Surgical Oncology (2006) 15, 257–266

Available at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/suronc

REVIEW

The role of ThinPrep cytology in the evaluation of estrogen and progesterone receptor content of breast tumors

P. Konofaos[a,b,*,1], K. Kontzoglou[b,2], J. Georgoulakis[c,3], T. Megalopoulou[d,4], C. Zoumpouli[e,5], Z. Christoni[c,6], O. Papadopoulos[b,7], G. Kouraklis[b,8], P. Karakitsos[c,9]

[a]*Eastern Virginia Medical School (EVMS), International Institute of Reconstructive Microsurgery, Norfolk, USA*
[b]*Second Department of Propedeutic Surgery of Athens University – "Laiko" General Hospital, Athens, Greece*
[c]*Department of Cytopathology, "Attikon" University Hospital, Athens, Greece*
[d]*Department of Histology and Embryology, Athens University, Medical School, Greece*
[e]*Second Department of Pathology, "Attikon" University Hospital, Athens, Greece*

Accepted 21 March 2007

KEYWORDS
Estrogen receptor (ER) and progesterone receptor (PR) content;
Breast cancer;
FNA biopsy;
ThinPrep technique

Summary
Introduction: The objective of the current study was to analyze the potential value of immunocytochemical analysis on ThinPrep (TP) -processed smears, from fine needle aspiration (FNA) biopsies, of breast tumors for the determination of ER and PR content as compared with the immunohistochemical analysis performed on paraffin-embedded breast tumor specimens.
Patients and methods: Percutaneous FNA biopsy of focal breast lesions in 119 female adult patients during a 31-month period was performed. Subsequently, these patients underwent

*Corresponding author. Eastern Virginia Medical School (EVMS), International Institute of Reconstructive Microsurgery, Norfolk, USA. Tel.: +1 757 214 5384; fax: +1 757 625 2131.
E-mail address: petros_konofaos@yahoo.com (P. Konofaos).
[1]Fellow in Reconstructive Microsurgery.
[2]Lecturer in General Surgery, Athens University, Medical School.
[3]Lecturer in Cytopathology, Athens University, Medical School.
[4]Post graduate in Probability and Statistics.
[5]Consultant Pathologist.
[6]Biologist.
[7]Associate Professor in Plastic Surgery, Athens University, Medical School.
[8]Associate Professor in General Surgery, Athens University, Medical School.
[9]Associate Professor in Cytopathology, Athens University, Medical School.

0960-7404/$ - see front matter
doi:10.1016/j.suronc.2007.03.004

surgical resection of the tumors. ER and PR status of the tumors was determined by immunocytochemical analysis on TP-processed smears and by immunohistochemical studies in paraffin-embedded sections.
Results: With the use of TP technique adequate material was observed in all cases. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and overall accuracy (OA) of the TP technique for the ER were 98.95%, 100%, 100%, 95.84% and 99.15% respectively. In addition, sensitivity, specificity, PPV, NPV and OA of the TP technique for the PR were 100%, 87.5%, 95.60%, 100% and 96.64%, respectively.
Conclusions: ER and PR status can be evaluated in FNA material from breast carcinomas by using the TP technique. Sample collection and storage is simple and permits the assortment of the FNA sample for both morphologic diagnosis and ancillary studies. The accuracy of TP technique in the detection of ER and PR content is comparable to those of the histological evaluation, and could be of paramount importance for the preoperative planning of treatment.

Contents

Introduction . . . 258
Patients and methods . . . 259
Patient's population . . . 259
FNA biopsy . . . 259
Surgical specimens . . . 259
TP cytological preparations . . . 259
Immunocytochemistry . . . 260
Immunohistochemistry . . . 260
Staining interpretation . . . 260
Statistical analysis . . . 260
Results . . . 260
Age . . . 261
TP cytology . . . 261
Histology . . . 261
Tumor types and grades . . . 261
Discussion . . . 262
Immunohistochemistry . . . 263
Immunocytochemistry . . . 263
TP cytology . . . 264
Conclusions . . . 265
References . . . 265

Introduction

The presence of estrogen receptor (ER) and progesterone receptor (PR) is positively correlated to favorable response to hormonal treatment of breast cancer [1–4] and evaluation of the hormone receptors status is a part of the routine assessment of these neoplasms. It is well known that hormone receptor negative breast carcinoma cases show more frequently aneuploid DNA distribution than receptor positive cases [5–7].

The development of immunohistochemistry techniques accommodates the evaluation of the hormone receptor status in breast cancer in an easier, applicable to a wider variety of samples, less expensive and more specific and sensitive way [8]. The proportion of cells stained, the intensity of the staining and the uniformity of staining within the positive cells are the main features of the stained tumor cancer cells [9]. However, there is no general agreement as to how the immunohistochemical assays should be evaluated the widely recognized importance of determining hormonal receptor status, which is essential for deciding if hormonal replacement therapy (HRT) is indicated in a given patient.

Hormone receptor analysis has been traditionally performed on surgically removed specimens. However, in a number of situations, such as inoperable cases and metastatic or recurrent breast tumors, in cases where preoperative irradiation or preoperative therapy is the initial treatment option and in advanced tumors where serial hormone receptor studies may provide information regarding the response to therapy [10–12], Fine Needle Aspiration (FNA) biopsy could be a useful method for the evaluation of ER and PR content.