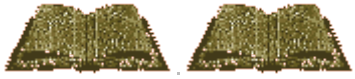
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Book Reviews: Technical Books Section



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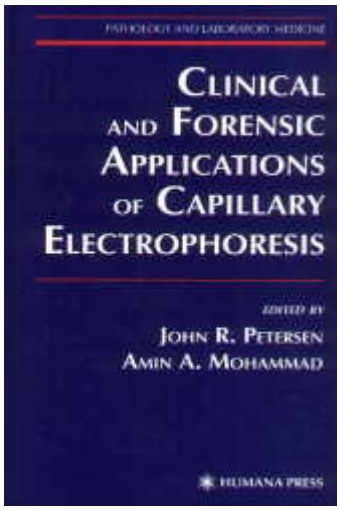
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A MANDATORY ADDITION TO EVERY LIBRARY

Clinical and Forensic Applications of Capillary Electrophoresis, 1st Edition, *Edited by* John R. Petersen and Amin A. Mohammad. Hard Bound, 6" x 9".
(A Book from *Pathology and Laboratory Medicine* Series by Humana Press)
Humana Press Inc., 999 Riverview Drive, Suite 208, Totowa, New Jersey 07512; Publication Date 1 May, 2001. x + 453 pages, ISBN 0-89603-645-6 (alk. Paper). Price $125.00

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The tremendous strides that the subject of toxicology has made over the last few decades can be attributed in large part to the rapid development of newer and more efficient analytical methods for the detection of poisons from various kinds of samples. Clinical toxicology could never have achieved the status it has today if the detection systems used in the diagnosis of poisoning had lagged behind. Forensic toxicology of course can hardly be practiced without recourse to convincing analytical proof.

Over a period of time, methods used in the detection of poisons and drugs evolved from primitive, inconclusive tests to cutting edge technology employing a wide variety of chemical and biological principles. The main driving force for technological innovations has been the need to report more accurate and faster results at the least possible cost.

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One of the commonest methods of toxicological analysis today that has grown by leaps and bounds ever since its advent in the 1930s is electrophoresis. It all began with paper electrophoresis, rapidly progressing through a plethora of matrixes, including cellulose acetate, agarose, starch gel, and polyacrylamide, even though ironically the Nobel Prize winning scientist who pioneered the concept of electrophoresis, Arne Tiselius had actually suggested the use of a quartz tube for separation, and not the matrixes mentioned above. In fact, the basic concept of using a tube for electrophoretic separation received scant attention till Hjerten came up with his design of a capillary electrophoresis apparatus in the late 1960s. Even then, it was only in 1981 when Jorgenson and Lukacs described the separation and fluorescent detection of amino acids, peptides,

and urine proteins by capillary zone electrophoresis that the scientific community finally woke up to the tremendous potential of this particular methodology in the fields of analytical biochemistry and toxicology. Today, the methodology encompasses numerous innovations ranging from immunoelectrophoresis, isoelectric focusing, and isotachophoresis to zone electrophoresis and micellar electrokinetic chromatography, rivaling the versatility of traditional chromatographic techniques such as high pressure liquid chromatography and gas chromatography.

Unfortunately, till recently, one aspect of electrophoresis that has been sluggish in its growth has been the separation of clinically important analytes. This is now receiving a lot of attention, and it is hoped that in the very near future the clinical applications of electrophoresis, particularly capillary electrophoresis, will become well entrenched. The book under review discusses this and other capillary electrophoresis (CE) methods as applicable to both clinical and forensic laboratories in a comprehensive manner. The editors, John R. Petersen and Amin A. Mohammad, along with a distinguished panel of leading experts give an amazing overview of the entire gamut of capillary electrophoresis. The book is divided into six sections comprising a total of twenty chapters.

QUICK NOTES

& Shows how to use CE to analyze PCR products for viral load analysis and forensic DNA typing
& Show how to use CE to analyze abnormal hemoglobins
& Covers the use of CE to analyze serum protein and detect monoclonal proteins in serum and urine
& Explains the use of CE to monitor levels of therapeutic drugs in serum

The first section (Introduction) covers historical perspectives and basic principles of CE, providing the reader with the fundamentals necessary for comprehension of the technique as it is employed today. Section II deals with protein electrophoresis, the earliest application of CE in the clinical setting. This section describes in detail the utility of CE in separating serum and cerebrospinal fluid proteins, lipoproteins, hemoglobin variants, and detecting serum or urine paraproteins. The problems associated with these procedures are also discussed at length along with their solutions. Section III is devoted to the special area of metabolic disorders and how CE can help in amino acid analysis, and study of organic acids and steroids. Section IV delves into the realm of immunoassay where CE is used as the separation method.

...This beautifully produced book should be a mandatory addition to every toxicology department library, dealing as it does with a methodology that is representative of the future of analytical toxicology. It is to the credit of the editors and contributors that the book succeeds in rendering the complicated technology of CE so easy to understand for even the relatively uninitiated reader...

By coupling immunoassay, CE, and laser-induced fluorescence it is possible to detect and separate simultaneously several drugs in extremely small samples (20 to 50 microlitres). Section V outlines the exciting possibilities of CE in molecular diagnostics, including quantitation of viral loads and analysis of PCR products used in forensic DNA typing. The latter was of particular interest to this reviewer, since it contains an exhaustive analysis of forensic applications. This section concludes with a mention of recent advancements such as combining CE with electrospray ionization mass spectrometry. The discussion is carried forward in the final section which elaborates on the combination of CE with mass spectrometry, and how this can revolutionize the detection of heavy metal poisoning, therapeutic drug monitoring, and in fact the entire field of toxicology.

This beautifully produced book should be a mandatory addition to every toxicology department library, dealing as it does with a methodology that is representative of the future of analytical toxicology. It is to the credit of the editors and contributors that the book succeeds in rendering the complicated technology of CE so easy to understand for even the relatively uninitiated reader. Division of the subject matter into clearly defined sections with appropriate sub-headings makes the whole book very readable and user friendly. All the contributors have taken pains to present updated accounts on all aspects, backed by recent authentic references. Another feature of this book that is remarkable is that such a large quantity of information has been so neatly encased into a compact volume, which is easy to handle, carry, and store in a modest bookshelf. The cover is simple and yet striking, the paper quality and printing of superior quality, and the binding pretty near flawless. In short, a book well worth its price.



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Dr.V.V.Pillay has been in the vanguard of the movement among medical professionals in India to develop the neglected field of Toxicology. He has published extensively in both the scientific and lay press on matters relating to Toxicology, as well as his chosen discipline - Forensic Medicine. Dr.Pillay has authored 6 books on Forensic Medicine and Toxicology, and has received an award for one of them (Modern Medical Toxicology), generally considered to be a trend setter among books on the subject in India. He has reviewed several books on Toxicology for the Internet Journal of Forensic Medicine and Toxicology. Dr.Pillay received a scroll of honour in appreciation of work done in the field of Toxicology from the Medicolegal Society, All India Institute of Medical Sciences, New Delhi. He has established a state-of-the-art Poison Control Centre, recognized by the World Health Organization at the institute where he is currently employed (AIMS, Cochin). Among his most sought-after publications is a 700 page reference work on Toxicology.

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