

COST IC0604

Evora 2nd October 2008

WG3 – Images: Analysis, Processing, Retrieval and Management

Prof. Janina Slodkowska MD, PhD. (PL)

Prof. PD Dr. M. Ansorge / EPFL (CH)

WG3

- * WG members
- * Output of 2008
- * Objectives for 2009
- * Tasks distribution / declarations of contributions

WG3 Members

- Inst. of Tuberculosis and Lung Diseases (PL)
- EPFL (Switzerland)
- TRIBNV (FR)
- UCLM (ES)
- Hospital General de Ciudad Real (ES)
- University of Regensburg (DE)
- University of Nottingham (UK)
- School of Molecular Med. Sc. Nottingham (UK)
- University of Belgrade (Serbia)
- Kaunas University. of Technology (LT)
- University of Nicosia (CY)
- Dako Copenhagen (DK)
- Tampere University (FI)
- VicomTech (ES)
- Wielkopolskie Centre of Oncology (PL)
- Precoptic (Nikon's Instruments Distributor) (PL)
- Hospital do Espirito Santo – Évora (PT)

WG3 Members (?)

- ? SESCAM (ES)
- ? University of Helsinki (FI)
- ? INSERM (FR)
- ? Charité Universitätsmedizin Berlin (DE)
- ? University of Udine (IT)
- ? Clinical Hospital of the Ministry of Internal Affairs and Administration (PL)
- * ? Chair and Department of Patomorphology. Medical University of Lodz (PL)

Output of 2008

A. Review the literature and select a model for the ihc analysis study.

Model: breast carcinoma

Biomarkers (ihc): HER-2, estrogen and progesteron receptors [ER/PgR]

Quantitative analysis: light microscope and automated image analysis systems.

B. Collection of the pathological material and clinical data

Material: >100 cases of invasive breast (surgical biopsy, resection material)
from the Wielkopolskie Centre of Oncology, Poznan, Poland.

Methods: Dako's standard for laboratory ihc procedures: HER-2, ER and PrR.
Light microscopy evaluation done by 3 pathologists
(pathological report, ihc scoring)

C. Selection and access to the automated image analysis systems AIAs

1. ACIS III – Dako

2. ScanScope Aperio (Precoptic, Poland)

Scanning procedures (Whole Image Slide): automated meth. - ACIS III
manual, focusing – Aperio

> 500 WIS was obtained for the analysis

Output of 2008

D. WSI quantitative analysis

- * **3 pathologists** (2 - WCO in Poznan, 1 - ITB&LD Warsaw; on line Aperio).
- * **3 measurements** by each pathologist
- * **2 training visits** in Dako, Copenhagen, Denmark
- * **2 consultations** with Dako and Aperio representatives
- * **Preliminary results** of HER-2 expression by 2 telemicroscopy systems.
- * ER and PrR evaluation has being continued

D Comparative analysis of ihc results obtained by light microscopy and AIAs for HER-2

Statistical evaluation of the results

E. Comparative analysis of ihc results for ER/PrR with the clinical data

Scoring model for ER/PrR expression (prognostic factor?)

Output 2008

*Scientific contribution to the European Congress on Telepathology,

Toledo, 17-19.05.2008

Assessment of HER-2/neu expression in breast carcinoma: a comparative approach by Automated Cellular Imaging System (ACIS III) and ScanScope Aperio.

J.Slodkowska¹, J.Breborowicz², M.Ploghoff³, M.Wojciechowski⁴, V.Filas², K.Pisula³, W. Staniszewski⁴.

¹Department of Telepathology, Institute of TB&Lung Diseases, Warsaw, Poland

²Department of Tumour Pathology, Wielkopolskie Center of Oncology, Poznan, Poland

³Dako, Copenhagen, Denmark

⁴Precoptic, Nikon's Distributor, Warsaw, Poland

•Organisation of the workshop on: „Quantitative Immunohistochemistry in Digital Pathology”
Warsaw, Nov. 29th, 2008

* Publication: Proceedings of the workshop

* Implementing STSMs (Aperio, U.K. – is programmed)

Programme for 2009

Incorporate and standardize current image technology in the system aids pathologists used for detection, classification and/or counting of cells and tissues.

Background: The clinical stage and histological grade of tumors differentiation have been commonly accepted as prognostic factors in many malignancies, which allow to predict a survival of the patients suffering from some tumours.

Immunohistochemical staining is an useful tool which helps pathologist to prepare differential diagnosis of tumors and to estimate their proliferative potential, the latter being an important prognostic factor.

E.g. In stomach NE tumours the grading system (G1-G3) is based on:
the histologic neoplastic cells differentiation and **Index Ki67**

Index Ki- 67 is: % positive nuclei stain within 1000 neoplastic cells
ihc staining with **MIB1 antibody**, Dako)

G1 = I Ki-67 < 10%

G2 = I Ki67 3-20%

G3 = I Ki-67 >20%

Programme for 2009

(2)

AIMS

1. to elaborate mathematic computerized software which help pathologists in the **precise evaluation of Ki-67 Index** in:
 - a. **Gastro-entero-pancreatic** tumours with **neuroendocrine differentiation**
 - b. **Central Nervous System** tumours

2. to elaborate mathematic computerized softwares which help neuropathologists in **differentiation between types of glial tumors**:
 - * astrocytoma v. oligodendroglioma (**built with so called small gemistocytes**);
 - * oligodendroglioma v. glioma mixtum;
 - * oligodendroglioma v. clearocellular ependymoma)on the **ihc cytoplasmic reaction** the neoplastic cells of astrocytic, oligodendroglial and ependymal derivation with antibodies against: **GFAP, EMA** and **Vimentine**
Glial Fibrillary Acid Protein (GFAP), Epithelial Membrane Antigen (EMA)

Programme for 2009

(3)

PARTNERS

Material

1. Doc Anna Nasierowska-Guttmejer: Head of the Patomorphology Dept. Clinical Hospital of the Ministry of Internal Affairs and Administration, Warsaw, Poland
2. Prof. Wielislaw Papierz: Head of the Chair and Department of Patomorphology. Medical University of Lodz, Lodz. Poland

METHODS

3. Prof. Gloria Bueno The University of Castilla-La Mancha, School of Engineering, Ciudad Real, Spain.
4. Dr Marcial Garcia Rojo, MD, PhD, MS. Hospital General de Ciudad Real. Ciudad Real. Spain

Coordinator

5. Prof. Janina Slodkowska, ITB&LD, Warsaw, Poland

WG3 Tasks: proposals and distribution

- 3.1. Image analysis tools study of possible solutions.
- 3.2. Design and implementation of image analysis tools related to scientific and medical data management.
- 3.3. Analysis of image compression techniques.
- 3.4. Design and development of conversion algorithms to create large files in standardized formats.
- 3.5. Design and development of a standardized large file formats microscopic pathology visualizing program.
- 3.6. Research on search engines available.
- 3.7. Developing collaborative work in telepathology servicing in Europe.

Open discussion

Suggestions provided by the partners:

- ✍ Consider also further topics additionally to image analysis
- ✍ Include the image analysis study on the basic histological staining.
- ✍ Initiate in 2008 also starting activities in medical image processing (RoI detection, segmentation, further analysis / feature extraction functions, compression, Search & Retrieval, storage organization, etc.).
- ✍ Possibly contribute to elaborating Open Source Toolboxes that can be made available to the open community.
- ✍ Content based image analysis
- ✍ Requirement: do not send the complete image to the analysis server