Supplementary File 1: Complete search strategy
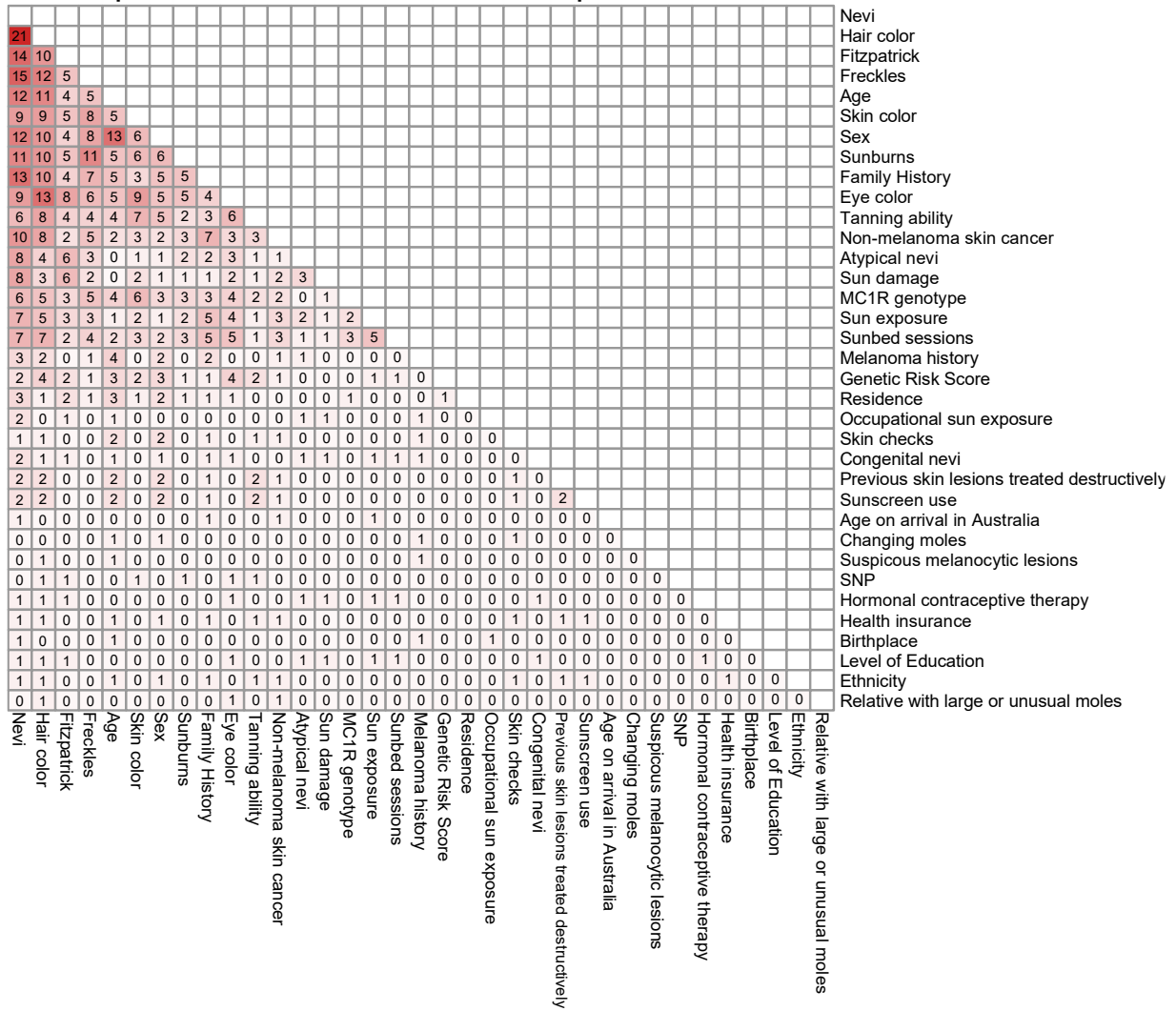
The search string for the literature search in Pubmed was:

 ((melanoma*[tiab] OR 'skin cancer'[tiab]) AND ('risk factor'[tiab] OR 'risk assessment'[tiab] OR 'probability'[tiab] OR 'likelihood'[tiab] OR chance[tiab] OR risk*[tiab]) AND ('prediction'[tiab] OR 'model'[tiab] OR 'score'[tiab] OR predict*[tiab])) AND (("2013/05/01"[Date - Publication] : "3000"[Date - Publication]))

Supplementary Table S1. Classification of model variables into meaningful groups

Original variables	References	New variable(s) used for analysis
Skin color	[16,22,23,29,34,35,54,56]	
Melanin density	[19]	Skin color
Colorimetric variables	[17]	
Freckles in childhood	[16,45]	
Freckling	[22,51,56]	
Freckles	[23,31]	
Freckle density	[32,37]	Freckles
Freckling tendency	[30]	
Density of freckles on arms before age 20	[36]	
Freckling as an adult	[62]	
Sunburns in all life	[16,22,30,51,56]	
Sunburn	[18,34,46]	Sunburns
Sunburns in childhood	[23,36,37,45,62]	
Sun exposure > 240 hours/year	[21]	
Mean time spent outdoors in summer aged 10-24	[20]	
Sunbathing vacations	[33]	
Intermitted sun exposure	[57]	Sun exposure
Vacational sun exposure	[62]	
Total childhood sun exposure hours	[45]	
Outdoor UV	[39]	
Nevi	[18,28,33,37,45,50,62]	
Raised nevi	[20]	
Melanocytic nevi	[21,35]	
Moles	[22,61]	
Common nevi	[23,31,46,53,57,60]	
Melanocytic common nevi	[24,25]	Nevi
Benign nevi	[30]	
Nevi density	[32,49,56]	
Raised moles	[36]	
Nevi distribution	[51]	
Moles at age 21	[52]	
Keratinocytic cancer	[50]	
Past history of excisions for skin cancer (not melanoma)	[52]	Non-melanoma skin cancer
Personal history of non-melanoma skin cancer	[20,31,36,45,62]	
Actinic lentigines	[24,25]	
Solar lentigines	[45,50]	
Solar skin damage	[22,57]	Sun damage
UV damage	[28]	

Original variables	References	New variable(s) used for analysis
Atypical nevi	[21,24,25,30,31,53]	Atypical nevi
Dysplastic nevi	[29,57]	
Tanning ability	[22,29,34,45,52,54,59]	Tanning ability
Skin reaction to repeated sun exposure	[32]	
Regular dermatologist visits	[26]	Skin checks
Skin checks in the past 3 years	[52]	
Indoor tanning	[56]	Sunbed sessions
Sunbed use	[33,57]	
Sunbank sessions	[45,49,62]	
Indoor UV	[39]	
Place of residence	[37]	Residence
Country	[60]	
Life in a country at low latitude	[35]	
Red hair (RH)-phenotype	[46]	Hair color
		Freckles
		Fitzpatrick
Pigmentation score	[45]	Tanning ability
		Fitzpatrick,
		Skin color
		Eye color
		Hair color
		Freckles

Frequencies of risk factor combinations in risk prediction models

	Nevi	Hair color	Fitzpatrick	Freckles	Age	Skin color	Sex	Sunburns	Family History	Eye color	Tanning ability	Non-melanoma skin cancer	Atypical nevi	Sun damage	MC1R genotype	Sun exposure	Sunbed sessions	Melanoma history	Genetic Risk Score	Residence	Occupational sun exposure	Skin checks	Congenital nevi	Previous skin lesions treated destructively	Sunscreen use	Age on arrival in Australia	Changing moles	Suspicous melanocytic lesions	SNP	Hormonal contraceptive therapy	Health insurance	Birthplace	Level of Education	Ethnicity	Relative with large or unusual moles
Nevi	21																																		
Hair color	14	10																																	
Fitzpatrick	15	12	5																																
Freckles	12	11	4	5																															
Age	9	9	5	8	5																														
Skin color	12	10	4	8	13	6																													
Sex	11	10	5	11	5	6	6																												
Sunburns	13	10	4	7	5	3	5	5																											
Family History	9	13	8	6	5	9	5	5	4																										
Eye color	6	8	4	4	4	7	5	2	3	6																									
Tanning ability	10	8	2	5	2	3	2	3	7	3	3																								
Non-melanoma skin cancer	8	4	6	3	0	1	1	2	2	3	1	1																							
Atypical nevi	8	3	6	2	0	2	1	1	1	2	1	2	3																						
Sun damage	6	5	3	5	4	6	3	3	3	4	2	2	0	1																					
MC1R genotype	7	5	3	3	1	2	1	2	5	4	1	3	2	1	2																				
Sun exposure	7	7	2	4	2	3	2	3	5	5	1	3	1	1	3	5																			
Sunbed sessions	3	2	0	1	4	0	2	0	2	0	0	1	1	0	0	0	0																		
Melanoma history	2	4	2	1	3	2	3	1	1	4	2	1	0	0	0	1	1	0																	
Genetic Risk Score	3	1	2	1	3	1	2	1	1	1	0	0	0	0	1	0	0	0	1																
Residence	2	0	1	0	1	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0															
Occupational sun exposure	1	1	0	0	2	0	2	0	1	0	1	1	0	0	0	0	1	0	0	0	0														
Skin checks	2	1	1	0	1	0	1	0	1	1	0	0	1	1	0	1	1	1	0	0	0	0													
Congenital nevi	2	2	0	0	2	0	2	0	1	0	2	1	0	0	0	0	0	0	0	0	1	0													
Previous skin lesions treated destructively	2	2	0	0	2	0	2	0	1	0	2	1	0	0	0	0	0	0	0	0	1	0	2												
Sunscreen use	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0											
Age on arrival in Australia	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0										
Changing moles	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0									
Suspicous melanocytic lesions	0	1	1	0	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
SNP	1	1	1	0	0	0	0	0	0	1	1	0	1	1	0	1	1	0	1	1	0	0	0	0	0	0	1	0	0						
Hormonal contraceptive therapy	1	1	0	0	1	0	1	0	1	0	1	1	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0					
Health insurance	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0				
Birthplace	1	1	1	0	0	0	0	0	1	0	0	1	1	0	1	1	0	0	0	0	1	0	0	0	0	0	1	0	0						
Level of Education	1	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	1	0	1	0			
Ethnicity	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Relative with large or unusual moles																																			

Supplementary Figure S1. Heatmap indicating relations joint occurrences of risk factor pairs among in risk prediction models for melanoma. All 35 risk factors occurring in any of the risk prediction models are included. Each number represents the absolute frequency of the corresponding risk factor combination. The darker the field the more frequent is the corresponding risk factor combination (N = 45 models). MC1R = melanocortin 1 receptor, SNP = Single Nucleotide Polymorphism

Supplementary Table S2. Absolute (n) and relative (%) frequencies of methods used when evaluating risk prediction models for melanoma regarding the methodological type of validation and the type of measures describing model performance (N=40 studies). With references (ref.).

Validation	Studies published up to 2011 (n=20)			Studies published after 2011 (n=20)			All Studies (N=40)		
	n	%	ref.	n	%	ref.	n	%	ref.
Internal validation	5	25.0	[17,18,20,36,37]	13	65.0	[27,34,45,49,50,52,54-57,60-62]	18	45.0	[17,18,20,27,34,36,37,45,49,50,52,54-57,60-62]
Cross-validation	1	5.0	[17]	5	25.0	[34,54,57,60,62]	6	15.0	[17,34,54,57,60,62]
Split sample	3	15.0	[18,20,36]	3	15.0	[52,55,56]	6	15.0	[18,20,36,52,55,56]
Bootstrapping	1	5.0	[37]	5	25.0	[27,45,49,50,61]	6	15.0	[27,37,45,49,50,61]
External validation	1	5.0	**[23]**	5	25.0	**[49-51,59,62]**	6	15.0	**[23,49,50,51,59,62]**
Both internal and external validation	0	0.0		3	15.0	[49,50,62]	3	7.5	[49,50,62]
Neither internal nor external validation	14	70.0	[19,21,22,24-26,28-33,35, 40]	5	25.0	[16,39,46,53,58]	19	47.5	[16,19,21,22,24-26,28-33,35,39,40,46,53,58]
Performance measures	n	%	ref.	n	%	ref.	n	%	ref.
Calibration [1]	2	10.0	[18,37]	9	45.0	[45,49,50,52-54,56,57,61,62]	11	27.5	[18,37,45,49,50,52-54,56,57, 61,62]
Hosmer-Lemeshow test	2	10.0	[18,37]	7	35.0	[45,50,54,56,57 ,61,62]	9	22.5	[18,37,45,50,54,56,57,61,62]
Graph (plot/intercept/slope)	0	0.0		3	15.0	[49,52,61]	3	7.5	[49,52,61]
Calibration in the large	0	0.0		1	5.0	[49]	1	2.5	[49]
Discrimination [2]	9	45.0	[17-20,23,28,35-37]	20	100.0	[16,27,34,39,45,46,49,50-62]	29	72.5	[16-20,23,27,28,34-37,39,45,46,49,50-62]
AUC	8	40.0	[17-19,23,28,35-37]	18	90.0	[16,27,34,39,45,46,49-51,54-62]	26	65.0	[16-19,23,27,28,34-37,39,45,46,49,50,51,54-62]
C-index	0	0.0		3	15.0	[52,53,58]	3	7.5	[52,53,58]
Discrimination slope	0	0.0		1	5.0	[45]	1	2.5	[45]
ROC plot (without AUC calculation)	1	5.0	[20]	0	0.0		1	2.5	[20]
Overall model performance [3]	0	0.0		1	5.0	**[45]**	1	2.5	**[45]**
Brier score	0	0		1	5.0	[45]	1	2.5	[45]
Nagelkerk's R^2	0	0		1	5.0	[45]	1	2.5	[45]

Performance measures	Studies published up to 2011 (n=20)			Studies published after 2011 (n=20)			All Studies (N=40)		
	n	%	Ref.	n	%	Ref.	n	%	Ref.
Reclassification [4]	0	0.0		4	20.0	[45,46,59,62]	4	10.0	[45,46,59,62]
Net reclassification improvement	0	0.0		4	20.0	[45,46,59,62]	4	10.0	[45,46,59,62]
Integrated discrimination index	0	0.0		2	10.0	[45,59]	2	5.0	[45,59]
Clinically usefulness	3	15.0	[17,18,36]	8	40.0	[27,45,61,57,49,52,55,46]	11	27.5	[17,18,27,36,45,46,49,52,55,57, 61]
Sensitivity/specificity	3	15.0	[17,18,36]	5	25.0	[27,45,55,57,61]	8	20.0	[17,18,27,36,45,55,57,61]
Decision curve	0	0.0		3	15.0	[49,52,46]	3	7.5	[49,52,46]
No performance measure at all	11	55.0	[21,24-26,29, 30-33,35,40]	0	0.0		11	27.5	[21,24-26,29, 30-33,35,40]

[1] Two studies reported multiple calibration measures; [2] Two studies reported multiple discrimination measures; [3] One study reported both performance measures; [4] Two studies reported both reclassification measures