

Digital Pathology

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The World is going Digital, Life is going Digital, Medicine is going Digital and also Pathology is going Digital.

The latest Technological advancements are used for Teaching -Learning , Clinical fields, Diagnostic Branches , Treatment , Governance , Administration , conducting Examinations, CMEs , Conferences , Seminars , Workshops , Clinical Trials , Research and Academic Programs. Pathology is also moving Digital.

There are different Modules of Teaching Learning , Education , Computer based Questions , Quiz, Exams , Master Banks for MCQs , Image Based Question Banks , Discussion of Clinical cases , Morphology and assessment , Gross ,Microscopy. Webinars are used to telecast CMEs, Conferences and Workshops. There are Pathology Groups and Indian main website for Pathologists is www.pathoindia.com set up by Dr John Marshall Johnson in 1999. Searching for various Careers, job positions in various Institutes and Organizations is made digital and easy. Digital Pathology will convert the Branch of Pathology from an Analog Art to a Digital Science.

Specimens are Bar-coded and received by Pneumatic systems. The e-reports are sent by LAN (Local area Network). Purchase of Equipments , chemicals , reagents , glassware is done by e tenders. Administrative work like sending circulars, notices are done by Digital mode. Communication with the Higher Administration, Govt. University can be digital and also communication with the different Staff and students can be digital. Examinations can be done digital. Digital Data Base is used for Research.

Doing so, there will be minimum paper work, easy archiving , easy retrieval. It also eliminates the need to store glass slides. All this will result in less use of space , less furniture, no glass , no cupboards , no paper files, no fading or bleaching of slides. Medical Records , Pathology Reports and Data can be stored in Digital form. Whole Slide Imaging Systems. Rapidly the entire slide can be scanned and images can be stored. Many Pathologists can view the Slide and report. Telepathology /Teleconsultation /Remote Reporting can be done in the Institution , region ,national and International Pathologists in the same state ,country or overseas. Quality and efficiency are improved doing so.

It benefits all: the patient , their relatives and doctors. PG students get lot of information from digital sources for their Seminars , CPCs Group Discussions ,Case discussions , Journal Clubs,

thesis , Dissertation , Log books and Portfolios and exam preparation and revision. There are online teaching programs, online tutorials and other modules. CMEs, Conferences and Workshops have e Registration , online payment , online submission of abstracts , online registration of delegates , e CME certificates , e CME credits , e posters. There are also e publications , e journals , e museums. Networking opportunities are increased. There is also e governance.

Soon Medicine will be totally digital, virtual and paperless. Digital Pathology has improved because of Faster and Higher resolution, fast internet, modern cameras like DARPA - Argus camera. The cell CT (computerized Tomography is being done for a single cell. The C-Pathologists (Computational Pathologist) will report many more features, just an example is for Breast Cancer there are 6642 features in the cancer epithelium and stroma .This gives a Prognostic model score. This is much more informative than just light microscopy. A Talk /Lecture delivered in one city can be telecast to any part of the world as well as simultaneously to other countries. The Computers can have artificial intelligence.

Digital Pathology is useful in Frozen section reporting, ROSE (Rapid on Site Evaluation) as well as Cytology reporting by Cytotechnologists. For photos the films are replaced by digital images. One can change a talk at any time just before a lecture or during a lecture. In the future, residents will carry Digital Slide Boxes instead of Glass Slide boxes. There will be a Quality Control and Quality assurance. All this will lead to Automated Cervical Cytology Screening, Screen sharing in rooms and Dynamic Screen sharing in different countries.

Thus Digital Pathology is used in Education, Training, Documentation, Research, Image Analysis, Measurements, Quality Control Second Opinion, Primary Diagnosis. There are Dynamic platforms, Pathology cockpits and robotic scanners. For Scanning there is a difference between Cytology and Histopathology, which is as follows:

1. Dimension- Histopathology is specific area but in Cytology whole slide is covered
In LBC, restricted are
2. In Cytopathology many levels of scanning is required because the cells are at many levels however in Histopathology the tissue is in one plane and hence easier
3. Microscopy- In CP fine focusing is required
4. Scanning techniques - single level and multilevel.

The Final Dimension of the Scanned Slide is tremendous. For storage huge space is required. For HP it could be 400 TB (Terabytes) of slides in a dept for 5 years. For CP it could be 2000 TB (Terabytes). The scanning takes time. For HP it can take 35 seconds per slide for CP 4 minutes per slide. For a large Dept scanning may take the whole day. Storage needs huge space in Cloud.

Autopsies can also be Virtual –Virtopsy. There are different posts and positions for Digital Pathology like Digital Pathology Technician, Digital Pathology Manager, Director Digital Pathology Informatics, Digital Pathology Scientist, Biomedical scientist and Engineer. There are Fellowship Programmes for Pathology Informatics. Medical Council of India (MCI) has a Digital Mission Mode Project. After a few years Pathology is going to get digitalized.
