

BOOK REVIEW

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Review of: *Clinical and Forensic Applications of Capillary Electrophoresis, first edition*

REFERENCE: Petersen JR, Mohammad AA, eds., *Clinical and Forensic Applications of Capillary Electrophoresis*, Humana Press, Totowa, New Jersey, USA, 2001, x + 453 pp., \$125.00.

The scope of this book is to give an overview of the basic technical aspects of capillary electrophoresis (CE) and to provide more detailed information on its applications to the major analytical fields in clinical biochemistry and forensic science.

Capillary electrophoresis, known with the acronyms CE or HPCE (standing for high-performance capillary electrophoresis) has originated from the optimization of the basic principles of electrophoresis in a capillary format. Later on, other separation modes including chromatography-like and other mechanisms have been introduced, making CE a new, independent analytical technique.

Since its introduction in the early 1980s, CE has found academic consensus worldwide and numerous applications in analytical chemistry, biochemistry, and in pharmaceutical and biomedical analysis.

The intrinsic features of CE, which can be summarized in broad analytical spectrum (ranging from inorganic ions to large DNA fragments), different separation modes and detection systems (including mass-spectrometry), high separation efficiency, high mass-sensitivity, negligible consumption of samples (nanolitres), and solvents (few millilitres per day), fit exceptionally well the typical requirements of forensic sciences. As is well known, in forensic analysis high-performance and quantitative separation techniques are needed (and often must be used in combination), as they must be applied to the determination of a wide array of analytes (toxics, controlled drugs, gunshot-residues, inks, etc.) in different biological and nonbiological specimens, which are often limited in quantity and heavily contaminated.

Notwithstanding a sound potential, only in the latest years has CE been introduced in the forensic and clinical laboratories, and is still largely overlooked by the majority of analysts and researchers.

On this basis, the book edited by Petersen and Mohammad may give an important contribution to the dissemination of the CE knowledge into fields of science, which are sometimes reluctant to adopt new technologies.

The first section of the book, including chapters by M. Lele et al. and H. Whatley, provides a general overview and a presentation of

the basic concepts and modes of CE. This section is propaedeutic for those readers who are not yet familiar with this relatively new technique.

The second section, including chapters by K. Srinivasan et al., C.R. Jolliff, J.R. Petersen and A.A. Mohammad, R. Lehmann and J.M. Hempe et al., covers CE of proteins of clinical relevance. Both instrumental aspects, i.e., capillary coatings and applications (to serum, cerebrospinal fluid, and urine) are specifically discussed. Also, lipoprotein, haemoglobin variants, and HbA_{1c} determinations are presented.

Section III is dedicated to metabolic diseases and includes chapters by M.K. Linde, K.L. Nuttall, and N.A. Guzman on applications of CE to the determination of amino acids and organic acids. A short chapter by Youh et al. describes the analysis of steroids in body fluids, a task challenging the limits of sensitivity of CE, because of the low levels of these analytes in biological matrices.

Section IV, by B. Adesoji et al., describes capillary electrophoretic immunoassay (CEIA), which combines the separation potential of CE with the high sensitivity and selectivity of immunoassays and looks promising for its high sensitivity, multianalyte screening potential, and easy implementation in standard CE instrumentation.

Section V includes chapters by J.M. Kolesar and B.R. McCord and J.M. Butler, which cover some crucial applications of CE in molecular diagnostics, such as forensic DNA typing and quantitation of viral load. Another chapter of this section, by S. Cherkaoui, which deals with interfacing CE and electrospray ionization mass spectrometry, is of the highest interest, but, in our opinion, should be shifted to the next section, which contains another important chapter on CE/mass-spectrometry by S. Naylor and A.J. Tomlinson.

The remaining chapters of the sixth and last section by Z.K. Shihabi, L.V. Rao et al., W. Thormann and J. Caslavská, and J.C. Hudson et al., deal with serum and urine drug monitoring and illicit drug screening and with the analysis of metal ions. All these subjects should be regarded as the most attractive for forensic toxicologists.

In conclusion, this multi-author book edited by John R. Petersen and Amin A. Mohammad is an excellent introduction to CE and a good, although rapid, review of CE applications in clinical biochemistry and forensic science.

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