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# Experimental and Molecular Pathology

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## Book review

**Molecular Pathology and the Dynamics of Disease**, M. Mitchell. 1st ed Academic Press, an imprint of Elsevier, London (2018). 9780128146101

### 1. Introduction

Maika Mitchell's "Molecular Pathology and the Dynamics of Disease" (published date: 25.6.2018) delineates conventional and contemporary concepts of molecular pathology whilst incorporating these principles through a succession of reproducible Standard Operating Procedures (SOP's). Molecular pathology is a developing and innovative field and, as such, Mitchell's work provides a beneficial educational reference which integrates the timely advances of disease mechanisms and foretells the direction of progressive future research. This literature benefits a niche audience comprising of scientists, medical students and scientifically-minded physicians with particular interests in viral and cancer pathology.

This book describes virus-host immune interactions with emphasis on Natural Killer (NK) cells' emerging prophylactic roles uncovered through molecular taxonomy development in '-omics' based research. The furtherance of this research in relation to virulent viral gene-protein investigations is also insightfully suggested. Molecular pathology of hereditary disorders is briefly discussed with strong prominence placed on the genetic basis of cancer. As outlined by Mitchell, Next Generation Sequencing (NGS) panel genomics for microsatellite biomarker screening can deduce whether a trinucleotide repeat expansion threshold motif is met. Hence meiotic and mitotic instability, in conjunction with genotypic homogeneity and numerous susceptibility factors, increase one's predisposition to hereditary disorders (namely cancer). Furthermore penetrance in the context of genome-wide association studies is importantly put into perspective as is the translational attributes of the molecular pathologist in terms of comprehending and communicating laboratory test statistics.

Mitchell's book imparts science at substantially variable levels of complexity and interplays pathology between laboratory research and clinical settings well. However, I believe chapter titles should be amended to accurately reflect their contents as they are misleadingly broad which implies full coverage of molecular pathology when only a subset of the larger discipline is elaborated. For instance, chapter title 'Molecular Pathology Introduction and Research Review' does not denote its text well as only viral pathology is discussed. This is important

as the author's objective for this book is to serve as a ready reference and because it reduces the scope of her target audience. Although the fundamentals of molecular pathology centre on constituents: nucleic acids and proteins, a description of gene expression could be omitted as it is assumed a reader with the capacity to comprehend SOP's would possess this knowledge as a prerequisite. The SOP's attempt to standardise laboratory procedures whilst maintaining the flexibility to incorporate new knowledge thus adhering to the evolving nature of molecular pathology. They extend guidance on grossing procedures, staining methods and quality management programs. I believe simplification of some SOP's (for example further segregation of administrative from practical aspects of laboratory procedures) is important to allow them to be easily utilised in a clinical laboratory setting. As stated, chapter titles appear misinformative as histologic staining and immunochemistry procedures - explained in the SOP's - are not traditionally constitutive of molecular pathology.

The author outlines the challenges for molecular medicine from a unique multidisciplinary stance by analysing investigative laboratory technologies and reviewing the clinical practicality of genetic cancer screening. This stance incorporates technological, economically constraintive and non-genetic predisposition factors relating to cancer. Additionally the potential of molecular pathology - increasingly for prognostic and therapeutic applications - is portrayed effectively via real-world examples in terms of clinical validity and utility. As illustrated, molecular tumor taxonomy in chronic myeloid leukaemia has propagated the development and administration of tyrosine kinase inhibitor medications which can potentially circumvent the clinical ramifications associated with oncology therapeutics.

### 2. Conclusion

As an undergraduate biomedical science student I am now markedly more informed and enthusiastic regarding pathology. Given the cognizance contained within this book (particularly in relation to the molecular genetics of cancer & NK cells' emerging roles) the peripheral amendments suggested in this review do not preclude the pedagogical value that Mitchell's work provides therefore I advocate "Molecular Pathology and the Dynamics of Disease" to a narrower audience principally laboratory scientists.

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