Pathology informatics selected abstracts

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Use of virtual microscopy to train pathology residents during the pandemic

November 2021—When the COVID-19 pandemic struck, many pathology training programs scrambled to formulate a plan to teach their pathology residents in a physically distanced learning environment. Using double- or multi-headed optical light microscopes, even with plexiglass barriers, is not ideal because they do not permit physical distancing. Many training programs leveraged digital imaging technology to continue teaching microscopy during the pandemic. Pathology departments that could not afford whole slide imaging for this purpose sometimes employed the less expensive option of dynamic virtual microscopy (DVM). A DVM platform includes a digital camera mounted to a light microscope and videoconferencing software so an educator can stream a slide image to one or more remote learners. These technologies typically are available in pathology departments but may need to be optimized for a virtual dynamic experience to overcome a lag time with image movement, focus problems, image quality issues, and a narrower field of view. The faculty member and trainee need to be logged on to the videoconferencing session to simultaneously review microscopic findings, while the faculty member operates the light microscope. The authors conducted a cross-sectional study of hematopathology, cytopathology, and surgical pathology faculty (n = 66) and trainees (n = 20, residents and fellows) at a major academic teaching hospital to evaluate the pros and cons of a DVM platform to teach microscopy during the pandemic. At the time of the study, the hospital had used the DVM platform for six months. Faculty and trainees used built-in computer audio via headsets or, occasionally, telephones (if there were connectivity or feedback issues) to communicate. Faculty members could also switch the view on their monitors to allow trainees to see the laboratory information system so the learners could observe the pathologist editing the pathology report in real time. The authors' survey data indicated that not only did DVM maintain the crux of the traditional light microscope teaching experience, but it also allowed all participants to annotate images in real time. Yet some laboratories may have to optimize their hardware and software and overcome resistance to adopting new technology to implement and benefit from a DVM educational platform. The study findings show that a silver lining of the pandemic is that it has forced educational innovation in pathology, including greater use of digital pathology for teaching purposes.

Christian RJ, VanSandt M. Using dynamic virtual microscopy to train pathology residents during the pandemic: Perspectives on pathology education in the age of COVID-19. *Acad Pathol*. 2021;8. doi:10.1177/23742895211006819

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A call to arms for using SI units to standardize counting mitoses

Mitotic activity plays an important role in grading tumor malignancy and informing the prognosis for a patient. However, processes for determining mitotic activity, including specific measurement techniques (for example, mitotic count, mitotic index, and mitotic rate) and nonstandard units, in particular the microscope high-power field (HPF), are inconsistent. With microscope field diameters changing considerably over the years, the use of HPF for determining mitotic activity is troubling given that even two modern microscopes could need from three to eight HPF to reach a standard area of 1 mm^2. Further complicating matters is that some journals have not enforced the requirement to define the high-power field area used in clinical studies and that some malignancies are still determined by counting mitoses per HPF based on older studies using microscopes with smaller fields of view. Mitotic activity also may be assessed by counting mitoses per unit area within a specific tumor hotspot (hotspot counting method) or by counting mitoses in randomly selected HPFs and averaging them (average counting method). In support of mitotic count standardization, the fifth edition of the WHO Classification of Tumors requires

that mitotic counts be reported in standardized international (SI) units (per mm^2) and, if necessary, qualified by the minimum area that should be counted and whether an average or hotspot counting method is to be used. Furthermore, digital pathology, image analysis, and computation pathology/artificial intelligence have shown significant promise as means for generating more precise and reproducible mitotic counts. Given that digital mitotic counts are output in standard SI units (per mm^2), the authors highly recommend that all pathologists use SI units for determining mitotic activity. As scientific knowledge about how tumors proliferate and the effects of mitotic activity on tumor behavior and patient prognosis grow, the authors ask that pathologists define their measurements in SI units to allow results to be corroborated across studies. They also ask that scientific journal editors and pathology textbook authors insist on the use of mitoses per mm^2 in lieu of high-power fields.

Cree IA, Tan PH, Travis WD, et al. Counting mitoses: SI(ze) matters! *Mod Pathol*. 2021;34:1651–1657. https://doi.org/10.1038/s41379-021-00825-7

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