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Ratio of involved/uninvolved immunoglobulin quantification by Hevylite™ assay: clinical and prognostic impact in multiple myeloma

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Abstract

Background: Hevylite™ is a new, recently developed method that facilitates separate quantification of the kappa and lambda-bounded amounts of a given immunoglobulin (Ig). Using this method, we measured intact immunoglobulin (heavy/light chain; HLC) IgG-kappa, IgG-lambda, IgA-kappa, IgA-lambda individually, as well as their deriving ratios (HLCR) in a series of IgG or IgA multiple myeloma (MM) patients, to investigate and assess the contribution of these tests to disease evaluation.

Patients and methods: Hevylite™ assays were used in sera from 130 healthy individuals (H) and 103 MM patients, at time of diagnosis. In patients, the level of paraprotein was IgG in 78 (52 IgG-kappa, 26 IgG-lambda) and IgA in 25 (13 IgA-kappa, 12 IgA-lambda). Durie-Salmon and International Staging System stages were evenly distributed. Symptomatic patients (n = 77) received treatment while asymptomatic ones (n = 26) were followed. Patients' median follow-up was at 32.6 months. HLCR was calculated with the involved Ig (either G or A) as numerator.

Results: In H, median IgG-kappa was 6.85, IgG-lambda 3.81, IgA-kappa 1.19 and IgA-lambda 0.98 g/L. The corresponding median involving HLC values in MM patients were 25.8, 23.45, 28.9 and 36.4 g/L. HLC-IgG related to anemia, high serum free light chain ratio and extensive bone marrow infiltration, while high HLCR correlated with the same plus increased β 2-microglobulin. In addition, increased HLCR and the presence of immunoparesis correlated with time to treatment. Patients with high HLCR had a significantly shorter survival ($p = 0.022$); HLCR retained its prognostic value in multivariate analysis.

Conclusions: HLC and HLCR quantify the precise amount of the involved immunoglobulin more accurately than other methods; moreover, they carry prognostic information regarding survival in MM patients.

Keywords: Multiple myeloma, Prognosis, Serum immunoglobulin, Heavy/light chain measurements, HLCR

Introduction

Multiple myeloma (MM) is characterized by bone marrow (BM) plasma cell infiltration and the presence of serum/urine monoclonal immunoglobulin (Ig). Disease manifestations and behavior vary widely, while survival ranges from a few months to more than a decade.

Serum monoclonal Ig quantification is part of MM diagnostic criteria, and one of Durie and Salmon (DS) staging system's risk factors [1]. It is also used for monitoring response and relapse. However, MM aggressiveness is not related to the amount of Ig secretion, and newer staging systems did not retain Ig quantity as a risk parameter [2].

The poor utility of IgG and IgA measurements may be related to the following: 1) Changes in hematocrit and blood volume occur in MM leading serum Ig concentrations to vary by 50% or more, independently of changes in tumor production [3]; 2) Serum IgG concentrations

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Immunoglobulin Quantification Manual Guide

Noel R. Rose



Immunoglobulin Quantification Manual Guide:

Handbook of Human Immunology Mary S. Leffell, Albert D. Donnenberg, Noel R. Rose, 1997-04-10 Combining basic explanations of laboratory tests with 115 tables full of reference data and applications the Handbook of Human Immunology provides practicing clinicians with a current complete guide to molecular immunology Introductory chapters overview the molecular basis of immune responses and immunological disorders focusing on the role of cell receptors accessory molecules and cytokines in these processes Emphasis is placed on immunological parameters that are clinically useful The basic principles underlying assays of the immune system are discussed and the book stresses the application and interpretation of immune tests Comprehensive coverage is given to immunoglobulins and their age dependent concentration Cellular immunology is discussed from the perspectives of lymphocyte functional parameters as well as through immunophenotyping of lymphocytes and other leukocytes Both serological and molecular diagnosis of infectious diseases are reviewed The Handbook of Human Immunology contains up to date information on exciting developments in immunogenetics covering the application of T cell receptor genes and the HLA alleles in disease associations and transplantation Manual of Molecular and Clinical Laboratory Immunology Barbara Detrick, John L. Schmitz, Robert G. Hamilton, 2020-07-16 THE authoritative guide for clinical laboratory immunology For over 40 years the Manual of Molecular and Clinical Laboratory Immunology has served as the premier guide for the clinical immunology laboratory From basic serology testing to the present wide range of molecular analyses the Manual has reflected the exponential growth in the field of immunology over the past decades This eighth edition reflects the latest advances and developments in the diagnosis and treatment of patients with infectious and immune mediated disorders The Manual features detailed descriptions of general and specific methodologies placing special focus on the interpretation of laboratory findings and covers the immunology of infectious diseases including specific pathogens as well as the full range of autoimmune and immunodeficiency diseases cancer and transplantation Written to guide the laboratory director the Manual will also appeal to other laboratory scientists especially those working in clinical immunology laboratories and pathologists It is also a useful reference for physicians mid level providers medical students and allied health students with an interest in the role that immunology plays in the clinical laboratory Mosby's Manual of Diagnostic and Laboratory Tests - E-Book Kathleen Deska Pagana, Timothy J. Pagana, 2013-10-15 This quick reference handbook offers clear concise coverage of over 700 of the most commonly performed diagnostic and laboratory tests including 39 new to this edition Trusted authors Kathleen Pagana PhD RN and Timothy Pagana MD FACS bring together a comprehensive collection of full color designs illustrations and photos to show exactly how various tests are performed Related tests are grouped by chapter and presented in a consistent format to facilitate a full understanding of each type of diagnostic test UNIQUE Coverage of the clinical significance of test results explains why a given test result indicates specific diseases Full color design clarifies key concepts procedures and testing techniques Related Tests sections list tests that

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A Procedural Guide to the Performance of the Radial Immunodiffusion Test and the Immunoelectrophoresis Test for Qualitation and Quantitation of Immunoglobulins Dan F. Palmer, 1972

Pagana's Canadian Manual of Diagnostic and Laboratory Tests - E-Book Sandra A. MacDonald, Kathleen Deska Pagana, Timothy J. Pagana, Theresa Noel Pagana, 2022-10-21 Written exclusively for a Canadian market Pagana's Canadian Manual of Diagnostic and Laboratory Tests 3rd Edition provides clear concise coverage of more than 700 of the most commonly performed tests with Canadian lab values SI units Canadian cultural considerations and unique Canadian content Its many user friendly features include an easy to understand writing style full colour illustrations and a logical organization Each test entry is presented in a consistent format to provide quick access to information on specimen collection normal findings indications test explanation procedure and patient care and test results and clinical significance as well as any applicable contraindications potential complications critical values interfering factors and related tests This edition has been updated to reflect the latest procedures equipment and techniques along with 35 of the most current laboratory and diagnostic tests Plus Canadian guidelines are highlighted by a maple leaf icon for easy reference UNIQUE Canadian guidelines are highlighted by a maple leaf icon in the text margin for easy identification and reference UNIQUE A description of commonly performed laboratory methods explains methods used to evaluate blood urine spinal fluid and other specimens UNIQUE Cultural Considerations boxes highlight important aspects of working with patients from the diverse cultural and racial backgrounds of the Canadian population such as Indigenous communities UNIQUE Coverage of the clinical significance of test results explains why a given test result indicates specific diseases UNIQUE SI units in the Normal Findings section of appropriate tests offer quick and easy reference conventional units also included UNIQUE Related Tests sections list tests that provide similar information or are used to evaluate the same body system disease process or symptom Information on Canadian standard precautions and procedures covers those set forth by the Canadian Nuclear Safety Commission as well as Canadian screening protocols such as those set out in the Canadian Cancer Society Screening Guidelines Blood studies coverage includes Canadian test tube colouring classifications and guidelines for the correct order and process of collecting blood samples in Canada Necessary consideration is given to the differences between provinces territories and institutions in regard to privacy legislation obtaining consent agency guidelines procedure protocols and the availability of tests Coverage of Canadian privacy laws and legislation includes PHIPA and PIPEDA the Canadian Labour Code policies for DNA collection reporting of infections such as Chlamydia and much more Up to date Canadian statistics are

provided for topics such as STDs and *C. difficile*

Manual of Molecular and Clinical Laboratory Immunology John L. Schmitz, Barbara Detrick, Maurice R. O'Gorman, 2024-12-24 THE authoritative guide for clinical laboratory immunology For nearly 50 years the Manual of Molecular and Clinical Laboratory Immunology has been the premier resource for laboratories students and professionals involved in the clinical and technical details of diagnostic immunology testing The 9th Edition continues its tradition of providing comprehensive clinical and technical information on the latest technologies used in medical and diagnostic immunology Led by a world renowned group of authors and editors this new edition reflects substantial changes aimed at improving and updating the Manual's utility while reflecting the significant transformations that have occurred since the last edition including the revolution of gene editing and the widespread adoption of molecularly engineered cellular therapies Topical highlights include Laboratory Management three new chapters cover essential aspects of quality assurance quality improvement and quality management aligning with the increasingly stringent and demanding regulatory environment Inborn Errors of Immunity the primary immunodeficiency section has been completely updated to align with the latest International Union of Immunological Societies classifications of inborn errors of immunity Functional Cellular Assays expanded content includes detailed discussions on various functional assays critical for modern immunologic testing Autoimmune Diseases expanded chapters on systemic and organ specific autoimmune disorders including new chapters on Sjögren's syndrome and deficiency of ADA2 as well as significant updates on organ specific autoimmune diseases Transplantation Immunology updated chapters detail the assessment of immune reconstitution and ABO testing reflecting latest practices The 9th Edition of the Manual of Molecular and Clinical Laboratory Immunology serves as an invaluable resource for laboratory directors clinicians laboratory managers technologists and students It provides critical insights into the selection application and interpretation of immunologic tests offering practical guidance on troubleshooting clinical application and an understanding of test limitations This comprehensive and up to date manual remains an essential tool for anyone involved in the diagnosis evaluation and management of immune mediated and immune system related disorders

A Manual of Laboratory and Diagnostic Tests Frances Talaska Fischbach, Marshall Barnett Dunning, 2009 Now in its Eighth Edition this leading comprehensive manual helps nurses deliver safe effective and informed care for patients undergoing diagnostic tests and procedures The book covers a broad range of laboratory and diagnostic tests and studies that are delivered to varied patient populations in varied settings Tests are grouped according to specimen and function test type e.g. blood urine stool cerebrospinal fluid etc Each test is described in detail with step by step guidance on correct procedure tips for accurate interpretation and instructions for patient preparation and aftercare Clinical Alerts highlight critical safety information

Middleton's Allergy E-Book A. Wesley Burks, Robyn E. O'Hehir, David H. Broide, Stephen T. Holgate, Leonard B. Bacharier, Gurjit K. Khurana Hershey, R. Stokes Peebles, 2019-09-25 Through eight outstanding editions Middleton's Allergy Principles and Practice has been the reference of choice for both clinicians and researchers as both a

practical reference and an effective self assessment tool for board preparation The 9th Edition continues the tradition of excellence with comprehensive coverage of all basic science and clinical applications regarding allergy practice and disease mechanisms It brings you fully up to date with recent innovations in the diagnosis prevention and management of allergic disorders including emerging global issues the advent of precision medicine and new immunologic therapies Offers unparalleled depth and up to date guidance on the full spectrum of allergy across the lifespan with significant updates throughout Contains new chapters on Innate Lymphoid Cells Systems Biology and Treatment of Primary Immunodeficiency Diseases Discusses emerging topics such as epidemic thunderstorm asthma and precision medicine in allergic disorders Features more than 730 full color illustrations including many new cellular and molecular drawings of disease mechanisms Includes new Summary of Important Concepts boxes plus new multiple choice questions online with explanations and answers Features a new team of expert editors and more international contributors for a global perspective of this complex field Enhanced eBook version included with purchase Your enhanced eBook allows you to access all of the text figures and references from the book on a variety of devices

Manual of Obstetrics E-book Muralidhar Pai,Prahalad

Kushtagi, Daftary, SUDIP Chakravarti, 2015-10-15 This book is based on the classic Holland and Brews Manual of Obstetrics The fourth edition is comprehensive with clear concepts concrete up to date knowledge and student friendly one stop obstetrics textbook Basic principles investigations management options as well as the recent advances have all been explained in a simple and systematic manner The information given is evidence based and as per international guidelines and management protocols Salient Features Every chapter has been thoroughly revised and updated with recent advances in Obstetrics The book has been made comprehensive with addition of new content algorithms figures drug regimens and tables Several new chapters Decision Making in Obstetrics Management of Post caesarean Pregnancy Obstetric History Taking Obstetric Examination Labour Care Ready Reckoner added Chapters on Specimens and Instruments in Obstetrics have been added to aid students to prepare for viva voce The format is modified to help not only students in obstetrics but also the practicing obstetricians Points to Remember added with each chapter highlighting important information

Mosby's Canadian Manual of Diagnostic and Laboratory Tests - E-Book Kathleen Deska Pagana, Timothy J. Pagana, Sandra A. Pike-MacDonald, 2018-10-08 Written exclusively for a Canadian market Mosby's Canadian Manual of Diagnostic and Laboratory Tests Second Edition provides clear concise coverage of more than 700 of the most commonly performed tests with Canadian lab values SI units Canadian cultural considerations and unique Canadian content Its many features include an easy to understand writing style full colour illustrations and a logical organization Each test entry is presented in a consistent format to provide quick access to information on specimen collection normal findings indications test explanation procedure and patient care and test results and clinical significance as well as any applicable contraindications potential complications interfering factors and related tests The second edition has been updated to reflect the latest procedures

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Immune system modeling and analysis Ramit Mehr,Miles Davenport,2015-04-22 The rapid development of new methods for immunological data collection from multicolor flow cytometry through single cell imaging to deep sequencing presents us now for the first time with the ability to analyze and compare large amounts of immunological data in health aging and disease The exponential growth of these datasets however challenges the theoretical immunology community to develop methods for data organization and analysis Furthermore the need to test hypotheses regarding immune function and generate predictions regarding the outcomes of medical interventions necessitates the development of mathematical and computational models covering processes on multiple scales from the genetic and molecular to the cellular and system scales The last few decades have seen the development of methods for presentation and analysis of clonal repertoires those of T and B lymphocytes and phenotypic surface marker based repertoires of all lymphocyte types and for modeling the intricate network of molecular and cellular interactions within the immune systems This e Book which has first appeared as a Frontiers in Immunology research topic provides a comprehensive online open access snapshot of the current state of the art on immune system modeling and analysis

Manual of Clinical Laboratory Immunology Noel R. Rose,1997 Reflects changes being thrust upon the laboratory

community **Molecular Pathology in Clinical Practice** Debra G.B. Leonard, 2007-11-25 Molecular Pathology In Clinical Medicine is an authoritative comprehensive textbook that provides the general pathologist in clinical practice as well as residents and fellows during their training with the current standard in molecular testing The text is divided into 8 sections as defined by the molecular pathology specialty board genetics inherited cancers infectious disease neoplastic hematopathology solid tumors HLA typing identity testing and laboratory management The book integrates the latest advancements in the field with the basic principles and practical applications Each chapter discusses the clinical significance of each diagnostic test available assays quality control and lab issues interpretation and reasons for testing Chapters cover such topics as HIV herpes hepatitis deafness developmental disorders bioterrorism warfare organisms lymphomas breast cancer and melanoma forensics parentage and much more 189 illustrations 45 of them in full color illustrate the principles outlined in the text This textbook is a classic in the making and a must have reference to meet the needs of every pathologist resident and fellow

Single-cell analysis on the pathophysiology of autoimmune diseases Shiang-Jong Tzeng, InKyeom Kim, Kuang-Hui Sun, 2024-07-11 Despite increasing research to facilitate the understanding of the pathophysiology of autoimmune disorders the exact cause of the incident of autoimmunity is unknown Current concepts on the occurrence of autoimmune diseases are thought to involve autoantigens genetic predisposition disease triggers and the breakdown of immune tolerance In addition to the breakdown of immunological tolerance one key characteristic of autoimmune disease is that within a single disease there is considerable variability in the clinical manifestation and severity in patients Single cell omics have emerged as an effective means of unraveling the complexity and heterogeneity of chronic disease development and therapeutic responses Recently advances in cutting edge spatial profiling of diverse cell types have increased our understanding of how distinct cells interact and orchestrate at specific locations across a tissue landscape in both physiological and pathological contexts at the single cell level

Comprehensive Handbook of Iodine Victor R Preedy, Gerard N. Burrow, Ronald Ross Watson, 2009-03-17 Over two billion people worldwide are at risk for the spectrum of disorders known as The Iodine Deficiency Disorders 1 10% will suffer cretinism 5 30% will have some sort of brain damage or neurological impairment and 30 70% will be hypothyroid The causes of iodine deficiencies can be considered from both simplistic and more complex perspectives From the leaching of iodine from soil resulting in crops with low iodine content to malnutrition resulting in impaired iodine absorption Poor dietary diversification and impoverished socio economic development can also lead to iodine deficiencies Although it is possible to diagnose and treat deficiencies there is still an ongoing dialogue regarding the detailed molecular pathology of iodine homeostasis how hypothyroidism impacts the body tissues and efficient diagnosis and treatment of the Iodine Deficiency Disorders This Handbook provides a resource of information on the various pathways and processes based on different countries or diseases Because there is a constant flow of new information on iodine and related disorders the goal of this Handbook is to provide a base of scientific information

upon which additional knowledge can be applied Provides important information on one of the most common micro nutrient deficiencies in the world the most important single nutrient multiple consequences paradigm today Includes information on iodine related diseases including those that are common preventable and treatable Provides insight from a broad perspective of viewpoints from subcellular transports to economic impact *Ferri's Clinical Advisor 2024, E-Book* Fred F.

Ferri,2023-06-13 For more than 25 years Ferri s Clinical Advisor has provided immediate answers on the myriad medical diseases and disorders you re likely to encounter in a unique easy to use format A bestselling title year after year this popular 5 books in 1 reference delivers vast amounts of information in a user friendly manner It is updated annually to provide current and clinically relevant answers on over 1 000 common medical conditions including diseases and disorders differential diagnoses clinical algorithms laboratory tests and clinical practice guidelines all carefully reviewed by experts in key clinical fields Extensive algorithms along with hundreds of high quality photographs illustrations diagrams and tables ensure that you stay current with today s medical practice Contains significant updates throughout all 5 sections covering all aspects of diagnosis and treatment Features 26 all new topics including monkeypox occupational asthma care of the transgender patient infantile hypotonia long COVID medical marijuana cannabinoid use disorder and abuse of performance enhancing hormones among others Includes useful appendices covering palliative care preoperative evaluation nutrition poison management commonly used herbal products in integrated medicine and much more Offers online access to Patient Teaching Guides in both English and Spanish An eBook version is included with purchase The eBook allows you to access all of the text figures and references with the ability to search customize your content make notes and highlights and have content read aloud *A Manual of Quantitative Immuno-electrophoresis* Nils H. Axelsen,Bent Weeke,J. Kroll,1977 *Ferri's Clinical Advisor 2025 - E-BOOK* Fred F. Ferri,2024-06-05 For more than 25 years Ferri s Clinical Advisor has provided

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medicine and much more Offers online access to newly revised and updated Patient Teaching Guides in both English and Spanish *Ferri's Clinical Advisor 2019 E-Book* Fred F. Ferri, 2018-05-26 Updated annually with the latest developments in diagnosis and treatment recommendations Ferri's Clinical Advisor uses the popular 5 books in 1 format to organize vast amounts of information in a clinically relevant user friendly manner This efficient intuitive format provides quick access to answers on more than 900 common medical conditions including diseases and disorders differential diagnoses and laboratory tests all updated by experts in key clinical fields Updated algorithms and current clinical practice guidelines help you keep pace with the speed of modern medicine Contains significant updates throughout with more than 500 new figures tables and boxes added to this new edition Features 17 all new topics including opioid overdose obesity Hypoventilation syndrome acute pelvic pain in women new onset seizures and eosinophilic esophagitis among many others Provides current ICD 10 insurance billing codes to help expedite insurance reimbursements Includes cross references outlines bullets tables boxes and algorithms to help you navigate a wealth of clinical information Offers access to exclusive online content more than 90 additional topics new algorithms images and tables EBM boxes patient teaching guides color images and more **Animal Genetics and Diseases: Advances in Farming and Livestock Systems** Mark S. Fife, John A. Hammond, Andrea B. Doeschl-Wilson, 2020-02-14 The new Animal Genetics and Disease 2017 conference committee organized a Research Topic for the proceedings of this inaugural conference The meeting brought together specialists working on the interface between genomics genetic engineering and infectious disease with the aims of improving animal and human health and welfare This conference was funded by Advanced Courses and Scientific Conference at the Wellcome Genome Campus Hinxton UK The conference will highlight breakthroughs in genomic technologies that are rapidly increasing our understanding of the fundamental role that host and pathogen genetics play in infections and epidemics This Research Topic focuses on how infections spread and how they further affect the productivity of livestock systems and food supply chains Thanks to technological advances we now have the tools for real time surveillance of zoonoses affecting wildlife farm animals and animal to human disease transmission

Unveiling the Power of Verbal Artistry: An Psychological Sojourn through **Immunoglobulin Quantification Manual Guide**

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