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DIGITAL PATHOLOGY & IMAGE ANALYSIS

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Scientific Tracks & Abstracts

DAY 1

Ichiro Mori, J Clin Exp Pathol 2017, 7:6 (Suppl)
DOI: 10.4172/2161-0681-C1-043

Glass slide preparation and digital pathology

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Digital Pathology is now spreading rapidly. One of the key event is slide scanning because good digital image is crucial for Digital Pathology. WSI (Whole Slide Imaging) scanner is not an all-mighty machine but requires real good glass slide for scan. This time, I'd like to list-up several key-points in glass slide preparation and make proposal for solution. Many steps in glass slide preparation may cause trouble in WSI scanning like quality of thin slicing, mounting slices on glass, embedding, drying, pasting slide label, cover slipping, writing on cover slip, type of cover slip, wiping before scanning, and tissue fixation. WSI scanners are always required to achieve fast scanning speed and good focus. Good quality of thin slicing and slide preparation is exclusive for this purpose. If there are folding, waving, or scratch of slices, embedding dust, bubble, too-much embedding materials, protruded slide label or cover slip, letters or lines on cover slip, they all may mislead autofocus. Moreover, because image analysis is highly expected in Digital Pathology, specimen fixation will become big issue. In Japan, there is no standardization in fixing solution except for recommendation that is buffered 10% formalin. Even using the same fixative, there are wide range of fixing conditions like the size of fixing tissues, fixing temparature, fixing time, stirring fixatives, etc. To get good results in image analysis that will surely reflect patient therapy, we should stand against fixation issues.

Biography

Ichiro Mori has completed his PhD from Gunma University, and Post-doctoral studies from Tokai University School of Medicine. He is Professor of Department of Pathology, International University of Health and Welfare, School of Medicine. He has published more than 25 papers in reputed journals.

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Study on the performance of an artificial intelligence system for image based analysis of peripheral blood smears

Renu Ethirajan, Dheeraj Mundhra, Jaiprasad Rampure, Shreepad Potadar, Sukrit Mukherjee and **Bharath Cheluvaraju**
SigTuple Technologies Pvt Ltd., India

In this study, we evaluate SHONIT, a cloud based Artificial Intelligence (AI) system for automated analysis of images captured from peripheral blood smears. SHONIT's performance in classification of WBCs was evaluated by comparing SHONIT's results with hematology analyzers and manual microscopy for manually stained smears. The study was carried out over 100 samples. The cases included both normal and abnormal samples, wherein the abnormal cases were from patients with one or more quantitative or qualitative flagging. All the smears were created using Hemaprep auto-smearer and stained using May Grunwald Geimsa stain. They were scanned and analyzed by SHONIT for WBC differentials under 40X magnification. WBC morphological classification by SHONIT was verified by an experienced hematopathologist. Quantitative parameters were analysed by computing the mean absolute error of the WBC DC values between SHONIT and Sysmex XN3000 and between SHONIT and manual microscopy. The mean absolute error between WBC differential values of manual microscopy and SHONIT were 7.67%, 5.93%, 4.58%, 2.69%, 0.44% for neutrophil, lymphocyte, monocyte, eosinophil and basophil respectively. The mean absolute error between WBC differential values values of Sysmex XN3000 and SHONIT were 8.73%, 5.55%, 3.63%, 2.12%, 0.45% for neutrophil, lymphocyte, monocyte, eosinophil and basophil respectively. SHONIT has proven to be effective in locating and examining WBCs. It saves time, accelerates the turnaround-time and and increases productivity of pathologists. It has helped to overcome the time-consuming effort associated with traditional microscopy.

Biography

Renu Ethirajan has completed her MBBS and DNB Pathology from Father Muller Medical College, Mangalore, India. She is currently working as Director Pathology for SigTuple, an organization that provides healthcare solutions driven by artificial intelligence and image processing. She has worked as a Consultant Hemato-Oncopathologist and has reported flowcytometry for more than 8 years at HCG Cancer Hospital, Bangalore. She is also trained in molecular diagnosis like fluoroscent in-situ hybradization and immuno-hematology. She has presented multiple papers in reputed CMEs and conferences. She has participated at the National Indian Conclave as a panelist on AI.

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Anila Chughtai et al., J Clin Exp Pathol 2017, 7:6 (Suppl)
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Synchronous ipsilateral clear cell renal cell carcinoma and chromophobe renal cell carcinoma: A case report and review of literature

Anila Chughtai, Khadija Shafqat, Mohammad Fayyaz Anwer and **Akhtar Sohail Chughtai**
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Collision tumor is a phenomenon in which two histologically different tumors exist as distinct lesions within same organ. Renal tumors represent 3% of adult malignancies and 2% of childhood malignancies but their synchronous occurrence is very rare. We present a case of synchronous tumors of kidney comprising clear cell renal cell carcinoma (CCRCC) and chromophobe renal cell carcinoma (CRCC). Grossly, two separate tumor nodules were identified with unremarkable intervening area. Microscopic examination from both tumor nodules revealed two different epithelial malignancies. Sections from larger nodules revealed nests of cells with distinct cell borders, hyperchromatic nuclei, perinuclear halos and eosinophilic granular cytoplasm while sections from smaller nodule revealed sheets and nests of cell with hyperchromatic nuclei, prominent nucleoli and clear to eosinophilic cytoplasm. Sections from intervening area showed renal parenchyma without any tumor infiltration. Larger tumor was positive for CK7 and CD117 immunohistochemical (IHC) stains while negative for CD10 IHC stain confirming the diagnosis of CRCC. However smaller tumor was positive for CD-10 IHC stain and negative for CK7 IHC stain confirming the diagnosis of CCRCC. Prognosis in such cases is determined by the more aggressive of the two tumors as in our case CCRCC is more aggressive with a 5 year survival rate of 50-60% as compared to CRCC with a 5 year survival rate of 80-90%.

Biography

Anila Chughtai has completed her Bachelor of Medicine & Bachelor of Surgery degrees (MBBS) from Services Institute of Medical Sciences, Lahore. Currently, she is working as a second year Post-graduate trainee at Chughtai lab Lahore.

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Walaa Fikry Elbossaty, J Clin Exp Pathol 2017, 7:6 (Suppl)
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Cluster of differentiations as biomarker in differentiation between ALL and AML

Walaa Fikry Elbossaty
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Introduction & Aim: Antigen surface markers represent as the new prognostic tool for detection of acute leukemia. To aim of this study is to investigate the prevalence expression of lymphoid and myeloid antigen lineage in acute leukemias.

Material & Methods: This study included 100 acute leukemias patients. Specimens were selected from consecutive patients who had sufficient material available. Among the 100 patients in which a detailed history, hematological, clinical and immunophenotyping analysis were performed. This study showed distribution of immunophenotyping characters between studied AML and ALL cases.

Results: The most abundant immunophenotyping features in acute myeloid leukemia were cMPO, CD33, CD117, CD13, CD14 and CD64, while the most abundant immunophenotyping features in acute lymphoblastic leukemia were CD19, CD79a, TdT, CD20, CD10 and CD34.

Conclusion: cMPO which act as independent prognostic factor for AML, CD10 and TdT can be used as independent prognostic factor to differentiate between ALL and AML.

Biography

Walaa Fikry Elbossaty is a PhD Post Research Fellow, Department of Chemistry, Faculty of Science-Damietta, Egypt. She received BSc (Chemistry/Biochemistry), MSc in Biochemistry from Mansoura University and PhD in Biochemistry/Molecular Biology from Damietta University.

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Faith I Onditi, J Clin Exp Pathol 2017, 7:6 (Suppl)
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Pathology of placental malaria in *Plasmodium knowlesi* infected Olive baboons (*Papio anubis*)

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Placental malaria (PM) causes adverse pregnancy outcomes in the mother and her foetus. It is difficult to study PM directly in humans due to ethical challenges. This study set out to bridge this gap by determining the outcome of PM in non-immune baboons in order to develop a non-human primate model for the disease. Ten pregnant baboons were acquired late in their third trimester (day 150) and randomly grouped as seven infected and three non-infected. Another group of four nulligravidae (non-pregnant) infected was also included in the analysis of clinical outcome. Malaria infection was intravenously initiated by *Plasmodium knowlesi* blood-stage parasites through the femoral vein on 160th day of gestation (for pregnant baboons). Peripheral smear, placental smear, haematological samples, and histological samples were collected during the study period. Findings in this study demonstrates the pathophysiology of placental malaria in non-immune baboons. Gross patholog presented similar features to human placentas. Placental parasitaemia was on average 19-fold higher than peripheral parasitaemia in the same animal. Placental damage and infiltration of immune cells was directly associated with *P. knowlesi* infection and subsequent sequestration in the baboon placenta. Therefore, our findings compare with key feature of placental *falciparum* malaria in humans. This presents the baboon as a new model for the characterization of malaria during pregnancy.

Biography

Faith I Onditi is a Senior Research Scientist at the Institute of Primate Research, Department of Tropical and Infectious Diseases, Malaria program. She holds a PhD in Biochemistry (Reproductive Immunology) from University of Nairobi and a Master's degree in Molecular Medicine. Her research interest is in the development of baboon (*Papio anubis*)-*Plasmodium knowlesi* animal model for placental malaria, validating and utilizing the model in testing potential vaccines and drug candidates against malaria in pregnancy. She has published 6 papers in peer reviewed journals and has presented her work in 12 conferences.

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DAY 2

Renu Ethirajan et al., J Clin Exp Pathol 2017, 7:6 (Suppl)
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Study on the performance of an artificial intelligence system for image based analysis of urine samples

Renu Ethirajan, Harshit Pande, Abdul Aziz, J H M Apoorva and **Bharath Cheluvaraju**
SigTuple Technologies Pvt. Ltd., India

In this study, we evaluate the performance of Shrava, a cloud based Artificial Intelligence (AI) system for automated analysis of images captured from urine samples. Identification and morphological classification of objects in urine sediments by Shrava was compared with the results from Sysmex UF-1000i urine analyzer and manual microscopy. Thirty urine samples were analysed for the study, wherein, on an average, 50 different fields of views were captured at a magnification of 400x from slides prepared from the samples. Classification of objects from the captured images was verified by three qualified medical experts and sensitivity, specificity, and accuracy of the classification results were calculated. Classification performance of Shrava was evaluated for RBCs, WBCs, crystals, epithelial cells and organisms (yeast and bacteria). The specificity for classification was above 97% for RBCs and above 99% for all other objects, while sensitivity was above 99% for yeast and epithelial cells, above 97% for RBCs, WBCs, and bacteria, and above 87% for crystals. Overall, classification accuracy for all objects was 96.4%. We also evaluated the sensitivity of Shrava for the above mentioned objects vis-a-vis reports obtained through a combination of urine analyser and manual microscopy and it was found to be 96.19%. Shrava was found to be effective in identifying and classifying objects in urine sediments. It saves time by aiding pathologists as a screening solution and also accelerates the turnaround time, thereby, increasing the productivity of pathologists and the laboratory.

Biography

Renu Ethirajan has completed her MBBS and DNB Pathology from Father Muller Medical College, Mangalore, India. She is currently working as Director Pathology for SigTuple, an organization that provides healthcare solutions driven by artificial intelligence and image processing. She has worked as a Consultant Hemato-Oncopathologist and has reported flowcytometry for more than 8 years at HCG Cancer Hospital, Bangalore. She is also trained in molecular diagnosis like fluoroscent *in-situ* hybradization and immuno-hematology. She has presented multiple papers in reputed CMEs and conferences. She has participated at the National Indian Conclave as a panelist on artificial intelligence.

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Malignant Triton Tumor of Thigh (MTTT): A case report and review of literature

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Malignant triton tumor (MTT) is a tumor arising from Schwann cells with divergent rhabdomyoblastic differentiation. It is a rare and aggressive variant of malignant peripheral nerve sheath tumor (MPNST). We present a case of 33 years old male with thigh swelling. Surgical excision was done followed by histopathological and immunohistochemical (IHC) workup which revealed a tumor showing two types of cell populations including pleomorphic spindle cells and large cells with pleomorphic eccentric nuclei. Spindle cells showed positivity for S-100 IHC stain confirming their neural origin while large cells with eccentric nuclei showed positivity for desmin & myogenin IHC stains confirming their rhabdomyoblastic origin. Hence, the diagnosis of MTT was made. A 5 years survival rate for MTT is 5-15% compared to 50-60% for MPNST. Considering it is a rare entity with aggressive clinical behavior and poor prognosis, correct diagnosis is essential that can be achieved by careful histological and IHC evaluation.

Biography

Anila Chughtai has completed her Bachelor of Medicine & Bachelor of Surgery degrees (MBBS) from Services Institute of Medical Sciences, Lahore. Currently, she is working as a second year Post-graduate trainee at Chughtai lab Lahore.

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Emmanuel G Prestat, J Clin Exp Pathol 2017, 7:6 (Suppl)
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The digital pathology inside Immunoscore® colon

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Immunoscore® quantifies the immune infiltrate within the microenvironment of the tumor. It is assessed by IHC and digital pathology on FFPE colon cancer (CC) tissue. The Immunoscore® is intended as an aid for clinicians to assess prognosis of CC at diagnosis, in combination with the tumor staging (AJCC/UICC-TNM classification). For each patient, 2 slides are stained with primary anti-CD3 & anti-CD8 monoclonal antibodies respectively. Following digitization, virtual slides obtained using a whole slide scanner are analyzed by a dedicated software (Immunoscore® Analyzer) able to calculate a score from CD3- and CD8-positive T cells densities in the invasive margin and core tumor regions. The Immunoscore® provides a score defined as low when low densities of both cell types are found in both regions, intermediate when densities are moderate and high when high densities are found in both regions. Whereas the software is designed to allow the expert-driven reclassification of tissue types (tumor, normal tissue and epithelium) which are necessary to compute the Immunoscore®, the software also proposes an automated classification. Therefore, a recurring question is "how robust would the Immunoscore® be if digital pathology steps are performed without any human supervision?" This question was answered by the high overall agreement (92% [85 - 96] over the three-classes of Immunoscore®) between the automated classification with and without edition by a Pathologist.

Biography

Emmanuel G Prestat obtained his PhD in bioinformatics at the University Claude Bernard Lyon 1 (France) in 2010 then went to Berkeley, CA where he worked in Lawrence Berkeley National Laboratory to develop, during a postdoctoral fellowship, methods to analyze NGS data and classify newly resolved environmental microbes until 2013. Moving back to France in 2014, he joined Qiagen as a Senior Manager in Bioinformatics and Biostatistics and led the bioinformatics design work necessary to the first Qiagen NGS MDx assay. A year after, HalioDx (spin-off of Qiagen Marseille) was created with the ambition to become the reference company in immuno-oncology diagnostics. Member of the R&D department, he is Associate Director of Digital Pathology Solutions: his responsibilities include the coordination for the development of image analysis steps associated to HalioDx IHC products, bioinformatics and biostatistics.

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