# SURGICAL & COSMETIC Dermatology

# Body photography in the diagnosis of melanoma: an integrative review

*A fotografia corporal no diagnóstico de melanoma: uma revisão integrativa*

**ABSTRACT**
This integrative review included 22 studies aiming to identify the main conclusions regarding the use of total body photography for the diagnosis of melanoma. Thus, it demonstrated that the method could help in the early detection of melanoma, reducing unnecessary biopsies, identifying melanomas from new lesions, improving patient survival, and decreasing patient anxiety. However, it can be a high-cost method. Therefore, total body photography is a proficient tool in facilitating the monitoring and diagnosis of melanoma in patients at a certain risk.
**Keywords:** Melanoma; Diagnosis; Dermoscopy

**RESUMO**
*Nesta revisão integrativa, incluíram-se 22 estudos com o objetivo de identificar as principais conclusões no que diz respeito ao uso do mapeamento corporal total para o diagnóstico de melanoma. Demonstrou-se, então, que o método pode auxiliar na detecção precoce do melanoma, reduzir o número de biópsias desnecessárias, identificar melanomas a partir de novas lesões, melhorar a sobrevida dos pacientes e reduzir a ansiedade dos pacientes. Todavia, pode ser um método de alto custo. Com isso, o mapeamento corporal coloca-se como uma ferramenta proficiente na facilitação do acompanhamento e do diagnóstico de melanoma em pacientes com determinado risco.*
*Palavras-chave: Melanoma; Diagnóstico; Dermoscopia*

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## INTRODUCTION

Non–melanoma skin cancer has the highest incidence of cancer in Brazil. Data from the National Cancer Institute (INCA) demonstrated that, in 2020, the estimated incidence of this disease in the population was 176,940 new cases. Meanwhile, melanoma skin cancer had an estimated occurrence of 8,450 new cases in the same year. Although the percentage of cases of the latter is less than 5% of the total number of cutaneous neoplasms, its mortality reaches 43% compared to the same diseases.[1]

Despite the high incidence, the lesions are easy to diagnose, and the cure prognosis is higher than 95% when these lesions are identified and treated early.[2] There is no cure for advanced cutaneous melanoma, so diagnosis and excision before advanced development are preferable. Thus, tools to assist dermatological examination with the naked eye have been developed, increasing sensitivity in detecting melanocytic lesions.[3]

Kopf and Slue at New York University first used total body photography (TBP) in 1988.[3] The technique consists of taking photographic records that document injuries and provide a point of support for monitoring patients over time. The great advantage of this method is the possibility of identifying melanomas from new lesions.[4]

Typically, TBP applies to patients with multiple lesions or extensive or atypical nevi, aiming to diagnose melanomas early.[5] Furthermore, this approach makes it possible to reduce the excision of benign lesions as the detection of increasingly thinner skin cancers increases, which routine dermatological examinations may not diagnose.6 Lesion Asymmetry, Border irregularity, Color variation, and Diameter greater than 6 mm comprise the ABCD of melanoma clinical diagnosis.[2]

TBP can occur alone or in combination with other diagnostic tools, such as sequential digital dermoscopy (SDD), which consists of recording and storing high-definition images of lesions with the highest suspicion of malignancy. This combination benefits patients more likely to develop melanoma (Fink & Haenssle, 2016). When the TBP is digitized, it is called TBDP ("Total Body Digital Photography").[7,8]

In addition to the clinical benefits, TBP positively interferes with the mental health status of patients who undergo it, especially those with a personal history of melanoma.8 Therefore, this review aims to identify the main conclusions regarding the use of total body photography, isolated or not, for melanoma diagnosis.

## METHODS

It is a qualitative study through an integrative literature review. We used the National Library of Medicine (PubMed), Virtual Health Library (VHL), and Scientific Electronic Library Online (SciELO) databases. The chosen descriptors, intermediated by the Boolean operator "AND" to search for articles on the platforms were "melanoma", "total body photography", and "diagnosis". We found only the first and the last in the Health Sciences Descriptors (DeCS).

We conducted the literature review following the steps: establishment of the theme; definition of eligibility parameters; definition of inclusion and exclusion criteria; verification of publications in databases; examination of the information found; analysis of the studies and presentation of the results.[9] Original articles in the experimental scope (clinical trials, randomized or non-randomized) and observational studies (cohort studies and case reports) were included in this study without a time frame. Articles relating to the topic, with unrelated descriptors, literature review-type, and duplicate papers were excluded.

## RESULTS

Initially, the search resulted in a total of 295 articles, 178 from PubMed, 116 from VHL, and 01 from Scielo. After applying the inclusion and exclusion criteria, we selected 22 articles: 19 from PubMed, 02 from VHL, and 01 from Scielo (Figure 1).
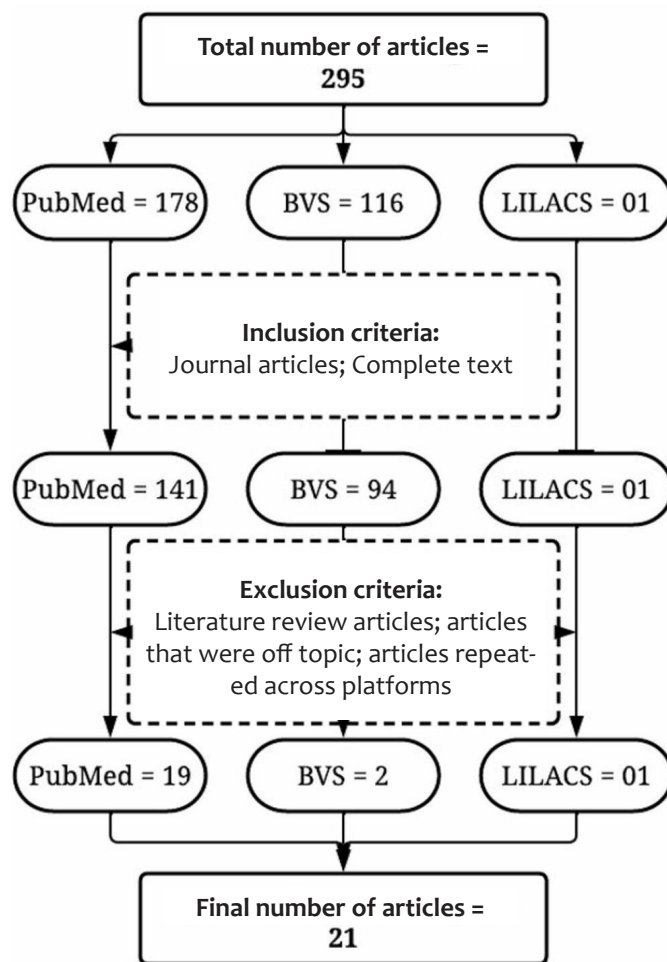


**FIGURE 1:** Flowchart of identification and selection of articles in the PubMed, VHL, and LILACS databases

| TABELA 1: 22 articles selected | | | |
|---|---|---|---|
| Author | Year | Type of study and sample | Lesions analysis | Key findings |
| Deinlein T et al.[10] | 2020 | Cohort study (N = 214) | TBP + SDD | Effective in diagnosing thin tumors and reducing the number of biopsies. Time is a relevant variable |
| Porcar Saura S et al.11 | 2020 | Cohort study (N = 152) | TBP + SDD | Excised lesions are significantly thinner |
| Strunck JL et al.[12] | 2020 | Cohort study (N = 1.995) | TBP | The use of TBP was associated with greater survival, the diagnosis of lower-risk melanomas and the diagnosis of melanoma from new lesions |
| Drugge ED et al.[13] | 2019 | Cross-sectional study (N = 4.692) | TBP | TBP proved to be efficient and effective for the early diagnosis of melanoma |
| Lallas A et al.14 | 2019 | Cohort study (N = 977) | TBP + SDD | Useful for detection of primary secondary melanoma. It has a high positive predictive value in the excision of lesions and high sensitivity for identifying new lesions |
| Mintsoulis D, Beecker J[15] | 2016 | Cross-sectional study (N = 698) | TBP + SDD | Greater diagnosis of melanomas in situ and shallower lesions. The high cost of TBP is a limiting factor |
| Secker LJ et al.[16] | 2016 | Cross-sectional study (N = 179) | TBP + SSE | TBP was significantly related to the decision to excise a lesion or not. When not instructed, patients prefer CSE to SSE. |
| Truong A et al.[17] | 2016 | Cross-sectional study (N = 926) | TBP | Significant reduction in the number of biopsies |
| Gadens GA[18] | 2014 | Cross-sectional study (N = 36) | TBP + SDD | Patients' low adherence to follow-up appointments compromises the effectiveness of the method |
| Moloney FJ et al.[19] | 2014 | Cohort study (N = 311) | TBP + SDD | Reduces the rate of biopsies and diagnoses melanomas in the early stages, which may interfere with mortality and survival of the disease |
| Salerni G et al.[20] | 2012 | Cross-sectional study (N = 618) | TBP + SDD | TBP is a sensitive and specific strategy for assessing focal changes in pigmentation or structure |
| Salerni G et al.[21] | 2011 | Cohort study (N = 618) | TBP + SDD | It has been shown to detect melanomas in early stages, in addition to melanomas presented as new lesions or arising from nevi not monitored by dermoscopy |
| Goodson AG et al.[22] | 2010 | Cohort study (N = 1.076) | TBP | TBP is sensitive for detecting melanomas from new lesions. It is associated with lower biopsy rates |
| Rademaker M, Oakley A[23] | 2010 | Cross-sectional study (N = 100) | TBP + SDD | Detection of thinner melanomas, which may influence patient survival |
| Rice ZP et al.[24] | 2010 | Cross-sectional study (N = 113) | TBP and/ or TBDP | Reduces patient anxiety about developing cancer. Logistical and financial difficulties are barriers to its widespread implementation |
| Terushkin V et al.[25] | 2010 | Cross-sectional study (N = 83) | TBP | TBP aids in the early detection of melanoma, reducing patient anxiety and reducing the number of biopsies. Logistical and financial restrictions were the most reported reasons for not using the method |
| Nathansohn N et al.[26] | 2007 | Cohort study (N = 206) | TBP | Effective method for early detection of melanoma. Efficient in detecting developments suggestive of melanoma and as a means of minimizing unnecessary surgeries |
| Risser J et al.[27] | 2007 | Cross-sectional study (N = 381) | TBDP | There were no statistically significant differences in the diagnosis of severe dysplastic nevi or the number of biopsies performed |
| Banky JP et al.[28] | 2005 | Cohort study (N = 309) | TBP | The use of TBP was associated with a lower rate of biopsies and the diagnosis of melanomas at early stages |
| Nehal KS et al.[29] | 2002 | Cross-sectional study (N = 83) | TBP | It can help with the early detection of melanoma and reduce the number of biopsies. Financial constraints and fear of accusations of negligence are frequent counter-complaints |
| Tiersten AD et al.[30] | 1991 | Cohort study (N = 357) | TBP | Improved prognosis by detecting thinner invasive malignant lesions |
| Slue W et al.[31] | 1988 | Cohort study (N = 452) | TBP | Enables early diagnosis of melanomas in patients with dysplastic nevi |

Among the 22 articles selected, half were cross-sectional studies, and the other half were cohort studies (Table 1). Of the total, 17 articles exclusively reported benefits when using TBP, associated or not with other methods, in the diagnosis of melanoma. On the other hand, four papers registered positive and negative points about using the tool, and only one article addressed the challenges of its use. Half of the articles addressed TBP as the only diagnostic tool; the other half associated TBP with digital Dermoscopy.

Regarding the main results, skin cancer early detection, reduced number of biopsies, improved survival, and new dysplastic lesions identification were the most mentioned benefits. On the other hand, the high cost of the method is considered an obstacle to its implementation, in addition to the low adherence of patients to monitoring. Figure 2 demonstrates the quantitative relationship between the main results obtained and the articles studied.

## DISCUSSION

TBP is a method that has been widespread and allows for more careful monitoring of patients at high risk of developing melanoma.[32] The results found in this study demonstrated that TBP is associated with early detection of these malignant lesions. This statement was reproduced in the study by Feit et al. (2004), conducted with 12 patients selected from a group of 576 people registered at the Dermatology Outpatient Clinic of the Memorial Sloan Kettering Cancer Center in New York (USA), where only one of 27 melanomas diagnosed through this procedure had thickness higher than 1 mm.[33]

The Breslow scale or index (Box 1) is widely used in Dermatopathology to classify the depth of lesions: the more superficial, the better the prognosis.[34] In cases of melanoma diagnosed using TBP, the significantly thinner depth impacts on the five-year survival rate of 95%.[33] In contrast, a study with 926 patients carried out by Truong et al. (2016), comparing data from
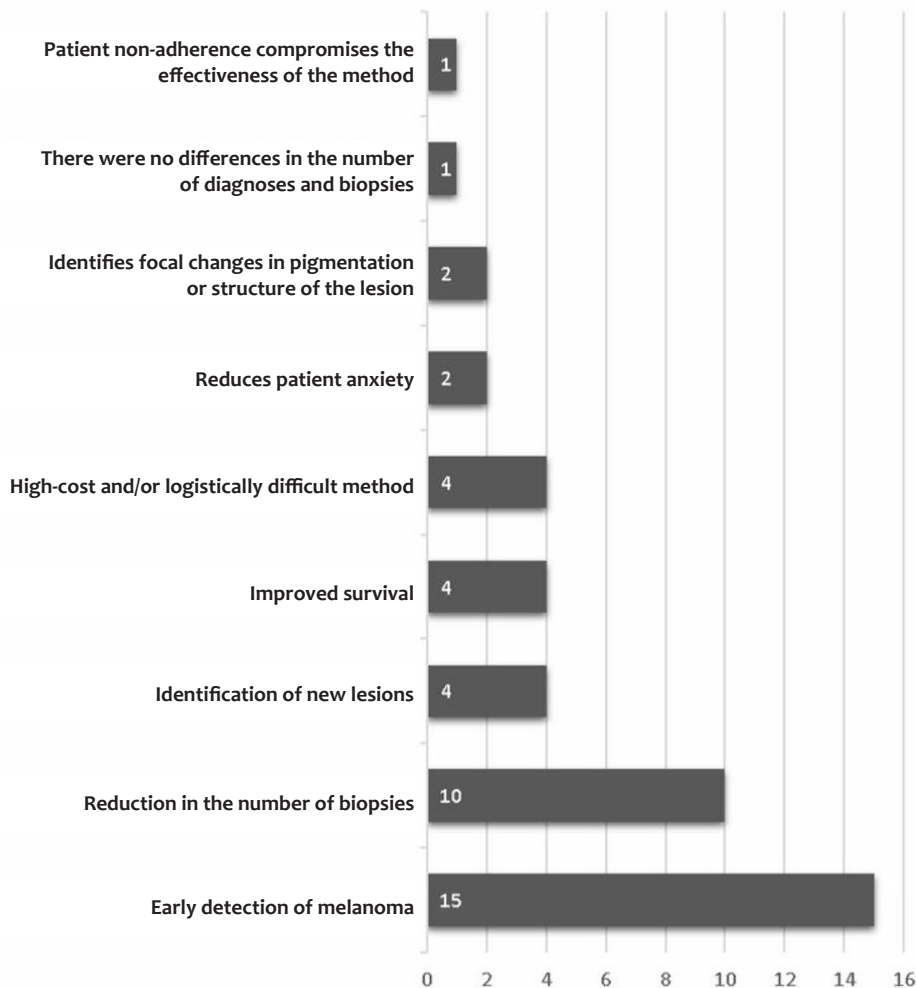


**FIGURE 2:** Quantitative relationship between the main results obtained regarding the use of TBP and the articles studied

| Box 1: Breslow scale or index or levels for classifying the depth of melanoma involvement. | |
|---|---|
| **Level** | **Lesion depth** |
| Level I | < 0,75 mm |
| Level II | 0,76 a 1,5 mm |
| Level III | 1,51 a 4,0 mm |
| Level IV | > 4,1mm |

*Source: Adapted from Brazilian Melanoma Group (2019).*[36]

patients with melanoma before and after the implementation of the TBP, demonstrated that the variation in depth on the Breslow scale of patients without photographic monitoring was 0.2 mm to 3.0 mm (compared to 0.11 mm to 2.1 mm using the technique), corroborating the importance of the method.[17] Thus, TBP can help in the early detection of melanoma and influence the prognosis of these patients.[35]

Another benefit was the reduction in biopsies in patients monitored by the studied tool. Goodson et al. (2010) report in their study that, of the 275 biopsies performed, 61% were a consequence of the use of TBP, detecting 12 melanomas, that is, the use of body photography increases the precision when performing biopsies.[22] Furthermore, a complementary study by Truong et al. (2016) revealed that the average number of excisions per patient before TBP was 5.92. However, after its implementation, this average dropped to 1.56 biopsies per person, detecting 93 melanomas in 589 patients.[17]

In contrast, analysis of patient data between 1998 and 2003 by Risser et al. (2007) did not find statistically significant differences in the number of severe dysplastic nevi diagnosed and biopsies performed between patients under surveillance for TBP and patients monitored without this parameter. In this study, the average number of biopsies per patient biopsied and photographed was 0.8, while the average number of individuals biopsied and without this follow-up was 0.82.[27] These results do not negate the need for new studies.

The retrospective cohort by Feit et al. (2004), with 576 patients observed periodically with standardized photographic records, indicated the diagnosis of 27 melanomas. Of this total number of lesions, 74% were identified due to the changes observed in their structure, both in the skin self-examination by the patient and in the dermatological examination by a doctor. Furthermore, 19% of the 27 melanomas represented new lesions not identified at the first consultation, information that exposed the recognition of new lesions as an essential part of melanocytic skin cancer diagnosis.[33]

Although it makes it possible to identify changes in the lesion structure and the emergence of new lesions, the research by Kelly et al. (1997), comprising 278 patients in a private dermatology service, highlighted the economic importance of TBP in health services. After 42 months of follow-up, 20 melanomas were diagnosed in 16 patients generating a cost of R$ 5,583.00 per melanoma using photographic records. Conversely, it proved that the prophylactic excisions necessary for the same prevention effect, without TBP, would result in an expense of R$ 395,038.00 for each melanoma since, of the 20 lesions, only three were pre-existing. Therefore, photographic monitoring of patients with many atypical pigmented lesions provided information on the stability of most lesions and avoided unnecessary biopsies.[37]

Regarding the applicability of the tool, Rice et al. (2010) report in their study with accredited Dermatology departments in the United States that among the obstacles to the use of TBP are mainly financial and logistical issues since the choice of how to take and record the photographs can affect the final cost. Even in a rich nation, the reimbursement rate offered by public health insurance in 2008 was between 20% and 30%, which may discourage the use of this technology. Furthermore, dermatologists who chose to adhere to the photographic record argued that it is a safety measure for patients in cases of medical error.[24]

The results of studies by Nehal et al. (2002) and Terushkin et al. (2010) reaffirm TBP as an effective tool in the early diagnosis of melanoma, as shown by Feit et al. (2004), as well as the identification of new lesions and the reduction in the number of unnecessary biopsies, outcomes also found by Kelly et al. (1997). At the same time, these authors highlight the advantage of reducing the patients' psychological stress due to their high risk of developing melanoma. The TBP offers a parameter to the skin examination and, therefore, reduces anxiety about changes in lesions.[29, 25, 33, 37]

**CONCLUSION**

Total body photography represents the advancement of technology associated with healthcare techniques and is a proficient tool in facilitating the monitoring and diagnosis of melanoma in patients at certain risks. Therefore, its access must be democratized through specialized centers with professionals in continued training since mortality from this type of skin cancer is statistically significant.

The biggest challenge for the widespread dissemination of the technique is its high cost, which would depend on the financial capacity of the Public Healthcare System (Sistema Único de Saúde - SUS). As an alternative, agreements could be signed between public bodies and private health systems, encouraging national research focused on health technologies. Finally, new research must be conducted to assess the technique within the dynamics of the national territory. ●

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