



# The need for improved dermoscopy training in residency: a survey of US dermatology residents and program directors

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**ABSTRACT Background:** Inadequate dermoscopy training represents a major barrier to proper dermoscopy use.

**Objective:** To better understand the status of dermoscopy training in US residency programs.

**Methods:** A survey was sent to 417 dermatology residents and 118 program directors of dermatology residency programs.

**Results:** Comparing different training times for the same training type, residents with 1-10 hours of dedicated training had similar confidence using dermoscopy in general ( $p = 1.000$ ) and satisfaction with training ( $p = .3224$ ) than residents with >10 hours of dedicated training. Comparing similar training times for different training types, residents with 1-10 hours of dedicated training had significantly increased confidence using dermoscopy in general ( $p = .0105$ ) and satisfaction with training ( $p = .0066$ ) than residents with 1-10 hours of only bedside training. Lastly, residents with 1-10 hours of dedicated training and >10 hours of dedicated training had significantly increased confidence using dermoscopy in general ( $p = .0002$ ,  $p = .2471$ ) and satisfaction with training ( $p < .0001$ ,  $p < .0001$ ) than residents with no dermoscopy training at all.

**Conclusions:** Dermoscopy training in residency should include formal dermoscopy training that is overseen by the program director and is possibly supplemented by outside dermoscopy training.

## Introduction

From its bulky long-handle origins, to its current handheld portability, the dermatoscope has developed tremendously,

becoming to some dermatologists, what the stethoscope is to the medical physician [1]. While the dermatoscope is most commonly used to assess melanoma and pigmented lesions, other indications for its use include the diagnosis of

non-pigmented lesions and other dermatological conditions (e.g., inflammatory diseases, infectious diseases, and hair/nail diseases) [2-6]. In general, studies have shown that proper dermoscopy use improves diagnostic accuracy, reduces unnecessary biopsies, and can even be used to monitor the outcomes and adverse effects of various treatments [3,4,6-8]. Despite a reported increase in the rate of dermoscopy use in the United States over the past decade, inadequate dermoscopy training in residency still represents one of the most important barriers to the use of dermoscopy [9-11]. To better understand the status of dermoscopy training in US residency programs, we surveyed dermatology residents and program directors (PDs) regarding education practices at their institutions and utilized residents' confidence with dermoscopy and satisfaction with training as surrogate markers to gauge the quality of dermoscopy training. With the first ever input from PDs on this topic, we aim to close the knowledge gap between teacher and student, bringing the perceptions of both groups together for a consensus.

## Methods

One hundred eighteen ACGME (Accreditation Council for Graduate Medical Education) dermatology programs were identified on FREIDA Online® (Fellowship and Residency Electronic Interactive Database Access). Dermatology residents and PDs of accredited dermatology programs were contacted via email directly or through forwarded messages, inviting them to participate in a self-report survey. Email addresses were obtained from FREIDA Online® or from direct correspondence with the contact person listed on FREIDA Online®. Participation was voluntary and participants did not receive financial compensation.

The survey was designed with questions pertaining to demographics, dermoscopy use, and training, using previous dermoscopy survey studies as guidelines [2,9,10,12,13]. PDs were additionally asked about their role in teaching dermoscopy and their beliefs regarding resident performance in relation to dermoscopy use. Similarly, residents were additionally asked if they planned on using dermoscopy after residency, as well as if their attendings advocated the use of dermoscopy. Residents' confidence using dermoscopy in general and satisfaction with training in residency were scored on a 5-point Likert scale, with 1 being not confident/not satisfied and 5 being very confident/very satisfied. The original survey was piloted by academic dermatologists and dermatology residents from the Albert Einstein College of Medicine/Montefiore Medical Center, and revisions were made accordingly before finalization. A link to the appropriate 27-question survey (resident or PD version) (using SurveyMonkey®) along with a cover letter describing the study goals was emailed to residents, PDs, and program coordinators. The surveys

were initially sent in August 2015. Four hundred seventeen residents were emailed (79 directly, and 338 indirectly, forwarded by PDs or program coordinators), and 118 PDs were emailed (78 directly, and 40 indirectly, forwarded by program coordinators). Non-responding residents, PDs, and program coordinators were sent a reminder email after two weeks and four weeks, up to a total of three emails. This study conformed to the ethical guidelines of the 1975 Declaration of Helsinki as reflected in its approval by the Albert Einstein College of Medicine/Montefiore Medical Center Institutional Review Board.

## Data Entry and Statistical Analysis

Survey responses were entered on Microsoft Excel (Microsoft Co, Redmond, WA) and analyzed using Graphpad Prism 6 (Graphpad Software Inc., La Jolla, CA). A two-tailed student's t-test was used to analyze continuous variables (5-point Likert scale questions) with significant levels set at  $p < .05$  and confidence intervals set at 95%. Residents with <1 hour of total dermoscopy training were treated no differently than residents with 0 hours of total dermoscopy training.

## Results

### *Respondents*

One hundred twenty-two of the 417 emailed residents, responded to the survey (29% response rate), and 22 of the 118 emailed PDs, responded to the survey (19% response rate). Data on the breakdown by gender, by region of the US, and by training level for residents and PDs is outlined in Table 1.

### **Dermoscopy use: Residents and program directors**

Ninety-one percent of residents (111/122) reported that their attendings advocate the use of dermoscopy, but only 84% (103/122) of residents reported using dermoscopy regularly. In contrast, 100% (22/22) of PDs reported using dermoscopy regularly. Of those residents who reported that they do not use dermoscopy, the reasons include: inadequate training (79%, 15/19), lack of attending use (26%, 5/19), not owning or having access to a dermatoscope (21%, 4/19), too much time to use a dermatoscope (11%, 2/19), minimal impact on biopsy decision (16%, 3/19), increased user anxiety/liability (5%, 1/19), and dermatoscopes cost too much (11%, 2/19). Irrespective of current dermoscopy use, 98% (119/122) of residents planned on using dermoscopy after residency.

### **Dermoscopy training types in residency and outside of residency**

Thirty-five percent (43/122) of residents had dedicated dermoscopy training in residency, 27% (33/122) had only bed-

**TABLE 1. Characteristics of respondents. [Copyright: ©2017 Patel et al.]**

Gender		Residents	Program Directors
Male		39% (n = 47/122)	41% (n = 9/22)
Female		61% (n = 75/122)	59% (n = 13/22)
Region of the United States		Residents	Program Directors
Northeast (CT, ME, MA, NH, RI, VT, NJ, NY, PA)		41% (n = 50/122)	36% (n = 8/22)
Midwest (IL, IN, MI, OH, WI, IA, KS, MN, MO, NE, ND, SD)		15% (n = 18/122)	23% (n = 5/22)
South (DE, FL, GA, MD, NC, SC, VA, DC, WV, AL, KY, MS, TN, AK, LA, OK, TX)		32% (n = 39/122)	32% (n = 7/22)
West (AZ, CO, ID, MT, NV, NM, UT, WY, AK, CA, HI, OR, and WA)		12% (n = 15/122)	9% (n = 2/22)
Residency Year	Residents	Years Post-Residency	Program Directors
PGY-2	39% (n = 48/122)	0-5 years	5% (n = 1/22)
PGY-3	35% (n = 43/122)	6-10 years	32% (n = 7/22)
PGY-4	25% (n = 30/122)	7-15 years	27% (n = 6/22)
Other	1% (n = 1/122, PGY-5)	16-20 years	18% (n = 4/22)
		21+ years	18% (n = 4/22)

**TABLE 2. Dermoscopy training type and total hours of training. [Copyright: ©2017 Patel et al.]**

Dermoscopy Training Type	1-10 Hours of Training	>10 Hours of Training
<b>Dedicated Training in Residency</b>		
Dedicated training in residency without outside training	14% (n = 17/122)	5% (n = 6/122)
Dedicated training in residency + 1 outside training modality	7% (n = 8/122)	5% (n = 6/122)
Dedicated training in residency + 2 or more outside training modalities	2% (n = 3/122)	2% (n = 3/122)
Total	23% (n = 28/122)	12% (n = 15/122)
<b>Bedside Training in Residency</b>		
Only bedside training in residency without outside training	12% (n = 14/122)	1% (n = 1/122)
Only bedside training in residency + 1 outside training modality	10% (n = 12/122)	1% (n = 1/122)
Only bedside training in residency + 2 or more outside training modalities	2% (n = 2/122)	2% (n = 3/122)
Total	23% (n = 28/122)	4% (n = 5/122)
<b>No dermoscopy training in residency</b>		
1 outside training modality only	7% (n = 9/122)	-
2 or more outside training modalities only	3% (n = 4/122)	1% (n = 1/122)
No dermoscopy training at all	-	-
Total	11% (n = 13/122)	1% (n = 1/122)

side dermoscopy training in residency, and 38% (46/122) had no dermoscopy training in residency, which includes residents who had only outside dermoscopy training (12%, 14/122) and residents who had no dermoscopy training at all (26%, 32/122). Forty-seven percent (20/43) of residents with dedi-

cated training in residency and 55% (18/33) of residents with only bedside training in residency supplemented their training with outside dermoscopy training (Table 2). Of the various outside training modalities, 60% (31/52) reported training at a national or local conference, 58% (30/52) reported training

**TABLE 3. Popularity of outside dermoscopy training modalities. [Copyright: ©2017 Patel et al.]**

Outside Dermoscopy Training Type	Residents*
National or local conference	60% (n = 31/52)
Outside course	58% (n = 30/52)
Web-based course	19% (n = 10/52)
Any fellowship or research year	6% (n = 3/52)

\*Some residents may have participated in more than one outside training modality

through an outside course, 19% (10/52) reported training through a web-based course, and 6% (3/52) reported training through a fellowship or research year (Table 3). Irrespective of current dermoscopy training, 91% (111/122) of residents desired more dermoscopy training in their residency programs; 5% (6/122) did not desire more training; and 4% (5/122) were unsure.

### Confidence using dermoscopy in general and satisfaction with training

To assess residents' confidence using dermoscopy and satisfaction with training as a result of only dermoscopy training in residency, residents with outside training were excluded from our analysis. The mean confidence using dermoscopy in general for residents with 1-10 hours of dedicated training in residency was 3 of 5 (95% 2.555-3.445) (n = 17), that for residents with >10 hours of dedicated training in residency was 3 of 5 (95% 1.850-4.150) (n = 6), that for residents with 1-10 hours of only bedside training in residency was 2.214

of 5 (95% CI 1.811-2.618) (n = 14), and that for residents with no dermoscopy training at all was 1.875 of 5 (95% CI 1.523-2.22) (n = 32) (Table 4). The mean satisfaction with training for residents with 1-10 hours of dedicated training in residency was 3.294 of 5 (95% 2.698-3.891) (n = 17), that for residents with >10 hours of dedicated training in residency was 3.833 of 5 (95% 2.802-4.865) (n = 6), that for residents with 1-10 hours of only bedside training in residency was 2.286 of 5 (95% CI 1.933-2.639) (n = 14), and that for residents with no dermoscopy training at all was 1.781 of 5 (95% CI 1.481-2.081) (n = 32) (Table 4). Since there was just one resident with >10 hours of only bedside training in residency, his/her response was excluded from our analysis.

When comparing the two training times for dedicated training in residency, residents with 1-10 hours of dedicated training had no significant difference in confidence using dermoscopy in general (p = 1.000) or satisfaction with training (p = .3224) than residents with >10 hours of dedicated training. When comparing the two types of dermoscopy trainings in residency, considering similar training times, residents with 1-10 hours of dedicated training had significantly increased confidence using dermoscopy in general (p = .0105) and satisfaction with training (p = .0066) than residents with 1-10 hours of only bedside training. Similarly, when comparing dedicating training in residency to no training at all, residents with 1-10 hours of dedicated training and residents with >10 hours of dedicated training both had significantly increased confidence using dermoscopy in general (p = .0002, p = .2471, respectively) and satisfaction with training (p < .0001, p < .0001, respectively) than residents with no dermoscopy training at all. Lastly, when comparing only bedside training

**TABLE 4. Residents' confidence using dermoscopy in general and satisfaction with training. [Copyright: ©2017 Patel et al.]**

Dermoscopy Training Type*	Mean Confidence with Dermoscopy in General 5-Point Likert scale (1, not confident; 5, very confident)	Mean Satisfaction with Dermoscopy Training in Residency 5-Point Likert scale (1, not satisfied; 5, very satisfied)
1-10 hours of dedicated training in residency without outside training (14%, n = 17/122;)	3.000 (95% CI 2.555-3.445)	3.294 (95% CI 2.698-3.891)
>10 hours of dedicated training in residency without outside training (5%, n = 6/122)	3.000 (95% CI 1.850-4.150)	3.833 (95% CI 2.802-4.865)
1-10 hours of only bedside training in residency without outside training (12%, n = 14/122;)	2.214 (95% CI 1.811-2.618)	2.286 (95% CI 1.933-2.639)
No dermoscopy training at all (26%, n = 32/122)	1.875 (95% CI 1.523-2.227)	1.781 (95% CI 1.481-2.081)

\*Since there was only one resident with >10 hours of bedside training in residency without outside training, his/her response was excluded from our analysis.

in residency to no dermoscopy training at all, residents with 1-10 hours of only bedside training had no significant difference in confidence using dermoscopy in general ( $p = .2471$ ) than residents with no dermoscopy training at all, but they did have significantly increased satisfaction with training than residents with no dermoscopy training at all ( $p = .0479$ ).

### The program director's role and beliefs surrounding dermoscopy

Fourteen percent (3/22) of PDs reported that they play a large role in teaching dermoscopy to residents; 77% (17/22) reported that they play a minor role; and 9% (2/22) reported that they do not teach dermoscopy at all. Nevertheless, 73% (16/22) of PDs still believed that those residents who use dermoscopy perform better in identifying suspicious skin lesions than those residents who do not; the remaining 27% (6/22) of PDs were unsure whether those residents who use dermoscopy perform any better in identifying suspicious skin lesions than those who do not.

## Discussion

This is the first study surveying US dermatology residents across all years concurrently with PDs to assess the status of dermoscopy training in residency. We included residents from all years to obtain a comprehensive view of dermoscopy training, and included PDs to get a teacher's view on training. Our analysis utilizes residents' confidence with dermoscopy and satisfaction with training as surrogate markers to gauge dermoscopy training in residency. Based on our results, we have made recommendations for improving training as shown in Table 5.

Similar to findings from recent years, 84% (103/112) of residents and 100% (22/22) of PDs reported using dermoscopy regularly, and inadequate dermoscopy training was the number one reason for not using dermoscopy by residents (79%, 15/19) [9-11]. In terms of dermoscopy training in residency, 35% (43/122) of residents had dedicated training in residency, 27% (33/122) had only bedside training in residency, and 38% (46/122) had no dermoscopy training in residency. While there was no significant difference in confidence using dermoscopy in general or satisfaction with training between residents with 1-10 hours of dedicated training and >10 hours dedicated training, there was a significant increase in confidence using dermoscopy in general and satisfaction with training between residents with dedicated training and residents with similar hours of only bedside training or no training at all. Our results are in accordance with previous studies that suggest that short formal dermoscopy training sessions could increase the dermoscopy naïve dermatologist's diagnostic capabilities and confidence using dermoscopy [14-16]. Nevertheless, in its current form, dedicated training

**TABLE 5. Improving dermoscopy training in residency: dermoscopy training recommendations. [Copyright: ©2017 Patel et al.]**

- Implement a formal dedicated dermoscopy training curriculum that is overseen by the program director.
- Avoid solely relying on informal bedside training in residency.
- Consider supplementing training in residency with one or more outside teaching modalities.
- Continuously implement resident feedback into improving dermoscopy training through ongoing surveys.

in residency is not ideal because the mean confidence using dermoscopy and mean satisfaction with training are only 3.000 (95% 2.555-3.445) and 3.294 (95% 2.698-3.891), respectively, for residents with 1-10 hours of dedicated training, and only 3.000 (95% 1.850-4.150) and 3.833 (95% 2.802-4.865), respectively for residents with >10 hours of dedicated training.

With 91% (111/122) of our responding residents desiring more dermoscopy training in their residency programs, one solution may be to supplement dedicated training in

residency with outside training, as is done in Australian dermatology residency programs, where dedicated dermoscopy training is supplemented with web-based dermoscopy training [2]. Unfortunately, given the wide variability of outside training programs, it was not possible for us to evaluate the effect of outside training modalities on our responding residents' confidence using dermoscopy and satisfaction with training. Indeed, training-specific prospective studies are needed to evaluate outside training programs as potential supplements to dedicated training in residency. One recent prospective study by Boespflug et al [17] reported that residents who trained with spaced education, web-based dermoscopy training combined with formal dermoscopy training had high training satisfaction and had significantly increased dermoscopy skills when compared to residents with just formal dermoscopy training alone.

Lastly, a majority of PDs reported that they play little to no role in teaching dermoscopy (77% play a minor role, and 9% do not teach dermoscopy at all). While it is not necessary that PDs themselves teach dermoscopy to residents, PD involvement in creating and/or maintaining a formal dedicated dermoscopy curriculum is important to improving residents' dermoscopy training.

## Limitations

There are some limitations to our study. First, we had a small sample size and a possible selection bias, as only 29% (122/417) of our emailed residents and 19% (22/118) of our

emailed PDs participated in our study, despite our attempts to send multiple emails through various email addresses, including those of program coordinators. It is possible that residents and PDs not interested in dermoscopy may have been less likely to complete our survey. Additionally, since confidence using dermoscopy and satisfaction with training do not always translate into diagnostic competence, our ability to consider them surrogate markers to gauge dermoscopy training is limited. With no practical way to gauge dermoscopy training, with the exception of implementing an examination, we had to rely on subjective user feedback to quantify and analyze our results.

## Conclusion

With 98% (119/122) of residents planning on using dermoscopy after residency, we believe it is our duty to provide quality dermoscopy training during residency. To improve current dermoscopy training in residency, we recommend implementing a formal dedicated dermoscopy training curriculum that is overseen by the program director and is possibly supplemented by outside dermoscopy training (e.g., national/local conference, outside course, web-based training, and/or fellowship year/research year). In the future, testing dermoscopy knowledge on national board examinations may serve as an incentive to implement quality dermoscopy training across all residency programs.

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## References

1. Tasli L, Kacar N, Argenziano G. A scientometric analysis of dermoscopy literature over the past 25 years. *J Eur Acad Dermatol Venereol*. 2012;26(9):1142-1148.
2. Piliouras P, Buettner P, Soyer HP. Dermoscopy use in the next generation: a survey of Australian dermatology trainees. *Australas J Dermatol*. 2014;55(1):49-52.
3. Lallas A, Giacomel J, Argenziano G, et al. Dermoscopy in general dermatology: practical tips for the clinician. *Br J Dermatol*. 2014;170(3):514-526.
4. Russo T, Piccolo V, Lallas A, Argenziano G. Recent advances in dermoscopy. *F1000Research*. 2016;5:184.
5. Park JH, Kim CW, Kim SS. The diagnostic accuracy of dermoscopy for scabies. *Ann Dermatol*. 2012;24(2):194-199.
6. Micali G, Lacarrubba F, Massimino D, Schwartz RA. Dermoscopy: alternative uses in daily clinical practice. *J Am Acad Dermatol*. 2011;64(6):1135-1146.
7. van der Rhee JI, Bergman W, Kukutsch NA. The impact of dermoscopy on the management of pigmented lesions in everyday clinical practice of general dermatologists: a prospective study. *Br J Dermatol*. 2010;162(3):563-567.
8. Rudnicka L, Olszewska M, Rakowska A, Slowinska M. Trichoscopy update 2011. *J Dermatol Case Rep*. 2011;5(4):82-88.
9. Wu TP, Newlove T, Smith L, Vuong CH, Stein JA, Polsky D. The importance of dedicated dermoscopy training during residency: a survey of US dermatology chief residents. *J Am Acad Dermatol*. 2013;68(6):1000-1005.
10. Freeman SR, Greene RE, Kimball AB, et al. US dermatology residents' satisfaction with training and mentoring: survey results from the 2005 and 2006 Las Vegas Dermatology Seminars. *Arch Dermatol*. 2008;144(7):896-900.
11. Terushkin V, Oliveria SA, Marghoob AA, Halpern AC. Use of and beliefs about total body photography and dermoscopy among US dermatology training programs: an update. *J Am Acad Dermatol*. 2010;62(5):794-803.
12. Nehal KS, Oliveria SA, Marghoob AA, et al. Use of and beliefs about dermoscopy in the management of patients with pigmented lesions: a survey of dermatology residency programmes in the United States. *Melanoma Res*. 2002;12(6):601-605.
13. Engasser HC, Warshaw EM. Dermoscopy use by US dermatologists: a cross-sectional survey. *J Am Acad Dermatol*. 2010;63(3):412-419.
14. Benvenuto-Andrade C, Dusza SW, Hay JL, et al. Level of confidence in diagnosis: clinical examination versus dermoscopy examination. *Dermatol Surg*. 2006;32(5):738-744.
15. Binder M, Puespoeck-Schwarz M, Steiner A, et al. Epiluminescence microscopy of small pigmented skin lesions: short-term formal training improves the diagnostic performance of dermatologists. *J Am Acad Dermatol*. 1997;36(2 Pt 1):197-202.
16. Chevolet I, Hoorens I, Janssens A, et al. A short dermoscopy training increases diagnostic performance in both inexperienced and experienced dermatologists. *Australas J Dermatol*. 2015;56(1):52-55.
17. Boespflug A, Guerra J, Dalle S, Thomas L. Enhancement of Customary Dermoscopy Education With Spaced Education e-Learning: A Prospective Controlled Trial. *JAMA Dermatol*. 2015;151(8):847-853.