Michael Torzewski, Karl J. Lackner, Jürgen Bohl, Clemens Sommer

Integrated Cytology of Cerebrospinal Fluid

Michael Torzewski, Karl J. Lackner,
Jürgen Bohl, Clemens Sommer

Integrated Cytology of Cerebrospinal Fluid

With 138 Figures

Springer

Michael Torzewski, MD
Institute of Clinical Chemistry and
Laboratory Medicine and Department
of Neuropathology
University of Mainz
55101 Mainz
Germany
torzewski@zentrallabor.klinik.uni-mainz.de

Karl J. Lackner, MD
Institute of Clinical Chemistry
and Laboratory Medicine
University of Mainz
55101 Mainz
Germany
lackner@zentrallabor.klinik.uni-mainz.de

Jürgen Bohl, MD
Department of Neuropathology
University of Mainz
55101 Mainz
Germany
bohl@neuropatho.klinik.uni-mainz.de

Clemens Sommer, MD
Department of Neuropathology
University of Mainz
55101 Mainz
Germany
sommer@neuropatho.klinik.uni-mainz.de

ISBN 978-3-540-75884-6 e-ISBN 978-3-540-75885-3

DOI 10.1007/978-3-540-75885-3

Library of Congress Control Number: 2007938083

springer.com

Springer-Verlag is a part of Springer Science+Business Media

Cover design: Frido Steinen-Broo, eStudio Calamar, Spain

Printed on acid-free paper

5 4 3 2 1 0

Preface

Cytologic examination of the cerebrospinal fluid (CSF) is a technically simple but productive diagnostic procedure. Its proper performance demands considerable expertise, but it can nevertheless be accomplished relatively rapidly and inexpensively. Therefore, it may be helpful for physicians and also technicians to obtain images of routinely prepared CSF slides of different pathologies. This book will be dedicated to physicians and technicians (both beginners and advanced) who deal with CSF cytology and will assist them with the diagnosis of different pathologies. The term "integrated" of the title implies that we have used immunocytochemical, histological, and immunohistochemical illustrations, gross nervous system pathology, and/or quantitative data liberally in addition to photographs and descriptions of cytologic preparations. This should provide the reader with background knowledge to the significance of abnormal cytological findings in relation to the etiology and pathogenesis of the underlying disease and create a comprehensive picture of the cytopathology of the central nervous system. In particular, we have used several images of immunocytochemical (and also immunohistochemical) illustrations throughout the section "Neoplastic Disorders" (Sect. 6) and suggest useful antibodies for further immunocytological work-up in cases where the routine cytological examination of CSF alone does not yield a sufficiently precise cytological diagnosis. This emphasis mirrors the widespread application of immunocytochemistry to CSF in the diagnosis of neoplastic diseases.

The book is systematically organized according to diagnostic categories, i.e., common cell types, inflammatory conditions, non-neoplastic disorders, neoplastic disorders, and contaminants. We have also provided a brief description of cytologic techniques (CSF cell preparation and common artifacts). However, as a more detailed description is far beyond the scope of the present book, the reader is referred to the appropriate literature. In each chapter, the images are accompanied by a brief introduction and description on the opposing page. If not otherwise specified CSF samples are stained by the panoptic Pappenheim's stain (a combination of the May–Grünwald's eosin-methylene blue stain with the Giemsa azure II-eosin stain) and shown using an oil immersion objective (×100).

Histologic specimens are usually stained with hematoxylin and eosin (H&E) and shown using a ×40 objective.

The authors would be glad to receive suggestions as to how the book might be further improved. In this regard, submissions of additional illustrations or of cytological preparations showing uncommon but diagnostically relevant findings would be particularly helpful. We thank Springer-Verlag GmbH, Heidelberg, Germany, and in particular Ellen Blasig and Gabriele Schröder for their extensive help and advice during the preparation of this book. We are grateful to Andreas Kreft, MD, Institute of Pathology, University of Mainz, for the critical reading of Sect. 6.3. We also thank the technical staff of the Institute of Clinical Chemistry and Laboratory Medicine and the Department of Neuropathology, University of Mainz, for the preparation of the cytological and histologic specimens.

Mainz, Germany
August 2007

Michael Torzewski
Karl J. Lackner
Jürgen Bohl
Clemens Sommer

Contents

CHAPTER 1 Cerebrospinal Fluid Cell Preparation

1.1 General Considerations

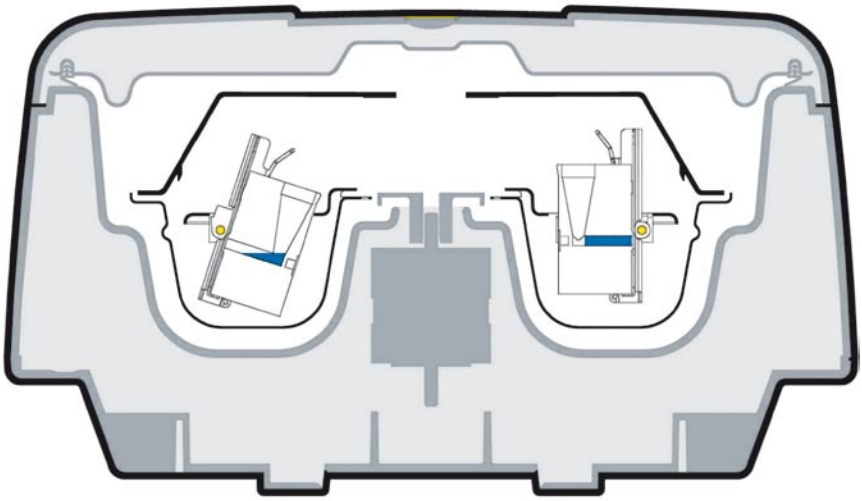
Since the cellular component of CSF obtained from the lumbar area is generally scant, an efficient method of concentrating this material is necessary. Furthermore, considerations regarding the selection of cytopreparation techniques include the potential for cell loss, the clarity of cellular detail, and the spectrum of stains offered. The most commonly utilized methods today are membrane filtration and cytocentrifugation.

1

1.2 Cytocentrifugation

Of all the possible methods of transferring cells from CSF samples onto slides, most laboratories now use a cytospin apparatus, such as the Shandon cytocentrifuge (Fig. 1A, reprinted by kind permission of Thermo Shandon), which is efficient in terms of cell yield. The cytocentrifuge technique also allows use of virtually all types of fixation and staining, including the preparation of cells for immunocytochemistry, immunofluorescence and in situ hybridization. Because of the centrifugal force when in the running position, the cytofunnel will raise up in vertical position (right-hand side of the illustration). When the cytospin is not running the cytofunnel is loaded at an angle to prevent the specimen coming into contact with the filter card (left-hand side of the illustration; blue color, specimen). To load the slide clip with a re-useable sample chamber and filter card (Fig. 1B, reprinted by kind permission of Thermo Shandon) it is necessary to fit the glass slide (1), to fit the filter card (2), to fit the re-useable sample chamber (3), and finally to pull up the spring and press it into the two retaining hooks to hold the chamber in place (4). After running the cytospin, cytospin sample chambers are unloaded and samples are fixed as soon as possible to avoid autolysis. The specimen can now be stained and examined microscopically.

A



B