The validity of CMV screening test in cervical smears using APERIO AT2.

Basim Mohammed Khashman
National Cancer Research Center (NCRC)/ University of Baghdad/Iraq
*e-mail: basim@bccru.uobaghdad.edu.iq

Abstract

Background:The e-pathology provides a high quality slide imaging with the ability of sharing abroad providing the best mean for accurate diagnosis. Several studies pointed ou the role of Human cytomegalovirus in several cancers including cervical carcinoma. Material and method: Twenty-five slides stained with Papanicolaou test and diagnosed as cervicitis in the NCRC All the samples were scanned using Aprio AT2 to detect the presence of the CMV cytopathic effects. Reults: The are no evidence of the CMV in all the examined samples. Conclusion: The use of Aperio At2 in the routine work provides a haigh detailed images for the nosis with the utitlity of the telecommunications with different pathologists at different places.

1. Introduction

The usual standard method for histopathological examination is still using the naked eye for tissue slides examination under the conventional light microscopes [1] Although,the introduction of "telepathology" in 1986 made possible to sharing live images by the microscope- integrated cameras [2, 3] and this is considered the earliest form of digital pathology but on the other side, the images was still static and limited to only 1 field of view (FOV) [4].

The era of slide digitization was still evolving until reaching to the robotic novel technology of the whole slide imaging (WSI) which were first introduced at the late of 1990s [5].

The WSI also referred as the virtual microscopy provides not only emulation of the conventional light microscopy a rapid computerizing manner, but also give the solution of the big data using cloud storage to be used for both archiving and telepathology and image analysis1–9. (PLMI-59826-whole-slide-imaging-for-diagnosis-in-pathology--current-and-_061115)and this very useful for remote pathological consultations globally [6] and in this regard, we will focus on the Aperio AT2 slide scanner.

The human Cytomegalovirus (CMV) is a member of the Betaherpesvirinae subfamily and is a widespread in the general adult population and can cause ubiquitous infections that can that can persist for a life-long [7].

. Human CMV considered as an opportunistic pathogen in immunocompromised individuals and its persistence in female vagina cause infections ranging from congenital problems during transmission from mother to infant such as diabetic and autoimmunlogic disorders [8].

The present paper focused on the utilization of Aperio AT2 slide scanner features since many researchers revealed that the observation of significant cytopathic changes produced in the female genital tract during CMV infection is unusal [8-10].

2. Materials and methods

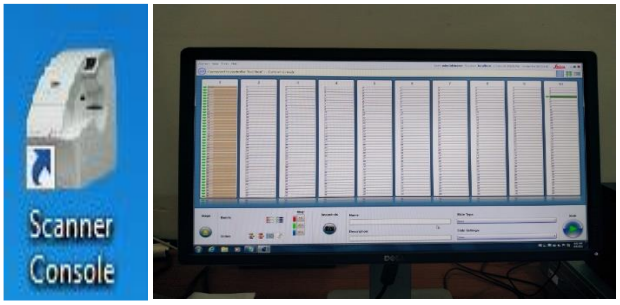
Around (25) cases of viginal smears were taken from female admitted to the National Cancer Research Center / Baghdad University. All the smears were submitted to the Papanicolaou stain method and diagnosed as vaginal cervicitis.

For slide digitization, all the slides were scanned using Aperio At2 scanner (Leica biosystems).First the slides loaded following the manufacturers' instructions.

Figure (1): Aperio At2 (Leica biosystems)

Step1: opening the scanner software and from the desk top Log in to Scanner Console wich The opens in Rack View that give the corresponding slide position in the slide autoloader.

doi.org/10.31838/hiv22.02.91 Received: 12.04.22, Revised: 11.05.22, Accepted: 17.08.22



Step 2: First the Presnap must be done first. Manual loading an empty clean class slide on stage (position one). This step is important for light reflection correction which make the Tissue Finder more sensitive and accurate.

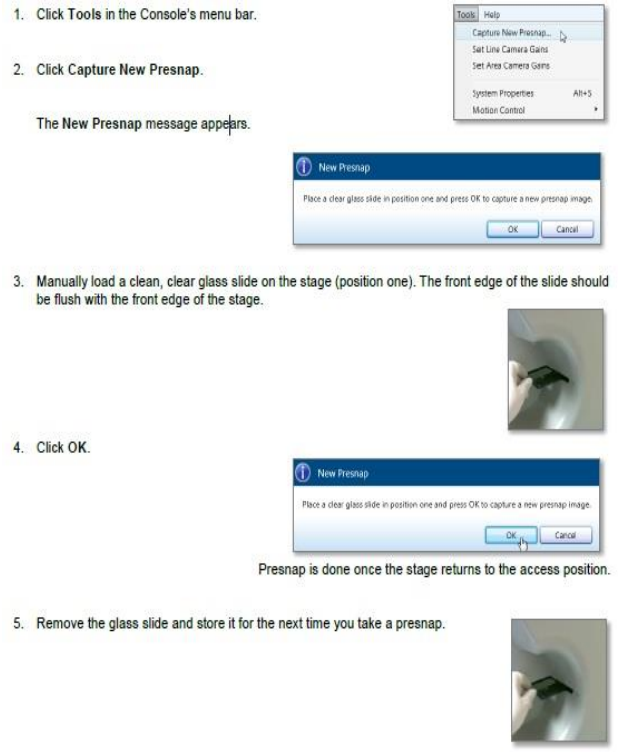


Figure (1): preparing for presnaping (Aperio AT2 Fundamentals Training Workbook Leicbiosystems)

Step 3: loading the Pap smear slides in the autoloader.
Step 4: from the Rack View we chose the position of the loaded slides for the Snapshots

Step 5: The order was given to the whole slide scanning with the required magnification. (Aperio AT2 Fundamentals Training Workbook Leicbiosystems).
Step 6: After completing the whole slide scanning, The high-resolution eSlide opens in Image Viewer of the scanned slides.

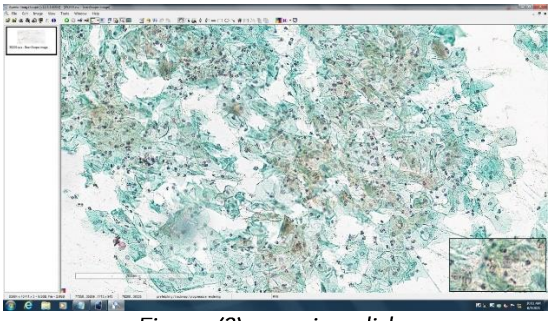


Figure (3) scanning slides

3. Results

Figures (4,5) showed the final scanning by Image Viewer at different magnifications.

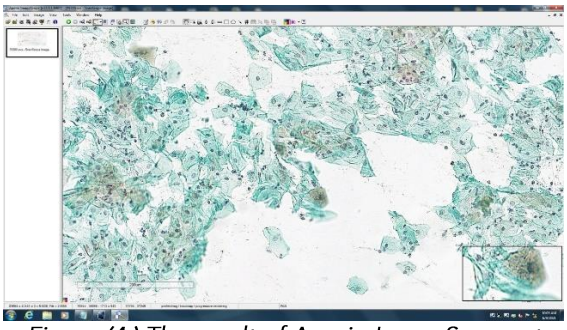


Figure (4):The result of Aperio ImageScope at magnification 20x

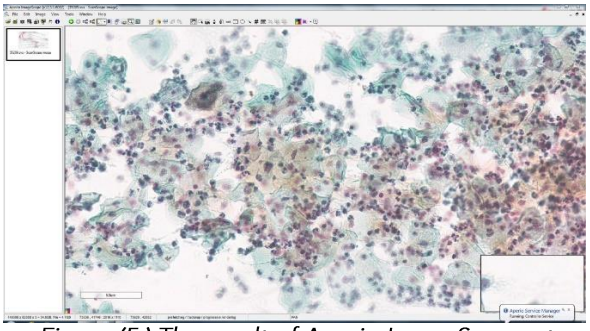


Figure (5):The result of Aperio ImageScope at magnification 40x

Although the high resolution cytological details, there are no evidences for the CMV cytopathic effect detected in all the examined slides.

4. Discussion

Up to our knowledge, it is the first attempt in Iraq to test the precision of the whole slide imaging using Aperio AT2 ((Leica Biosystems) and implement it in research.
There are increased clues that the human cytomegalovirus infection is more common than is though [11], and in the previous study of Salman et al. [12] conducted on placenta of aborted Iraqi women,the virus was found in 36% of female with spontaneous abortion [12], Moreover; Khashman [7] found a correlation between the HCMV infection in the cervical tissues using immunohistochemical staining with anti-CMV pp65,

however; in the current study,CMV was not detected in the all the cytological smears and theses result coincides with Abd El All et al. [13] it is unusual to detect the virus

It is rare to detect of the HCMV infections with acute cervicitis especially in cervical cytological smears [8, 11] compared with serological methods that can detect the seroprevelance of cytomegalovirus antibodies as used by [14, 15].Sine all the patient in the current study are immunocompetent,this may explain the absence of the viral cytophathic effect since the CMV is considered among the most prevalent pathogenic opportunistics in immunocompromised individuals [16].

In summery,The highlighting the CMV infection still very important since is can spread by contact with different body fluids causing diverse pathological problems. On the other side, the high resolution of the tissue architectures provided by WSI leverages the confidence for better diagnosis

Further studies with a larger samples are recommended with the increased depending and adapting on the digital telepathology systems.

References

1. Stathonikos N, Veta M, Huisman A, van Diest PJ. Going fully digital: Perspective of a Dutch academic pathology lab. Journal of pathology informatics. 2013;4(1):15. https://doi.org/10.4103/2153-3539.114206
2. Pantanowitz L, Valenstein PN, Evans AJ, Kaplan KJ, Pfeifer JD, Wilbur DC, Collins LC, Colgan TJ. Review of the current state of whole slide imaging in pathology. Journal of pathology informatics. 2011;2(1):36. https://doi.org/10.4103/2153-3539.83746
3. Al-Janabi S, Huisman A, Van Diest PJ. Digital pathology: current status and future perspectives. Histopathology. 2012;61(1):1-9. https://doi.org/10.1111/j.1365-2559.2011.03814.x
4. Hanna MG, Parwani A, Sirintrapun SJ. Whole slide imaging: technology and applications. Advances in Anatomic Pathology. 2020;27(4):251-9. https://doi.org/10.1097/PAP.0000000000000273
5. Farahani N, Parwani A, Pantanowitz L. Whole slide imaging in pathology: advantages, limitations, and emerging perspectives. Pathol Lab Med Int. 2015; 7: 23-33. 2015. p. 23-33.
6. Furat NT, Alwan NA, Khashman BM. Optimization of digital histopathology image quality. IAES International Journal of Artificial Intelligence. 2018;7(2):71-7. https://doi.org/10.11591/ijai.v7.i2.pp71-77
7. Khashman BM. Study the Oncomodulation Potential of Human Cytomegalovirus and its Correlation with TGF-β1 in a Group of Iraqi Patients with OSCC. International Journal of Science and Research (IJSR). 2017;6(5). https://doi.org/10.21275/ART20173558
8. Elgert PA, Yee-Chang M, Simsir A. Cytomegalovirus (CMV) in cervical cancer screening tests: A series of 8 cases and review of the literature. Diagnostic Cytopathology. 2018;46(7):593-9.
9. Anderson N, Rao N, Ledeboer NA. A rare presentation of a common disease. Am Soc Microbiol; 2011.
10. Abou M, Dällenbach P. Acute cervicitis and vulvovaginitis may be associated with Cytomegalovirus. Case Reports. 2013;2013:bcr2013008884. http://doi.org/10.1136/bcr-2013-008884
11. McGalie C, McBride H, McCluggage W. Cytomegalovirus infection of the cervix: morphological observations in five cases of a possibly under-recognised condition. Journal of clinical pathology. 2004;57(7):691-4. http://doi.org/10.1136/jcp.2004.016162
12. Salman ST, Basim M, Areej A. Expression of Lymphtoxin α and their Receptor among Aborted Women Infected with Human Cytomegalovirus. International Journal of Science and Research 2017; 6 (8): 1395. 2017;1399. Available from: https://www.researchgate.net/profile/Areej-Hussein-4/publication/319459370
13. Abd El All HS, Refaat A, Dandash K. Prevalence of cervical neoplastic lesions and human papilloma virus infection in Egypt: national cervical cancer screening project. Infectious agents and cancer. 2007;2(1):1-14. https://doi.org/10.1186/1750-9378-2-12
14. Aljumaili ZKM, Alsamarai AM, Najem WS. Cytomegalovirus seroprevalence in women with bad obstetric history in Kirkuk, Iraq. Journal of infection and public health. 2014;7(4):277-88. https://doi.org/10.1016/j.jiph.2013.08.006
15. Khudhair SA, Al-Azzawi RH. Estimation of Anti CMV Antibodies in Iraqi Pregnant Women Infected with Chronic Cytomegalovirus. Journal of Global Pharma Technology. 2018;10(11):52-6. https://www.researchgate.net/publication/331607871
16. Nogalski MT, Collins-McMillen D, Yurochko AD. Overview of human cytomegalovirus pathogenesis. In: Human cytomegaloviruses. Springer, 2014. p. 15-28. https://doi.org/10.1007/978-1-62703-788-4_2