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Cytogenetic culture failure and its causes in hematological disorders; a single centre perspective

Sarah Javed¹, Jawad Hassan^{1*}, Maliha Naz¹, Saira Shan¹, Madiha Abid² and Tahir Sultan Shamsi³

Abstract

Objective To highlight the reasons of culture failure in bone marrow aspirate samples sent for Cytogenetic analysis and to identify the associated parameters causing this impact.

Methodology This is a retrospective cross-sectional study conducted in the Clinical and Molecular Cytogenetics Laboratory of NIBD Hospital, Karachi, Pakistan. The rates of culture failure are assessed from the year 2017–2020 along with their reasons. Bone Marrow aspirate samples of patients with hematological malignancies were cultured for chromosomal analysis, both at the time of diagnosis or relapse. Statistical analysis was performed using SPSS version 25.

Results A total of 1061 bone marrow aspirate samples were assessed for cytogenetic culture failures from the duration of 2017 to 2020. Ratio of males was predominantly higher i.e. 62.7% than female 37.3% with Mean \pm SD age was 36.78 ± 18.94 . Frequency of culture failure in the year 2020 was relatively high 20% as compared to the preceding years i.e. 8% in 2017, 6% in 2018, 7% in 2019. However, the patients were diagnosed with the following hematological malignancies; ALL 23%, CMIL 17.1%, AML 16.5% and AA 12.5%. Among the reasons of culture failure, cytogenetic analysis of patients with on-going chemo resulted in significant culture failures with p-value < 0.001 and the hematological malignancy, Acute Promyelocytic Leukemia, significantly impacted the growth of bone marrow aspirate cultures, with p-value < 0.001.

Conclusion Significant findings were associated with causative factors of culture failure including on-going treatment and sample issues of clotted bone marrow as well as with the clinical diagnosis. These evaluations facilitated in overcoming the rise in culture failures. As per our knowledge, no such data, discussing the effects of various parameters such as sample quality, diagnosis, effects of treatment etc., has been documented previously.

Keywords Cytogenetic analysis, Culture failure, Hematological disorders, Metaphases, Bone marrow aspirate

Introduction

Cytogenetic studies constitute a major part in predicting the outcome of a treatment for certain hematological disorders. Hematological disorders are the neoplasms that develop in bone marrow-derived cells. Many patients with leukemia, lymphoma, or other malignant hematologic diseases have malignant cells that have acquired clonal chromosomal aberrations [6]. Nowadays, cytogenetic testing is considered to be a requirement for diagnosing hematologic malignancies. Recurrent structural abnormalities are useful

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Susman,2012-12-06 This book like the two previous editions was written as an introduction to human cytogenetics but it could also be used as a text for a general cytogenetics course since chromosome structure and behavior are similar in all eukaryotes Many examples in this book are from organisms other than humans reflecting our combined backgrounds of molecular and bacterial genetics and plant and animal cytogenetics In the rapidly expanding field of human cytogenetics certain subjects for instance clinical and cancer cytogenetics are now covered in recently published thousand page volumes In this book such subjects are presented only in outline The enormous growth of information has also made the choice of topics and of examples to illustrate them even more arbitrary and subjective than in the previous editions Apart from a few pages here and there the text has been rewritten Major parts especially those on molecular matters have been added This book would not exist without the dedicated participation of Mrs Barbara Susman She has been involved in the project from the planning stages to the final proofreading She has done the extensive literature research designed most of the tables and illustrations and edited and typed the text For discussions and suggestions we are indebted to many colleagues We wish especially to mention Drs Lassi Alvesalo Evelyn M Kuhn and Renata Laxova who have critically read selected parts of the book and Dr Carter Denniston who has read the whole text

Current Catalog National Library of Medicine (U.S.),1985
First multi year cumulation covers six years 1965 70 *Human Genetic Diversity* Julian C. Knight,2009-08-06 The secrets of our genetic heritage are finally being unlocked The massive scientific effort to sequence the human genome is in fact just the beginning of a long journey as the extraordinary genetic diversity that exists between individuals becomes clear Work in this field promises much to understand our evolutionary origins to define us as individuals to predict our risk of disease and to more effectively understand treat and prevent illness Contemporary genetic research is allowing the basis of both rare inherited disorders and common multifactorial diseases like asthma and diabetes to be more clearly defined Huge investments are being made and great advances have been achieved but the challenges remain daunting This book provides an authoritative overview of this topical and very rapidly advancing field of biomedical research Human Genetic Diversity describes the major classes of genetic variation and their functional consequences A combination of cutting edge research and landmark historical studies illustrate developments in the field the rationale for current studies and likely future directions Major structural variants at a chromosomal level are described as well as copy number variation and sequence level genetic diversity Evidence of selective pressures in human populations and insights into human evolution are illustrated The book describes the development of linkage analysis and more recently genome wide association studies to define the genetic basis of disease current approaches to defining functional causative variants and the emerging fields of pharmacogenomics and individualised medicine

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Sinise,2007 Tumour markers are molecules occurring in blood or tissue that are associated with cancer and whose measurement or identification is useful in patient diagnosis or clinical management This book analyses potential signals of cancerous tumours otherwise known as markers or indicators This includes direct and rapid determination of cancer antigen potential tumour markers for cholangiocarcinoma melanoma inhibitory activity metastatic uveal melanoma measurement of tumour oxygenation bladder cancer markers epithelial cell adhesion and progression markers in prostate tumours

Molecular and cytogenetic research advances in human reproduction - Volume II Rick Francis Thorne,Ihtisham Bukhari,Shi Qinghua,2023-08-03 *Human and Mammalian Cytogenetics* T. C. Hsu,2012-12-06 The history of science is mostly written retrospectively a generation or two after the actual events being discussed Science historians are now analyzing and evaluating the origins of evolutionary and genetical theory in the nineteenth century and a sort of Darwin industry seems to have grown up A history of mammalian cytogenetics by one of the main participants is hence a very welcome change since it has a vividness an immediacy and a personal flavor which these scholarly tomes and the official biographies of scientists mostly lack The life of the author Chinese born T C Hsu has been a romantic and colorful one and he is himself a unique personality so that his book is a very unusual blend of reminiscences history of his special field which has transformed human genetics and wise comments on the mistakes made along the way The best qualities of a very fine Chinese mind have contributed to Dr Hsu's career including this book Those qualities which seem to me especially Chinese include a kind of transparent honesty a very direct empirical approach to problems and superb technical ability

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teachers to continue to employ plant cytogenetics to address fundamental questions about the cytology of plant chromosomes and genomes for years to come Hank W Bass is a Professor in the Department of Biological Science at Florida State University James A Birchler is a Professor in the Division of Biological Sciences at the University of Missouri Scientific Directory and Annual Bibliography National Institutes of Health (U.S.),1984 Each issue lists papers published during the preceding year

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