

GLYCOPROTEINS

GLYCOPROTEINS ARE ESSENTIAL BIOMOLECULES CHARACTERIZED BY THE COVALENT ATTACHMENT OF CARBOHYDRATE GROUPS TO PROTEINS. THESE MACROMOLECULES PLAY CRITICAL ROLES IN NUMEROUS BIOLOGICAL PROCESSES, INCLUDING CELL-CELL COMMUNICATION, IMMUNE RESPONSE, AND MOLECULAR RECOGNITION. FOUND ON THE SURFACES OF CELLS AND WITHIN BODILY FLUIDS, GLYCOPROTEINS ARE INTEGRAL TO MAINTAINING CELLULAR FUNCTION AND ORGANISMAL HOMEOSTASIS. THEIR DIVERSE STRUCTURES AND FUNCTIONS HAVE MADE GLYCOPROTEINS A SIGNIFICANT FOCUS IN BIOCHEMISTRY, MOLECULAR BIOLOGY, AND MEDICAL RESEARCH. THIS ARTICLE EXPLORES THE STRUCTURE, BIOSYNTHESIS, BIOLOGICAL ROLES, AND APPLICATIONS OF GLYCOPROTEINS, PROVIDING A COMPREHENSIVE OVERVIEW OF THEIR IMPORTANCE IN BOTH HEALTH AND DISEASE.

- STRUCTURE AND CLASSIFICATION OF GLYCOPROTEINS
- BIOSYNTHESIS AND PROCESSING
- BIOLOGICAL FUNCTIONS AND ROLES
- GLYCOPROTEINS IN DISEASE AND THERAPEUTICS
- ANALYTICAL TECHNIQUES FOR GLYCOPROTEIN STUDY

STRUCTURE AND CLASSIFICATION OF GLYCOPROTEINS

UNDERSTANDING THE STRUCTURAL CHARACTERISTICS OF GLYCOPROTEINS IS FUNDAMENTAL TO APPRECIATING THEIR DIVERSE BIOLOGICAL FUNCTIONS. GLYCOPROTEINS CONSIST OF A PROTEIN BACKBONE COVALENTLY LINKED TO CARBOHYDRATE MOETIES, WHICH CAN VARY GREATLY IN COMPOSITION AND COMPLEXITY.

TYPES OF GLYCOSYLATION

GLYCOSYLATION REFERS TO THE ENZYMATIC PROCESS BY WHICH CARBOHYDRATE CHAINS ARE ATTACHED TO PROTEINS. THE TWO MAIN TYPES OF GLYCOSYLATION IN GLYCOPROTEINS ARE N-LINKED AND O-LINKED GLYCOSYLATION. N-LINKED GLYCOSYLATION INVOLVES THE ATTACHMENT OF OLIGOSACCHARIDES TO THE NITROGEN ATOM OF ASPARAGINE SIDE CHAINS, WHEREAS O-LINKED GLYCOSYLATION ATTACHES SUGARS TO THE OXYGEN ATOM OF SERINE OR THREONINE RESIDUES.

CARBOHYDRATE COMPONENTS

THE CARBOHYDRATE PORTION OF GLYCOPROTEINS COMMONLY INCLUDES MONOSACCHARIDES SUCH AS GLUCOSE, MANNOSE, GALACTOSE, N-ACETYLGLUCOSAMINE, FUCOSE, AND SIALIC ACID. THESE SUGARS CAN BE ARRANGED IN VARIOUS BRANCHING PATTERNS, INFLUENCING THE GLYCOPROTEIN'S PROPERTIES AND INTERACTIONS.

CLASSIFICATION BASED ON FUNCTION AND LOCATION

GLYCOPROTEINS CAN BE BROADLY CLASSIFIED BASED ON THEIR BIOLOGICAL ROLES AND CELLULAR LOCALIZATION, SUCH AS MEMBRANE GLYCOPROTEINS, SECRETED GLYCOPROTEINS, AND EXTRACELLULAR MATRIX GLYCOPROTEINS. EACH CATEGORY EXHIBITS DISTINCT STRUCTURAL FEATURES TAILORED TO THEIR SPECIFIC FUNCTIONS.

- **MEMBRANE GLYCOPROTEINS:** INVOLVED IN CELL SIGNALING AND ADHESION.

- **SECRETED GLYCOPROTEINS:** FUNCTION AS HORMONES, ENZYMES, OR IMMUNE MEDIATORS.
- **EXTRACELLULAR MATRIX GLYCOPROTEINS:** PROVIDE STRUCTURAL SUPPORT AND MEDIATE CELL-MATRIX INTERACTIONS.

BIOSYNTHESIS AND PROCESSING

THE BIOSYNTHESIS OF GLYCOPROTEINS IS A COMPLEX, TIGHTLY REGULATED PROCESS THAT OCCURS PRIMARILY IN THE ENDOPLASMIC RETICULUM (ER) AND GOLGI APPARATUS. THIS PROCESS ENSURES THE CORRECT FOLDING, MODIFICATION, AND TRAFFICKING OF GLYCOPROTEINS TO THEIR FUNCTIONAL DESTINATIONS.

N-LINKED GLYCOSYLATION PATHWAY

THE N-LINKED GLYCOSYLATION PATHWAY BEGINS IN THE ER, WHERE A PRE-ASSEMBLED OLIGOSACCHARIDE IS TRANSFERRED EN BLOC TO NASCENT POLYPEPTIDE CHAINS. SUBSEQUENT TRIMMING AND PROCESSING IN THE GOLGI APPARATUS GENERATE MATURE GLYCOPROTEINS WITH DIVERSE GLYCAN STRUCTURES.

O-LINKED GLYCOSYLATION PATHWAY

O-LINKED GLYCOSYLATION OCCURS MAINLY IN THE GOLGI APPARATUS, WHERE MONOSACCHARIDES ARE SEQUENTIALLY ADDED TO SERINE OR THREONINE RESIDUES. THIS PATHWAY ALLOWS FOR GREATER VARIABILITY IN GLYCAN STRUCTURES COMPARED TO N-LINKED GLYCOSYLATION.

QUALITY CONTROL MECHANISMS

CELLS EMPLOY STRINGENT QUALITY CONTROL SYSTEMS DURING GLYCOPROTEIN SYNTHESIS TO ENSURE PROPER FOLDING AND FUNCTION. MISFOLDED GLYCOPROTEINS ARE TYPICALLY TARGETED FOR DEGRADATION TO PREVENT CELLULAR DYSFUNCTION.

BIOLOGICAL FUNCTIONS AND ROLES

GLYCOPROTEINS FULFILL A WIDE ARRAY OF BIOLOGICAL FUNCTIONS THAT ARE CRITICAL FOR CELLULAR COMMUNICATION, IMMUNE DEFENSE, AND PHYSIOLOGICAL REGULATION. THEIR CARBOHYDRATE MOETIES OFTEN MEDIATE SPECIFIC INTERACTIONS WITH OTHER BIOMOLECULES.

CELL-CELL RECOGNITION AND ADHESION

MANY GLYCOPROTEINS ON THE CELL SURFACE SERVE AS RECOGNITION MOLECULES THAT FACILITATE CELL ADHESION AND COMMUNICATION. THESE INTERACTIONS ARE ESSENTIAL DURING DEVELOPMENT, IMMUNE RESPONSES, AND TISSUE REPAIR.

IMMUNE SYSTEM MODULATION

GLYCOPROTEINS SUCH AS ANTIBODIES AND CYTOKINE RECEPTORS PLAY PIVOTAL ROLES IN MODULATING IMMUNE RESPONSES. THE GLYCAN STRUCTURES ON THESE PROTEINS INFLUENCE THEIR STABILITY, ACTIVITY, AND INTERACTIONS WITH OTHER IMMUNE COMPONENTS.

RECEPTOR FUNCTIONS AND SIGNAL TRANSDUCTION

MEMBRANE-BOUND GLYCOPROTEINS ACT AS RECEPTORS FOR HORMONES, GROWTH FACTORS, AND NEUROTRANSMITTERS, INITIATING INTRACELLULAR SIGNALING CASCADES THAT REGULATE CELLULAR ACTIVITIES.

PROTECTION AND STRUCTURAL INTEGRITY

GLYCOPROTEINS CONTRIBUTE TO PROTECTING CELLS FROM MECHANICAL AND CHEMICAL DAMAGE, AND THOSE IN THE EXTRACELLULAR MATRIX HELP MAINTAIN TISSUE STRUCTURE AND ELASTICITY.

- MEDIATE CELL COMMUNICATION AND ADHESION
- MODULATE IMMUNE RESPONSES AND PATHOGEN RECOGNITION
- SERVE AS RECEPTORS FOR SIGNALING MOLECULES
- PROVIDE STRUCTURAL SUPPORT AND PROTECTION

GLYCOPROTEINS IN DISEASE AND THERAPEUTICS

ALTERATIONS IN GLYCOPROTEIN STRUCTURE AND FUNCTION ARE IMPLICATED IN NUMEROUS DISEASES, INCLUDING CANCER, AUTOIMMUNE DISORDERS, AND INFECTIOUS DISEASES. UNDERSTANDING THESE CHANGES HAS LED TO ADVANCES IN DIAGNOSTICS AND THERAPEUTICS.

ROLE IN CANCER

ABERRANT GLYCOSYLATION PATTERNS ON GLYCOPROTEINS CAN PROMOTE TUMOR PROGRESSION, METASTASIS, AND IMMUNE EVASION. CERTAIN GLYCOPROTEIN MARKERS ARE WIDELY USED IN CANCER DIAGNOSIS AND PROGNOSIS.

AUTOIMMUNE AND INFECTIOUS DISEASES

DEFECTIVE GLYCOPROTEIN EXPRESSION OR GLYCAN MODIFICATIONS CAN TRIGGER AUTOIMMUNE REACTIONS OR ALTER PATHOGEN RECOGNITION. MANY VIRUSES AND BACTERIA EXPLOIT HOST GLYCOPROTEINS TO FACILITATE INFECTION.

THERAPEUTIC APPLICATIONS

GLYCOPROTEINS ARE INTEGRAL TO THE DEVELOPMENT OF BIOPHARMACEUTICALS, INCLUDING MONOCLONAL ANTIBODIES AND VACCINES. GLYCOENGINEERING TECHNIQUES IMPROVE THE EFFICACY AND STABILITY OF THESE THERAPEUTICS.

- CANCER BIOMARKERS AND TARGETED THERAPIES
- VACCINE DEVELOPMENT INVOLVING GLYCOPROTEIN ANTIGENS
- MONOCLONAL ANTIBODIES WITH OPTIMIZED GLYCOSYLATION
- DIAGNOSTIC TOOLS BASED ON GLYCOPROTEIN DETECTION

ANALYTICAL TECHNIQUES FOR GLYCOPROTEIN STUDY

STUDYING GLYCOPROTEINS REQUIRES SPECIALIZED ANALYTICAL METHODS TO CHARACTERIZE BOTH THE PROTEIN AND CARBOHYDRATE COMPONENTS. ADVANCES IN TECHNOLOGY HAVE ENHANCED THE ABILITY TO ANALYZE GLYCOPROTEIN STRUCTURE AND FUNCTION.

MASS SPECTROMETRY

MASS SPECTROMETRY IS A POWERFUL TOOL FOR IDENTIFYING GLYCOSYLATION SITES AND ANALYZING GLYCAN STRUCTURES WITH HIGH SENSITIVITY AND PRECISION.

CHROMATOGRAPHY AND ELECTROPHORESIS

TECHNIQUES SUCH AS HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC) AND CAPILLARY ELECTROPHORESIS SEPARATE GLYCOPROTEINS AND THEIR GLYCAN MOETIES BASED ON SIZE, CHARGE, AND AFFINITY.

LECTIN-BASED METHODS

LECTINS ARE CARBOHYDRATE-BINDING PROTEINS USED IN AFFINITY CHROMATOGRAPHY AND BLOTTING TECHNIQUES TO DETECT SPECIFIC GLYCAN STRUCTURES ON GLYCOPROTEINS.

IMMUNOASSAYS

ANTIBODY-BASED ASSAYS ENABLE THE QUANTIFICATION AND LOCALIZATION OF GLYCOPROTEINS IN BIOLOGICAL SAMPLES, AIDING IN BOTH RESEARCH AND CLINICAL DIAGNOSTICS.

- MASS SPECTROMETRY FOR DETAILED GLYCAN ANALYSIS
- CHROMATOGRAPHIC SEPARATION OF GLYCOPROTEINS AND GLYCANS
- LECTIN AFFINITY TECHNIQUES FOR GLYCAN DETECTION
- IMMUNOASSAYS FOR GLYCOPROTEIN QUANTIFICATION

FREQUENTLY ASKED QUESTIONS

WHAT ARE GLYCOPROTEINS?

GLYCOPROTEINS ARE MOLECULES THAT CONSIST OF A PROTEIN BACKBONE COVALENTLY BONDED TO CARBOHYDRATE CHAINS. THEY PLAY ESSENTIAL ROLES IN CELL-CELL RECOGNITION, SIGNALING, AND IMMUNE RESPONSES.

HOW ARE GLYCOPROTEINS SYNTHESIZED IN THE CELL?

GLYCOPROTEINS ARE SYNTHESIZED IN THE ENDOPLASMIC RETICULUM AND GOLGI APPARATUS, WHERE CARBOHYDRATE CHAINS ARE ENZYMATICALLY ATTACHED TO SPECIFIC AMINO ACID RESIDUES ON THE PROTEIN.

WHAT IS THE SIGNIFICANCE OF GLYCOPROTEINS IN THE IMMUNE SYSTEM?

GLYCOPROTEINS ARE CRUCIAL IN THE IMMUNE SYSTEM FOR CELL RECOGNITION AND SIGNALING, INCLUDING ROLES IN ANTIBODIES, MAJOR HISTOCOMPATIBILITY COMPLEX (MHC) MOLECULES, AND CELL SURFACE RECEPTORS.

HOW DO GLYCOPROTEINS AFFECT VIRAL INFECTIONS?

MANY VIRUSES HAVE GLYCOPROTEINS ON THEIR SURFACE THAT FACILITATE ATTACHMENT AND ENTRY INTO HOST CELLS, MAKING GLYCOPROTEINS KEY TARGETS FOR ANTIVIRAL DRUGS AND VACCINES.

WHAT TECHNIQUES ARE USED TO STUDY GLYCOPROTEINS?

TECHNIQUES SUCH AS MASS SPECTROMETRY, LECTIN AFFINITY CHROMATOGRAPHY, AND GLYCAN SEQUENCING ARE COMMONLY USED TO ANALYZE THE STRUCTURE AND FUNCTION OF GLYCOPROTEINS.

CAN GLYCOPROTEINS BE USED AS BIOMARKERS FOR DISEASES?

YES, CHANGES IN GLYCOPROTEIN EXPRESSION OR GLYCOSYLATION PATTERNS ARE OFTEN ASSOCIATED WITH DISEASES LIKE CANCER, MAKING THEM USEFUL BIOMARKERS FOR DIAGNOSIS AND PROGNOSIS.

WHAT ROLE DO GLYCOPROTEINS PLAY IN CELL ADHESION?

GLYCOPROTEINS ON THE CELL SURFACE MEDIATE CELL ADHESION BY INTERACTING WITH OTHER CELLS OR THE EXTRACELLULAR MATRIX, WHICH IS ESSENTIAL FOR TISSUE FORMATION AND WOUND HEALING.

HOW DOES GLYCOSYLATION AFFECT PROTEIN FUNCTION?

GLYCOSYLATION CAN INFLUENCE PROTEIN FOLDING, STABILITY, ACTIVITY, AND LOCALIZATION, THEREBY AFFECTING THE PROTEIN'S OVERALL FUNCTION AND INTERACTIONS.

ARE GLYCOPROTEINS INVOLVED IN BLOOD GROUP DETERMINATION?

YES, GLYCOPROTEINS ON RED BLOOD CELL SURFACES CARRY BLOOD GROUP ANTIGENS, SUCH AS ABO BLOOD GROUPS, WHICH ARE IMPORTANT FOR BLOOD TRANSFUSIONS AND IMMUNE COMPATIBILITY.

ADDITIONAL RESOURCES

1. *GLYCOPROTEINS: STRUCTURE, FUNCTION, AND CLINICAL IMPLICATIONS*

THIS COMPREHENSIVE BOOK EXPLORES THE INTRICATE STRUCTURES OF GLYCOPROTEINS AND THEIR DIVERSE BIOLOGICAL FUNCTIONS. IT DELVES INTO THE ROLE OF GLYCOPROTEINS IN CELL SIGNALING, IMMUNE RESPONSE, AND DISEASE PROGRESSION. THE CLINICAL IMPLICATIONS SECTION HIGHLIGHTS RECENT ADVANCES IN DIAGNOSTICS AND THERAPEUTICS INVOLVING GLYCOPROTEINS.

2. *ESSENTIALS OF GLYCOBIOLOGY*

A FOUNDATIONAL TEXT IN THE FIELD, THIS BOOK COVERS THE BASICS OF GLYCOBIOLOGY WITH A STRONG EMPHASIS ON GLYCOPROTEINS. IT EXPLAINS THE BIOSYNTHESIS AND METABOLISM OF GLYCOPROTEINS AND THEIR SIGNIFICANCE IN CELLULAR COMMUNICATION. THE CLEAR ILLUSTRATIONS AND DETAILED EXPLANATIONS MAKE IT AN ESSENTIAL RESOURCE FOR STUDENTS AND RESEARCHERS ALIKE.

3. *GLYCOPROTEIN ANALYSIS: METHODS AND PROTOCOLS*

FOCUSED ON LABORATORY TECHNIQUES, THIS VOLUME PRESENTS A VARIETY OF METHODS FOR ANALYZING GLYCOPROTEINS, INCLUDING MASS SPECTROMETRY AND CHROMATOGRAPHY. IT PROVIDES STEP-BY-STEP PROTOCOLS FOR GLYCOPROTEIN PURIFICATION, CHARACTERIZATION, AND FUNCTIONAL ASSAYS. RESEARCHERS WILL FIND VALUABLE TIPS FOR TROUBLESHOOTING AND OPTIMIZING EXPERIMENTAL WORKFLOWS.

4. *GLYCOPROTEINS IN IMMUNE REGULATION*

THIS BOOK INVESTIGATES THE CRITICAL ROLES GLYCOPROTEINS PLAY IN THE IMMUNE SYSTEM, INCLUDING ANTIGEN RECOGNITION AND IMMUNE CELL COMMUNICATION. IT DISCUSSES HOW ALTERATIONS IN GLYCOPROTEIN STRUCTURES CAN LEAD TO IMMUNE DISORDERS AND AUTOIMMUNE DISEASES. CASE STUDIES HIGHLIGHT THERAPEUTIC STRATEGIES TARGETING GLYCOPROTEINS TO MODULATE IMMUNE RESPONSES.

5. *ADVANCES IN GLYCOPROTEIN ENGINEERING*

DETAILING THE LATEST TECHNIQUES IN PROTEIN ENGINEERING, THIS BOOK FOCUSES ON MODIFYING GLYCOPROTEINS FOR ENHANCED STABILITY AND FUNCTION. IT COVERS GENETIC AND CHEMICAL METHODS TO ALTER GLYCOSYLATION PATTERNS AND IMPROVE THERAPEUTIC PROTEIN EFFICACY. EXAMPLES INCLUDE ENGINEERED ANTIBODIES AND ENZYMES WITH IMPROVED CLINICAL PERFORMANCE.

6. *GLYCOPROTEINS AND CANCER: MOLECULAR MECHANISMS AND THERAPEUTIC TARGETS*

THIS TEXT EXPLORES THE INVOLVEMENT OF GLYCOPROTEINS IN CANCER DEVELOPMENT AND METASTASIS. IT OUTLINES HOW ABERRANT GLYCOSYLATION AFFECTS TUMOR PROGRESSION AND IMMUNE EVASION. THE BOOK ALSO REVIEWS CURRENT AND EMERGING THERAPIES TARGETING GLYCOPROTEIN-RELATED PATHWAYS IN ONCOLOGY.

7. *GLYCOPROTEOMICS: TECHNOLOGIES AND APPLICATIONS*

DEDICATED TO THE FIELD OF GLYCOPROTEOMICS, THIS BOOK HIGHLIGHTS CUTTING-EDGE TECHNOLOGIES FOR LARGE-SCALE GLYCOPROTEIN ANALYSIS. IT DISCUSSES THE INTEGRATION OF BIOINFORMATICS TOOLS FOR DATA INTERPRETATION AND THE APPLICATION OF GLYCOPROTEOMICS IN BIOMARKER DISCOVERY. RESEARCHERS WILL GAIN INSIGHTS INTO TACKLING COMPLEX GLYCOPROTEIN DATASETS.

8. *THE ROLE OF GLYCOPROTEINS IN VIRAL INFECTIONS*

THIS BOOK EXAMINES HOW VIRAL GLYCOPROTEINS MEDIATE HOST CELL ENTRY AND IMMUNE EVASION. IT COVERS VARIOUS VIRUSES INCLUDING HIV, INFLUENZA, AND CORONAVIRUSES, DETAILING THE STRUCTURE-FUNCTION RELATIONSHIPS OF THEIR GLYCOPROTEINS. THE TEXT ALSO EXPLORES ANTIVIRAL STRATEGIES TARGETING VIRAL GLYCOPROTEINS TO PREVENT INFECTION.

9. *GLYCOPROTEINS IN NEUROBIOLOGY: STRUCTURE AND FUNCTION*

FOCUSING ON THE NERVOUS SYSTEM, THIS VOLUME DISCUSSES THE ROLES OF GLYCOPROTEINS IN NEURAL DEVELOPMENT, SYNAPTIC FUNCTION, AND NEURODEGENERATIVE DISEASES. IT HIGHLIGHTS HOW GLYCOPROTEIN ALTERATIONS CAN IMPACT NEUROLOGICAL DISORDERS SUCH AS ALZHEIMER'S AND PARKINSON'S DISEASE. THE BOOK COMBINES MOLECULAR INSIGHTS WITH POTENTIAL THERAPEUTIC APPROACHES.

[Glycoproteins](#)

Find other PDF articles:

<https://explore.gcts.edu/business-suggest-019/Book?ID=OnY30-2331&title=instant-loan-for-business.pdf>

glycoproteins: Glycoprotein and Proteoglycan Techniques J.G. Beeley, 2000-04-01 The past two decades have seen an expansion of interest in glycoproteins. From being a borderline area between carbohydrate and protein chemistry, it has become relevant to a wide range of biological phenomena. The aim of the book is to describe techniques which can be used to answer some of the basic questions about glycosylated proteins. Methods are discussed for isolation; compositional analysis; structure carbohydrate units; protein-carbohydrate linkages, keeping in mind the diverse nature of problems which readers may have to tackle.

glycoproteins: Glycoprotein Methods and Protocols Anthony P. Corfield, 2007-10-26 The mucins (mucus glycoproteins) have long been a complex corner of glycoprotein biology. While dramatic advances in the separation, structural analysis, biosynthesis, and degradation have marked

the progress in general glycoprotein understanding, the mucins have lagged behind. The reasons for this lack of progress have always been clear and are only now being resolved. The mucins are very large molecules; they are difficult to separate from other molecules present in mucosal secretions or membranes; they are often degraded owing to natural protective functions or to isolation methodology and their peptide and oligosaccharide structures are varied and complex.

Understanding these molecules has demanded progress in several major areas. Isolation techniques that protect the intact mucins and allow dissociation from other adsorbed but discrete molecules needed to be developed and accepted by all researchers in the field. Improved methods for the study of very large molecules with regard to their aggregation and polymerization were also needed. Structural analysis of the peptide domains and the multitude of oligosaccharide chains was required for smaller sample sizes, for multiple samples, and in shorter time. In view of these problems it is perhaps not surprising that the mucins have remained a dilemma, of obvious biological importance and interest, but very difficult to analyze.

glycoproteins: *Biochemistry of the Eye* Elaine R. Berman, 1991-04-30 My first introduction to the eye came more than three decades ago when my close friend and mentor, the late Professor Isaac C. Michaelson, convinced me that studying the biochemistry of ocular tissues would be a rewarding pursuit. I hastened to explain that I knew nothing about the subject, since relatively few basic biochemical studies on ocular tissues had appeared in the world literature. Professor Michaelson assured me, however, that two books on eye biochemistry had already been written. One of them, a beautiful monograph by Arlington Krause (1934) of Johns Hopkins Hospital, is well worth reading even today for its historical perspective. The other, published 22 years later, was written by Antoinette Pirie and Ruth van Heyningen (1956), whose pioneering achievements in eye biochemistry at the Nuffield Laboratory of Ophthalmology in Oxford, England are known throughout the eye research community and beyond. To their credit are classical investigations on retinal, corneal, and lens biochemistry, beginning in the 1940s and continuing for many decades thereafter. Their important book written in 1956 on the Biochemistry of the Eye is a volume that stood out as a landmark in this field for many years. In recent years, however, a spectacular amount of new information has been generated in ocular biochemistry. Moreover, there is increasing specialization among investigators in either a specific field of biochemistry or a particular ocular tissue.

glycoproteins: *Chemical Biology of Glycoproteins* Zhongping Tan, Lai-Xi Wang, 2017-03-20 Glycans play a vital role in modulating protein structure and function from involvement in protein folding, solubility and stability to regulation of tissue distribution, recognition specificity, and biological activity. They can act as both positive and negative regulators of protein function, providing an additional level of control with respect to genetic and environmental conditions. Due to the complexity of glycosylated protein forms, elucidating structural and functional information has been a challenging task for researchers but recent development of chemical biology-based tools and techniques is bridging these knowledge gaps. This book provides a thorough review of the current state of glycoprotein chemical biology, describing the development and application of glycoprotein and glycan synthesis technologies for understanding and manipulating protein glycosylation.

glycoproteins: *Glycoproteins I* J. Montreuil, J.F.G. Vliegenthart, H. Schachter, 1995-06-23 Part I covers modern advances in the determination of glycoprotein structure and in the biosynthesis of mammalian, bacterial, yeast, plant and insect glycoproteins. There are also two chapters on functional aspects (glycoprotein hormones and collagens). The content of the volume is very comprehensive in that, most contributors have focussed on discussing, in depth, the wealth of most recent advances in their field, and referring to previous reviews of older work for background information. This method can effectively produce a very wide subject coverage in a small number of chapters/volumes. The volume is an important information source for all glycobiologist researchers (senior investigators, post-doctoral fellows and graduate students), and as a good, comprehensive, reference text for scientists working in the life sciences.

glycoproteins: *Membrane Glycoproteins* R. Colin Hughes, 2014-05-20 Membrane Glycoproteins: A Review of Structure and Function deals with membrane glycoproteins found in

biological systems. The book describes the structure and biosynthesis of the glycoproteins in relation to known or postulated functions in membranes. The text opens with an introduction and a topic on detection and distribution of membrane glycoproteins. The book then notes that the isolation of membrane glycoproteins brought by the progress in research and technology of membrane solubilization and purification of the soluble components is now possible. Discussion is also directed to glycoproteins as being integral components of intracellular membranes, and not just located on cell surfaces. Through the structural analysis of glycoproteins produced by the secretory glands, analysis of human blood group antigens is available. Likewise, discoveries are made, explaining that lectins are useful reagents in detecting the type and numbers of glycoproteins found on cellular members. Lectins are likewise being widely used in tests for carbohydrate-containing substances in membrane-mediated processes. The metabolism, growth control, and cell surface reactions of membrane glycoproteins are also explained. The book can serve as a guide for biologists, chemists, biochemists, and academicians interested in the study of membranes or glycoproteins.

glycoproteins: Glycopeptides and Glycoproteins Valentin Wittmann, 2007-01-30 With contributions by numerous experts

glycoproteins: Glycoprotein Analysis Weston B Struwe, 2024-10-16 Glycoproteins are central to numerous cellular processes and are among the most structurally complex biomolecules in nature. This unique complexity stems from variability in complex oligosaccharides that are located throughout the protein, a feature that is profoundly important for regulating biomolecular interactions but also makes glycoproteins difficult to study. As such, glycoprotein analysis entails a range of techniques to bridge the knowledge gap between glycoprotein structure and biological function. This book serves as an authoritative guide to glycoprotein analysis, written by internationally recognised experts in the field and discussed in the context of real-world applications across the life sciences. It provides a wide-ranging assessment of the modern methods, from those used to characterise glycoprotein structure, to approaches proficient in uncovering the molecular mechanisms by which they function as well as those capable of measuring structural dynamics and macromolecular assembly. These methods differ to a large extent and include mass spectrometry, glycan/lectin arrays, nuclear magnetic resonance, infrared spectroscopy, scanning probe microscopy and high-performance liquid chromatography. Equally important are computational techniques, including molecular dynamics and bioinformatics, which are also covered and discussed in the wider context of glycoprotein analysis. Glycobiology is indeed a rapidly growing field and the development of advanced tools for glycoproteins analysis has been enabled by researchers from different backgrounds working to overcome long-standing analytical challenges and biological questions involving glycosylation. This book is intended to aid academic and professional researchers at various levels of their career to gain a deeper appreciation of cutting-edge methods in glycoprotein analysis and their applications in biomolecular research, biotherapeutic development, structural biology and biophysical chemistry.

glycoproteins: Glycoproteins Alfred Gottschalk, 1972

glycoproteins: Biochemistry Pamela C. Champe, Richard A. Harvey, Denise R. Ferrier, 2005 Lippincott's Illustrated Reviews: Biochemistry has been the best-selling medical-level biochemistry review book on the market for the past ten years. The book is beautifully designed and executed, and renders the study of biochemistry enormously appealing to medical students and various allied health students. It has over 125 USMLE-style questions with answers and explanations, as well as over 500 carefully-crafted illustrations. The Third Edition includes end-of-chapter summaries, illustrated case studies, and summaries of key diseases.

glycoproteins: Functional and Structural Proteomics of Glycoproteins Raymond J. Owens, Joanne E. Nettleship, 2010-12-02 It has been predicted that nearly half of all human proteins are glycosylated indicating the significance of glycoproteins in human health and disease. For example, the glycans attached to proteins have emerged as important biomarkers in the diagnosis of diseases such as cancers and play a significant role in how pathogenic viruses gain entry into human cells. The study of glycoproteins has now become a truly proteomic science. In the last few years,

technology developments including in silico methods, high throughput separation and detection techniques have accelerated the characterization of glycoproteins in cells and tissues.

Glyco-engineering coupled to rapid recombinant protein production has facilitated the determination of glycoprotein structures key to exploring and exploiting their functional roles. Each chapter in this volume is written by experts in the field and together provide a review of the state of the art in the emerging field of glycoproteomics.

glycoproteins: Lehninger Principles of Biochemistry Albert L. Lehninger, David L. Nelson, Michael M. Cox, 2005 CD-ROM includes animations, living graphs, biochemistry in 3D structure tutorials.

glycoproteins: Textbook of Medical Biochemistry Dinesh Puri, 2010-10-20 The third edition of the book is thoroughly updated and presented in a new two-colour format. The book presents a detailed and authoritative exposition of the basic principles and applications of biochemistry. It focuses primarily on clarity of the fundamental concepts and explains them according to the need of undergraduate medical students. The organization of content in this book is such that it provides the reader with a logical sequence of events that aids learning. - More emphasis in this edition is to systemize presentation and make reading soothing and pleasurable by deleting redundant details, adding new text and figures, improvement of earlier figures, supplementing text with easy to comprehend flowcharts, without changing basic framework of the book. - Each chapter ends with clinical cases and the related questions, which evokes yet another method of active learning rather than didactic methods of imparting knowledge. - Key points have been highlighted and boxed at the end of each topic for quick revision of the core concepts. - This book comes with a free companion website which contains self-assessment exercises, detailed case discussions related to the clinical cases given inside the book, glossary and various other features for enhanced learning.

glycoproteins: Research Awards Index , 1987

glycoproteins: Cumulated Index Medicus , 1974

glycoproteins: Microheterogeneity of Glycoprotein Hormones B.A. Keel, 2018-05-04 Eleven contributions review our knowledge of the characterization of glycoprotein hormone microheterogeneity, the relationships between biological activity and microheterogeneity, the endocrinological control mechanisms involved in the production of these forms and the underlying biochemical basis for glycoprotein hormone microheterogeneity. Organized so that the heterogeneity of each hormone from a variety of species is covered in detail, the peptide components and oligosaccharide structures of glycoprotein hormones are reviewed, and the heterogeneity of uncombined alpha and beta subunits is discussed.

glycoproteins: Latest Advances in Glycoengineering Yanmei Li, Zhongping Tan, 2020-11-18 Glycans have long been known to be one of the most abundant biological molecules in living organisms. They can function as energy compounds, form structural cell wall/matrix polymers, or exist as oligomers that are attached on proteins, lipids and natural products to influence their properties and function. Because of their important biological roles, glycans have great potential for applications in the development of new drugs, materials, food additives and many other products. However, it is often difficult to directly obtain glycans from natural sources with ideal properties for these applications. Thus, modification of glycan structures for desired properties has emerged as an active area of research. This research area is generally called glycoengineering.

glycoproteins: Biomedical Index to PHS-supported Research , 1991

glycoproteins: Essentials of Medical Biochemistry Chung Eun Ha, N. V. Bhagavan, 2022-12-16 Essentials of Medical Biochemistry, Third Edition offers a condensed, yet detailed overview of clinical biochemistry, spanning fundamentals and relevant physiologic and pathophysiologic concepts. Pivotal clinical case studies aid in understanding basic science in the context of diagnosis and treatment of human diseases, and the text illuminates key topics in molecular immunology and hemostasis. Users will find fundamental concepts aiding students and professionals in biochemistry, medicine, and other healthcare disciplines. The text is a useful refresher that will help users meet USMLE and other professional licensing examination requirements, providing thorough

introductions, key points, multicolored illustrations of chemical structures and figures, fact-filled tables, and recommended reading lists. This Third Edition has been fully updated to address evolving techniques in the biological sciences, including genomics, metabolomics, transcriptomics, epigenomics, proteomics, and gene therapy, among other methods. In addition, each chapter has been fully revised for current science and now features learning objectives and chapter summaries, supplemental reading, and 5 clinical case based multiple choice questions. New clinical cases have been added throughout. - Integrates the biochemical principles with physiological, pharmacological, and pathological aspects of human diseases - Each chapter features learning objectives, summaries, required and supplemental reading lists, clinical cases, and multiple-choice questions - Presents essential biochemical concepts within the context of their biological functions Offers instructional overview figures, flowcharts, tables and multi-colored illustrations - Provides an online ancillary package with PowerPoint images and an additional 500 study questions to aid in comprehension and USMLE exam preparation

glycoproteins: Current List of Medical Literature , 1956 Includes section, Recent book acquisitions (varies: Recent United States publications) formerly published separately by the U.S. Army Medical Library.

Related to glycoproteins

AI Image Generator - DeepAI Whether you're a creator, developer, or entrepreneur, DeepAI's Free Online AI Image Generator gives you the power to visualize your imagination in seconds. Just describe your vision and

AI Image Generator (free, no sign-up, unlimited) - Perchance A *fast*, unlimited, no login (ever!!!), AI image generator. Generate large *batches* of images all in just a few seconds. Generate AI art from text, completely free, online, no login or sign-up, no

Free AI Image Generator, Text to Image App from Microsoft Just write a description of the image you'd like and watch the text to image transformation happen in seconds. You'll get vivid, high-resolution images with stunning detail. Use the AI image

Free AI Image Generator - No Sign-Up, Fast & Private Generate detailed and aesthetically pleasing images suitable for various creative and professional uses. Use seeds to reproduce image styles or explore variations consistently across multiple

Craiyon - Your FREE AI image generator tool: Create AI art! Craiyon is an AI art generator that transforms your text descriptions into unique images in seconds. Previously known as DALL·E mini, Craiyon lets you create anything from abstract art

AI Image Generator - Free online AI art generator A free AI image generator that lets you create AI art by providing text and image prompts to AI models like Stable Diffusion

Free AI Art Generator: All the best AI models in one place Use all the best AI art models, share your images and prompts, chat with other AI art enthusiasts, participate in AI art challenges, and more with our free AI art generator

AI Image Generator - 100% Free Generate high-quality AI images instantly with our free online Image Generator. Turn your ideas into art, choose styles, set aspect ratios, and create AI images for free

Free AI Image Generator Online [No Login, No Restrictions] With our Image to Video AI generator, simply upload one or more images and let AI craft a professional-looking video, complete with transitions, animations, soundtracks, and dynamic

Create Your Perfect Image With AI: How to Use AI Image - CNET Interested in AI image generators but don't know where to start? Here's everything I've learned using OpenAI's Dall-E, Canva and Google's nano banana

Pracownicy delegowani do pracy za granicą na krótki okres Twój pracodawca może Cię wysłać tymczasowo do pracy w innym kraju UE. W okresie delegowania będziesz mieć status „pracownika delegowanego” i korzystać z tych

Oddelegowania pracowników - najważniejsze kwestie podatkowe Eksperti rozmawiają na

temat minimalnych warunków i obowiązków administracyjnych w przypadku pracowników oddelegowanych. Delegując pracownika za granicę należy zwrócić

Zasady oddelegowania pracownika - z jakim wyprzedzeniem W praktyce przyjmuje się, że pracownik powinien być poinformowany o oddelegowaniu i warunkach delegacji z co najmniej kilkutygodniowym wyprzedzeniem,

Oddelegowanie pracownika za granicę - obowiązki pracodawcy Oddelegowanie pracownika za granicę jest poleceniem służbowym, zgodnie z którym pracownik zostaje zobowiązany do wykonywania swoich dotychczasowych

Oddelegowanie pracownika do pracy za granicą a obowiązki W wielu przypadkach polscy pracodawcy mają uzasadnione wątpliwości dotyczące tego, czy oddelegowanie pracownika do wykonywania pracy za granicą obliuguje ich

Delegowanie pracownika za granicę - co mówi prawo? Delegowanie ma miejsce wtedy, gdy pracodawca mający siedzibę w Polsce kieruje swojego pracownika do pracy na ograniczony czas na terytorium innego państwa członkowskiego

Oddelegowanie pracownika za granicę - wszystko co musisz Formalności prawne: Pracodawca musi dopełnić wszelkich formalności związanych z zatrudnieniem pracownika za granicą, w tym zgłoszeń do odpowiednich urzędów i instytucji

Pracownicy delegowani w UE: wytyczne i przepisy o Dokument A1 potwierdza, że pracownik delegowany jest zarejestrowany w systemie zabezpieczenia społecznego w swoim kraju pochodzenia i nie musi opłacać składek w kraju

Delegowanie do pracy pracownika poza Unię Europejską Delegowanie do pracy pracownika do kraju spoza UE, EOG i Szwajcarii to nie tylko wyzwanie dla pracownika, lecz w szczególności dla samego pracodawcy, na którym ciąży

Delegowanie pracownika za granicę. - Adwokat Lewandowska W związku z tym pracodawca musi dostosować warunki zatrudnienia pracownika do standardów obowiązujących w kraju oddelegowania w zakresie : czasu pracy, okresu

Psoriatic arthritis - Symptoms & causes - Mayo Clinic Psoriatic arthritis is a type of arthritis that can affect people who have psoriasis. Psoriasis is a skin condition that causes itchy, scaly patches on the skin. The patches may be

Signs and Symptoms of Psoriatic Arthritis - WebMD Psoriatic arthritis is a long-term inflammatory arthritis. It causes symptoms such as pain, stiffness, redness, and swelling in your joints and where your tendons and ligaments

Psoriatic Arthritis: Symptoms and Treatments - Cleveland Clinic Psoriatic arthritis is a form of arthritis that's linked to psoriasis — a chronic skin condition. The most common symptoms are joint pain and stiffness, skin rashes and changes in your

Psoriatic Arthritis Psoriatic arthritis, or PsA, is a chronic, autoimmune form of arthritis that causes joint inflammation and occurs with the skin condition psoriasis. It can affect large or small joints. In less common

Psoriatic Arthritis - Johns Hopkins Medicine Psoriatic arthritis is a form of arthritis associated with psoriasis. Psoriasis is a chronic skin and nail disease. It causes red, scaly rashes and thick, pitted fingernails. Psoriatic arthritis is similar to

Psoriatic Arthritis: Symptoms, Causes & Treatment Psoriatic arthritis affects about 30% of people with psoriasis and can start at any age, even affecting children. There's no cure, but treatments are available to manage

Psoriatic Arthritis: What Is It, Symptoms, Treatment, and More Psoriatic arthritis is a type of arthritis that only occurs in people with psoriasis. Learn more about the types and causes of psoriatic arthritis, and what you can do to reduce symptoms

Psoriatic Arthritis - American College of Rheumatology Psoriatic arthritis (PsA) is a chronic inflammatory autoimmune condition characterized by inflamed joints. Psoriatic arthritis often, but not always, occurs in people who also have psoriasis, an

Psoriatic Arthritis Symptoms, Causes, & Risk Factors | NIAMS Psoriatic arthritis is a

progressive inflammatory condition of the joints and the places where tendons and ligaments attach to bones (entheses). It happens when the immune system, for

Psoriatic Arthritis - Diagnosis, Treatment, Prognosis and Clinical Overview of Psoriatic Arthritis including the signs, symptoms, diagnosis and treatment options from the Johns Hopkins Arthritis Center

Treasures Tier List - Cookie Run: Kingdom Wiki This Treasures Tier List is the Cookie Run: Kingdom Wiki's unofficial ranking of the Treasures seen in-game based on their utility and effectiveness

Treasures Tierlist : r/CookieRunKingdoms - Reddit This also plays a role how the treasures are ranked. PASSIVE means that the treasure's details is applied all the time while ACTIVE works like a normal skill of a cookie, it

Cookie Run: Kingdom Treasures tier list (September 2025) Use this Cookie Run: Kingdom Treasures tier list to identify the best and worst items to equip your team of Cookies and beat every level in the game

Create a All CRK Treasures Tier List - TierMaker A list of every treasure from Cookie Run Kingdom, special treasures included. I can't find the latest treasures with their background

CookieRun Kingdom Treasure Tier List for Best Effects - May 2025 Wanna dive into the Cookie Run Kingdom with the best effects? Then, here is the CRK treasure tier list for you. If you have no idea what the Cookie Run Kingdom's best

Cookie Run Kingdom Treasures Tier List - Best in the Game Find out which are the best Treasures in Cookie Run Kingdom based on our up-to-date tier list. See where your favorite stands and how to optimize cookies

Cookie Run Kingdom Tier List CRK September 2025 [Silent Salt] 6 days ago Dive into the sweet and strategic world of Cookie Run Kingdom with the latest Tier List update featuring the dynamic duo!

Cookie Run: Kingdom Treasure Tier List for May 2025 Get the best picks of the season via this Cookie Run: Kingdom Tier List and get the best out of your treasure and cookies

698 Synonyms & Antonyms for CREATE | Find 698 different ways to say CREATE, along with antonyms, related words, and example sentences at Thesaurus.com

CREATE Synonyms: 92 Similar and Opposite Words - Merriam-Webster Synonyms for CREATE: generate, bring, cause, produce, do, prompt, work, spawn; Antonyms of CREATE: restrict, limit, impede, suppress, quash, stifle, subdue, quell

What is another word for create? | Create Synonyms - WordHippo Find 2,773 synonyms for create and other similar words that you can use instead based on 14 separate contexts from our thesaurus

CREATE Synonyms: 2 628 Similar Words & Phrases - Power Thesaurus Find 2 628 synonyms for Create to improve your writing and expand your vocabulary

CREATE - 39 Synonyms and Antonyms - Cambridge English These are words and phrases related to create. Click on any word or phrase to go to its thesaurus page. Or, go to the definition of create

CREATE Synonyms | Collins English Thesaurus Synonyms for CREATE in English: cause, lead to, occasion, beget, bring about, make, form, produce, develop, design,

Create synonyms, create antonyms - Synonyms for create in Free Thesaurus. Antonyms for create. 61 synonym for create: cause, lead to, occasion, bring about, make, form, produce, develop, design, generate, invent, coin,

Create Synonyms and Antonyms - Synonyms for CREATE: make, produce, formulate, beget, breed, engender, father, hatch, devise, originate, parent, procreate, conceive, sire, spawn, start, constitute, establish; Antonyms for

create - English Thesaurus create - WordReference thesaurus: synonyms, discussion and more. All Free

55+ Useful Synonyms for "Create" with Examples - 7ESL Find the perfect create synonyms in

our comprehensive guide. Enhance your writing with varied vocabulary and context-specific examples

Related to glycoproteins

Headspace invaders: How mosquito-borne viruses breach the brain's defenses (6don MSN) Mosquito-borne viruses can cause more than fevers and joint pain. In severe cases, they invade the brain, leading to seizures

Headspace invaders: How mosquito-borne viruses breach the brain's defenses (6don MSN) Mosquito-borne viruses can cause more than fevers and joint pain. In severe cases, they invade the brain, leading to seizures

Pregnancy-specific glycoproteins linked to poor outcomes for women with lung cancer (Healio4mon) Please provide your email address to receive an email when new articles are posted on . Female patients whose lung cancer had pregnancy-specific glycoprotein expression had worse survival outcomes. A

Pregnancy-specific glycoproteins linked to poor outcomes for women with lung cancer (Healio4mon) Please provide your email address to receive an email when new articles are posted on . Female patients whose lung cancer had pregnancy-specific glycoprotein expression had worse survival outcomes. A

Glycoproteins of Human Parainfluenza Virus Type 3: Characterization and Evaluation as a Subunit Vaccine (JSTOR Daily8y) The envelope glycoproteins of human parainfluenza type 3 virus were characterized by sodium dodecyl sulfate—polyacrylamide gel electrophoresis and reactivity with specific monoclonal antibodies. The

Glycoproteins of Human Parainfluenza Virus Type 3: Characterization and Evaluation as a Subunit Vaccine (JSTOR Daily8y) The envelope glycoproteins of human parainfluenza type 3 virus were characterized by sodium dodecyl sulfate—polyacrylamide gel electrophoresis and reactivity with specific monoclonal antibodies. The

Simply better glycoproteins (Nature11y) Many of the protein drugs on the market are glycoproteins, including hormones, cytokines and monoclonal antibodies. Two aspects of glycosylation are particularly relevant to their therapeutic activity

Simply better glycoproteins (Nature11y) Many of the protein drugs on the market are glycoproteins, including hormones, cytokines and monoclonal antibodies. Two aspects of glycosylation are particularly relevant to their therapeutic activity

Glycoproteins: Their Biochemistry, Biology and Role in Human Disease (The New England Journal of Medicine10mon) With the background on the structure and metabolism of the carbohydrate-containing proteins presented in the first part of this review one can now consider the properties, both chemical and biologic,

Glycoproteins: Their Biochemistry, Biology and Role in Human Disease (The New England Journal of Medicine10mon) With the background on the structure and metabolism of the carbohydrate-containing proteins presented in the first part of this review one can now consider the properties, both chemical and biologic,

In situ Detection of Antigenic Glycoproteins in Taenia solium Metacestodes (JSTOR Daily7y) This is a preview. Log in through your library . Abstract Taenia solium has a complex life cycle. Its cysticercus can lodge in the brain, causing neurocysticercosis (NCC), and the adult tapeworm's

In situ Detection of Antigenic Glycoproteins in Taenia solium Metacestodes (JSTOR Daily7y) This is a preview. Log in through your library . Abstract Taenia solium has a complex life cycle. Its cysticercus can lodge in the brain, causing neurocysticercosis (NCC), and the adult tapeworm's

Chemical octopus catches sneaky cancer clues, trace glycoproteins (Science Daily7y) Certain minuscule cancer signals easily evade detection, but perhaps no longer. Biomarkers made of glycoproteins are bound to get snared in the tentacles of this chemical octopus that chemists devised

Chemical octopus catches sneaky cancer clues, trace glycoproteins (Science Daily7y) Certain minuscule cancer signals easily evade detection, but perhaps no longer. Biomarkers made of

glycoproteins are bound to get snared in the tentacles of this chemical octopus that chemists devised

Identifying Sialic Acids in Glycoproteins (GEN12y) Sialic acids, also referred to as neuraminic acids, are critical to glycoprotein bioavailability, function, stability, and metabolism. When present, these carbohydrates occupy terminal positions of

Identifying Sialic Acids in Glycoproteins (GEN12y) Sialic acids, also referred to as neuraminic acids, are critical to glycoprotein bioavailability, function, stability, and metabolism. When present, these carbohydrates occupy terminal positions of

Synthesizing Glycoproteins (C&EN8mon) Researchers at Bayreuth University, in Germany, have developed a new method for synthesizing homogeneous glycoproteins, combining solid-phase peptide synthesis with peptides produced in Escherichia

Synthesizing Glycoproteins (C&EN8mon) Researchers at Bayreuth University, in Germany, have developed a new method for synthesizing homogeneous glycoproteins, combining solid-phase peptide synthesis with peptides produced in Escherichia

Glycoproteins: Their Biochemistry, Biology and Role in Human Disease (The New England Journal of Medicine11mon) A GREAT number of the proteins that are found in nature have carbohydrate covalently linked to the peptide portion and are accordingly termed glycoproteins. These conjugated proteins are represented

Glycoproteins: Their Biochemistry, Biology and Role in Human Disease (The New England Journal of Medicine11mon) A GREAT number of the proteins that are found in nature have carbohydrate covalently linked to the peptide portion and are accordingly termed glycoproteins. These conjugated proteins are represented

Back to Home: <https://explore.gcts.edu>