

## **SUPPLEMENT 1**

Search strategy, inclusion and exclusion criteria, search string and captured articles

### **Topic:**

Performance of market approved, Artificial Intelligence for the Classification of Melanoma in Practice

### **Study Questions**

What is the diagnostic accuracy of artificial intelligence in detecting MM in practice?

### **Inclusion and Exclusion Criteria**

#### **Inclusion Criteria**

Empirical research reports published in English in peer-reviewed scientific journals between 1st January 2018 and 31st December 2023 that answer the research question.

Systematic reviews were included in the search to identify model studies, and to check the search terms captured these studies.

#### **Exclusion Criteria**

We will exclude articles that:

- provide insufficient data to answer the research question
- failed to use systematic research design and reporting procedures
- are in the form of commentary, letter to the editor, reviews, editorials, thesis, government and non-governmental reports
- Outside years 2018 through to 2024
- are not published in English

### **Search Strategy**

**Databases:** Five databases: CINAHL (EBSCOHost), Medline (EBSCOHost), ScienceDirect, Scopus and Web of Science.

**Supplement Table S1:** Search string

<b>Characteristics</b>	<b>MeSH Search Terms</b>
<b>Population</b>	melanoma OR "cutaneous melanoma" OR nevi OR "pigmented lesion" OR "malignant melanoma"
<b>Intervention</b>	artificial intelligence OR "machine learning" OR "neural network" OR "deep learning"
<b>Control</b>	dermoscopy OR dermatology OR dermatoscopy OR telederm* OR image* OR "skin screen*" OR "skin exam*" OR "skin clinic" OR "skin cancer screening" OR "mobile application*" OR "mobile skin screen*" OR "mobile skin cancer screen*" OR "primary care" OR "secondary care" OR "tertiary care" OR "health screen*" OR "cancer screen*"
<b>Outcome</b>	"diagnostic accuracy" OR (sensitivity AND specificity) OR class* OR detect* OR diagnos*

**CINAHL :** (melanoma OR "cutaneous melanoma" OR nevi OR "pigmented lesion" OR "malignant melanoma") AND ("diagnostic accuracy" OR (sensitivity AND specificity) OR class\* OR detect\* OR diagnos\*) AND (artificial intelligence OR "machine learning" OR "neural network" OR "deep learning") AND (dermoscopy OR dermatology OR dermatoscopy OR telederm\* OR image\* OR "skin screen\*" OR "skin exam\*" OR "skin clinic" OR "skin cancer screening" OR "mobile application\*" OR "mobile skin screen\*" OR "mobile skin cancer screen\*" OR "primary care" OR "secondary care" OR "tertiary care" OR "health screen\*" OR "cancer screen\*")

Add: Date Filter between 01/01/2018 to present AND English language only

**Supplement Table S2: CINAHL keywords and captured articles**

Search	Term	Keywords	Date of search (22 Dec 2023)	Date of search (07 Jan 2024)
1	All Fields	melanoma OR "cutaneous melanoma" OR nevi OR "pigmented lesion" OR "malignant melanoma"	22,343	22,343
2	All Fields	"diagnostic accuracy" OR (sensitivity AND specificity) OR class* OR detect* OR diagnos*	1,756,789	1,758,042
3	All Fields	artificial intelligence OR "machine learning" OR "neural network" OR "deep learning"	35,776	35,988
4	All Fields	dermoscopy OR dermatology OR dermatoscopy OR telederm* OR image* OR "skin screen*" OR "skin exam*" OR "skin clinic" OR "skin cancer screening" OR "mobile application*" OR "mobile skin screen*" OR "mobile skin cancer screen*" OR "primary care" OR "secondary care" OR "tertiary care" OR "health screen*" OR "cancer screen*"	394,847	395,103
Combined search with AND (1,2,3,4)			122	122
Filter date (01-01-2018 to 31-12-2023)			113	113
English language only			113	113*

**Note:** \* No additional articles captured

**Medline:** (melanoma OR "cutaneous melanoma" OR nevi OR "pigmented lesion" OR "malignant melanoma") AND ("diagnostic accuracy" OR (sensitivity AND specificity) OR class\* OR detect\* OR diagnos\*) AND (artificial intelligence OR "machine learning" OR "neural network" OR "deep learning") AND (dermoscopy OR dermatology OR dermatoscopy OR telederm\* OR image\* OR "skin screen\*" OR "skin exam\*" OR "skin clinic" OR "skin cancer screening" OR "mobile application\*" OR "mobile skin screen\*" OR "mobile skin cancer screen\*" OR "primary care" OR "secondary care" OR "tertiary care" OR "health screen\*" OR "cancer screen\*")

Add: Date Filter between 01/01/2018 to present AND English language only

**Supplement Table S3: Medline keywords and captured articles**

Search	Term	Keywords	n = Records captured; Date of search (08 Nov 2023)	n = Records captured; Date of search (07 Jan 2024)
1	All Fields	melanoma OR "cutaneous melanoma" OR nevi OR "pigmented lesion" OR "malignant melanoma"	170,123	171,482
2	All Fields	"diagnostic accuracy" OR (sensitivity AND specificity) OR class* OR detect* OR diagnos*	9,953,917	10,033,330
3	All Fields	artificial intelligence OR "machine learning" OR "neural network" OR "deep learning"	255,020	265,582
4	All Fields	dermoscopy OR dermatology OR dermatoscopy OR telederm* OR image* OR "skin screen*" OR "skin exam*" OR "skin clinic" OR "skin cancer screening" OR "mobile application*" OR "mobile skin screen*" OR "mobile skin cancer screen*" OR "primary care" OR "secondary care" OR "tertiary care" OR "health screen*" OR "cancer screen*"	1,685,425	1,703,632
Combined search with AND (1,2,3,4)			768	812
Filter date (01-01-2018 to 31-12-2023)			645	687
English language only			634	676*

**Note:** \* 42 additional articles captured

**ScienceDirect:** melanoma AND "artificial intelligence" AND detection AND accuracy AND clinic AND dermatology

Add: Date Filter between 01/01/2018 to present AND English language only

**Supplement Table S4:** ScienceDirect keywords and captured articles

Search	Term	Keywords	n = Records captured; Date of search (07 Jan 2024)
<b>1</b>	<b>All Fields</b>	melanoma AND "artificial intelligence" AND detection AND accuracy AND clinic AND dermatology	195
<b>Filter date (01-01-2018 to 31-12-2023) AND English language only</b>			155
<b>Review articles AND Research articles</b>			101

**Scopus:** ( TITLE-ABS-KEY ( melanoma OR "cutaneous melanoma" OR nevi OR "pigmented lesion" OR "malignant melanoma" ) ) AND ( TITLE-ABS-KEY ( "diagnostic accuracy" OR ( sensitivity AND specificity ) OR class\* OR detect\* OR diagnos\* ) ) AND ( TITLE-ABS-KEY ( artificial AND intelligence OR "machine learning" OR "neural network" OR "deep learning" ) ) AND ( TITLE-ABS-KEY ( dermoscopy OR dermatology OR dermatoscopy OR telederm\* OR image\* OR "skin screen\*" OR "skin exam\*" OR "skin clinic" OR "skin cancer screening" OR "mobile application\*" OR "mobile skin screen\*" OR "mobile skin cancer screen\*" OR "primary care" OR "secondary care" OR "tertiary care" OR "health screen\*" OR "cancer screen\*" ) ) AND PUBYEAR > 2017 AND PUBYEAR < 2024 AND ( LIMIT-TO ( LANGUAGE , "English" ) ) AND ( LIMIT-TO ( DOCTYPE , "ar" ) OR LIMIT-TO ( DOCTYPE , "re" ) )

**Supplement Table S5:** Scopus keywords and captured articles

Search	Term	Keywords	n = Records captured; Date of search (08 Nov 2023)	n = Records captured; Date of search (07 Jan 2024)
1	Article title, Abstract, Keywords	melanoma OR "cutaneous melanoma" OR nevi OR "pigmented lesion" OR "malignant melanoma"	248,403	250,602
2	Article title, Abstract, Keywords	"diagnostic accuracy" OR (sensitivity AND specificity) OR class* OR detect* OR diagnos*	16,458,756	16,634,188
3	Article title, Abstract, Keywords	artificial intelligence OR "machine learning" OR "neural network" OR "deep learning"	728,154	746,053
4	Article title, Abstract, Keywords	dermoscopy OR dermatology OR dermatoscopy OR telederm* OR image* OR "skin screen*" OR "skin exam*" OR "skin clinic" OR "skin cancer screening" OR "mobile application*" OR "mobile skin screen*" OR "mobile skin cancer screen*" OR "primary care" OR "secondary care" OR "tertiary care" OR "health screen*" OR "cancer screen*"	3,864,952	3,916,976
Combined search with AND (1,2,3,4)			1,003	1,053
Filter date (01-01-2018 to 31-12-2023)			757	799
English language only			731	773
Limited to Article AND Review			516	545*

**Note:** \* 29 additional articles captured

## Web of Science

melanoma OR "cutaneous melanoma" OR nevi OR "pigmented lesion" OR "malignant melanoma"  
 (Topic) AND "diagnostic accuracy" OR (sensitivity AND specificity) OR class\* OR detect\* OR diagnos\*  
 (Topic) AND artificial intelligence OR "machine learning" OR "neural network" OR "deep learning"  
 (Topic) AND dermoscopy OR dermatology OR dermatoscopy OR telederm\* OR image\* OR "skin screen\*" OR  
 "skin exam\*" OR "skin clinic" OR "skin cancer screening" OR "mobile application\*" OR "mobile skin screen\*" OR  
 "mobile skin cancer screen\*" OR "primary care" OR "secondary care" OR "tertiary care" OR "health  
 screen\*" OR "cancer screen\*" (Topic) and Preprint Citation Index (Exclude –  
 Database) and English (Languages) and Article or Review Article (Document Types)  
 AND date filter 2018-2013.

**Supplement Table S6:** Web of science keywords and captured articles

Search	Term	Keywords	n = Records captured; Date of search (08 Nov 2023)	n = Records captured; Date of search (07 Jan 2024)
1	Topic	melanoma OR "cutaneous melanoma" OR nevi OR "pigmented lesion" OR "malignant melanoma"	290,123	293,098
2	Topic	"diagnostic accuracy" OR (sensitivity AND specificity) OR class* OR detect* OR diagnos*	21,293,654	21,476,299
3	Topic	artificial intelligence OR "machine learning" OR "neural network" OR "deep learning"	1,381,654	1,462,195
4	Topic	dermoscopy OR dermatology OR dermatoscopy OR telederm* OR image* OR "skin screen*" OR "skin exam*" OR "skin clinic" OR "skin cancer screening" OR "mobile application*" OR "mobile skin screen*" OR "mobile skin cancer screen*" OR "primary care" OR "secondary care" OR "tertiary care" OR "health screen*" OR "cancer screen*"	4,151,086	4,194,396
Combined search with AND (1,2,3,4)			2,086	2,167
Filter date (01-01-2018 to 31-12- 2023)			1,712	1,838
English language only			1,680	1,802
Limit to Article AND review			1,284	1,337*

Note: \*53 additional records identified

## SUPPLEMENT 2

**Supplementary Table S7.** Critical appraisal of included studies

Author, Year, Country	Study Design	Level of Evidence*	Modified Axis (Average for reviewers)	Percentage (%)	Quality Rating
Anderson et al., 2023, USA [34]	Cross-sectional study	III-3	13/20	65.0	Fair
Cerminara et al., 2023, Switzerland [37]	Prospective, single-center, observational study	III-2	17/20	85.0	Good
Fink et al., 2020, Germany [43]	Cross-Sectional Study	III-2	17/20	85.0	Good
Jahn et al., 2022, Switzerland [35]	Prospective, single-center, comparative observational cohort study	III-2	17/20	85.0	Good
MacLellan et al., 2021, Canada [44]	Prospective diagnostic accuracy study	III-2	16.5/20	82.5	Good
Marchetti et al., 2023, USA [38]	Single-center, retrospective, observational convenience study	III-2	17/20	85.0	Good
Martin-Gonzales et al., 2022, Spain [45]	Retrospective cross-sectional study	III-2	17/20	85.0	Good
Menzies et al., 2023, Australia [46]	Multicenter, prospective, diagnostic, clinical trial	II	19/20	95.0	Good
Miller et al., 2023, Australia [47]	Cross-Sectional study	III-1	17/20	85.0	Good
Phillips, 2019, United Kingdom [48]	Prospective, multicenter, single-arm, masked diagnostic trial	III-1	16/20	80.0	Good



Thomas et al., 2023, United Kingdom [49]	Prospective, Multicenter, diagnostic clinical trial	II	16.5/20	82.5	Good
Udrea et al., 2020, Romania/ Netherlands [36]	Retrospective, diagnostic, clinical trail	III-2	17/20	85.0	Good
Winkler et al., 2023, Germany [39]	Multicenter Prospective, diagnostic study	III-1	17/20	85.0	Good
Winkler et al, 2019, Germany [40]	Retrospective Cross- sectional analysis	III-3	17/20	85.0	Good
Winkler et al., 2021, Germany [41]	Retrospective Cross- sectional analysis	III-3	16/20	80.0	Good
Winkler et al., 2022, Germany [42]	Retrospective cross- sectional study	III-2	17/20	85.0	Good
			k = 0.977	Mean=83.4% SD±5.9	

Where: \* Level of Evidence [32], k = Cohen's kappa score, SD = standard deviation

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