Improving Melanoma Screening in Primary Care: The Experience of the Association of French General Practitioners Practicing Dermoscopy

Julien Anriot[1], Nadia Ikhlef[2], Gérard Duru[3], Sophie Darnis[4], Pauline Scouarnec[5], Younes Tamarat[6], Mona Amini-Adle[1], Luc Thomas[2,3,7]

1 Department of Dermatology, Centre Léon Bérard, Lyons, France
2 Dermatology department, Hôpital Lyon Sud, Hospices Civils de Lyon, Lyons, France
3 Claude Bernard Lyon-1 University, Lyons, France
4 Delegation for Clinical Research and Innovation Centre Léon Berard, Lyons, France
5 Collège des Hautes Etudes en Médecine, Brest, France
6 Pediatric Department, Médipôle Hôpital Mutualiste, Médipôle Lyon Villeurbanne, Villeurbanne, France
7 Cancer Research Center of Lyon, Lyons, France

Corresponding Author: Luc Thomas, MD, PhD, Service de dermatologie, Centre Hospitalier Lyon Sud, 165 Chemin du Grand Revoyet, 69310 Pierre-Bénite, France. E-mail: luc.thomas@chu-lyon.fr

ABSTRACT

Background: Melanoma constitutes an increasing global health burden. In the light of a growing shortage of dermatologists in several countries, primary care has emerged as an optimal setting for skin cancer screening. Historically, skin cancer detection in France was typically managed by dermatologists, while general practitioners (GPs) were barely involved. In 2021, the Association of French GPs Practicing Dermoscopy was created to address this gap by promoting and legitimizing dermoscopy practice among primary care physicians.

Objectives: To assess the number of melanomas detected by dermoscopy-trained GPs three years after the association's foundation and to compare the melanomas' histopathological characteristics to those documented in the existing literature.

Methods: A survey was shared via Google® Forms with all the members of the association's Facebook® account between 26 November 2024 and 26 December 2024.

Results: A total of 85 general practitioners responded to the survey. They reported the detection of 266 melanomas, corresponding to a median of approximately 1.6 per year of dermoscopy practice (mean: 2.9). Of the detected melanomas, 39.5% (105/266) were in situ, while only 22.4% (36/161) had a Breslow thickness above 1 mm, which constitutes a substantial improvement compared to previously reported data on GP-detected melanomas.

Conclusions: Empowerment of primary care medicine through dermoscopy learning appears to be a promising way to overcome the relative shortage of diagnostic offer observed in several countries. Integrating skin cancer screening into a GP's practice may contribute to early melanoma detection and support ongoing efforts to lower melanoma mortality.

Introduction

Cutaneous melanoma is an increasingly significant public health concern worldwide. Although it accounts for only 10% of skin cancers, it is responsible for more than 75% of skin cancer-related mortality, and its incidence rate has been increasing for decades [1]. Early detection is essential to mitigate this burden [2-3]. Indeed, the five-year survival rate ranges from 91% to 95% when the Breslow thickness is less than one millimeter, and ranges from 63% to 79% when it reaches 2–4 mm, and even worse (less than 48%) above 4 mm. Due to a growing shortage of dermatologists in Western countries [4], primary care is increasingly recognized as a suitable setting for skin cancer screening [1,5,6]. Dermoscopy has shown benefits in early melanoma detection while minimizing excisions of benign lesions [7]. Its effectiveness in the early detection of melanoma is supported by level A evidence-based recommendations [8,9]. The Primary Care Dermatology Society in the UK [10] and the Skin Cancer College Australasia in Australia and New Zealand [11] are successful examples of general practitioners (GPs) organizing themselves to participate in melanoma detection (with the notable help of dermoscopy) alongside dermatologists.

In France, this activity remained uncommon, as melanoma diagnosis is historically under the responsibility of dermatologists.

In 2021, the Association of French GPs Practicing Dermoscopy was created through the release of an open Facebook account [12], modeled after that of the International Dermoscopy Society, "Dermatoscopy" [13].

As of 10 November 2024, 2920 GPs have subscribed to the account.

This study aimed to evaluate the number and characteristics of melanomas detected by trained GPs three years after the foundation of the association.

Methods

Study Population and Authorizations

This study received approval from Centre Léon Berard institutional ethics committee (R201-004-511).

This retrospective study was conducted from 26 November 2024 to 26 December 2024.

A survey developed on Google Forms ([online computer software], Alphabet, 2023, Mountain View, USA) was distributed to all subscribers of the Association's Facebook ([online computer software], Meta, 2024, Menlo Park, California, USA) account on 26 November 2024, with a reminder sent on 5 December.

Participants were asked to complete the survey and upload screenshots of anonymized histopathological reports of melanomas they had personally diagnosed; patients referred by other healthcare professionals for a suspicious lesion were excluded.

Responses were sent to a designated Google Drive Folder ([online computer software], Alphabet, 2023, Mountain View, USA).

The survey gathered the following information about GPs : sex, date of birth, start date of dermoscopy practice, frequency of dermoscopy use, medical practice setting (self-employed, salaried, et cetera), practice location (urban, rural, et cetera).

Participants who uploaded melanoma cases into the database with no survey completed were classified as "unknown" (n=9). GPs who completed the survey with no uploaded melanoma cases were interpreted as GPs who had not diagnosed any melanoma.

The study focused on the following histopathological characteristics: melanoma pathological subtype (superficial spreading melanoma (SSM), lentigo malignant melanoma (LMM), acro-lentiginous melanoma (ALM), nodular (NM), unclassifiable, metastatic) and Breslow's thickness.

Cases of melanocytic intraepithelial neoplasia (MIN)/ intraepidermal atypical melanocytic proliferation of uncertain significance (IAMPUS) and melanocytic tumors of uncertain malignant potential (MELTUMP) cases were excluded to ensure better comparability with historical series in the literature.

Statistical Analysis

Qualitative variables are described as frequencies and percentages (n, %), and quantitative variables as medians and range (min–max).

The mean and median Breslow thickness were evaluated on invasive melanomas only, since Breslow's index does not apply to in situ melanomas.

For comparisons with results from other cohorts [14-17], Fisher's exact test was used when the theoretical value of each category was less than 5, and a chi2 was used when this value was equal to or greater 5.

Results

As of 26 December 2024, the Facebook account had 2920 subscribers (Figure 1).

Among them, 69% (2015/2920) were female and 87% (2540/2920) were under under age 44 years.

A total of 2773 (95%) resided in France, including 44 from Overseas Departments and Territories, with additional followers from French-speaking countries like Belgium (52), Algeria (44), Switzerland (7), Morocco (7), and Tunisia (5).

Participants' Characteristics

A total of 85 GPs participated in this study (Table 1), of the 628 who viewed the Facebook post (13.5%), representing 2.9% of the total number of followers (85/2920).

The median start of dermoscopy practice among participants was June 2023 (Figure 2).

Melanomas Diagnosed

The mean Breslow thickness of melanomas detected in our study was 1.12 mm (median 0.5 mm) (Table 2).

In 2000 (Table 3), the mean Breslow thickness was 1.9 mm for dermatologists (median 0.9 mm) and 2.9 mm for GPs (median 2.0 mm) [15].

In 2013, Grange et al. in France identified a mean Breslow thickness of 1.68 mm (median 0.85 mm) for melanomas detected by trained GPs [16].

In 2020, Lorier et al., also in France, analyzed the melanomas detected during consultation by dermatologists in private practice, finding a median Breslow index of 0.4 mm [17].

Our study identified:

- a lower proportion of in situ melanomas than did Hay et al. [14] (39.5% vs 65%, $P<0.001$)
- a higher proportion of in situ melanomas than did Grange et al. [16] (39.5% vs 28.2%, $P<0.001$)
- A similar proportion of in situ melanomas than did Lorier et al. [17] (39.5% vs 43.8%, $P=0.50$)

Our study identified:

- a similar rate of Breslow thickness >1 mm among the invasive melanomas compared with Hay et al. [14] (22.4% vs 27.8%, $P= 0.39$)
- a lower rate of Breslow thickness >1 mm among the invasive melanomas than did Grange et al. [16] (22.4% vs 42.6%, $P<0.001$).

Our study identified a different distribution of histologic subtypes compared with Hay et al. [14] ($P<0.001$) and Richard et al. [15] ($P<0.001$), and one similar to that of Lorier et al. [17] ($P=0.43$)

Table 1. Characteristics of Participants.

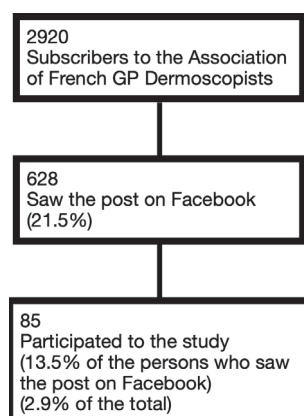|	Total (n=85)
Sex	
Male	27 (31.8%)
Female	49 (57.6%)
Unknown	9 (10.6%)
Age	39.0 (med 37; min 28; max 63)
Duration of practice in dermoscopy (years)	1.47 (med 1.25; min 0.1; max 6.3)
Frequency of dermoscopy use	
Every day	40 (47.1%)
Several times per week	31 (36.5%)
Several times per month	4 (4.7%)
Several times per year	1 (1.1%)
Unknown	9 (10.6%)
Type of medical practice	
Self-employed	69 (81.2%)
Salaried	5 (5.9%)
Mixed	2 (2.3%)
Unknown	9 (10.6%)
Location	
Urban	29 (34.1%)
Semi-rural	29 (34.1%)
Rural	18 (21.2%)
Unknown	9 (10.6%)

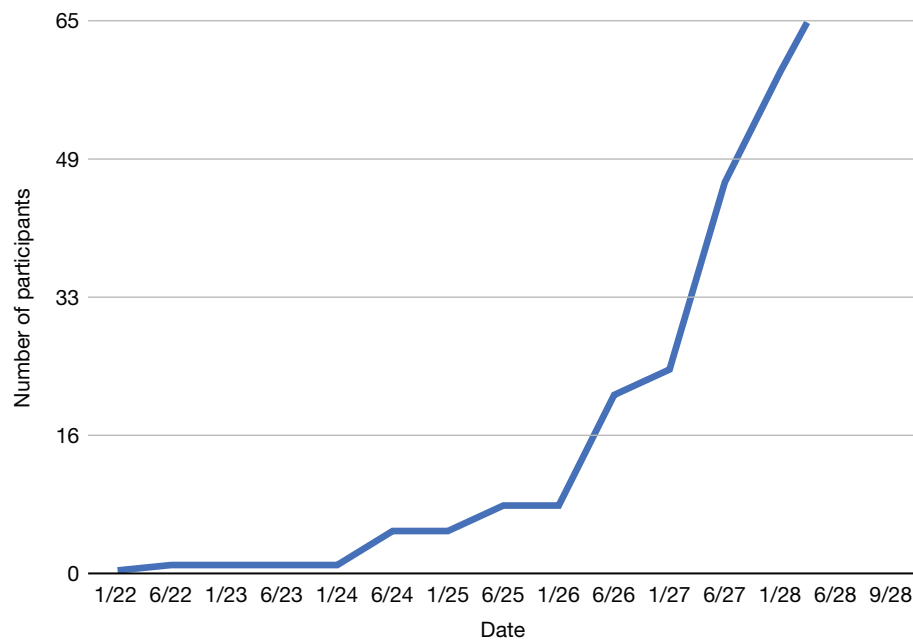**Figure 1.** Flowchart of participants.

Figure 2. Number of participants practicing dermoscopy over time among the responders to the survey

Table 2. Histopathological Characteristics of Diagnosed Melanomas.

	Total (n=266)
Type of melanoma	
SSM (superficial spreading melanoma)	210 (78.9%)
LMM (lentigo maligna melanoma)	30 (11.3%)
ALM (acral lentiginous melanoma)	10 (3.8%)
Nodular melanoma	8 (3.0%)
Unclassifiable melanoma	7 (2.6%)
Metastases of melanoma	1 (0.4%)
Thickness	
Proportion of in situ melanomas	39.5% (105/266)
Proportion of melanomas with Breslow index >1 mm among the invasive melanomas	22.4% (36/161)
Breslow index for invasive melanomas only	1.12 (Med 0.5; Min 0.1; Max 9)
T of TNM classification	
Tis	39.5% (105/266)
T1a	39.8% (106/266)
T1b	7.2% (19/266)
T2a	6.0% (16/266)
T2b	1.1% (3/266)
T3a	2.2% (6/266)
T3b	0.4% (1/266)
T4a	1.1% (3/266)
T4b	2.7% (7/266)

Table 3. Comparison of Melanoma Characteristics in this Study with Previously Published Studies.

|	GPs				Dermatologists		Both
	Present Study	Hay et al (Australia NZ 2022) (14)	Grange et al. (France 2013) (16)	Richard et al. (France 2000) (15)	Richard et al. (France 2000) (15)	Lorier et al. (France 2020) (17)	Richard et al. (France 2000) (15)
Mean Breslow Thickness	1.12 mm		1.68 mm	2.9 mm	1.9 mm		
Median Breslow Thickness	0.5 mm		0.85 mm	2 mm	0.9 mm	0.4 mm	
Proportion of in situ melanomas	39.5% (105/266)	65% (414/637)	28.2% (175/621)			43.8% (32/73)	
Breslow thickness >1 mm among invasive melanomas	22.4% (36/151)	27.8% (62/223)	42.6% (190/446)				
SSM	78.9% (210/266)	50.2% (320/637)				82.2% (60/73)	71.0% (297/418)
Lentiginous	15.1% (38/266)	39.1% (249/637)				16.4% (12/73)	5.5% (23/418)
Nodular	3.0% (7/266)	4.2% (27/637)				0% (0/73)	20.8% (87/418)
Metastasis	0.4% (1/266)	1.4% (9/637)					
Unclassified	2.6% (7/266)	2.7% (17/637)					2.6% (11/418)
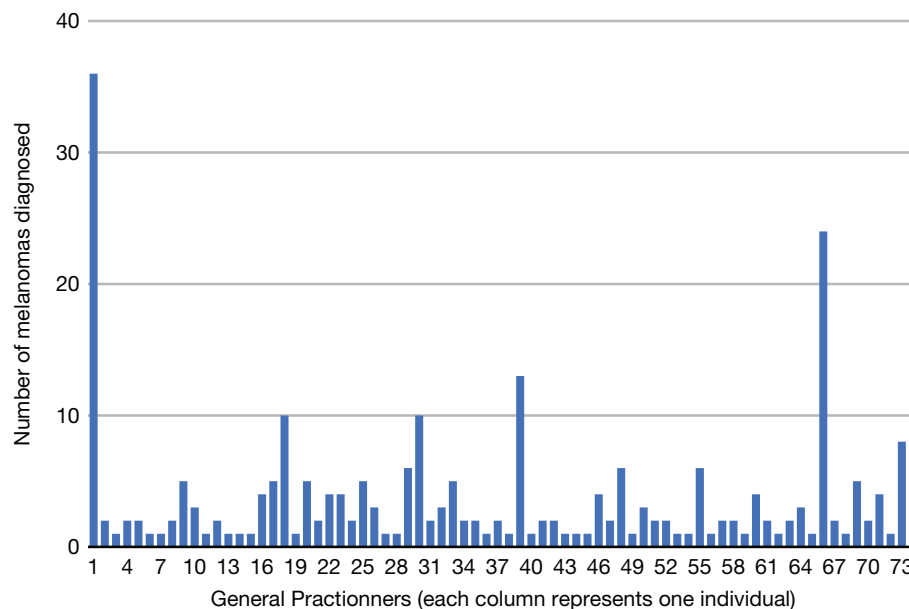
Figure 3. Melanomas diagnosed per GP.

Participants diagnosed an average of 3.2 melanomas each (median 2; min 0; max 36) (Figure 3).

Each participant diagnosed a mean of 2.9 melanomas per year of dermoscopy practice (median 1.6; min 0; max 48).

Discussion

Early recognition of life-threatening skin tumors is a public health concern, but is nowadays made difficult by the growing shortage of dermatologists in many European countries. Moreover, recent studies have underlined that Breslow thickness at melanoma detection is higher in areas of medical deprivation [18]. In France, we count 2592 dermatologists for 52291 general practitioners [4]. Australia and, to a lesser extent the UK, have chosen to involve general practitioners in skin cancer detection. In Australia, the majority of melanomas are diagnosed by GPs. This practice is very new in France, and still developing, despite some limitations, such as GPs' lack of confidence in their own diagnostic abilities, despite good results [19]. The Association of French GPs Practicing Dermoscopy, created in 2021, now includes 2920 members.

In this context, we conducted a survey to analyze the melanomas detected by Association members.

Dermoscopy-trained GPs from the Association of French GPs Practicing Dermoscopy were able to detect early melanomas, with a notable improvement in the mean and median Breslow thickness compared to previously reported values in 2000 [15] and 2013 [16]. The proportion of in situ melanomas increased (28.2% in 2013 vs 39.5% in present study), as did the proportion of invasive melanomas with Breslow

index less than 1 mm (57.4% in 2013 vs 77.6% in the present study).

These findings suggest a significant improvement in melanoma detection, likely attributable to dermoscopy implementation in general practice.

Notably, Lorier et al.'s [17] evaluation of detected melanomas by dermatologists in France is consistent with our results. Using a similar study design, they reported a comparable median Breslow thickness and distribution of melanoma histological subtypes. This suggests that after appropriate training in dermoscopy, GPs can also achieve excellent performance in skin cancer screening and are qualified to perform such screening [19]. Developing this expertise may be crucial since a large proportion of patients consulted their GP in the year preceding a melanoma diagnosis [20].

With a growing number of GPs participating in melanoma detection, including approximately 20% in rural areas (significant, given the shortage of dermatologists in these locations [21]), this could lead to a rapid increase in the number of melanomas detected by GPs, since the median number of melanomas diagnosed per year was 1.7.

Although this may seem low, melanoma remains relatively rare in general practice: with approximately 17,000 new cases per year and 52,291 GPs in France, the average GP encounters a new melanoma case only once every three years. Participants in our study detected melanomas at a rate three times higher than this national average.

Half of the participants used dermoscopy daily, but this practice remained relatively new for most French GPs, with a median dermoscopy experience of only 1.5 years.

Strengths and Limitations

To date, most publications on skin cancer screening and diagnosis by general practitioners have been limited to:

- assessing the use of dermoscopy by general practitioners in various countries [22,23,24,25,26,27]
- evaluating general practitioners' ability to detect suspicious skin lesions and refer them to dermatologists [28,29,30]
- Investigating the improvement in general practitioners' skills after clinical and dermoscopy training of varying durations provided by dermatologists [31,32,33,34,35,36]
- determining the required training duration for general practitioners to gain proficiency in skin cancer detection [37]
- exploring the benefits of tele-expertise in improving diagnostic accuracy and reducing treatment delays for skin cancers [38]
- developing computer-assisted diagnostic systems and algorithms with artificial intelligence to aid in the dermoscopic image classification for general practitioners [39]

Apart from the previously mentioned work from Australia, which aligns with a national health policy prioritizing melanoma due to its prevalence, no study has examined in detail the actual contribution of general practitioners to the complete and independent diagnosis of cutaneous melanomas. This research thus represents a pioneering study in Europe, highlighting the legitimacy and significant role of general practitioners in skin cancer screening.

The low participation rate, considering the number of the Facebook account followers, constitutes a limitation of this study. However, among the 2920 followers, not all are GPs (e.g., pediatricians, dermatologists, occupational doctors, physiotherapists, et cetera) or are replacement GPs or residents that may not have access to the final pathology reports of their cases. Additionally, some individuals (n=8) who were known to have diagnosed melanoma cases (previously published on the Facebook account, n=16) did not participate in this study.

Recruitment bias: Respondents may have a greater interest in skin cancer detection, potentially increasing the representation of dermoscopy practice among GPs. However, this does not question the capabilities or outcomes achieved by GPs practicing dermoscopy.

Most participants were young (mean age 38.0 years) and female (56.7% (42/73)), which is consistent with the demographics of the Facebook group (58% were under age 34, and 69% female), in contrast with the global GP population in France (mean age: 51 years old, female: 46%). Some GPs could have been worried about openly participating in a study related to a medical specialty outside their primary field.

Recall bias: Some survey questions relied on the GP's ability to recall certain information, which could have led to slight inaccuracies in the reported start date of dermoscopy practice. This is a non-differential error, but it could result in an underestimation of the number of melanomas per participant, as some cases may have been forgotten or the pathology report may not have been forwarded to the general practitioner by the dermatologist who performed the excision.

Allocation bias: The study specified that only melanomas diagnosed directly by a GP should be included. Some GPs, especially those who accept referrals from other GPs, may have included these as their own diagnoses. However, we provided clear guidance to avoid this issue.

Future Directions

The Association of French General Practitioners Practicing Dermoscopy has recently been created, and these promising results need to be confirmed with an extended follow-up of five years.

Conclusion

This study highlights the emerging role of general practitioners in the detection of cutaneous melanoma in France, three years after the creation of the Association of French General Practitioners Practicing Dermoscopy. Our findings indicate that identification of melanomas at an early stage is entirely possible for trained GPs.

We believe that empowering GPs through a wider use of dermoscopy for skin examination could reduce inequalities in the diagnostic offer in France.

Continued efforts to promote dermoscopy training among general practitioners appears to be essential since growing evidence demonstrates that proper training is key to obtaining adequate suspicious skin lesion triage and management. Future research should aim to evaluate the long-term impact of such initiatives on melanoma detection rates and patient outcomes. By fostering a collaborative approach between GPs and dermatologists, enhanced early detection capabilities is expected and, ultimately, a reduced burden of melanoma in the community.

References

1. Haute Autorité de Santé. Stratégie de diagnostic précoce du mélanome : rapport stratégie de diagnostic précoce du mélanome. Updated October 2006. Accessed February 19 2023. https://www.has-sante.fr/upload/docs/application/pdf/rapport_strategie_de_diagnostic_precoce_du_melanom e.pdf
2. Institut National du Cancer. Survie des personnes atteintes de cancer en France métropolitaine 1989-2018 - Synthèse des résultats: tumeurs solides et hémopathies malignes. Updated August 23

2021. Accessed June 19 2023. https://www.santepubliquefrance .fr/docs/survie-des-personnes-atteintes-de-cancer-en-france -metropolitaine-1989-2018-melanome-de-la-peau

3. Haute Autorité de Santé. Rapport d'orientation sur les facteurs de retard au diagnostic du mélanome cutané. Updated July 2012. Accessed March 16 2023. https://www.has-sante.fr/upload/docs /application/pdf/2013-01/synthese_du_rapport_dorientation_ facteurs_de_retard_au_diagnostic_du_melanome_cutane.pdf

4. https://www.ameli.fr/rhone/medecin/textes-reference/convention -medicale-2024-2029/les-negociations-en-pratique/panorama -medecins-concernes

5. Sinclair R, Meah N, Arasu A. Skin checks in primary care. Aust J Gen Pract. 2019 Sep;48(9):614-619. DOI: 10.31128/AJGP-03-19-4887. PMID: 31476828.

6. Buckley D, McMonagle C. Melanoma in primary care. The role of the general practitioner. Ir J Med Sci. 2014 Sep;183(3): 363-8. DOI: 10.1007/s11845-013-1021-z. Epub 2013 Oct 4. PMID: 24091614.

7. Salerni G, Terán T, Puig S, Malvehy J, Zalaudek I, Argenziano G, Kittler H. Meta-analysis of digital dermoscopy follow-up of melanocytic skin lesions: a study on behalf of the International Dermoscopy Society. J Eur Acad Dermatol Venereol. 2013 Jul;27(7):805-14. DOI: 10.1111/jdv.12032. Epub 2012 Nov 26. PMID: 23181611.

8. Vestergaard ME, Macaskill P, Holt PE, Menzies SW. Dermoscopy compared with naked eye examination for the diagnosis of primary melanoma: a meta-analysis of studies performed in a clinical setting. Br J Dermatol. 2008 Sep;159(3):669-76. DOI: 10.1111/j.1365-2133.2008.08713.x. Epub 2008 Jul 4. PMID: 18616769.

9. Kittler H, Pehamberger H, Wolff K, Binder M. Diagnostic accuracy of dermoscopy. Lancet Oncol. 2002 Mar;3(3):159-65. DOI: 10.1016/s1470-2045(02)00679-4. PMID: 11902502.

10. https://www.pcds.org.uk/

11. https://www.skincancercollege.org/

12. https://www.facebook.com/groups/475003700493511/

13. https://www.facebook.com/groups/dermatoscopy/

14. Hay J, Keir J, Jimenez Balcells C, et al. Characteristics, treatment and outcomes of 589 melanoma patients documented by 27 general practitioners on the Skin Cancer Audit Research Database. Australas J Dermatol. 2022 May;63(2):204-212. DOI: 10.1111/ajd.13843. Epub 2022 Apr 19. PMID: 35437755; PMCID: PMC9320831

15. Richard MA, Grob JJ, Avril MF, et al. Delays in diagnosis and melanoma prognosis (II): the role of doctors. Int J Cancer. 2000 May 20;89(3):280-5. DOI: 10.1002/1097-0215 (20000520)89:3<280::aid-ijc11>3.0.co;2-2. PMID: 10861505.

16. Grange F, Woronoff AS, Bera R, et al. Efficacy of a general practitioner training campaign for early detection of melanoma in France. Br J Dermatol. 2014 Jan;170(1):123-9. DOI: 10.1111 /bjd.12585. PMID: 23937244.

17. Lorier Roy E, Gressier L, Marco Bonnet J, et al. MELALIB15 : étude observationnelle rétrospective de 383 mélanomes dépistés par des dermatologues libéraux [MELALIB 15: A retrospective observational study of 383 cases of melanoma diagnosed by dermatologists in private practice]. Ann Dermatol Venereol. 2020 Nov;147(11):706-712. French. DOI: 10.1016/j.annder.2020.05.004. Epub 2020 Jul 9. PMID: 32653218.

18. Moncayo AK, Ferguson JM, Dizon MP, et al. Area Deprivation Index and Melanoma Thickness in Veterans. JAMA Dermatol. 2025 Mar 6. DOI: 10.1001/jamadermatol.2025.0311. Epub ahead of print. PMID: 40047783.

19. Andremasse C, Anriot J, Duru G, Mismetti V, Perrot JL, Thomas L. Creation and evaluation of an online dermoscopy test for self-evaluation of competences in diagnosis of skin cancer. J Eur Acad Dermatol Venereol. 2025 Feb 6. DOI: 10.1111/jdv.20573. Epub ahead of print. PMID: 39912230.

20. Geller AC, Koh HK, Miller DR, Clapp RW, Mercer MB, Lew RA. Use of health services before the diagnosis of melanoma: implications for early detection and screening. J Gen Intern Med. 1992 Mar-Apr;7(2):154-7. DOI: 10.1007/BF02598004. PMID: 1487762.

21. https://www.assurance-maladie.ameli.fr/etudes-et-donnees /zoom-ps-dermatologues-liberaux

22. Morris JB, Alfonso SV, Hernandez N, Fernández MI. Examining the factors associated with past and present dermoscopy use among family physicians. Dermatol Pract Concept. 2017 Oct 31; 7(4):63-70. DOI: 10.5826/dpc.0704a13. PMID: 29214111; PMCID: PMC5718128.

23. Fee JA, McGrady FP, Rosendahl C, Hart ND. Dermoscopy Use in Primary Care: A Scoping Review. Dermatol Pract Concept. 2019 Apr 30;9(2):98-104. DOI: 10.5826/dpc.0902a04. PMID: 31106011; PMCID: PMC6502297.

24. Fee JA, McGrady FP, Hart ND. Dermoscopy use in primary care: a qualitative study with general practitioners. BMC Prim Care. 2022 Mar 15;23(1):47. DOI: 10.1186/s12875-022-01653-7. PMID: 35291937; PMCID: PMC8925058.

25. Jones OT, Jurascheck LC, Utukuri M, Pannebakker MM, Emery J, Walter FM. Dermoscopy use in UK primary care: a survey of GPs with a special interest in dermatology. J Eur Acad Dermatol Venereol. 2019 Sep;33(9):1706-1712. DOI: 10.1111 /jdv.15614. Epub 2019 May 17. PMID: 30977937; PMCID: PMC6767170.

26. Chappuis P, Duru G, Marchal O, Girier P, Dalle S, Thomas L. Dermoscopy, a useful tool for general practitioners in melanoma screening: a nationwide survey. Br J Dermatol. 2016 Oct;175(4):744-50. DOI: 10.1111/bjd.14495. Epub 2016 Jun 30. PMID: 26914613..

27. Whiting G, Stocks N, Morgan S, Tapley A, Henderson K, Holliday E, Ball J, van Driel ML, Spike N, McArthur L, Davey AR, Magin P. General practice registrars' use of dermoscopy: Prevalence, associations and influence on diagnosis and confidence. Aust J Gen Pract. 2019 Aug;48(8):547-553. DOI: 10.31128/AJGP-11-18-4773. PMID: 31370131..

28. Williams NM, Marghoob AA, Seiverling E, Usatine R, Tsang D, Jaimes N. Perspectives on Dermoscopy in the Primary Care Setting. J Am Board Fam Med. 2020 Nov-Dec;33(6):1022-1024. DOI: 10.3122/jabfm.2020.06.200238. PMID: 33219084; PMCID: PMC9121797.

29. Duarte AF, da Costa-Pereira A, Del-Marmol V, Correia O. Are General Physicians Prepared for Struggling Skin Cancer?- Cross-Sectional Study. J Cancer Educ. 2018 Apr;33(2):321-324. DOI: 10.1007/s13187-016-1078-2. PMID: 27405456.

30. Buckley D, McMonagle C. Melanoma in primary care. The role of the general practitioner. Ir J Med Sci. 2014 Sep;183(3): 363-8. DOI: 10.1007/s11845-013-1021-z. Epub 2013 Oct 4. PMID: 24091614.

31. Mathew T, Ianno DJ, Sidhu SK. Stage IA melanoma follow-up: Exploring the level of confidence of South Australian general practitioners in undertaking surveillance skin checks including considerations for shared care. Australas J Dermatol. 2023 May;64(2):e135-e144. DOI: 10.1111/ajd.14026. Epub 2023 Apr 1. PMID: 37002712.

32. Argenziano G, Puig S, Zalaudek I, Sera F, Corona R, Alsina M, Barbato F, Carrera C, Ferrara G, Guilabert A, Massi D, Moreno-Romero JA, Muñoz-Santos C, Petrillo G, Segura S, Soyer HP, Zanchini R, Malvehy J. Dermoscopy improves accuracy of primary care physicians to triage lesions suggestive of skin cancer. J Clin Oncol. 2006 Apr 20;24(12):1877-82. DOI: 10.1200/JCO.2005.05.0864. PMID: 16622262.

33. Augustsson A, Paoli J. Effects of a 1-Day Training Course in Dermoscopy Among General Practitioners. Dermatol Pract Concept. 2019 Jul 31;9(3):195-199. DOI: 10.5826/dpc.0903a04. PMID: 31384492; PMCID: PMC6659592.

34. Westerhoff K, McCarthy WH, Menzies SW. Increase in the sensitivity for melanoma diagnosis by primary care physicians using skin surface microscopy. Br J Dermatol. 2000 Nov;143(5):1016-20. DOI: 10.1046/j.1365-2133.2000.03836.x. PMID: 11069512.

35. Gonna N, Tran T, Bassett RL, Farris DP, Nelson KC. Sensitivity and Specificity for Skin Cancer Diagnosis in Primary Care Providers: a Systematic Literature Review and Meta-analysis of Educational Interventions and Diagnostic Algorithms. J Cancer Educ. 2022 Oct;37(5):1563-1572. DOI: 10.1007/s13187-022-02194-4. Epub 2022 Jul 14. Erratum in: J Cancer Educ. 2022 Oct;37(5):1573. DOI: 10.1007/s13187-022-02217-0. PMID: 35834156; PMCID: PMC11869934.

36. Barten AHJ, Beyers CP, Vondenhoff MFR, Stergioulas L, Kukutsch NA. The effect of a dermoscopy training programme on diagnostic accuracy and management decisions regarding pigmented skin lesions: a comparison between dermal therapists and general practitioners. Clin Exp Dermatol. 2024 May 21;49(6):591-598. DOI: 10.1093/ced/llad441. PMID: 38214576.

37. Friche P, Moulis L, Du Thanh A, Dereure O, Duflos C, Carbonnel F. Training Family Medicine Residents in Dermoscopy Using an e-Learning Course: Pilot Interventional Study. JMIR Form Res. 2024 May 13;8:e56005. DOI: 10.2196/56005. PMID: 38739910; PMCID: PMC11130775.

38. Bouton C, Schmeltz H, Lévèque C, Gaultier A, Quereux G, Dreno B, Nguyen JM, Rat C. Early diagnosis of melanoma: a randomized trial assessing the impact of the transmission of photographs taken with a smartphone from the general practitioner to the dermatologist on the time to dermatological consultation. BMC Health Serv Res. 2024 May 24;24(1):660. DOI: 10.1186/s12913-024-11106-9. PMID: 38783296; PMCID: PMC11118897.

39. Giavina-Bianchi M, de Sousa RM, Paciello VZA, Vitor WG, Okita AL, Prôa R, Severino GLDS, Schinaid AA, Espírito Santo R, Machado BS. Implementation of artificial intelligence algorithms for melanoma screening in a primary care setting. PLoS One. 2021 Sep 22;16(9):e0257006. DOI: 10.1371/journal.pone.0257006. PMID: 34550970; PMCID: PMC8457457.