Molecular Epidemiology of Chronic Diseases

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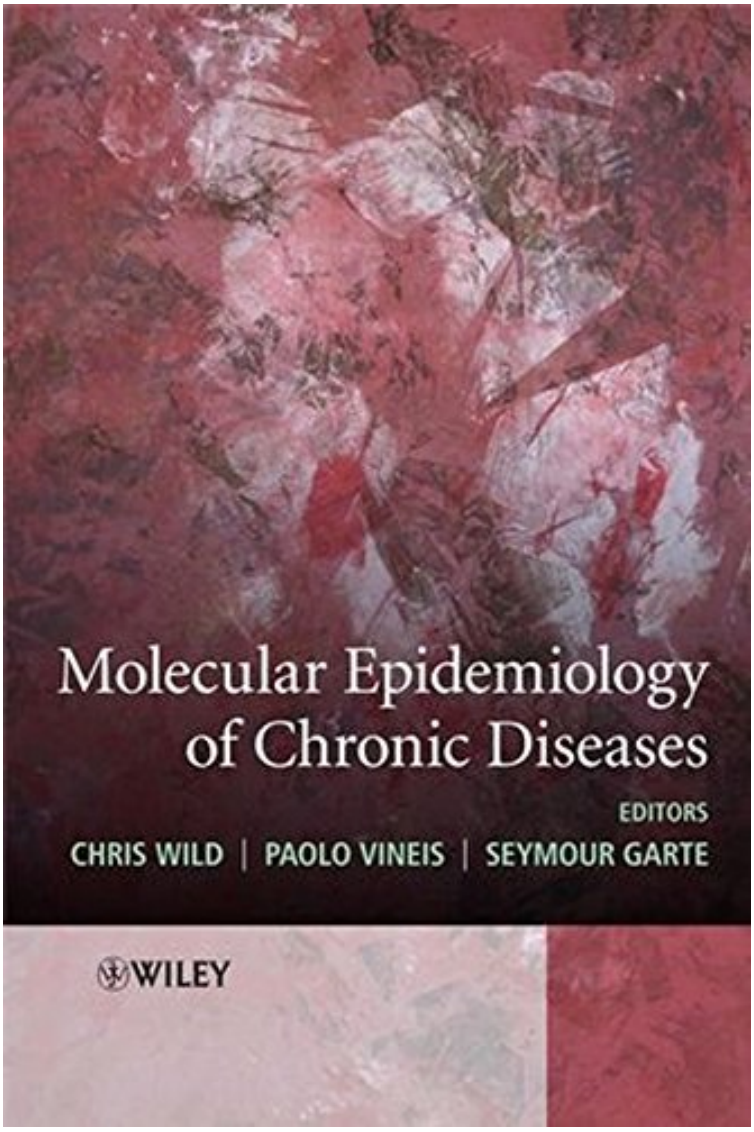

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Chris Wild, Paolo Vineis, Seymour Garte : Molecular Epidemiology of Chronic Diseases before purchasing it in order to gage whether or not it would be worth my time, and all praised Molecular Epidemiology of Chronic Diseases:

3 of 3 people found the following review helpful. A common homeland for scientists of diverse backgrounds.By Miquel PortaMore than 25 intense years have elapsed since the pioneering articles on molecular epidemiology were published, and about 20 since the first textbooks came out. Happily, the obsolescence of some sections of the precursor books is immense, such is the distance with the protagonist of this review. The entire book shows the substantial progress that has been accomplished, and in particular how epidemiologic reasoning, knowledge and

methods have increased the capacity of other contemporary biological sciences to integrate reasoning, knowledge and methods from multiple disciplines.The book is coherently structured in 26 chapters written by the 3 editors and 48 additional authors. Wild was until recently at the University of Leeds, UK; in January 2009 he became Director of the International Agency for Research on Cancer (IARC). After many years in Torino, Italy, Vineis now works at Imperial College, London, while Garte is at the University of Pittsburgh, US. Most authors of the book work in the US, UK, Italy and Denmark, and some do so in France, Germany, Finland and New Zealand. Remarkably, many authors are laboratory scientists. Actually, skimming through the list of contributors you realise how the authors' institutional affiliations show strong relationships between -"on one hand..."- epidemiology, biostatistics, environmental sciences and public health, and -"on the other hand..."- genetics, molecular biology, systems biology, and chemistry, without forgetting clinical medicine. While the book devotes -as it must- a huge amount of space to research on biological mechanisms, it is also properly focused on clinical research and public health (page 20).Almost all chapters are refreshingly brief, and the effort to write clearly and concisely shows. Generous use is made of tables, `boxes', and figures. The excellent introduction ("Why molecular epidemiology?") is followed by three chapters, fundamentally methodological, on study designs, molecular epidemiological studies that can be nested within cohorts, and family studies, haplotypes and gene association studies. The following chapters are on individual susceptibility and gene-environment interactions, biomarker validation, exposure assessment, carcinogen metabolites as biomarkers, adducts as biomarkers of exposure, and biomarkers of mutation and DNA repair. Four other chapters are devoted to innovative techniques in genotyping, genomics, bioinformatics, proteomics and other "-omics". Problems that analyses in molecular and genetic epidemiology pose are addressed in many parts of the book, but three chapters are specifically devoted to univariate and multivariate data analysis, meta-analysis and pooled analysis of genetic and environmental data, and analysis of complex datasets. The other main topics that the book covers are as follows: implications of random measurement errors in environmental and occupational epidemiology; etiopathogenic mechanisms, characterization of individual and population risks, monitoring and vigilance, and regulatory decisions; biomarkers as endpoints in intervention studies; biospecimens and biobanks; ethical implications of biomarkers of individual susceptibility; biomarkers for dietary carcinogens (the example of heterocyclic amines); large-scale studies on hormones; studies on aflatoxins, hepatitis B and liver cancer as a paradigm for molecular epidemiology and biology; and air pollution as an example of complex exposures.There is a remarkable and successful effort to focus on biological techniques that are relevant for clinical and epidemiological research, including the assessment of the reliability of the techniques. The frontiers shared by laboratory sciences, biomedicine and epidemiology are extensively and carefully walked; frontiers hence become common homelands for scientists of many diverse backgrounds. Two examples are chapters 9 and 23 on adducts, which show what adducts can add to simpler measures of exposures and of biological effective dose (e.g., increase precision of comparisons, refine predictability of outcomes).I was glad to read in two different sections (pages 18 and 316) analyses of selection biases caused by limited, non-random procurement of biological samples, a problem that we often prefer not to look at and which, however, may severely affect microbiological, clinical and epidemiological studies; even cohort-nested case-control studies may suffer from selection biases due to limited retrieval of disease-related samples (e.g., tumour tissue for DNA analyses). The application of the principles of clinical epidemiology -and, in fact, direct evidence from molecular epidemiology itself- shows that the availability of biological samples should never be assumed to be independent from clinical and environmental characteristics of the individuals we study.As an example of the need to assess the validity of exposure biomarkers, attention is given to "disease progression biases", that is, to biases that occur when disease progression entails pathophysiologic changes that alter the characteristics or concentrations (in blood, adipose tissue, target organs, peritumoral tissue) of the exposure biomarkers. Biomarkers of exposure collected during subclinical or overt disease will then not reflect exposures of etiologic significance that took place in more distant time windows. For instance, during the progression of some cancers, blood concentrations of lipophilic substances of putative etiologic interest (e.g., lipophilic vitamins, organochlorine compounds) may be increased or decreased due to pathophysiologic changes associated with cancer-induced weight loss, cholestasis or lipid mobilization.I also found a balanced treatment of acquired, somatic mutations as markers of biological response and, more generally, as relevant biological events whose clinical and environmental causes deserve study (pages 73, 112, 301). The mutational effects of gene-environment interactions are also properly analysed (page 63): among the other kinds of gene-environment interactions "the best example is that of somatic mutations caused by the direct chemical interaction of a toxic agent with a regulatory or active site of a critical gene, such as an oncogene or tumour suppressor gene". Indeed, I found the book to have a broad, inclusive and comprehensive perspective; it does not marginalise sensitive environmental problems, and there is no hypertrophy of inherited genetic susceptibility to disease.The book covers virtually everything on molecular epidemiology and most on genetic epidemiology that may interest a wide spectrum of professionals in the health and life sciences; e.g., professionals working on environmental and occupational exposures, toxic habits (tobacco, alcohol), virus and other infectious agents, nutrition... the examples based on exposures are innumerable. The book will also be useful to laboratory scientists, who will find in it an excellent introduction to epidemiologic and statistical methods, embedded in examples on biological issues. All types

of biomarkers are analysed: biomarkers of exposure, susceptibility, early biological response, and clinical outcomes. Hence, the book deserves attention by those who work in the laboratory, in medicine, in the occupational and population settings, or in the environmental sciences. It also tackles the instrumental and causal relationships among such processes and multiple clinical pathologies; cancers in particular, but also other chronic diseases (neurological, endocrine, respiratory, digestive and cardiovascular). Having the book at hand will also be useful to those who use biomarkers in their daily professional life. All libraries of the health and life sciences should have a copy; for today, two decades later, using or assessing biomarkers to study health and disease is everything but uncommon.

"I think this is an excellent bookI recommend it to anyone involved in molecular epidemiology... The 26 chapters are written by topic specialists, in an explanatory, east to read style." BTS Newsletter, Summer 2009 "This text provides an accessible and useful handbook for the epidemiologist who wants to survey the field, to become better informed, to look at recent developments and get some background on these or simply to appreciate further the relatively rapid changes in informatic and analytical technologies which increasingly will serve and underpin future epidemiological studies. One of the strengths in this book is the extensive array of practical illustrative examples, and it would also in my opinion have useful potential as a teaching text." American Journal of Human Biology, March 2009 With the sequencing of the human genome and the mapping of millions of single nucleotide polymorphisms, epidemiology has moved into the molecular domain. Scientists can now use molecular markers to track disease-associated genes in populations, enabling them to study complex chronic diseases that might result from the weak interactions of many genes with the environment. Use of these laboratory generated biomarker data and an understanding of disease mechanisms are increasingly important in elucidating disease aetiology. Molecular Epidemiology of Disease crosses the disciplinary boundaries between laboratory scientists, epidemiologists, clinical researchers and biostatisticians and is accessible to all these relevant research communities in focusing on practical issues of application, rather than reviews of current areas of research. Covers categories of biomarkers of exposure, susceptibility and disease Includes chapters on novel technologies: genomics, transcriptomics, proteomics and metabonomics, which are increasingly finding application in population studies Emphasizes new statistical and bioinformatics approaches necessitated by the large data sets generated using these new methodologies Demonstrates the potential applications of laboratory techniques in tackling epidemiological problems while considering their limitations, including the sources of uncertainty and inaccuracy Discusses issues such as reliability (compared to traditional epidemiological methods) and the timing of exposure Explores practical elements of conducting population studies, including biological repositories and ethics Molecular Epidemiology of Disease provides an easy-to-use, clearly presented handbook that allows epidemiologists to understand the specifics of research involving biomarkers, and laboratory scientists to understand the main issues of epidemiological study design and analysis. It also provides a useful tool for courses on molecular epidemiology, using many examples from population studies to illustrate key concepts and principles.

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