

Smart Phone Microscopic Photography

A Novel Tool for Physicians and Trainees

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Modern pathologists often practice separately from their clinicians. Photographing interesting microscopic findings enables a pathologist to capture microscopic images that can be used for interdepartmental communication, presentations, rounds, tumor boards, and teaching.

Unfortunately, microscopic photography is not available to all pathologists or to trainees. Traditional photomicroscopes with mounted cameras are costly, limiting their availability. Whole slide scanning is time consuming, and access to digital accounts is also expensive. Recently, cellular phone technologies have advanced to the point that smart phones have photographic capability greater than many point-and-shoot cameras. New smart phone accessories can adapt smart phones to microscope eyepieces, thus facilitating microscopic image capturing. Priced around \$100, these accessories are affordable and appropriate in some settings but are still bulky for trainees and clinicians to carry. Similarly, pathologists would not likely bring them into the microbiology laboratory or to a colleague's microscope, and they are unlikely to be available in developing nations.

With the goal of facilitating microscopic image capturing without additional accessories, we developed a simple method for capturing microscopic images with any smart phone camera. This technique is quick, easy to learn, and can be used by anyone at any microscope.

Smart phone microscopic photography entails using the third through fifth fingers of the left hand to steady the hand on the left microscope eyepiece, holding the camera between the thumb and second finger of the left hand and second through fifth fingers of the right hand, to leave the right thumb free. By looking through the smart phone screen while focusing on the light in the ocular of the right eyepiece and slowly bringing the phone closer to the microscope, the view beneath the microscope lens will

eventually fill the screen (Figure). The right thumb is free to focus the camera and capture the image. The camera's zoom function can remove vignetting (the circular frame around the image). A video tutorial is available at <http://www.youtube.com/watch?v=cf9VihBIR4> (accessed September 10, 2013). Additional basic smart phone camera functions can be used to produce high-quality images suitable for use in presentations, posters, and publications. Successful smart phone microscopic photography is dependent on the ability to hold the camera steady and, while initially frustrating to learn, the technique can be readily mastered.

Although conceptually simple, smart phone microscopic photography is an invaluable tool for pathologists, clinicians, and trainees in many fields. This technique enables pathologists who do not own conventional microscope cameras, including those in small practices or developing nations, to obtain high-quality photomicrographs for use in a variety of clinical and educational applications, thus facilitating virtual consultations and the sharing of interesting cases. Smart phone microscopic photography also encourages trainees and clinicians to interact with microscopic images, further generating interest in histopathologic diagnostics, and encouraging a rapport between pathologists and clinicians. Another application for this technique is in endoscopy or laparoscopic surgery. To our knowledge, detailed instructions for obtaining quality smart phone microscopic photographs have not been previously published. Our technique and its potential applications are of novel interest and utility to physicians across many specialties.



Holding the smart phone steady, the view beneath the microscope lens will fill the screen and an image can be captured.

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INSTRUCTIONS FOR AUTHORS

(See January 2016 issue, page 99. Also available at www.archivesofpathology.org)

Erratum

We wish to apologize for unintentionally overlooking a previous work by Bellina and Missoni from 2011¹ that appears to be the first detailed description of free-hand smartphone microscopic photography without an adapter. We were just recently made aware of this publication. We did not identify this previous publication on our previous literature searches, as this paper uses the term “m-phone” instead of the universally understood term “smartphone,” and because this paper is not indexed in PubMed. It appears we were not alone in our oversight, as no other paper discussing smartphone microscopic photography in the pathology literature has cited it either. As we were unaware of this article when we published our previous papers on this topic in the *Archives of Pathology & Laboratory Medicine*,^{2,3} we unintentionally made the erroneous claim that Dr. Morrison’s technique was the first detailed description of free-hand, no-adapter microscopic photography in the literature. We were mistaken. The paternity of that first detailed description belongs solely to Professors Bellina and Missoni. The method described by these authors, which is similar but not identical to the Morrison technique, predates our publication by several years. We hope this erratum will help ensure that their work is discovered by other pathologists and appropriately cited in future publications on this topic.

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