

Four good reasons to switch to digital pathology

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Digital pathology describes the transition from histopathological diagnosis with microscope to virtual microscopy on the computer. The digitization of pathology services is promising and offers the answer to an increasing workload and to complexity of establishing a diagnostic in an era of targeted therapies. In this article you will find four good reasons to switch to digital pathology.



1

Reorganizing laboratories to meet the requirements of precision medicine

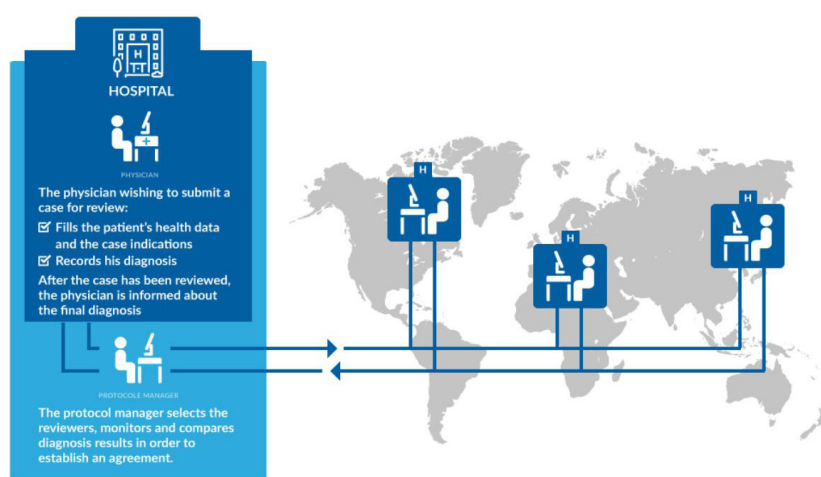
Never before has the establishment of a diagnosis been so complex, requiring the integration of heterogeneous and complex data. Anapath has a crucial role to play in determining with precision at the tissue and cellular level the diagnosis, but also the prognosis and the response to certain targeted therapies. This is particularly true in oncology where fine compression of the tumor and its microenvironment is essential for the right therapeutic orientation. Making an informed diagnosis is complex and time consuming.

In this context of precision medicine, and faced with the continuous increase in the number of cases and the global shortage of physicians, anapath laboratories must organize themselves and access new tools to respond more efficiently to the demands. The grouping of pathologists and their networking are at the heart of these challenges. First of all, gathering samples on a centralized technical platform allows better automation of tissue preparation and better amortization of resources and technician time, which is a source of significant productivity gains. Secondly, bringing together pathologists around a centralized platform makes it possible to subspecialize by therapeutic area, to improve the permanence of the diagnosis, and to ensure that expertise is shared. In this perspective of reaching a critical size and functioning as a network, digital pathology has a major role to play by facilitating communication between technical platforms and physicians, but also between physicians and by providing access to visualization and screening tools that allow time savings and precision.

Digital pathology is the act of digitizing information, which allows the access of slides from a computer from anywhere and at any time. It offers a geographical independence and allows to share cases with other pathologists all over the world via dedicated platforms specially designed for pathologists. Indeed, TeleSlide platform makes possible to share cases with other pathologists, and thus obtain additional, fast proofreading. Telepathology platforms allow a real opening to the world, and a collaboration between pathologists without borders. The possibility of sharing cases and obtaining opinions through a network of pathologists has a significant influence on the establishment of diagnoses. Indeed, a scientific study conducted in the “European Journal of Cancer”¹ shows a high level of discordances between initial and expert diagnosis and reveals the importance of expert review for optimal treatment decision-making. The study focused on pathologic review of thymic epithelial tumours; however, the importance of second opinion diagnosis is generalizable to all types of pathologies and tumours. Digital pathology is therefore a great way to overcome the problem of case complexity and pathology understanding.

2

Tackling increased workload with time saving



The workload of laboratories is constantly increasing. Indeed, in the past few years, there has been an explosion in the number of cancers, which requires additional staff. Nevertheless, paradoxically, there is a shortage of technicians, and even more so for pathologists. Indeed, the World Health Organization (WHO) warns that, if current trends continue, new cancer cases are expected to increase by about 60% over the next two decades². However, the number of pathologists is stagnating or even decreasing. The “Physician Speciality Data Report”³ shows a decrease of 11.3% in the number of active pathologists between 2010 and 2015 and predicts that 63.2% of pathologists will retire within the next ten years. Thus, it is essential to overcome this increasing workload and the decrease of pathologists’ numbers by using digital pathology.

Current users of digital pathology say that their transition to digital pathology allowed them to be between 10% and 30% more productive. Indeed, the increasing number of cancer cases and the decreasing workforce are firstly solved by a gain in pre-analytical time. The time-consuming, laborious, and repetitive sorting, allocation of cases and dispatching is eliminated from their workflow. These steps are replaced by the digitization of the slides which will be directly and computationally distributed to the pathologists, with all related patient and clinical information, in its digital list of cases.

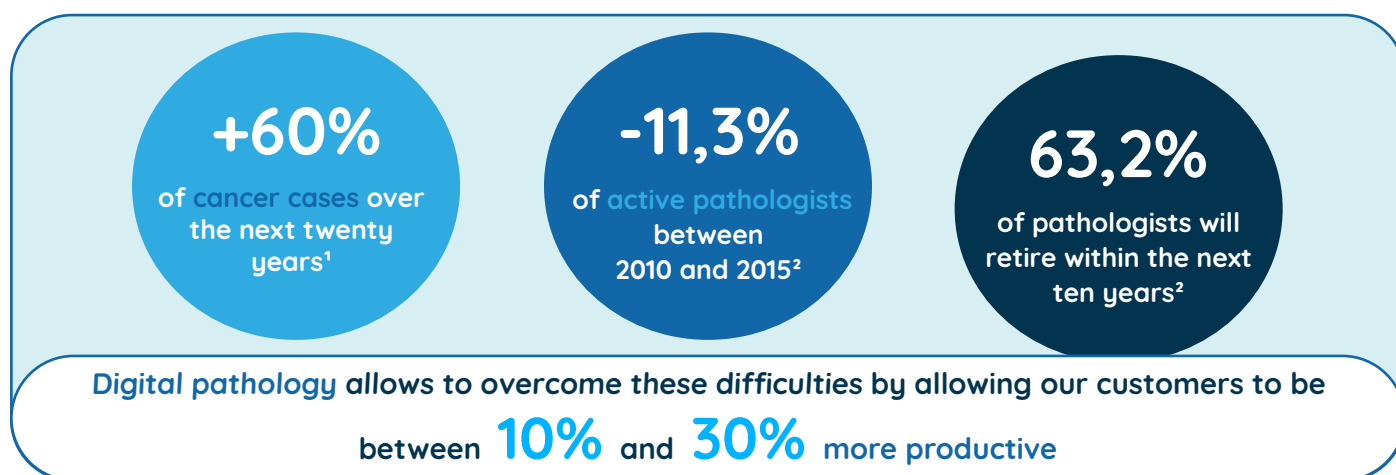
¹ Impact of expert pathologic review of thymic epithelial tumours on diagnosis and management in a real-life setting: A RYTHMIC study - EJC

² WHO REPORT ON CANCER, WHO (2020)

³ Physician Speciality Data Report, AAMC (2016)

As a practical example, Pr. Guettier, Professor at the University of Paris-Saclay and head of the Pathology department at Paris Saclay Hospital Group stated that “We save medical time at first, we especially save time because we do not spend our time looking for the immunostaining slides and putting them on the same plate as the IHC slides; and now that we read digitally, we also save time examining”¹ thanks to digital pathology and the use of our image analysis software CaloPix.

Secondly, the new possibilities offered by computational pathology, i.e. Artificial Intelligence algorithms (AI) allow pathologists to use digital tools to carry out time-consuming and repetitive tasks. The automation of time-consuming activities allows to study more cases. Future application possibilities are already being sketched out and the possibilities for development are promising. In particular, the quantification of biomarkers and the search for diagnostically relevant tumor areas can be automated by computer-aided algorithms. Virtual microscopy makes it possible to recognize and record profiles; in the case of rare results, comparable cases with the same histological profile can be searched and a diagnostic proposal can be made based on these previous cases. AI algorithms are a big opportunity to deal with an increasing workload, they support pathologists in making diagnoses. The algorithms bring out the necessary data by automating the cells counting for example, and the pathologists are indispensable to establish the diagnosis according to the data brought out by the AI. Thus, pathologists no longer need to worry about time-consuming tasks but only about reading, understanding, and analyzing the data.



3

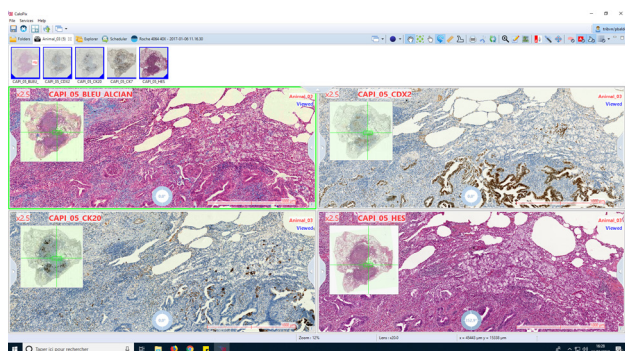
Improving work convenience and flexibility

Classical histopathological diagnosis has some limitations. Indeed, pathology with a microscope implies to always work from the same place; limits the possibilities and precision of annotations on glass slides; requires to send the slides by postal mail to obtain a second opinion; and is the cause of many pains due to the use of the microscope all day long. Digital pathology allows to face all this limits by increasing work convenience and flexibility.

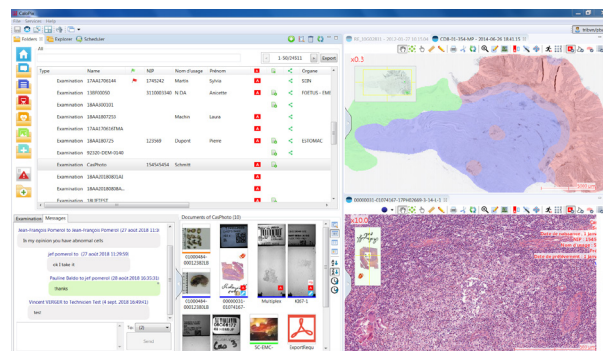
With the current health crisis, online remote work has become an important part of our everyday life and the digitization of the slides provides access to the data from home. The slide distribution phase is eliminated thanks to the system automation, which also allows a reduction of the risks of contamination linked to the COVID-19. Moreover, as the phase of assigning histological slides is eliminated, pathologist workspace will not be cluttered by a considerable number of slide trays and papers on the desk anymore.

Moreover, according to several of our clients, the transition to digital technology has allowed them to experience less pain due to static postures generated by the use of the microscope. Indeed, digital pathology offers better ocular and musculoskeletal comfort.

Furthermore, the digitization of slides allows to have a global view of the slides. Pathologists do not have to move the slide anymore each time they want to study another area, as they had to do with the microscope. Moreover, CaloPix software provides a slide navigational tracking, so it is possible to directly know which part of the slide you have already studied or not. Morphological interpretations are also simplified thanks to digital tools directly integrated into the software, such as marks with comments, annotations, measurements, and counts. It is also possible to show up to eight images side by side in the viewer. It makes easier to compare multiple stainings with each other. Digitization of slides also allows an easy observation of different cases simultaneously with other pathologists or students through telepathology software such as TeleSlide TeleMedicine, a tele-expertise platform for second opinion and TeleSlide MultiMedia, a platform for education and knowledge sharing.



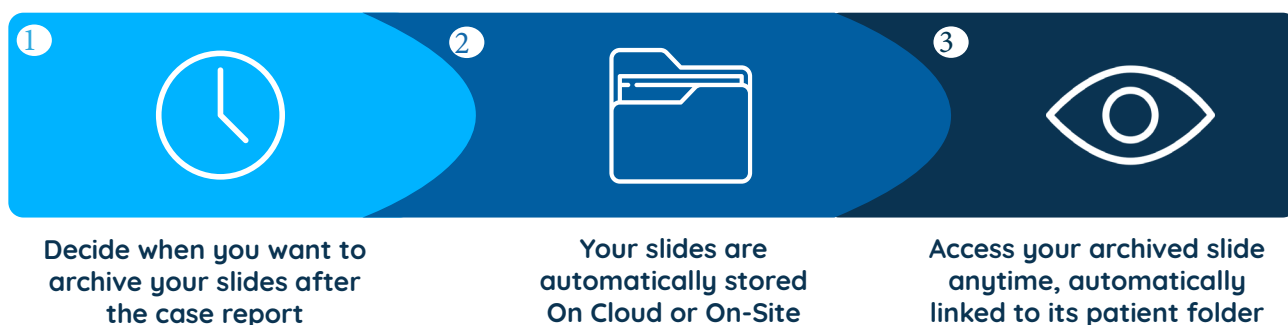
CaloPix: Compare multiple stainings with each other, navigational tracking



CaloPix: sort out cases, communicate and run automated tissue analysis

Finally, improving data retention is possible thanks to the digitization of slides and dedicated data storage solutions such as CaloPix Archive. This archiving solution avoids the loss of information and the deletion of slides due to a lack of storage space on site. Digital archiving allows to keep slides for patient history conservation and permits easy retrieval to establish a new diagnosis, for education and for the development of AI in Deep Learning. It is a way of archiving a large quantity of slides automatically at a reasonable price, in a secure environment that complies with health standards. It is now possible through CaloPix Archive to store your slides on Cloud, on-site or to adopt a hybrid storage solution.

CaloPix Archive



The diagnosis established thanks to microscopes has some disadvantages that can now be overcome thanks to digital pathology. Indeed, the risks related to handling fragile materials, in particular slides, are reduced. There is less chance of dropping a slide or mixing them together during the phase of assigning, in fact the slides are only handled during the digitization phase and then are automatically linked to the correct patient file. Thus, the safety of the slides is improved, and the risks are reduced. Digital security is also ensured, using logins to open the IMS software and to access to the patient cases. A login is required as well to analyze shared slides, thus only the pathologists concerned can access to the cases.

The digitization allows an automatic follow-up of the actions that have been carried out since everything is recorded informatically, and automatically integrated in the right patient folder. Traceability is improved as CaloPix software makes it possible to see which users have opened a customer case, and which cases they opened. It is, therefore, additional security for the management of private data but also a real traceability for laboratory audits realization.

Thanks to digital pathology, pathologists get a better overview of their work. Through the digital worklist integrated in the software, they can see exactly which tissue section need to be reviewed or have already been reviewed. Traceability allows a real management of the tasks and helps to prioritize some duties. It is also possible to see exactly how many tissue sections and stainings have been made per examination. Traceability thus offers a significant comfort in work organization and tends to a clear improvement of the productivity thanks to the centralization of the whole data.

There is also a real advantage in terms of logistics, as it is no longer necessary to consult the physical archives when a patient's case needs to be reviewed, which happens on average in 1% to 2% of the cases. You can directly access to customer cases digitally. In addition, mobilizing technician time is no longer necessary to manage the storage and filing system, thus saving money by optimizing resources.

Conclusion

The aim of digitization is to support and expand on pathologists' diagnostic skills, morphological expertise, and experience, and relieve them of time-consuming and tedious tasks. The benefits for patients are obvious: cancer treatments are becoming increasingly individualized and there are specialists for every type of cancer. With Digital Pathology, these specialists can be reached and consulted swiftly to obtain second opinions and advice across the world. Diagnosis can be carried out more quickly, and the right treatment can be initiated earlier. Digital pathology holds the promise of more powerful and faster pathological diagnosis with higher confidence.