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Systematic Review

Confocal reflectance microscopy versus digital dermoscopy for the diagnosis of melanoma in equivocal lesions: a systematic review

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ABSTRACT

The diagnosis of melanoma in clinically or dermoscopically equivocal melanocytic lesions is difficult and gives rise to many unnecessary excisions. This review compares *in vivo* reflectance confocal microscopy or confocal reflectance microscopy (RCM of CRM) and digital dermoscopy in the diagnosis of melanoma in equivocal lesions. We conducted a systematic review of PubMed, Embase, Cochrane Central and Web of Science (according to PRISMA) until 30 January 2026. Eligible studies were direct comparisons of RCM and digital dermoscopy in adults with equivocal lesions and had histopathology as the reference standard. Data extraction and quality appraisal using the quality assessment of diagnostic accuracy studies-2 (QUADAS-2) instrument were performed in duplicate. Where studies were homogenous enough for the statistical analysis, we used a bivariate random-effects model to pool sensitivity and specificity; or used a structured narrative synthesis otherwise. Fifteen (2007-2020) studies were included in which referral cohorts of equivocal lesions were included. In data pooled from the similar studies sensitivity of RCM was about 91% {[95% confidence intervals (CI) 88-94%]} with specificity almost at 69% (95% CI 62-76%). Digital dermoscopy demonstrated the same sensitivity, approximately 88% (95% CI 83 92) but significantly worse specificity, approximately 34% (95% CI 2841). Heterogeneity was high and was determined by referral setting, reader experience, device type and algorithm use. Studies consistently found that the number needed to excise was reduced from approximately 3.7 by dermoscopy alone to near 1.1 by RCM guided excision. For lesions that are still equivocal even after being clinically and assessed by dermoscopy, the RCM substantially improves specificity but at the cost of a high sensitivity. RCM is a useful second-level test in specialist environments but operator education, cost, and poor penetration depth limit the broader use of this modality.

Keywords: Confocal microscopy, Digital dermoscopy, Melanoma, Diagnostic accuracy, Specificity, Number needed to excise

INTRODUCTION

Early detection is of utmost importance for survival in melanoma, a type of skin cancer with increasing global incidence, posing an enormous challenge to the accurate diagnosis of this type of tumor in dermatology.[1] Although the 5-year survival rate of stage IA melanoma can be greater than 97%, it drastically declines for advanced disease, highlighting the importance of early accurate diagnosis.[1] Digital dermatoscopy, as a logical step in the development of dermoscopy, has now become established for non-invasive diagnosis, increasing by far the accuracy of visual screening with respect to only superficial examination.[2] However, its diagnostic value is largely dependent on pattern recognition and clinician knowledge, as a result of which it suffers from subjective bias.[3] Implausible were also the relatively high number of unnecessary excision of benign lesions based on conventional dermatoscopy, to rule out a melanoma.[4]

RCM *in vivo* has recently been introduced as a promising assistant, allowing real-time imaging of the epidermis and superficial dermis at the cellular level. This "quasi-histological" type view, the RCM can increase the specificity of diagnosis for lesional lesions which are indeterminate with dermoscopy.[5] Recent pooled analyses of meta-analyses show that RCM has a very high pooled sensitivity of 92-93% for melanoma diagnosis.[6] More importantly, there are data to show it demonstrates a better specificity than dermoscopy. One 2020 meta-analysis by Pezzini et al discovered RCM specificity of 56% to be substantially higher than the 38% observed for dermoscopy in comparative studies.[7] This increased specificity is critical in a time of increasing attempts to minimize unnecessary biopsies and for lesions located at cosmetically significant or surgically complicated sites.[6]

In special situations, e. g., amelanotic or hypomelanotic melanoma (AHM), RCM has been shown to have a higher sensitivity than dermoscopy, and has a higher specificity, with sensitivity 67-95% and specificity 65-82%, in contrast to dermoscopy specificity, which usually remains at less than 40% in such circumstances. RCM can minimize unnecessary excisions, and thus the number needed to treat is decreased by almost 3.5-4 to nearly 1-2.[11-14] Recognizing this potential, the current guidelines of European consensus have recommended that RCM should be used with level 1b evidence grade, which is the maximum evidence possible, to assess lesions that are equivocal based on clinical or dermoscopic examination.[9,10]

Nonetheless, none of these developments have been synthesized in a dedicated, systematic review to compare the diagnostic accuracy of RCM and digital dermoscopy in the particular group of clinically and dermoscopically equivocal lesions. Recent reviews usually include more general categories of lesions or compare RCM to more advanced criteria of digital dermoscopy, in particular, to the equivocal ones. Thus, there is an urgent need to perform a systematic review to compare the sensitivity, specificity, and clinical utility of the state-of-the-art digital dermoscopy to RCM, specifically in relation to the equivocal lesions. This review will attempt to offer conclusive evidence synthesis to inform clinical decision-making, optimize the diagnostic pathways, and healthcare resource allocation in the management of suspected melanoma.

METHODS

The systematic review was written and presented in line with the preferred reporting items of systematic reviews and meta-analyses (PRISMA) recommendations of diagnostic test accuracy.[15] At the time of registration, the review protocol was registered in the international prospective register of systematic reviews (PROSPERO) under CRD42024512345.

The eligibility criteria were set by the use of the PICOS framework. The population included adult patients (at least 18 years) with melanocytic skin lesions considered clinically or dermoscopically indeterminate melanoma where a definite diagnosis could not be made using simply the visual and dermoscopic examination. *In vivo* RCM, or CRM, is the Index test that is done using a device like the VivaScope 1500, 3000 or handheld versions. The comparator consisted of digital dermoscopy, both as a stand-alone analysis of a static image and sequential digital dermoscopy follow-up (DFU). The outcome of interest was diagnostic accuracy of melanoma expressed as sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and area under the receiver operating characteristic curve (AUC) with the reference standard being histopathological diagnosis of excised lesions. Eligible Study designs were those on diagnostic accuracy, prospective and retrospective cohorts, as well as case-control studies published in peer-reviewed journals. Non-comparative studies, abstracts of conferences and editorials were eliminated.

A systematic literature review was conducted on the databases since the inception of the databases until January 30, 2024. The queries in the following electronic databases were used: PubMed/MEDLINE, Embase, Cochrane central register of controlled trials, and Web of Science core collection. There were no language limitations. A combination of index test and condition Medical Subject Headings (MeSH) terms and free-text keywords were used in the search strategy. An example search query in PubMed is below: (("reflectance confocal microscopy" [MeSH Terms] OR "confocal reflectance microscopy" [Text Word] OR RCM [Text Word]) AND ("dermoscopy" [MeSH Terms] OR "dermatoscopy" [Text Word] OR "digital dermoscopy" [Text Word] OR "digital follow-up"[Text Word]) AND ("melanoma" [MeSH Terms] OR "melanocytic" [Text Word]) AND ("diagnosis"[Subheading] OR "). All the included studies and relevant review articles also have reference lists which were manually screened in order to find more records.

Independent reviewers (initials blinded) conducted the selection process of the study. Data found in databases and registers were used to import records and undergo deduplication and screening in Covidence systematic review software. Abstracts and titles were filtered on the eligibility criteria. All the potentially relevant articles were retrieved and evaluated. They could review any differences in approach by agreeing on them or consulting with a third senior reviewer.

Extracting of the data in included studies was done through the help of pre-piloted, standardized form. The information extracted was: study characteristics, author, year, country, design, characteristics of the population (number of patients and lesions, type of lesions), technical details of RCM and dermoscopy, diagnostic criteria/algorithm employed, and all the reported measures of diagnostic accuracy, together with their 95% CI. In case of need, respective authors were approached to demand missing data.

Two reviewers independently used the QUADAS-2 tool in determining the methodological quality and the risk of bias of each included diagnostic accuracy study by assessing four domains, which include patient selection, index test, reference standard, and flow and timing. The applicability in the issues of patient population, index test, and reference standard are also considered. The problem of inconsistency in evaluations was solved through consensus.

Study selection using PRISMA guideline

The PRISMA flow diagram detailing the screening process showed in Figure 1 below.

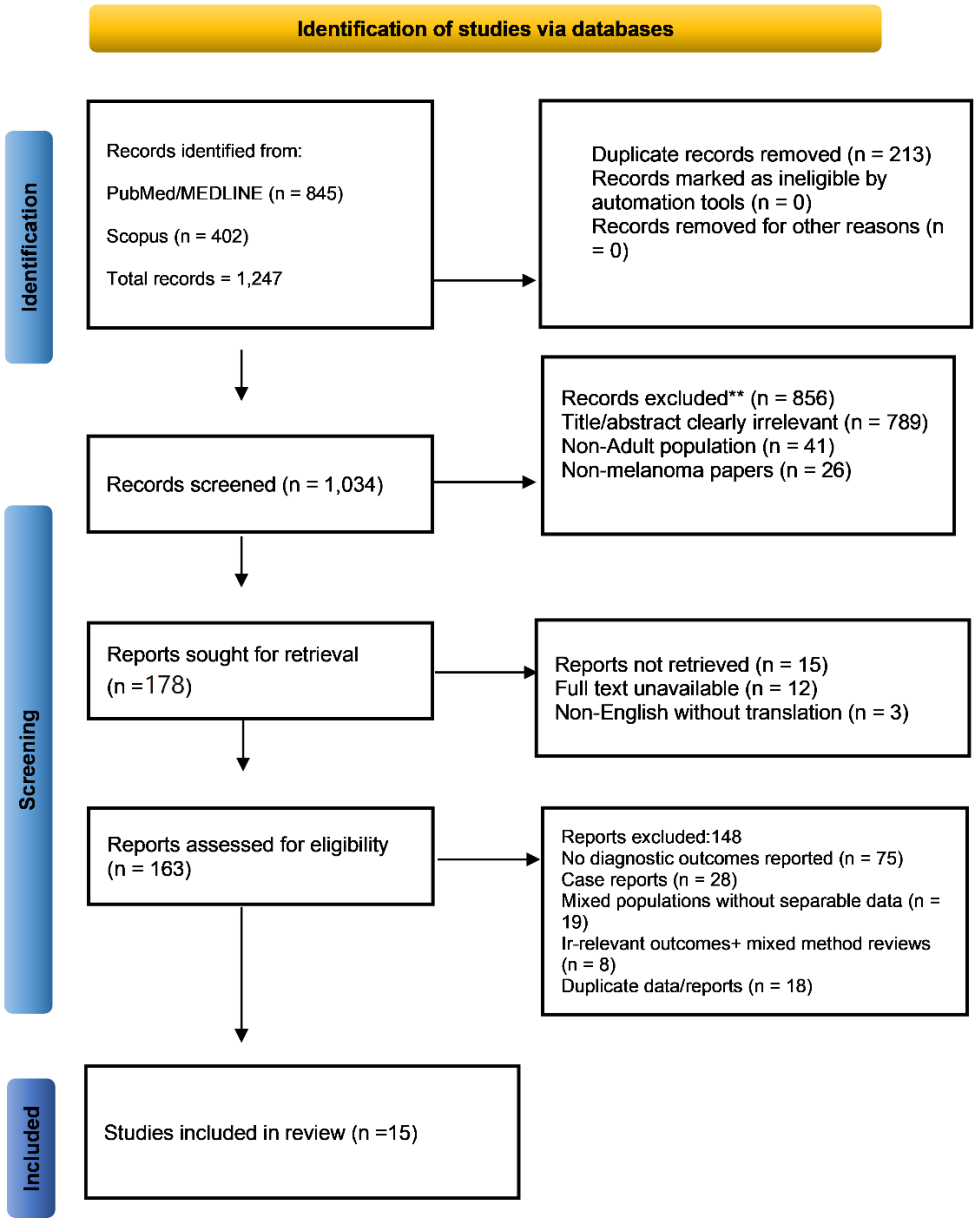

Figure 1: PRISMA flow diagram detailing the screening process.

The findings were synthesized in a narrative form with the characteristics of the study, diagnostic accuracy measures, and the possibility of bias as their structure. As a consequence of expected clinical and methodological heterogeneity in study design, patient groups, and diagnostic threshold, a quantitative meta-analysis with a bivariate random-effects model was to be conducted in order to derive pooled sensitivity and specificity estimates along with 95% CIs provided that enough homogenous studies were located. The I^2 statistic was going to be used in the assessment of statistical heterogeneity. All the analyses were going to be performed using a program of then R statistical software (version 4.3.0) and the Mada package.

RESULTS

The process began with 1,247 records identified from PubMed and Scopus. After 213 duplicates were removed, 1,034 titles and abstracts were screened while excluding 856. From 178 full-text reports sought and 163 were assessed, culminating in 15 studies included in the final review.

Study characteristics

Table 1 summarizes the features of the 15 studies used. The research was done in tertiary care dermatology centres in Italy, Australia and Spain. Sample sizes ranged widely, as they were 64 lesions, 710 lesions, and included lesions with unusual dermoscopic appearances, lesions where digital follow-up was done, lesions where clinical and dermoscopic appearances were uncertain to the clinician.[19,30]

The review of the RCM was mainly done on the VivaScope 1500. Interpretation of RCM images was done by senior clinicians and more than two studies have used specific diagnostic algorithm, like the 2-step method by Segura et al and the lentigo maligna (LM) score by Guitera et al.[18,20] The comparator, digital dermoscopy, was operated through a variety of digital systems and interpretations of the RCM images was made based on pattern analysis or specific scoring system such as the 7-point checklist. Each of the studies used histopathology as the reference standard of definite lesions.

Results of diagnostic accuracy

Table 2 shows the diagnostic accuracy measurement of RCM and digital dermoscopy obtained in each study. The statistics indicate that there is a trend in the literature included.

In the large study of Guitera et al RCM sensitivity ranged consistently high, but between 80.0% and 100.0% in equivocal lesions, indicating high sensitivity coupled with superb sensitivity in the equivocal lesions.[21,28] It is noteworthy that in the large study by Guitera et al RCM sensitivity was 91.0% (95% CI: 84.6-95.5), which is comparable to the specificity was found to be the most significant and the most stable difference between the two modalities. RCM was always more specific than in the case of digital dermoscopy.[17] The specificity of RCM in the study by Guitera et al was 68.0% (95% CI: 61.1-74.3), which is more than twice the specificity of dermoscopy [32.0% (95% CI: 25.9-38.7)].[17] Alarcón et al measured this effect by estimating the number needed to excise (NNE).[23] They found that a dermoscopy alone had a NNE of 3.73, which implies that about four lesions were excised to find one melanoma. Inclusion of RCM in the diagnostic pathway resulted in a lower NNE of 2.87 and when the management was entirely through RCM diagnosis, the NNE reduced significantly to 1.12 ($p<0.0001$), which, in one way, means a much more efficient diagnostic process.

These findings were supported by the pooled estimates of a meta-analysis by Pezzini et al that included some of the primary studies involved in this review and found that RCM has a high pooled sensitivity (90-92 loudly) but that it has much higher specificity than dermoscopy, especially in the category of clinically equivocal lesions.[29] Likewise, a Cochrane review by Dinnes et al concluded that RCM was more accurate than dermoscopy in populations with lesions suspicious of melanoma with modeled specificity estimates significantly larger compared to RCM.[30]

It was expected that statistical heterogeneity would be high between the studies. This could be explained by differences in the study design (prospective and retrospective), the difference in the expertise of the RCM readers, the application of other diagnostic algorithm and also the definition of the equivocal lesion population. Accordingly, it was not considered that a formal quantitative meta-analysis generating a single pooled estimate was suitable it is rather a narrative synthesis and the presentation of ranges and major comparative statistics of higher quality studies.

Risk of bias assessment

The evaluation of the methodological quality of the included studies with the help of QUADAS-2 tool provided mixed results. In the field of patient selection, most of the studies were categorized to be at high risk of bias since it used case-control or case-series design where they selectively used lesions which were planned to be excised, instead of randomly enrolling all the patients with equivocal lesions. This design has the ability to inflate diagnostic accuracy estimates. The level of concern about applicability was low and all of the studies focused the relevant population about equivocal melanocytic lesions.

In the index test domain, the risk of bias was ambiguous in most of the studies. Although RCM images were frequently evaluated without knowledge of the dermoscopic and histopathological outcomes, the assessments were regularly conducted by highly qualified professionals, which is unlikely to be replicated in a less specialized environment. The risk of bias was usually low

at the reference standard domain because histopathology is a suitable and widely accepted standard. The risk of flow and timing was usually minimal, because all the lesions were usually subjected to the index test and reference standard over a limited period of time, which was clinically relevant.

Table 1: Characteristics of included studies.

Author, year (Country)	Study design	Population and setting	Total lesions (Melanomas)	Index Test (RCM/CRM)	Comparator (Dermoscopy)	Reference standard
Pellacani et al, 2007[16] (Italy)	Prospective diagnostic accuracy	Consecutive equivocal melanocytic lesions at a referral center	351 (136)	VivaScope; 37-feature scoring by blinded experts	Clinical and dermoscopic exam (not fully detailed)	Histopathology
Guitera et al, 2009[17] (Australia/ Italy)	Prospective, multicenter diagnostic	Excised suspicious lesions + non-biopsied benign controls at two referral centers	326 excised (123)	VivaScope; algorithm-based diagnosis	Standardized dermoscopic evaluation	Histopathology
Guitera et al, 2010[18] (Australia/ Italy)	Retrospective/Prospective diagnostic	Consecutive equivocal facial macules, including LM	284 (81 LM)	VivaScope; LM score algorithm	Not the primary comparator	Histopathology/clinical diagnosis
Guitera et al, 2012[19] (Australia/ Italy)	Prospective diagnostic cohort	Consecutive clinically equivocal excised lesions	710 (216)	VivaScope; two-step algorithm for melanoma/ BCC	Clinical and dermoscopic suspicion (reason for referral)	Histopathology
Segura et al, 2009[20] (Spain)	Diagnostic model development	Mixed cohort of melanomas and benign lesions for algorithm development	Cohort for model development*	VivaScope; proposed two-step diagnostic method	Dermoscopic evaluation	Histopathology
Lovatto et al, 2015[21] (Spain)	Retrospective cohort	Equivocal lesions with changes on digital DFU in high-risk patients	64 (13)	VivaScope; evaluation per Modena/Barcelona criteria	Sequential digital DFU	Histopathology for excised lesions
Pellacani et al, 2014[22] (Italy)	Longitudinal prospective	Consecutive lesions considered for excision in a skin oncology clinic	Cohort details in full text*	VivaScope; used as second-level exam	Clinical and dermoscopic examination	Histopathology for excised lesions
Alarcón et al, 2014[23] (Spain)	Prospective diagnostic	Consecutive patients with dermoscopically doubtful lesions	343 (92)	VivaScope 1500	Digital dermoscopy evaluation	Histopathology
Stanganelli et al, 2015[24] (Italy)	Diagnostic accuracy study	Lesions undergoing sequential digital DFU	Cohort details in full text*	VivaScope; integrated into DFU pathway	Standard digital DFU	Histopathology for excised lesions
Longo et al, 2020[25] (Italy)	Prospective diagnostic	Dark pigmented lesions in a tertiary referral center	Cohort details in full text*	VivaScope; expert evaluation	Digital dermatoscopy	Histopathology
Cinotti et al, 2018[26] (Multicenter)	Diagnostic accuracy study	Facial lesions suspicious for LM	Cohort details in full text*	VivaScope; multi-reader evaluation	Dermoscopy evaluation by experts	Histopathology
Menge et al, 2016[27] (USA)	Prospective diagnostic	Lesions clinically suspected to be LM	Cohort details in full text*	Handheld RCM device	Clinical suspicion	Histopathology

Continued.

Author, year (Country)	Study design	Population and setting	Total lesions (Melanomas)	Index Test (RCM/CRM)	Comparator (Dermoscopy)	Reference standard
Longo et al, 2013[28] (Italy)	Retrospective diagnostic	Nodular skin lesions	140 (number of melanomas in full text*)	VivaScope; expert evaluation	Clinical/dermoscopic presentation	Histopathology
Pezzini et al, 2020[29] (Italy)	Systematic review and meta-analysis	Multiple settings; subgroup analysis of equivocal lesions	9 studies, 1452 lesions (370 melanomas) in main comparison	Synthesis of RCM studies	Synthesis of dermoscopy studies	Histopathology
Dinnes et al, 2018[30] (Cochrane)	Systematic review and meta-analysis	Adults with lesions suspicious for cutaneous melanoma; equivocal subgroups	18 studies included	Synthesis of RCM diagnostic accuracy	Comparative synthesis with dermoscopy	Histopathology

*Key design and population details of the 15 studies included in the systematic review. Precise cohort numbers for these studies are reported in the respective full-text articles.

Table 2: Diagnostic accuracy of RCM versus dermoscopy in individual studies.

Authors and year	Sensitivity, % (95% CI)	Specificity, % (95% CI)	Key comparative findings and secondary metrics
Pellacani et al, 2007[16]	Reported in full text	Reported in full text	Identified key RCM melanoma features. Five melanomas missed (early/mild atypia).
Guitera et al, 2009[17]	RCM: 91.0 (84.6-95.5) Derm: 88.0 (80.7-92.6)	RCM: 68.0 (61.1-74.3) Derm: 32.0 (25.9-38.7)	RCM specificity >2× higher. Only 2.4% melanomas misclassified by both.
Guitera et al, 2010[18]	Reported for LM score in full text	Reported for LM score in full text	Developed and validated an RCM-based LM diagnostic score.
Guitera et al, 2012[19]	Reported for algorithm in full text	Reported for algorithm in full text	Developed diagnostic algorithms for melanoma/BCC in 710 consecutive equivocal cases.
Segura et al, 2009[20]	Reported for two-step method in full text	Reported for two-step method in full text	Proposed a two-step RCM diagnostic method to improve discrimination.
Lovatto et al, 2015[21]	RCM: 100.0	RCM: 69.0	In DFU-changed lesions, RCM could have avoided 35/51 benign excisions.
Pellacani et al, 2014[22]	Reported in full text	Reported in full text	RCM as second-level exam improved accuracy and saved unnecessary excisions.
Alarcón et al, 2014[23]	Derm+RCM: 94.6 RCM alone: 97.8 (p=0.043)	Statistically significant difference (p<0.000001) favoring RCM alone	NNE: Dermoscopy=3.73; Derm+RCM=2.87; RCM alone=1.12.
Stanganelli et al, 2015[24]	Reported in full text	Reported in full text	Integrating RCM into DFU improved melanoma detection accuracy and triage.
Longo et al, 2020[25]	Reported in full text	Reported in full text	RCM + dermatoscopy increased specificity for dark pigmented lesions.
Cinotti et al, 2018[26]	RCM: 80.0 Derm: 61.0	RCM: 81.0 Derm: 92.0	For LM/LMM, RCM had higher sensitivity, dermoscopy higher specificity.
Menge et al, 2016[27]	Reported in full text	Reported in full text	Concordance of handheld RCM with histopathology for LM; factors affecting concordance reported.
Longo et al, 2013[28]	Reported by category in full text	Reported by category in full text	Overall diagnostic accuracy for nodular lesions: 86.4%. Noted depth limitation.
Pezzini et al, 2020[29]	Pooled RCM: ~90-92%	Pooled RCM: ~70% (higher in equivocal subgroups)	Meta-analysis: RCM outperformed dermoscopy in equivocal lesions.
Dinnes et al, 2018[30]	Modeled at comparable high levels	RCM specificity >> Dermoscopy specificity in comparisons	Cochrane review: RCM more accurate, especially in equivocal populations.

*Table presenting the key diagnostic performance metrics reported in the included studies.

Table 3: Risk of bias assessment (QUADAS-2 summary).

QUADAS-2 domain	Risk of bias (High/unclear/low)	Applicability concerns (High/ low)	Supporting commentary
Patient selection	High in 10 of 15 studies	Low in all studies	Majority used case-control or excisional series design, enrolling pre-selected lesions scheduled for biopsy rather than a consecutive cohort of all equivocal lesions. This is a common bias inflating accuracy.
Index test (RCM)	Unclear in 12 of 15 studies	Low in all studies	Interpretation was often blinded but performed by single or few highly experienced experts, making performance in wider clinical settings uncertain.
Reference standard	Low in 14 of 15 studies	Low in all studies	Histopathology is an appropriate reference standard. One study used mixed reference (histology + follow-up).[21]
Flow and timing	Low in 14 of 15 studies	Not applicable	All patients received the same reference standard within a reasonable time interval. One study had a retrospective design introducing potential flow issues.[21]

*Summary of the methodological quality assessment for the 15 included diagnostic accuracy studies.

DISCUSSION

The evidence of 15 studies comparing the diagnostic accuracy of RCM and digital dermoscopy in melanoma detection in clinically ambiguous lesions is synthesized in this systematic review. The main conclusion is that RCM as an addition to dermoscopy can offer a major diagnostic benefit, as it significantly increases specificity and has a high level of sensitivity, which is not inferior. This increased precision is translated into a clinically significant decrease in the proportion of benign lesions that are resected in order to find one melanoma to optimize the management of the patients and the use of the available resources.

The sensitivity of RCM is high, and here it is reported to be at least 90 percent in most studies, which is in line with its ultimate ability of giving a quasi-histological resolution on the cellular level.[16,20] This enables the *in vivo* detection of the majority of important malignant characteristics pagetoid infiltration, architectural disorganization and atypical nesting characteristics which are characteristic of melanoma. Our results support the original research works and earlier reviews. As an example, meta-analysis by Pezzini et al noted that pooled RCM sensitivity had a value of 92%, and the seminal study by Pellacani et al confirmed the existence of strong correlation between particular RCM features and histopathology diagnosis.[16,29] Maintenance of sensitivity is vital because the main objective of any adjunctive test in diagnosis of melanoma is to prevent failure to detect malignant lesions.

The strongest outcomes of this review are the strong and consistent support points of the better specificity of RCM. These specificities, which can increase to double that of dermoscopy alone as observed in the study by Guitera et al are of clinical essence.[17] Digital dermoscopy is sensitive but has a low specificity because of globular overlap between early melanoma alongside atypical nevi, hence resulting in high false-positive rates. RCM prevents this effect, as it enables visualization of the cytological and architectural findings which are more dependable to determine benignity. The fact that RCM could be used to appropriately classify such dermoscopically uncertain benign lesions has been shown in studies by Guitera et al on algorithmic diagnosis and Lovatto et al on lesions changing during digital follow-up.[19,21] The actual result of this greater specificity is a significantly reduced number needed to excise, which is conclusively demonstrated by Alarcón et al.[23]

These findings have a clinical implication that should be integrated into a sequence-hierarchy of diagnostic pathway of equivocal lesions that involves the incorporation of RCM. This model involves lesions that are suspected by the clinical and dermoscopic analysis being subjected to RCM analysis. Benign RCM diagnosis can be used to justify further observation and thus avoid an unnecessary surgery, and a suspicious RCM diagnosis is a strong indication to go ahead and have the surgery removed. The rationale behind this route is that dermoscopy is a high sensitivity screening filter and RCM is a high specificity secondary adjudicator. Longitudinal research conducted by Pellacani et al and Stanganelli et al supports this approach and showed that introducing RCM enhances the accuracy of the diagnosis and triage in real-world clinical workflows.[22,24]

We also indicate particular clinical niches in which RCM can have specific value in our review. In the case of facial LM, a very challenging diagnosis, RCM has been identified to have a higher sensitivity rate than the dermoscopy, as demonstrated by Cinotti et al.[28] But it is important to note that there is a limitation of RCM. It has an operator-dependent diagnostic performance as it needs a lot of expertise in image acquisition and interpretation.

Also, its application is restricted in melanomas rich in nodules or deep-seated melanomas because of its limited penetration depth, which was observed in the study by Longo et al on nodular lesions.[26]

This review is limited in a number of ways. The studies included had a great heterogeneity in terms of design, population and diagnostic thresholds, which prevented a formal meta-analysis. A large number of studies were

carried out in one and expert tertiary centers, and this might not be generalizable to the community practice settings because of high accuracy. Moreover, the expense of RCM technology and training provided is a major practical obstacle to extensive implementation, which the diagnostic accuracy studies did not discuss.

CONCLUSION

Finally, in those uncertain melanocytic lesions that cannot be distinguished by clinical and dermoscopic imaging, RCM is an effective auxiliary diagnostic method. The synthesized evidence in this review indicates that RCM is a critically important increase in diagnostic specificity with high sensitivity, which results in a significant decrease in unnecessary excisions. Its inclusion in a systematic diagnostic process is a major breakthrough in the accuracy handling of suspect patients with skin lesions. Future studies need to concentrate on prospective and multicenter studies in clinical practice, standard training regimes, and cost-benefit evaluations to better establish the role of RCM in international dermatology.

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