

# Sentinel Lymph Node Biopsy for Desmoplastic Melanoma: A Systematic Review and Meta-Analysis

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## Background

- Desmoplastic melanoma (DM) is a rare variant of melanoma, accounting for less than 4% of all melanomas.<sup>1</sup>
- There is controversy over the utility of sentinel lymph node biopsy (SLNB) for DM: DM tumors have been described as having higher rates of local recurrence and distant metastases, but a lower incidence of nodal metastases than non-DM tumors.<sup>2</sup>
- Further, DM can be subclassified into pure (pDM) and mixed (mDM) histologic subtypes, which have been associated with differing patterns of lymphatic spread.<sup>3,4</sup>
- This study is a systematic review and meta-analysis evaluating the SLNB positivity rate in DM, with the aim of assessing whether SLNB is indicated in the routine work-up of these patients.

## Methods

### Search Strategy and Study Selection

- Two databases (PubMed and Ovid MEDLINE) were searched. The final search strategy included free text terms and MeSH terms combined using Boolean operators.
- We included studies on outcomes of patients with desmoplastic melanoma in which at least a subset of the patients underwent sentinel lymph node biopsy. The search process is detailed in Figure 1.

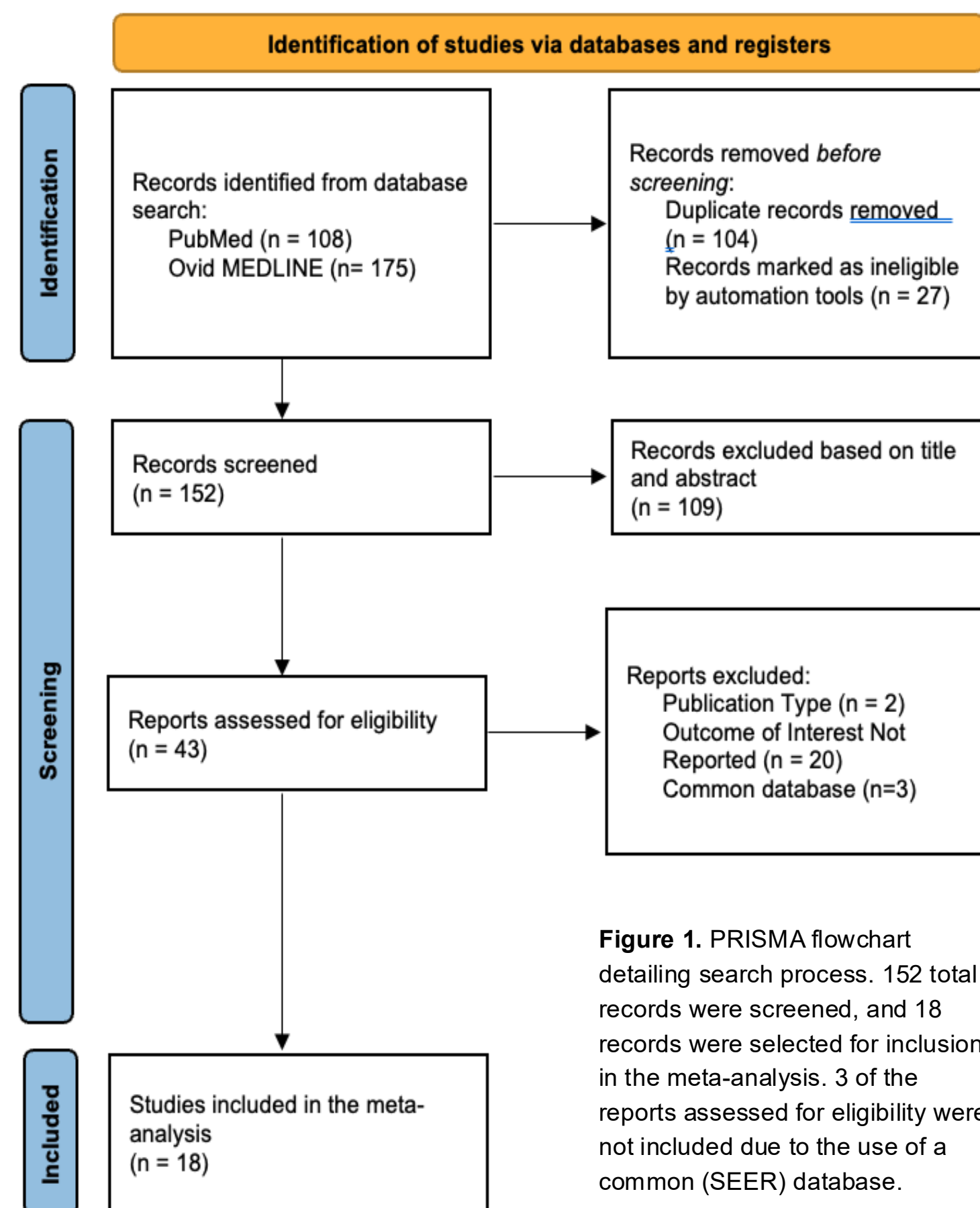
### Data Extraction

- We designed a data extraction template that included publication details, sample size, patient demographics and clinical characteristics, and sentinel lymph node positivity rates.

### Data Synthesis and Statistical Analysis

- Random-effects generalized linear mixed model with binomial distribution and logit link was used for meta-analysis of SLN positivity proportions in overall, pure, and mixed DM cohorts.
- Pooled estimates were calculated on the logit scale and back-transformed with 95% confidence intervals for interpretation.
- Statistical heterogeneity between studies was assessed using Cochran's Q test (with  $p < 0.10$  indicating significant heterogeneity) and quantified by the  $I^2$  statistic.

**Figure 1.** PRISMA flowchart detailing search process. 152 total records were screened, and 18 records were selected for inclusion in the meta-analysis. 3 of the reports assessed for eligibility were not included due to the use of a common (SEER) database.



## Results

### Study Selection and Patient Characteristics

- A total of 1,671 patients with DM were included across all 18 studies in the meta-analysis; of the 10 studies reporting separate data for DM subtypes, 570 pDM and 578 mDM patients were included.
- 997 patients underwent SLNB, with at least one positive SLN in 95 of these patients.

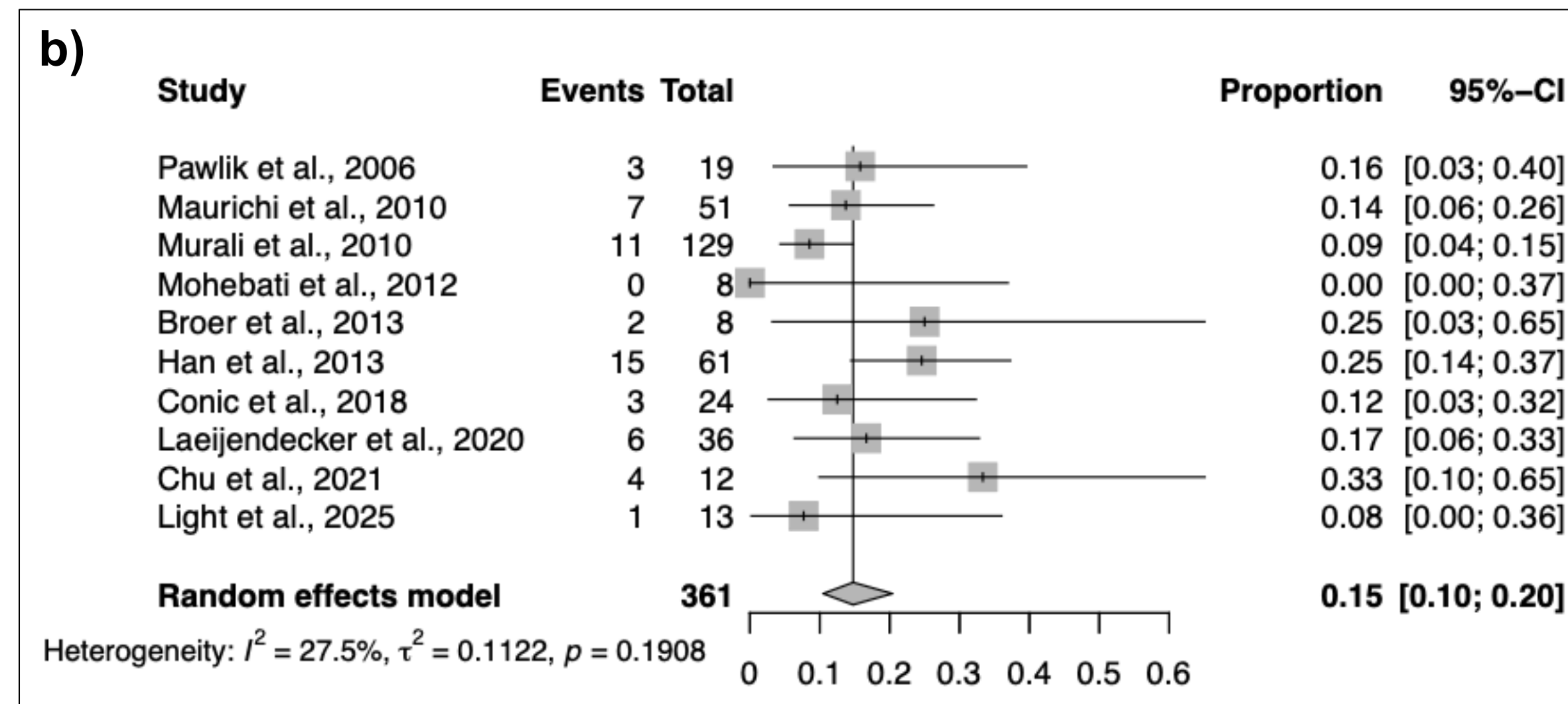
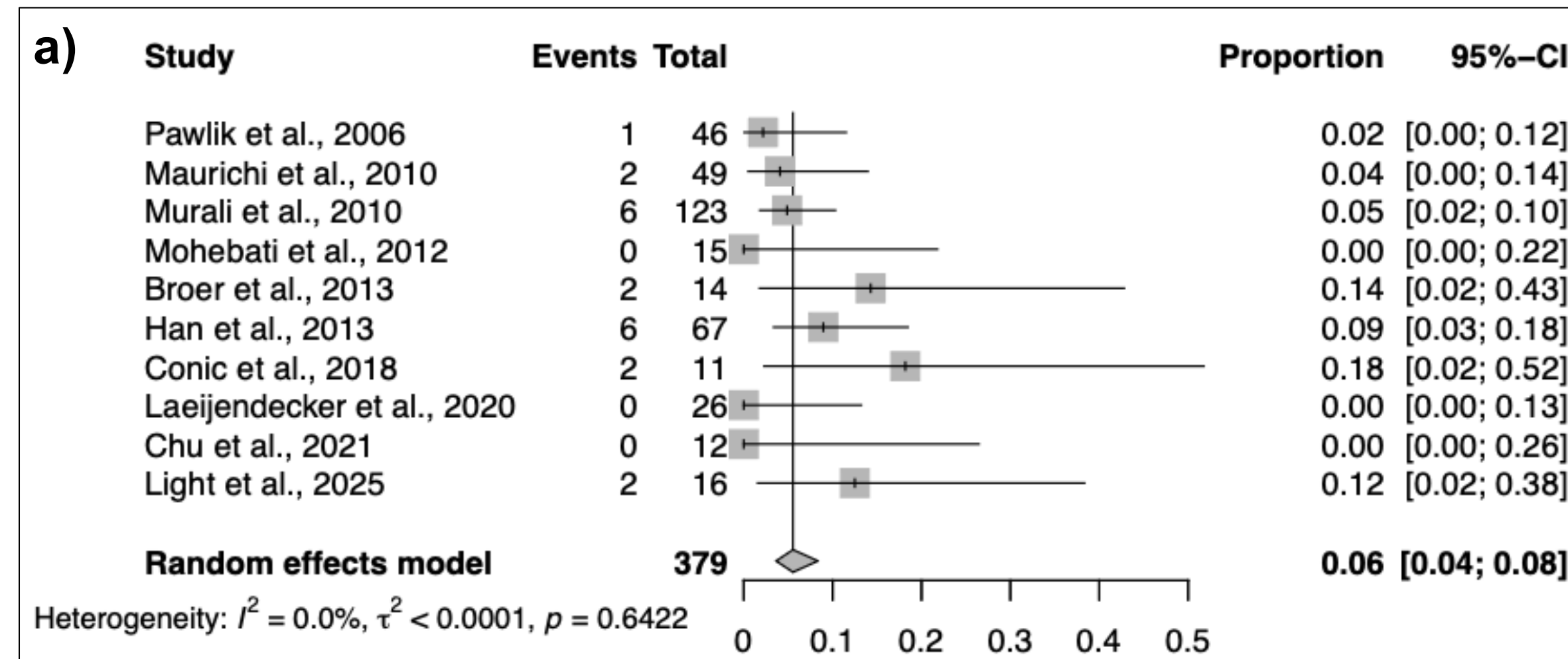
### Study Findings

#### Pooled Sentinel Lymph Node Positivity Rate

- A random-effects meta-analysis of all 18 studies demonstrated a pooled SLN positivity rate of 9% (95% CI, 7% – 12%).<sup>5-22</sup> Statistical heterogeneity was low, with an  $I^2$  value of 0% and a nonsignificant Cochran's Q test ( $p = 0.755$ ), indicating consistency across studies and a stable pooled estimate.

#### Subgroup Analysis: Pure vs. Mixed Desmoplastic Melanoma

- The pooled sentinel lymph node positivity rate for pDM was 6% (95% CI, 4% – 8%) with an  $I^2$  value of 0% and a nonsignificant Cochran's Q test ( $p = 0.642$ ) (Figure 2a).
- The positivity rate for mDM was 15% (95% CI, 10% – 20%) with an  $I^2$  value of 27.5% with a nonsignificant Cochran's Q test ( $p = 0.191$ ) (Figure 2b).



**Figure 2.** Forest plot demonstrating the pooled proportion of sentinel lymph node positivity among patients with a) pure desmoplastic melanoma and b) mixed desmoplastic melanoma. Individual study proportions are displayed with corresponding 95% confidence intervals. The overall pooled estimate was calculated using a random-effects model. Study heterogeneity was assessed by using the Cochran's Q test and quantified by the  $I^2$  statistic.

## Discussion & Limitations

- This represents the first meta-analysis synthesizing sentinel lymph node biopsy positivity rates in DM.
- The pooled SLNB positivity rate across all patients with DM was 9%.
- Subgroup analysis demonstrated substantial differences by histologic subtype, with pooled SLNB positivity rates of 6% in pure DM vs. 15% in mixed DM.
- Prior studies have reported highly variable SLNB positivity rates, likely reflecting small samples sizes and inconsistency in subtype classification.
- Standardized application and reporting of histopathological criteria is essential to improving risk stratification and optimizing SLNB use in patients with DM.
- Interpretation is limited by the predominance of small, retrospective case series and the absence of patient-level data in many reports.

## Conclusion

Patients with mixed DM may derive greater prognostic and diagnostic benefit from SLNB, whereas SLNB in pure DM may be considered selectively, particularly in the setting of histopathologic uncertainty or other high-risk features.

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