

# Dermatopathology and Social Media

## A Survey of 131 Medical Professionals From 29 Countries

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• **Context.**—Use of social media in the medical profession is an increasingly prevalent and sometimes controversial practice. Many doctors believe social media is the future and embrace it as an educational and collaborative tool. Others maintain reservations concerning issues such as patient confidentiality, and legal and ethical risks.

**Objective.**—To explore the utility of social media as an educational and collaborative tool in dermatopathology.

**Design.**—We constructed 2 identical surveys containing questions pertaining to the responders' demographics and opinions regarding the use of social media for dermatopathology. The surveys were available on Twitter and Facebook for a period of 10 days.

**Results.**—The survey was completed by 131 medical professionals from 29 different countries: the majority

(81%, 106 of 131) were 25 to 45 years of age. Most replied that they access Facebook or Twitter several times a day (68%, 89 of 131) for both professional and social purposes (77%, 101 of 131). The majority agreed that social media provides useful and relevant information, but stated limitations they would like addressed.

**Conclusions.**—Social media is a powerful tool with the ability to instantaneously share dermatopathology with medical professionals across the world. This study reveals the opinions and characteristics of the population of medical professionals currently using social media for education and collaboration in dermatopathology.

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Social media is a staple of modern living. From celebrities to grandparents, it seems that everyone is reaching out via these electronic avenues to connect with others. Social media allows people today to effortlessly interact with those they otherwise would not, in a way that has never before been possible. In 2014, 58% of the entire adult population and 71% of all adult Internet users in the United States had a Facebook (Menlo Park, California) account; 23% of adult Internet users had a Twitter (San Francisco, California) account in 2014.<sup>1</sup> Although platforms such as Facebook and Twitter were originally intended for social interactions between friends, the social media boom has widened its scope of impact. These sites are now being used for a variety of purposes and the possibilities appear endless.

Medical professionals have not been immune to social media's expansion—for physicians, quite the opposite is true. One study in 2011 showed that 87% of physicians in the United States use social media. Not only do physicians participate in social media, but physicians as a group are more likely to have a social media presence than the average American adult.<sup>1,2</sup> Some pathologists use social media to promote discussion of difficult cases and highlight esoteric diagnoses—some even believe that, in addition to connecting people in a real-time fashion, social media could be a force multiplier in advocating health care quality and patient safety.<sup>3,4</sup>

Many physicians believe that social media is a wave of the future and embrace it as an educational and collaborative tool in health care. Many uses have been explored already. Social media has been implicated as a tool in medical education.<sup>5–8</sup> It has also been used by cancer patients to assemble support communities; some pathologists have interacted directly with cancer patients via these social media patient support groups.<sup>9–15</sup> Medical journals may use social media as a way of reaching a broader audience. One radiology journal used Twitter “tweet chat” sessions to increase its audience and expand readership.<sup>16</sup> The *Archives of Pathology & Laboratory Medicine* shares figure images from its journal articles on its Facebook, Twitter, and Instagram (acquired by Facebook in 2012) accounts.<sup>17–19</sup> The reach of social media is also used to help improve access to health care by providing an additional source for patient-doctor interactions; MedHelp (San Francisco, California) is an example of a social media medical community.<sup>20</sup>

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**Table 1. Opinion Questions Incorporated Into Survey<sup>a</sup>**

To what extent do you agree with the following statements:

- Facebook (Menlo Park, California) and Twitter (San Francisco, California) contain useful dermatopathology information
- Information is more readily available on social media than traditional resources (eg, journals, textbooks)
- I find the dermatopathology cases I see on social media to be useful and relevant to my practice
- Photomicrographs, medical photography, and “pearls” posted on Facebook and Twitter are as useful and up-to-date as traditional resources
- I learn at least as much dermatopathology information from Facebook and Twitter as I do from traditional educational resources such as textbooks and medical journal articles
- I would like to see MORE utilization of social media for educational purposes in the field of dermatopathology

<sup>a</sup> To assess usage patterns, 3 sets of analyses were conducted and are summarized in Tables 1 through 3. The first analysis assessed opinions related to the usefulness of social media. Listed are the questions used in the survey to assess respondent opinion of usefulness.

Despite its prevalence, however, physician use of social media is often viewed as a controversial practice. Some physicians still express reservations regarding the professional utilization of social media sites, citing concerns regarding patient confidentiality, and legal and ethical risks.<sup>21</sup> Others express concerns about the additional time commitment required for already busy physicians to also use social media professionally.<sup>22</sup> These concerns have spurred many organizations and independent investigators to construct a set of suggested guidelines for use of social media for medical professionals.<sup>6,23,24</sup>

## OBJECTIVE

Although prior studies and treatises have discussed these aforementioned topics, the utility of social media as an educational and collaborative tool in the field of dermatopathology has not previously been investigated in depth. The aim of this study was to reach those physicians who already use social media, assess how they use social media, and discover their perceived strengths and weaknesses in the use of social media as a professional tool in dermatopathology.

## DESIGN

The authors constructed 2 identical surveys by using Google Forms (Mountain View, California), which contained single and multiple selection answer choices as well as fill-in responses pertaining to the survey respondents' demographics and their opinions regarding the use of social media for dermatopathology. The surveys were distributed to social media users on Twitter and Facebook by means of hyperlinks to a survey corresponding to the social media site from which the hyperlink was obtained. On Facebook, the hyperlink was shared via a closed group, “Dermatopathology,” and was also shared by the investigators' Facebook posts, accessible by those able to view each investigator's page. On Twitter, the hyperlink was tweeted from the investigators' Twitter accounts. The surveys were left open to collect responses for a period of 10 days. The survey was conducted during April/May 2015.

**Table 2. Frequency Questions Incorporated Into Survey<sup>a</sup>**

On Facebook<sup>b</sup> or Twitter<sup>c</sup> approximately how often do you:

- View a dermatopathology-related post that appears on your feed?
- “Like,” “share,” “retweet,” or “favorite” a dermatopathology-related post?
- Comment on a dermatopathology-related post?
- Personally make an original post on the topic of dermatopathology?

<sup>a</sup> The second analysis assessed frequency of usage of different types of social media by asking the questions listed here.

<sup>b</sup> Menlo Park, California.

<sup>c</sup> San Francisco, California.

## METHODS

### Data Analysis

To assess usage patterns among respondents, we conducted 3 different sets of analyses. The first analysis assessed opinions related to the usefulness of social media (Table 1). The second analysis assessed frequency of different types of social media usage—for example, frequency of sharing, liking, commenting, and posting on social media about dermatopathology subjects (Table 2). The third analysis assessed in a binary fashion professional applications of social media—for example, to identify collaborators for projects, locate job postings, locate potential staff to hire, or find/share rare cases. Usage questions with associated acronyms can be found in Table 3.

The first 2 analyses—opinion about utility and frequency of use—used questions that were measured on Likert-type scales. Opinion questions ranged from 1 (strongly disagree) to 5 (strongly agree). There were 5 items in the opinion scale. The frequency of use measure used 4 items, with answer choices ranging from 1 (never) to 7 (several times daily). In each case, a higher number indicates a greater endorsement of social media—either through a higher opinion of its utility or by more frequent use.

For both of these outcomes, reliability coefficients and factor structures were analyzed to determine whether it was appropriate to combine them into a single measure. In both cases, responses showed a strong single factor structure with good reliability. Scree plots can be found in the supplemental digital content at [www.archivesofpathology.org](http://www.archivesofpathology.org) in the February 2018 table of contents. The opinion scale ( $\alpha = 0.84$ ) and the frequency scale ( $\alpha = 0.80$ ) were used as outcome measures in multiple linear regression models.

The specific professional usage patterns, being binary responses, were assessed by performing factor analysis on the return matrix resulting from a polychoric correlation of the items. The results of this assessment revealed that there were multiple latent factors. As such, the items were not combined into a single index. Rather, the 5 most frequently endorsed professional uses of social media—KITKnow (Keep in touch with other pathologists/dermatologists/dermatopathologists I already know well personally), MeetNewIn-Field (Meet new pathologists/dermatologists/dermatopathologists whom I have never met before in person), Promote (View, “like,” “share” cases in pathology discussion groups on Facebook), Comment (Comment on cases in pathology discussion groups on Facebook), and KITMeet (Keep in touch with other pathologists/dermatologists/dermatopathologists I recently met at a medical meeting)—were analyzed by using multiple logistic regression.

All models—the 2 linear models for opinion and frequency and the 5 logistic models—were developed by using a backward stepwise process.

The initial models included types of social media accounts held by respondents, age, discipline, and the respondent's United Nations Digital Access Index (UNDAI; countries are assigned a value, 0–1, to measure their access to information and communication technology). Age and discipline were maintained in all final

**Table 3. Social Media Usage Questions Incorporated Into Survey (Mean %)<sup>a</sup>**

Abbreviation	Response, % (No.)	Definition
For which of the following activities have you used your professional Facebook <sup>b</sup> and Twitter <sup>c</sup> accounts only		
KITKnow	64.12 (84/131)	Keep in touch with other pathologists/dermatologists/dermatopathologists I already know well personally
MeetNewInField	63.36 (83/131)	Meet new pathologists/dermatologists/dermatopathologists whom I have never met before in person
Promote	67.18 (88/131)	View, "like," "share" cases in pathology discussion groups on Facebook
Comment	54.96 (72/131)	Comment on cases in pathology discussion groups on Facebook
KITMeet	43.51 (57/131)	Keep in touch with other pathologists/dermatologists/dermatopathologists I recently met at a medical meeting
MeetNewOut	29.77 (39/131)	Meet new physicians in other specialties whom I have never met before in person
PostFB	34.35 (45/131)	Post my own new cases in pathology discussion groups on Facebook
FaveRT	38.17 (50/131)	Favorite or retweet pathology pics/cases on Twitter
Town	25.19 (33/131)	Tweet my own pathology pics/cases on Twitter
ProLit	35.11 (46/131)	Share links to peer-reviewed medical literature
PatInt	9.92 (13/131)	Interact with patient support groups
Have you ever used social media:		
ToPub	21.37 (28/131)	To locate a rare case/photomicrograph from a colleague to use in a publication, lecture, or research project you were working on?
ToColl	20.61 (27/131)	To identify collaborators for a research project or medical publishing opportunity?
ToJob	13.74 (18/131)	In an attempt to find a job for yourself?
ToHire	9.92 (13/131)	In an attempt to hire someone for a job?

<sup>a</sup> The third analysis assessed in a binary fashion professional applications of social media. The mean percentage who responded as using social media for these professional purposes are included. Percentage values are rounded to the nearest hundredth unit.

<sup>b</sup> Menlo Park, California.

<sup>c</sup> San Francisco, California.

models regardless of statistical significance. Age, measured categorically, the UNDAI, and type of social media account held by the respondent were removed from the model by using an  $\alpha$  cutoff (<0.10). The  $\alpha$  cutoff was selected owing to the exploratory nature of the analysis. All data were analyzed with STATA v.13 (College Station, Texas).

### Institutional Review Board, Consent Statement

This study was approved by University of Arkansas for Medical Sciences (Little Rock) Institutional Review Board (IRB protocol No. 204469).

### RESULTS

In total there were 131 respondents from 29 different countries. Table 4 shows the basic description of all outcome variables, predictor variables, and covariates. Table 5 shows the results from the first 2 linear regression models—opinion and frequency. Unstandardized and standardized coefficients are shown for covariates in Table 4, as interpretation without knowledge of the conditional distribution function of each variable would be difficult. Table 6 shows the results from the 5 logistic regression models.

Table 4 shows the composition of our sample population. The opinion scale, ranging from 5 to 25, had a mean of 14.6. The frequency scale, ranging from 6 to 30, had a mean of 15.45. Most respondents were between the ages of 25 to 34 years (49.6% [65 of 131], 95% CI: 40.9%–58.3%) and 35 to 44 years (32.1% [42 of 131], 95% CI: 24%–40.2%). Most respondents were pathologists (60.3% [79 of 131], 95% CI: 51.8%–68.8%) or dermatopathologists (24.4% [32 of 131], 95% CI: 17%–31.9%). Nearly all respondents held a Facebook account, 55.7% (73 of 131) held a Twitter account, and 44.3% (58 of 131) held a LinkedIn (Sunnyvale, California) account. Only 13.7% (18 of 131) held a Doximity (San Francisco, California) account. By current users of popular social media sites, social media is viewed as a useful tool to enhance professional relationships and promote

dermatopathology-specific knowledge. The 5 most common specific uses of social media among respondents were as follows: Promote (View, "like," or "share" cases in pathology discussion groups on Facebook; 67.2% [88 of 131], 95% CI: 59%–73%), KITKnow (Keep in touch with other pathologists/dermatologists/dermatopathologists I already know well personally; 64.1% [84 of 131], 95% CI: 55.8%–72.4%), MeetNewInField (Meet new pathologists/dermatologists/dermatopathologists whom I have never met before in person; 63.4% [83 of 131], 95% CI: 55%–71.7%), Comment (Comment on cases in pathology discussion groups on Facebook; 55% [72 of 131], 95% CI: 46.3%–63.4%), and KITMeet (Keep in touch with other pathologists/dermatologists/dermatopathologists I recently met at a medical meeting; 43.5% [57 of 131], 95% CI: 34.9%–52.1%).

Although most respondents reported using social media to keep in touch with professionals they knew personally (64.1%, 84 of 131) and to meet new professionals they have never met in person (63.4%, 83 of 131), a minority of respondents (43.5%, 57 of 131) used social media to keep in touch with other pathologists/dermatologists/dermatopathologists whom they recently met at a medical meeting. Even fewer (29.8%, 39 of 131) respondents reported using social media to meet new physicians in other specialties whom they have never met before in person.

Less commonly, social media users reported using social media platforms to pursue and advertise job opportunities. With respect to seeking and publicizing employment opportunities, few respondents reported using social media in an attempt to find a job for themselves (13.7%, 18 of 131) and few have used social media to hire someone for a job (9.9%, 13 of 131).

Social media is viewed as having a relevant role in dermatopathology education with room for expansion of that role. Eighty percent of respondents agree dermatopathology cases seen on social media are useful and relevant to their practice. Interestingly, although of the 131 respon-

**Table 4. Description of Sample<sup>a</sup>**

Response	Mean (%)	95% CI	
Opinion	14.60 (range: 5–25)	13.71	15.49
Frequency	15.45 (range: 6–30)	14.40	16.50
Promote	67.18 (88/131)	59.03	75.32
KITKnow	64.12 (84/131)	55.80	72.44
MeetNewInField	63.36 (83/131)	55.00	71.12
Comment	54.96 (72/131)	46.33	63.59
KITMeet	43.51 (57/131)	34.91	52.11
FaveRT	38.17 (50/131)	29.74	46.6
ProLit	35.11 (46/131)	26.83	43.39
PostFB	34.35 (45/131)	26.11	42.59
MeetNewOut	29.77 (39/131)	21.84	37.71
Town	25.19 (33/131)	17.66	32.72
ToPub	21.37 (28/131)	14.26	28.49
ToColl	20.61 (27/131)	13.59	27.63
ToJob	13.74 (18/131)	7.77	19.71
PatInt	9.92 (13/131)	4.74	15.11
ToHire	9.92 (13/131)	4.74	15.11
Age, y			
<25	1.53 (2/131)	0.00	3.65
25–34	49.62 (65/131)	40.94	58.29
35–44	32.06 (42/131)	23.96	40.16
45–55	9.16 (12/131)	4.16	14.17
>55	7.63 (10/131)	3.03	12.24
Discipline			
General	7.63 (10/131)	3.03	12.24
Pathology	60.31 (79/131)	51.82	68.79
Dermatology	7.63 (10/131)	3.03	12.24
Dermatopathology	24.43 (32/131)	16.97	31.88
UNDAI	0.575	0.538	0.611
Types of accounts held			
Facebook (Menlo, California)	95.42 (125/131)	91.79	99.05
Twitter (San Francisco, California)	55.73 (73/131)	47.11	64.34
LinkedIn (Sunnyvale, California)	44.27 (58/131)	35.66	52.89
Doximity (San Francisco, California)	13.74 (18/131)	7.77	19.71
Total	3.083969	2.760922	3.40717

Abbreviations: Comment, Comment on cases in pathology discussion groups on Facebook; FaveRT, Favorite or retweet pathology pics/cases on Twitter; KitKnow, Keep in touch with other pathologists/dermatologists/dermatopathologists I already know well personally; KitMeet, Keep in touch with other pathologists/dermatologists/dermatopathologists I recently met at a medical meeting; MeetNewInField, Meet new pathologists/dermatologists/dermatopathologists whom I have never met before in person; MeetNewOut, Meet new physicians in other specialties whom I have never met before in person; PatInt, Interact with patient support groups; PostFB, Post my own new cases in pathology discussion groups on Facebook; ProLit, Share links to peer-reviewed medical literature; Promote, view, “like,” and “share” cases in pathology discussion groups on Facebook; ToColl, To identify collaborators for a research project or medical publishing opportunity; ToHire, In an attempt to hire someone for a job; ToJob, In an attempt to find a job for yourself; ToPub, To locate a rare case/photomicrograph from a colleague to use in a publication, lecture, or research project you were working on; Town, Tweet my own pathology pics/cases on Twitter; UNDAI, United Nations Digital Access Index.

<sup>a</sup> Percentage values are rounded to the nearest hundredth unit. UNDAI are rounded to the nearest thousandth unit. Totals are true values.

**Table 5. Linear Regression Models of Opinion and Frequency Scales (n = 131)<sup>a</sup>**

	Opinion				Frequency			
	b	β	95% CI		b	β	95% CI	
Age	0.134	0.025	−0.833	1.102	0.603	0.093	−0.461	1.667
General	1							
Pathology	2.135	0.204	1.275	5.546	−0.480	−0.039	−4.278	3.318
Dermatology	2.150	0.112	−2.436	6.737	0.304	0.013	−4.919	5.528
Dermatopathology	2.422	0.203	−1.284	6.127	2.639	−0.246	−7.555	0.618
holdtwi	−2.126 <sup>b</sup>	−0.206	−3.943	0.310	−2.145 <sup>b</sup>	−0.176	−4.169	−0.120
UNDAI					11.591 <sup>c</sup>	0.406	6.717	16.466
Intercept	13.379		9.347	17.412	9.458		4.003	14.913

Abbreviations: holdtwi, holds a Twitter (San Francisco, California) account; UNDAI, United Nations Digital Access Index.

<sup>a</sup> Values are rounded to the nearest thousandth unit. β indicates fully standardized coefficient.

<sup>b</sup>  $P < .05$ .

<sup>c</sup>  $P < .001$ .

**Table 6. Logistic Regression Models of Specific Uses of Social Media, Discipline, Age, and Social Media Profiles Held (n = 131)<sup>a</sup>**

	Promote		KITKnow			MeetNewInField			Comment		KITMeet				
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI			
Age	1.353	0.846	2.162	0.653 <sup>b</sup>	0.423	1	1.001	0.669	1.498	0.991	0.645	1.521	0.622	0.397	0.976
General	1		1												
Pathology	1.946	0.460	8.241	1.309	0.330	5.188	1.205	0.301	4.817	1.537	0.313	7.549	6.187	0.710	53.929
Dermatology	4.524	0.515	39.705	1.455	0.240	8.806	1.500	0.235	9.582	0.757	0.090	6.342	9.388	0.825	106.822
Dermatopathology	2.339	0.489	11.183	8.636 <sup>b</sup>	1.576	47.330	1.668	0.363	7.659	1.769	0.329	9.500	14.263 <sup>b</sup>	1.502	135.468
holdtwti							2.234	1.060	4.710						
UNDAI	0.024 <sup>c</sup>	0.002	0.250							0.005 <sup>c</sup>	0	0.051			
Holdtot	1.512 <sup>c</sup>	1.167	1.959												
Holddcox				4.175 <sup>b</sup>	1.041	16.742				3.092 <sup>b</sup>	1	9.842	6.967 <sup>b</sup>	1.962	24.735

Abbreviations: Comment, Comment on cases in pathology discussion groups on Facebook; Holddcox, holds Doximity account; Holdtot, holds total accounts (including Facebook [Menlo Park, California], Twitter [San Francisco, California], LinkedIn [Sunnyvale, California], and Doximity [San Francisco, California]); holdtwti, holds Twitter (San Francisco, California) account; KITKnow, Keep in touch with other pathologists/dermatologists/dermatopathologists I already know well personally; KITMeet, Keep in touch with other pathologists/dermatologists/dermatopathologists I recently met at a medical meeting; MeetNewInField, Meet new pathologists/dermatologists/dermatopathologists whom I have never met before in person; OR, odds ratio; Promote, view, “like,” and “share” cases in pathology discussion groups on Facebook; UNDAI, United Nations Digital Access Index.

<sup>a</sup> OR represents predicted change in odds ratio for each increase in the value of the predictor variable. Values are rounded to the nearest thousandth unit.

<sup>b</sup>  $P < .05$ .

<sup>c</sup>  $P < .001$ .

dents, 90 respondents (69.0%) agreed photomicrographs, medical photography, and “pearls” posted on Facebook and Twitter were as useful and up-to-date as traditional resources, only 56 respondents (42.6%) reported learning at least as much dermatopathology information from Facebook and Twitter as they did from traditional educational resources such as textbooks and medical journal articles. It is possible that bias may have some influence on the perception of traditional resources as being more educationally valuable than social media, which is commonly perceived as being mostly a source of entertainment and leisure rather than a bona fide educational tool. Perhaps over time this view will change with increased exposure to social media as an academic resource. In fact, most respondents (84.5%, 111 of 131) agreed they would like to see more utilization of social media for educational purposes in the field of dermatopathology and most (81.7%, 107 of 131) would like to see more medical professionals with interest in dermatopathology actively using social media.

Table 5 shows the results of the multiple linear regression of the opinion scale and frequency scale. Respondents in higher UNDAI regions (ie, countries with greater overall access to information and communication technologies) had much higher frequency of use scores than respondents in lower UNDAI regions. This is a logical association; social media use is more frequent in locations with easier access to technology.

Table 6 shows the predicted change in odds of reported use of each of the 5 most common specific applications of social media to dermatopathology practice and research. Increased age significantly predicted lower odds of keeping in touch with other pathologists/dermatologists/dermatopathologists whom respondents already knew well personally. Dermatopathologists were significantly more likely to keep in touch with those they knew personally or those they met recently at a medical meeting than dermatologists. Higher UNDAI scores predicted significantly higher odds of commenting, viewing, “liking,” and “sharing” cases in pathology discussion groups on Facebook. For each additional social media profile held, odds increased 50% that respondents would view, “like,” and “share” cases in

pathology discussion groups on Facebook. Compared to respondents who did not hold Doximity accounts, respondents with Doximity accounts had much higher odds of keeping in touch with other pathologists/dermatologists/dermatopathologists they already knew well personally (odds ratio [OR] = 4.175,  $P = .04$ ) and had met at a medical conference (OR = 6.97,  $P < .001$ ). Additionally, compared to respondents who did not hold Doximity accounts, respondents with Doximity accounts also demonstrated higher odds of commenting on cases in pathology discussion groups on Facebook (OR = 3.092,  $P = .05$ ).

## DISCUSSION

Social media is ubiquitous in the 21st century, connecting those across the globe. This technology has permeated through cultures and has interconnected people of all walks of life in ways that no one could have predicted even a decade ago. These platforms have facilitated communication over great distances at the click of a button. These trends are reflected in our current cross-sectional study, as our modest survey of 131 procured responses from medical professionals from 29 countries, with most responders coming from outside the United States. Of note, we collected these responses in only 10 days, using nothing more than an online survey platform and distribution via our own social media channels. This of itself is evidence of the broad reach and interconnectivity that social media provides to its users. Many scientists have already recognized the benefits of sharing research and disseminating knowledge through social media.<sup>25</sup> The ability to collaborate with colleagues across borders through social media has even inspired the birth of academic social networks, such as ResearchGate (San Francisco, California) and Academia.edu (San Francisco, California), to name a few.<sup>26</sup> However, these networks are on a scale that is a fraction of that of Facebook or Twitter, with merely a few million users, as opposed to more than a billion.<sup>26</sup> Regardless, the trend of using social media for educational use has long since been recognized and continues to gain momentum.

We found that most of those who responded to our survey were younger than 45 years. This is not surprising, especially

since age has been found to be inversely proportional to use of social media,<sup>27</sup> and most social media services began with young adults as their target audience. However, the “over 65” population has been making strides. For the first time, in 2014, it was reported that 31% of all seniors in the United States are now on Facebook.<sup>1</sup> Unfortunately, in our survey, there were no respondents older than the age of 65 years. Thus, we cannot conclude much about if or how dermatopathologists older than 65 years use social media services.

More than half of those who took this survey reported they found Facebook to be more useful than Twitter in dermatopathology for their professional usage. In general, Facebook is a more popular social media platform according to reports.<sup>1</sup> This outcome may simply reflect the popularity of the site and not true preference. One other consideration is that as our survey was conducted nearly 1.5 years before preparation of this article, it may not be fully reflective of the current state of the various social networks studied. Social networks change quickly, and Twitter in particular has experienced an enormous surge in activity among pathologists over that time frame.<sup>28</sup>

More than half of those who responded to our survey reported that they access Facebook or Twitter several times daily. This seems to be slightly more than that of the general population.<sup>1</sup> In addition, more than three-quarters of medical professionals in our survey reported using social media for both social and professional purposes. This finding may be due to many factors: One possibility is that, owing to the young population of respondents to the survey, this group of physicians may be more likely than an older population to use social media both socially as well as professionally. And since those social media users may be using these sites more frequently, they may have been more likely to see and respond to these surveys in the first place. Considering the short time frame for which the survey was released, we may have been able to reach a broader population of users, both social, professional, and both, if a longer window of access had been made available.

There is plenty of room for expansion when it comes to a dermatopathologist’s role in social media. Most of our responses highlighted the desire of physicians using social media for dermatopathology to see more of their peers actively engaged. Most physicians reported passive daily activities in dermatopathology social media such as viewing posts and “liking” or “retweeting.” A minority reported daily active use including posting and tweeting original content. The dermatopathology population may be underperforming in this regard when compared to the general population.<sup>1</sup> Although the survey did not address this directly, there are a few plausible explanations. First and foremost is time; physicians are typically very busy in their professional lives and adding an additional commitment, such as posting interesting cases, may not seem worth the time to an overworked physician. In addition to the time factor, there may be a lack of understanding about the logistics and etiquette involved in participating in posting original content or being part of a discussion on social media. There are also the lingering legal and privacy risks that are always in the back of the physician’s mind, which may be just enough to deter one from reaching active educational use of social media.<sup>21</sup> These barriers may be addressed by increased awareness, education about appropriate professional social media use for medical professionals, and encouragement of participation by pathology and dermatology organizations and by key leaders in the field.

Most respondents agree that there should be more utilization of social media for dermatopathology education; however, it is interesting that most Facebook and Twitter respondents were either neutral or disagreed with the premise that they “learn at least as much dermatopathology information from Facebook and Twitter as from traditional educational resources such as textbooks and medical journal articles.” Dermatopathologists, pathologists, and their respective professional associations (eg, United States and Canadian Academy of Pathology, American Society of Dermatopathology) can be instrumental in championing and disseminating more content including recently published peer-reviewed articles and concise teaching pearls through their Twitter and Facebook accounts. These practices have been suggested by other disciplines as a mechanism to create a more balanced and educated approach to controversial topics.<sup>1</sup>

A minority of respondents reported using social media to contact those outside the field of dermatology and dermatopathology, suggesting that most dermatopathologists do not currently see social media as a medium for interdisciplinary discussion in dermatopathology. Interdisciplinary communication and collaboration plays a vital role in the quotidian dermatopathology practice to manage a variety of skin diseases including melanoma,<sup>29–31</sup> squamous cell carcinoma,<sup>31</sup> and lymphoproliferative disorders.<sup>32</sup> More investigation is necessary to determine how social media and interdisciplinary discussion can be used to increase collaboration and problem-solving.

Regions with a high UNDAI were more likely to use social media; perhaps this is simply due to the ease of access to technology when compared to lower scoring countries. In addition to providing and receiving interesting educational cases, social media can serve as a venue for consultative services in resource-limited regions of the world. Static image telepathology has been described as a low-cost solution for providing second opinions from experts across the world.<sup>33</sup> As Internet access becomes more readily available, social media sites could be repurposed as a portal through which low-cost microscopic imaging systems, such as via smartphone microscopy (either free hand or using an adapter) technique,<sup>34–41</sup> more sophisticated low-resource whole slide imaging systems,<sup>42</sup> and low-cost telepathology applications,<sup>43</sup> could create another avenue for consultation around the world.

Many concerns have been raised previously regarding physician use of social media. Social media in medicine has been described as underutilized and unregulated.<sup>44</sup> Limitations due to the lack of content regulation and validity are legitimate. Internet content is a universal struggle in the medical community. Many have accused and poked fun at the infamous “Dr Google,” naming the physician a less-than-reputable clinician.<sup>45–47</sup> But unlike artificial intelligence, the collaboration of dermatopathologists and those from other specialties can engage in value-generating cocreation, which not only advances education but may ultimately benefit the patient. In a recent poll conducted by one of the authors, most respondents who were doctors (89.7%; 691 of 770) agreed or strongly agreed that social media posts about medicine or pathology helped improve the way they practiced medicine (enabling them to better care or provide diagnoses for their own patients in real life).<sup>48</sup>

## CONCLUSIONS

Social media is a potentially powerful tool with the ability to instantaneously share dermatopathology with a great number of medical professionals all over the world. This study reveals the opinions and characteristics of the population of medical professionals currently using social media for education and collaboration in dermatopathology. Further research focused on improving aspects such as quality control and organization of dermatopathology information in social media is needed.

## References

1. Duggan M, Ellison NB, Lampe C, Lenhart A, Madden M. Social media update 2014. Pew Research Center. January 9, 2015. <http://www.pewinternet.org/2015/01/09/social-media-update-2014/>. Accessed October 3, 2015.
2. Modahl M, Tompsett L, Moorhead T. Doctors, patients and social media. *QuantiaMD*. September 2011. <http://www.quantiamd.com/q-qcp/doctorspatientsocialmedia.pdf>. Accessed October 3, 2015.
3. Allen TC. Social media: pathologists' force multiplier. *Arch Pathol Lab Med*. 2014;138(8):1000–1001. doi:10.5858/arpa.2014-0071-ED.
4. Glassy EF. The rise of the social pathologist: the importance of social media to pathology. *Arch Pathol Lab Med*. 2010;134(10):1421–1423. doi:10.1043/2010-0255-ed.1.
5. Batt-Rawden S, Flickinger T, Weiner J, Cheston C, Chisolm M. The role of social media in clinical excellence. *Clin Teach*. 2014;11(4):264–269. doi:10.1111/tct.12129.
6. Klee K, Covey C, Zhong L. Social media beliefs and usage among family medicine residents and practicing family physicians. *Fam Med*. 2015;47(3):222–226.
7. Cheston CC, Flickinger TE, Chisolm MS. Social media use in medical education: a systematic review. *Acad Med*. 2013;88(6):893–901. doi:10.1097/ACM.0b013e31828ffc23.
8. Gonzalez RS, Amer SM, Yahia NB, et al. Facebook discussion groups provide a robust worldwide platform for free pathology education [published online ahead of print October 20, 2016]. *Arch Pathol Lab Med*. doi:10.5858/arpa.2016-0369-OA.
9. Sugawara Y, Narimatsu H, Hozawa A, Shao L, Otani K, Fukao A. Cancer patients on Twitter: novel patient community on social media. *BMC Res Notes*. 2012;5:699. doi:10.1186/1756-0500-5-699.
10. Angiosarcoma support group. Facebook. <https://www.facebook.com/groups/101899709845272>. Accessed December 15, 2016.
11. Dermatofibrosarcoma protuberans. Facebook. <https://www.facebook.com/groups/dfpsupport>. Accessed December 15, 2016.
12. Dermatofibrosarcoma protuberans support and awareness. Facebook. <https://www.facebook.com/groups/743419279047310>. Accessed December 15, 2016.
13. Gardner JM. How angiosarcoma and Facebook changed my life. *Arch Pathol Lab Med*. 2017;141(2):188. doi:10.5858/arpa.2016-0447-ED.
14. Gardner JM. Pathologist involvement in patient support groups on Facebook. YouTube. <https://youtu.be/tW7dzU0Gg34>. Accessed December 10, 2016.
15. Gardner JM. Pathologist collaboration with DFSP patient support groups of Facebook. YouTube. <https://youtu.be/4fzH2T6hVtA>. Accessed December 10, 2016.
16. Hawkins CM, Hillman BJ, Carlos RC, Rawson JV, Haines R, Duszak R. The impact of social media on readership of a peer-reviewed medical journal. *J Am Coll Radiol*. 2014;11(11):1038–1043. doi:10.1016/j.jacr.2014.07.029.
17. Archives of Pathology & Laboratory Medicine. Facebook. <https://www.facebook.com/ArchivesPath/>. Accessed December 10, 2016.
18. Archives of Pathology & Laboratory Medicine. Twitter. <https://twitter.com/archivespath>. Accessed December 10, 2016.
19. Archives of Pathology & Laboratory Medicine. Instagram. <https://www.instagram.com/archivespath/>. Accessed December 10, 2016.
20. Desai DG, Ndukwu JO, Mitchell JP. Social media in health care: how close is too close? *Health Care Manag (Frederick)*. 2015;34(3):225–233. doi:10.1097/HCM.0000000000000072.
21. Crane GM, Gardner JM. Pathology image-sharing on social media: recommendations for protecting privacy while motivating education. *AMA J Ethics*. 2016;18(8):817–825. doi:10.1001/journalofethics.2016.18.08.stas1-1608.
22. DeCamp M, Cunningham AM. Social media: the way forward or a waste of time for physicians? *J R Coll Physicians Edinb*. 2013;43(4):318–322. doi:10.4997/JRCPE.2013.411.
23. Farnan JM, Sulmasy LS, Worster BK, et al. Online medical professionals: patient and public relationships: policy statement from the American College of

Physicians and the Federation of State Medical Boards. *Ann Intern Med*. 2013;158(8):620–627. doi:10.7326/0003-4819-158-8-201304160-00100.

24. American Medical Association. Professionalism in the use of social media. June 2011. <http://www.ama-assn.org/resources/doc/code-medical-ethics/9124a.pdf>. Accessed October 3, 2015.
25. Savage N. Scientists in the Twitterverse. *Cell*. 2015;162(2):233–234. doi:10.1016/j.cell.2015.06.062.
26. Van Noorden R. Scientists and the social network. *Nature*. 2014;512(7513):126–129. doi:10.1038/512126a.
27. Cooper CP, Gelb CA, Rim SH, et al. Physicians who use social media and other internet-based communication technologies. *J Am Med Inform Assoc*. 2012;19(6):960–964. doi:10.1136/amiainl-2011-000628.
28. Gardner JM. USCAP's social media committee rocks! United States & Canadian Academy of Pathology (USCAP). Summer 2016. Page 13. [http://www.uscap.org/public/newsletter/OpenMind\\_SUMMER\\_2016.pdf](http://www.uscap.org/public/newsletter/OpenMind_SUMMER_2016.pdf). Accessed December 10, 2016.
29. Johnson TM, Chang A, Redman B, et al. Management of melanoma with a multidisciplinary melanoma clinic model. *J Am Acad Dermatol*. 2000;42(5, pt 1):820–826.
30. Garbe C, Peris K, Hauschild A, et al. Diagnosis and treatment of melanoma: European consensus-based interdisciplinary guideline—update 2012. *Eur J Cancer*. 2012;48(15):2375–2390. doi:10.1016/j.ejca.2012.06.013.
31. Fratila M, Rosu S. The importance of early detection of lip cancer risk groups: International Conference on Applied Sciences. *Mat Sci Eng*. 2014;57:1–4. doi:10.1088/1757-899X/57/1/012014.
32. Tyler KH, Haverkos BM, Hastings J, et al. The role of an integrated multidisciplinary clinic in the management of patients with cutaneous lymphoma. *Front Oncol*. 2015;5:136. doi:10.3389/fonc.2015.00136.
33. Gimbel DC, Sohani AR, Prasad Busarla SV, et al. A static-image telepathology system for dermatopathology consultation in East Africa: the Massachusetts General Hospital Experience. *J Am Acad Dermatol*. 2012;67(5):997–1007. doi:10.1012/j.jaad.2011.12.036.
34. Morrison AO, Gardner JM. Microscopic image photography techniques: past, present, future. *Arch Pathol Lab Med*. 2015;139(12):1558–1564. doi:10.5858/arpa.2014-0315-RA.
35. Morrison A. Smart phone microscopic photography. YouTube. 2013. <https://youtu.be/cfd9ViHBIR4>. Accessed December 12, 2016.
36. Morrison AS, Gardner JM. Smart phone microscopic photography: a novel tool for physicians and trainees. *Arch Pathol Lab Med*. 2014;138(8):1002. doi:10.5858/arpa.2013-0425-ED.
37. Gardner JM. The Bellina-Missoni Method and the Morrison Technique: two variations of free-hand no-adaptor smartphone microscopic photography. *J Cutan Pathol*. 2016;43(9):805–806. doi:10.1111/cup.12752.
38. Morrison AO, Gardner JM. The Morrison technique: a free-hand method for capturing photomicrographs using a smartphone. *J Cutan Pathol*. 2016;43(5):472–474. doi:10.1111/cup.12650.
39. Bellina L, Missoni E. M-learning: mobile phones' appropriateness and potential for the training of laboratory technicians in limited-resource settings. *Health Technol*. 2011;1(2):93–97. doi:10.1007/s12553-011-0008-x.
40. Bellina L, Missoni E. Mobile cell-phones (M-phones) in telemedicine: increasing connectivity of isolated laboratories. *Diagn Pathol*. 2009;4:19. doi:10.1186/1746-1596-4-19.
41. Roy S, Pantanowitz L, Amin M, et al. Smartphone adapters for digital photomicrography. *J Pathol Inform*. 2014;5(1):24. doi:10.4103/2153-3539.137728.
42. Nakayama I, Matsumura T, Kamataki A, et al. Development of a teledermatopathology consultation system using virtual slides. *Diagn Pathol*. 2012;7:177. doi:10.1186/1746-1596-7-177.
43. Hartman DJ, Parwani AV, Cable B, et al. Pocket pathologist: a mobile application for rapid diagnostic surgical consultation. *J Pathol Inform*. 2014;5(1):10. doi:10.4103/2153-3539.129443.
44. Panahi S, Watson J, Partridge H. Social media and physicians: exploring the benefits and challenges. *Health Informatics J*. 2016;22(2):99–112. doi:10.1177/1460458214540907.
45. Feke T. Dr. Google should be sued for malpractice – here's why. KevinMD. August 2015. <http://www.kevinmd.com/blog/2015/08/dr-google-should-be-sued-for-malpractice-heres-why.html>. Accessed October 3, 2015.
46. Queensland University of Technology. Dr. Google doesn't know best: search engine self-diagnosis and 'cyberchondria'. ScienceDaily. May 2015. [www.sciencedaily.com/releases/2015/05/150506095710.htm](http://www.sciencedaily.com/releases/2015/05/150506095710.htm). Accessed October 3, 2015.
47. Moorthee VV. Google Medical Center. Gomer Blog. August 2015. <http://gomerblog.com/2015/08/google-medical-center/>. Accessed October 3, 2015.
48. Gardner JM. Social media evaluation for Jerad Gardner, M.D. SurveyMonkey. 2016. <https://www.surveymonkey.com/results/SM-VRPSJKLM/>. Accessed December 15, 2016.