenesis of autoimmune diseases. The many chapters offer critical reviews the basic mechanisms controlling cytokine induction and regulation, as well as the resulting production of proinflammatory and anti-inflammatory cytokines, the former of which induces organ-specific autoimmune diseases. From the vantage of these insights, they address the role of cytokines in a wide variety of autoimmune diseases, uvetis, encephalomyelitis, multiple sclerosis, human type 1 diabetes, rheumatoid arthritis, SLE, and myasthenia gravis. Authoritative and state-of-the-art, Cytokines and Autoimmune Disease highlights the enormous therapeutic potential of cytokine modulation in the treatment of autoimmune disease.

Presenting a wealth of new data on the interaction among T-cell subsets and cytokines, this book offers a fresh perspective on infectious diseases. It provides useful insights into the nature and treatment of helminthic and mycobacterial infections, with special emphasis on leprosy, leishmaniasis, malaria and trypanosomiasis. The outcome of the host response to infectious agent is seen as depending upon the T-cell subsets activated and the cytokines produced by them and other cells, such as macrophages, B cells and basophils. Experts contributions shed new light on how TH0 cells are preferentially activated and differentiated into TH1 or TH2 subsets; TH1 and TH2 cells and their cytokines induce both protective immune responses and adverse immune reactions to infectious agents; cytokines modulate the response of infectious diseases to chemotherapy; and cytokines, their receptors and antagonist, and anti-cytokine antibodies can be used in therapy. Those working in the fields of immunology, parasitology, microbiology and vaccine development particularly if they are interested in tropical diseases, will find the volume an invaluable source of information.

Cytokines are polypeptide mediators which act as communication signals among cells of the immune system as well as among other cells and tissues in the body. They are a heterogeneous and complex group and include interferons, tumor necrosis factor and chemokines. They play a key role in homeostasis and inhost defense and are involved in such inflammatory and autoimmune diseases such as rheumatoid arthritis as well as infectious diseases such as HIV infection and septic shock. Modulation of the production and action of cytokines, as well as their exploitation as therapeutic agents has been the object of intense and competitive research. This book overviews the field of cytokine research and describes the various approaches that have been taken to develop the pharmacology of these novel mediators. The pharmacology of cytokines is an exploding area which is entering the clinical arena. The book in the framework of the immunobiology of cytokines, examines the interactions with the cytokine system of a variety of compounds ranging from simple synthetic chemicals to biotechnological products. In addition to examinig individual agents and approaches, the book examines the pathophysiology of individual body systems and analyzes specific contexts for the pathophysiology of these mediators as well as pharmacological approaches for their control.

At the time of the first edition of Principles of Cancer Biotherapy in 1987, this book represented the first comprehensive textbook on biological therapy. In 1991, when the second edition was published, there was still some doubt on the part of many oncologists and cancer researchers as to the therapeutic value of these new approaches. By 2003 and the fourth edition, it was generally agreed that biopharmaceuticals were producing major opportunities for new cancer therapies. Cancer biotherapy has now truly matured into the fourth modality of cancer treatment. This fifth revised edition describes the tremendous progress that has been made in recent years using biologicals in cancer treatment. This book summarizes an evolving science and a rapidly changing medical practice in biotherapy. In this new millennium, it is now possible to envision a much more diversified system of cancer research and treatment that will afford greater opportunities for a patient’s personalized cancer treatment. This was first envisioned in the 1987 initial edition of this textbook and is now a “new” and popular approach to cancer treatment. Some forms of cancer biotherapy use the strategy of tumor stabilization and control through continued biological therapy, akin to the use of insulin in the treatment

of diabetes. This textbook illustrates new methods of thinking and new strategies for control of cancer. It is always difficult to move from past dogma to future opportunity, but this fifth edition of Principles of Cancer Biotherapy illustrates why it is so important to the patients for researchers and clinicians to explore and quickly apply these new opportunities in cancer biotherapy.

This book provides comprehensive coverage of the cytokines from a pharmacological approach. The chapters are presented in a consistent format allowing easy cross-reference, with sample diagrams and a summary table of essential facts for each chapter at the end of the book. Cytokines is unique in stressing cytokine biology and the application of research data to provide disease therapy. With 33 detailed and up-to-date chapters about individual cytokines, this comprehensive reference will provide both clinicians and researchers in immunology and pharmacology with invaluable information. Genetic information and sequences Protein structure Cell sources and production Biological activity Cytokine receptor structure and signal transduction Discussion of the role of cytokines in disease and the potential for therapy Summary table of essential facts Comprehensive bibliography

The mechanism of autoantibodies cannot be explained without the detail knowledge of cytokines and interferon. These active molecules of immunology are very much dependent on each other and their function cannot be completed without their interaction towards each other. Currently, this the most updated book on this subject that helps the readers/students to upgrade their knowledge by going through chapter by chapter. Contribution by the renounced authors across the globe makes this book really unique and consider as one of the most updated textbook on this subject. This book provides a comprehensive guide to the function and types of autoantibodies and cytokines in basic and clinical field.

Cytokines are soluble mediators of intercellular communication. They contribute to a chemical signalling language that regulates development, tissue repair, haemopoiesis, inflammation and the immune response. Potent cytokine polypepides have pleiotropic activities and functional redundancy. They act in a complex network where one cytokine can influence the production of, and response to, many other cytokines. In the past five years, this bewildering array of more than 100 effector molecules and associated cell surface receptors has been simplified by study of cytokine and cytokine receptor structure; elucidation of convergent intracellular signalling pathways; and molecular genetics, and targeted gene disruption to 'knock-out' production of individual cytokines in mice. It is also now clear that the pathophysiology of infectious, autoimmune and malignant disease can be partially explained by the induction of cytokines and the subsequent cellular response. Viral homologues exist for many cytokines and receptors and genetic variations in cytokine production may influence response to pathogenic stimuli. Cytokine and cytokine antagonists have shown therapeutic potential in a number of chronic and acute diseases. The Cytokine Network: Frontiers in Molecular Biology is not a survey of individual cytokines, but guides the reader through the latest research on the cytokine network as a whole covering genomics, signalling pathways, control of the immune response, and therapeutics.

The book describes the mechanisms involved in the maintenance of neuroendocrine-immune interactions in ageing. The lack of this maintenance leads to the appearance of age-related diseases (cancer, infections, dementia) and subsequent disability. The capacity of some hormones or nutritional factors in restoring and remodelling the neuroendocrine-immune response during ageing is reported presenting possible new anti-ageing strategies in order to reach healthy ageing and longevity.

Regulation of Superantigen-induced Cytokine ProductionCytokine InhibitorsCRC Press

Tumor Immunology and Immunotherapy - Cellular Methods Part B, Volume 632, the latest release in the Methods in Enzymology series, continues the legacy of this premier serial with quality chapters authored by leaders in the field. Topics covered include Quantitation of calreticulin exposure associated with immunogenic cell death, Side-by-side comparisons of flow cytometry and immunohistochemistry for detection of calreticulin exposure in the course of immunogenic cell death, Quantitative determination of phagocytosis by bone marrow-derived dendritic cells via imaging flow cytometry, Cytofluorometric assessment of dendritic cell-mediated uptake of cancer cell apoptotic bodies, Methods to assess DC-dependent priming of T cell responses by dying cells, and more. Contains content written by authorities in the field Provides a comprehensive view on the topics covered Includes a high level of detail

Cytokines are pleiotropic regulatory proteins involved in essentially all biological processes and associated with a wide variety of diseases, including inflammatory disorders as well as many types of cancer and leukemia. Knowledge about the quantitative and qualitative nature of cytokine production is critical in the understanding of normal and pathological processes. The cytokine detection in biological and clinical samples faces many challenges including their low abundance, the need to distinguish between active and latent cytokine forms, and the need to measure multiple cytokines in a single assay. This volume will provide a comprehensive collection of classic and cutting-edge methodologies that are currently used to analyze and quantify cytokines and their biological activities in complex biological and clinical samples. The chapters are divided into four main categories. The first group focuses on the immunodetection of released cytokines in tissue culture supernatants, plasma, serum and whole blood samples by immunoassays. These immunoassays measure the total concentrations of released cytokines regardless of their biological activity and include ELISA, flow cytometry, ELISPOT and the antibody-based proximity ligation. The second group will focus on the analysis of biologically active cytokines by bioassays using neutralizing antibodies, chemotaxis assay, cytokine-induced cell degranulation assay, cell proliferation and differentiation, cytokine-induced cytokine production and the radioreceptor cytokine assay. The third group focuses on the analysis of intracellular cytokines by flow cytometry, western blotting and fluorescence and confocal microscopy. In addition, this category includes protocols for quantitative analysis of cytokine gene expression by real time RT-PCR and analysis of the cytokine promoter occupancy by chromatin immunoprecipitation. The fourth group focuses on the recently developed multiplex arrays that can measure multiple cytokines in the same sample at the same time. This group includes quantification of multiple cytokines using

cytometric bead arrays, ELISPOT assays, proteomics cytokine evaluation, multiplexed proximity ligation assays for high-throughput cytokine analysis and finally, cytokine gene expression analysis by gene arrays. The protocols will be written by experienced basic and clinical researchers with hands-on knowledge of the described protocols. By covering a broad variety of methods used in cytokine detection and analysis, this book will be of interest not only to biochemists, molecular biologists and immunologists but also to physician-scientists working in the field of cytokine research.

This book guides the reader through the latest research on the cytokine network, covering signaling pathways, control of the immune response, and potential therapeutics. Different cytokines stimulate diverse responses in various phases of inflammation and immunity, including the innate immune response, the generation of effector T cells, and the development of antibodies by the humoral immune system. It is now clear that the pathophysiology of many infectious, autoimmune, allergic, and malignant diseases can be largely explained by which cytokines are induced and subsequently regulate the cellular responses. In clinical medicine, cytokines are involved in a wide spectrum of diseases. This book describes in three parts the properties and roles of 15 key cytokines under physiological and pathological conditions. Part I presents nine cytokines associated with inflammatory disorders, pro-inflammatory cytokines, and the recently identified new helper T (Th) subset: Th17 cells. Part II gives details of three cytokines associated with allergic disorders, including Th2 responses and recently identified types of innate cells. Part III describes three cytokines that are associated with immunological tolerance and anti-inflammation, including regulatory T (Treg) cells, IL-10-producing Treg (Tr1) cells, and inducible IL-35-producing Treg (iTr35) cells. Cytokines are considered to be important as therapeutic targets for specific agonists or antagonists in numerous immune and inflammatory diseases. The ultimate goal of this book is to facilitate the development of therapeutic treatments for such diseases which has been limited by an insufficient understanding of the biology of cytokines and the complicated network that they create.

Intercellular Signaling Peptides and Proteins: Advances in Research and Application: 2011 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Intercellular Signaling Peptides and Proteins. The editors have built Intercellular Signaling Peptides and Proteins: Advances in Research and Application: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Intercellular Signaling Peptides and Proteins in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Intercellular Signaling Peptides and Proteins: Advances in Research and Application: 2011 Edition has been produced by the world’s leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.

Compiling an up-to-date and detailed survey of the role cytokines play in cell-to-cell communication, development, and differentiation, this comprehensive reference highlights the medical advantages of cytokine inhibition and pursues novel methods of discovery for more potent and specific blocking agents. Investigates the pathogenic role of

Immunotherapy is an innovative, leading and valuable approach to the treatment and control of many diseases. It can solve many problems of public health worldwide. Many people in numerous countries are suffering from a wide range of diseases (communicable and non-communicable) that can be cured or controlled by the immune system and immunotherapy. Some immunological diseases (i.e. allergic reactions and asthma, autoimmune disease, immunodeficiency disease, hypersensitivity reactions, etc.) have immune response pathophysiology and by controlling immune system mechanisms, these diseases can be controlled and cured. Immunoregulatory Aspects of Immunotherapy focuses on immune system mechanism, diagnosis, treatment and other related problems. The chapters have applicable and scientific data in immunotherapeutic approaches based on medical sciences, and would be of benefit to all researchers in immunology, allergy and asthma fields. The book discusses the prevention, diagnosis, treatment and follow-up of patients who have dangerous diseases. We hope this book will be a new approach to the immunotherapy of diseases and will improve public health and wellbeing.

This volume is based on the program of the International Conference on Drugs of Abuse, Immunity and Immunodeficiency held in Clearwater Beach, Florida. It was sponsored by the University of South Florida College of Medicine with the support of the National Institute on Drug Abuse. During the past few decades, drugs of abuse, including marijuana, cocaine, opiates and alcohol, have been studied by biomedical scientists in terms of the systemic effects of the drugs as well as alterations in neurophysiology and the psychology. More recently, the scope of such investigations has been broadened to include alterations within the immune system, and the influence of altered immunity on physiological and psychological consequences of drug abuse. In this regard, participants in the Clearwater Beach conference provided new information concern ing both basic and clinical aspects of drugs of abuse and immunity, especially immunodeficiency. Advances have been made in recent years in understanding the nature and mechanisms regulating the immune response and the mechanisms by which drugs may influence immune responses. In particular, the emergence of psychoneuroimmunology as a new discipline has heightened interest in immune responses influenced by psychoactive drugs. This has resulted in interdisciplinary investigations involving clinical and basic scientists including microbiologists, immu nologists, physiologists, psychiatrists, oncologists and others. The recreational use of the above mentioned drugs by large numbers of individuals has aroused serious concern about the consequences of this activity.

Among the deadliest type of cancers, lung cancer faces several challenges in diagnosis and treatment: late diagnosis and misdiagnosis, inadequate tumor sampling, and resistance development to current therapies, among others. Together with advances in the understanding of molecular features, factors, and mechanisms involved in initiation and tumor progression, important improvements have occurred in diagnostics and therapeutics in the shape of advances in

molecular genotyping, procedures for sampling, new potential, and less invasive sources of samples for the diagnosis and development of new targeted therapies. The aim of this book is to provide an exciting read on strategies in the diagnosis and therapy of lung cancer.

Every aspect of immune function and host defense is dependent upon a proper supply and balance of nutrients. Severe malnutrition can cause significant alteration in immune response, but even subclinical deficits may be associated with an impaired immune response, and an increased risk of infection. Infectious diseases have accounted for more off-duty days during major wars than combat wounds or nonbattle injuries. Combined stressors may reduce the normal ability of soldiers to resist pathogens, increase their susceptibility to biological warfare agents, and reduce the effectiveness of vaccines intended to protect them. There is also a concern with the inappropriate use of dietary supplements. This book, one of a series, examines the impact of various types of stressors and the role of specific dietary nutrients in maintaining immune function of military personnel in the field. It reviews the impact of compromised nutrition status on immune function; the interaction of health, exercise, and stress (both physical and psychological) in immune function; and the role of nutritional supplements and newer biotechnology methods reported to enhance immune function. The first part of the book contains the committee's workshop summary and evaluation of ongoing research by Army scientists on immune status in special forces troops, responses to the Army's questions, conclusions, and recommendations. The rest of the book contains papers contributed by workshop speakers, grouped under such broad topics as an introduction to what is known about immune function, the assessment of immune function, the effect of nutrition, and the relation between the many and varied stresses encountered by military personnel and their effect on health.

Streptococci and enterococci are the etiologic agents of infectious diseases that rank among the most severe in human pathology. The diagnosis, antibiotherapy, and prevention of the streptococcal diseases have improved considerably. However, the reemergence of severe streptococcal and enterococcal diseases constitutes a growing public health con cern, which remains open to scientific and medical debate. The XIII'h Lancefield International Symposium on Streptococci and Streptococcal Diseases, held at Institut Pasteur, Paris, France, September 16---2el, 1996, attracted 505 par ticipants from 43 countries. Twenty-two percent of the participants were students, a clear sign of the intense interest in this field. Of the 390 presentations made at the symposium, 260 were submitted as manuscripts for the Proceedings; we have included 249 of these in this volume. This symposium provided a forum for the presentation of the most recent findings and approaches to understanding several important fields, such as new aspects of infec tion, bacteria~host interactions, epidemiology, and molecular genetics of streptococci and enterococci. Over the last three years, the study of these subjects has expanded as increas ingly sophisticated methods of molecular analysis have been applied to investigate the bi ology of pathogenic streptococci and enterococci. Virulence, vaccine strategies, genetics, antibiotic resistance, epidemiology, and immunology are now being examined through the lens of molecular biology. The application of recently developed techniques to this field will continue to yield insight into the mechanism by which these organisms cause disease.

Lipids are functionally versatile molecules. They have evolved from relatively simple hydrocarbons that serve as depot storages of metabolites and barriers to the permeation of solutes into complex compounds that perform a variety of signalling functions in higher organisms. This volume is devoted to the polar lipids and their constituents. We have omitted the neutral lipids like fats and oils because their function is generally to act as deposits of metabolizable substrates. The sterols are also outside the scope of the present volume and the reader is referred to volume 28 of this series which is the subject of cholesterol. The polar lipids are comprised of fatty acids attached to either glycerol or sphingosine. The fatty acids themselves constitute an important reservoir of substrates for conversion into families of signalling and modulating molecules including the eicosanoids amongst which are the prostaglandins, thromboxanes and leucotrienes. The way fatty acid metabolism is regulated in the liver and how fatty acids are desaturated are subjects considered in the first part of this volume. This section also deals with the modulation of protein function and inflammation by unsaturated fatty acids and their derivatives. New insights into the role of fatty acid synthesis and eicosenoid function in tumour progression and metastasis are presented.

International Review of Experimental Pathology, Volume 34: Cytokine-Induced Pathology Part B: Inflammatory Cytokines, Receptors, and Disease presents experimental findings obtained from the most recently studied cytokines and growth factors. The book is organized into three sections. Section I contains studies on pathology induced by inflammatory cytokines. Topics covered include the biological effects of interferon-?, tumor necrosis factor- ? (TNF), interleukin-8, transforming growth factor-?, and leukemia inhibitory factor on experimental animals; TNF-induced pathophysiologic alterations; and the biological activity of leukemia inhibitory factor (LIF). The papers in Section II examine cytokine receptors, including their structure and signal transduction; interferon-? (IFN-?) activity; and immunoregulatory role of TNF-?. Section III is devoted to cytokine receptors, including studies on TNF properties relevant to tissue injury and its role in T cell-mediated immunopathological reactions in vivo; the role of cytokines in experimental pulmonary fibrosis induced in mice; and the role of cytokines in bacterial meningitis.

This book brings together basic scientists or clinicians from a variety of different backgrounds - immunology, infectious diseases or critical care - who share a common interest in understanding the changes that occur in immune responses in sepsis. It provides an up-to-date and unrivalled synthesis of current research in this rapidly developing field.

Immune Response Activation and Immunomodulation has been written to address the perceived needs of both medical school and undergraduate curricula and to take advantage of new understandings in immunology. We have tried to achieve several goals and present the most important principles governing the function of the immune system. Our fundamental objective has been to synthesize the key concepts from the vast amount of experimental data that have emerged in the rapidly advancing field of immunology. The choice of what is most important is based on what is most clearly established by experimentation, what our

students find puzzling, and what explains the wonderful efficiency and economy of the immune system. Inevitably, however, such a choice will have an element of bias, and our bias is toward emphasizing the cellular interactions in immune response by limiting the description of many of the underlying biochemical and molecular mechanisms to the essential facts. This book gives an insight into the role of cytokines in activating immune response during pathogenic invasion. Immunomodulation, aryl hydrocarbons, the role of the protein defensin and nucleated cells in provoking immune response, Bcl protein/gene-based apoptotic pathways, and plant-derived phytochemical-mediated immune response are all central themes of this book.

Dendrimers are important molecules that are currently undergoing investigation for use in a variety of different biomedical applications. This book explores the use of dendrimers for a variety of potential functions, including antiamyloidogenic agents, drug delivery systems, nucleic acid and RNA delivery vectors and to produce hybrid fibre platforms for nantechnology. Following the work of COST action TD0802, the main objective of which is to improve existing therapies and find new drugs based on dendrimers, the book will provide comprehensive coverage of dendrimer applications. Coverage includes modelling and molecular dynamic studies of dendrimers and dendrons, anionic dendrimer polymers, cationic carbosilane dendrimers and self-assembled multivalent dendrimers. Providing clear indications for future research and applications, this text will appeal to chemists, biologists and materials scientists, working in both academia and industry.

Within the past few years, it has become recognized that the immune system communicates to the brain. Substances released from activated immune cells (cytokines) stimulate peripheral nerves, thereby signaling the brain and spinal cord that infection/inflammation has occurred. Additionally, peripheral infection/inflammation leads to de novo synthesis and release of cytokines within the brain and spinal cord. Thus, cytokines effect neural activation both peripherally and centrally. Through this communication pathway, cytokines such as interleukin-1, interleukin-6 and tumor necrosis factor markedly alter brain function, physiology and behavior. One important but underrecognized aspect of this communication is the dramatic impact that immune activation has on pain modulation. The purpose of this book is to examine, for the first time, immune-to-brain communication from the viewpoint of its effect on pain processing. It is aimed both at the basic scientist and health care providers, in order to clarify the major role that substances released by immune cells play in pain modulation. This book contains chapters contributed by all of the major laboratories focused on understanding how cytokines modulate pain. These chapters provide a unique vantage point from which to examine this question, as the summarized work ranges from evolutionary approaches across diverse species, to the basics of the immune response, to the effect of cytokines on peripheral and central nervous system sites, to therapeutic potential in humans.

Cytokines have become established as key mediators of the signs and symptoms of inflammatory diseases such as arthritis, dermatitis, asthma and multiple sclerosis. Furthermore, they are involved in the cascade of events leading to cardiovascular shock and are major regulators of the function of immune cells. This book reviews recent advances in the development of new anti-inflammatory drugs. It addresses different therapeutic intervention possibilities for new drugs, such as the cellular source of cytokines, specific receptors which induce cytokine synthesis, intracellular regulators of cytokine gene induction and expression, secretion and activation of cytokines, cytokine receptors and signalling pathways from these receptors. Accordingly, experts were drawn from different backgrounds including academic research institutes, the pharmaceutical industry and clinical pharmacology. In each area, the opportunities for drug development are highlighted and, where possible, clinical data is reviewed.