

Supplemental content

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Table S0 List of excluded studies with reasons for exclusion

Reason for exclusion	Study
Induced caries lesion	Okano et al. (1985), Eggertsson et al. (1999), Young and Featherstone (2005), Ferreira et al. (2006), Belem et al. (2013), Vieira et al. (2015), Kajan et al. (2015)
Missing data/ Unclear data reporting	Noar and Smith (1990), Pitts and Rimmer (1992), Choksi et al. (1994), Syriopoulos et al. (2000), Janhom et al. (2001), Hellen-Halme and Lith (2013), Nikneshan et al. (2015) Gray et al. (2017);
No/ unsuitable reference standard	Espelid and Tveit (1986), Obry-Musset et al. (1988), de Vries et al. (1990), Verdonschot et al. (1992), Svenson et al. (1993), Scarfe et al. (1994), Heaven et al. (1994), Ardakani et al. (2004), Otis and Sherman (2005), Akkaya et al. (2006), Aleksejuniene et al. (2006), Galcera Civera et al. (2007), Tsuchida et al. (2007), Akarslan et al. (2008), Crombie et al. (2009), Raghav et al. (2014), Yoon et al. (2017), Laitala et al. (2017), Berg et al. (2018)
Occlusal surfaces	Ketley and Holt (1993), Lussi and Hellwig (2006)
Other language	Li et al. (2006), Falahzadeh et al. (2013), Faghihian and Faghihian (2015),
Out of subject	Marsh et al. (1989), Verdonschot et al. (1991), De Araujo et al. (1992), Reddy and Sugandhan (1994), Vaarkamp et al. (1997a), Vaarkamp et al. (1997b), Tyndall et al. (1998), Syriopoulos et al. (1999), Caliskan Yanikoglu et al. (2000), Shi et al. (2001), Kidd et al. (2003), Haak et al. (2001), Koob et al. (2004), Llena-Puy and Forner (2005) Kielbassa et al. (2006), Matalon et al. (2007), Hellén-Halme et al. (2008), Valizadeh et al. (2009), Holtzman et al. (2011), Tracy et al. (2011), Qu et al. (2011), Schulze et al. (2011), Xavier et al. (2011), Maia et al. (2011), Akbari et al. (2013), Ritter et al. (2013), Madalli et al. (2014), Sansare et al. (2014a), Sansare et al. (2014b), Ozsevik et al. (2015), Dashpuntsag et al. (2017)
Primary teeth	Clifton et al. (1998), Hintze (2006)
Review	Vaarkamp et al. (2000)
Secondary caries	White et al. (1988)

Diagnostic test method criteria

Table S1a Visual examination criteria

Criteria No.	Authors	Criteria description
1	Bin-Shuwaish et al. (2008)	1.Halo present 2.Halo absent
2	Ekstrand et al. (2011)	<i>ICDAS-II Classification.</i> 0 = sound, 1 = first visual change in enamel (seen only after prolonged air drying or restricted to within the confines of a pit or fissure), 2 = distinct visual change in enamel, 3 = localized enamel breakdown (without clinical visual signs of dentinal involvement), 4 = underlying dark shadow from dentine, 5 = distinct cavity with visible dentine, 6 = extensive distinct cavity with visible dentine
3	Hintze et al. (1998) Mialhe et al. (2003)	0 = sound 1 = non-cavitated caries 2 = cavitated caries
4	Senel et al. (2010)	0, no caries lesion; 1, opacity or cavitation in enamel; 2, cavitation in dentine; 3, cavitation in dentine extending to pulp.
5	Shimada et al. (2014)	0: Sound tooth surface. No evidence of caries or demineralization of enamel. 1: Superficial demineralization of enamel, but without cavitation. Opacity or discoloration (white or brown) is visible. 2: Localized enamel breakdown due to caries, with no visible dentin or underlying shadow. Carious lesion was limited to the depth of enamel. 3: Superficial dentin caries. Softened carious dentin was present, and the carious involvement was within the outer half of total thickness of dentin. 4: Deep dentin caries. Softened carious dentin was present, and deep dentin was involved, where caries infection extended into the inner half of total thickness of dentin.
6	Haak et al. (2002)	0 = no lesion, 1 = enamel opacity with smooth surface, 2 = enamel opacity with rough surface, 3 = cavitation restricted to the enamel, 4 = cavitation extending into dentine.
7	Hintze (2003) De Araujo et al.(1992)	0 = sound 1 = caries lesion without cavitation, 2 = caries lesion with cavitation 3 = caries lesion with manifest cavitation

Criteria No.	Authors	Criteria description
8	Silva Neto et al. (2008)	0= sound 1= white spot 2= dark spot 3= white dark spot or cavitation
9	Bozdemir et al. (2016)	0= sound 1= presence of opaque white or brown spots 2= gray discoloration in the underlying dentin
10	Peker et al. (2009)	0= sound 1= Enamel opacity with smooth surface 2= Enamel opacity with rough surface 3= Cavitation restricted to enamel 4= Cavitation extending into dentin

Table S1b Radiography criteria

Criteria No.	Authors	Healthy	Enamel caries		Dentine caries		
1	Rickets et al. (1997) Dove et al. (1992) Russel et al. (1993) Pitts et al. (1984) Marthaler et al. (1966)	0	1	2 [#]	3	4	
2	Espelid et al.(1986)	0	1	2	3	4	5
3	Ekstrand et al. (2011)	0	1	2		3	4
4	Hintze et al. (1998) Mialhe et al. (2003)	0	1	2	3	4	
5	Wenzel et al.(2007)	0	1		2	3	
6	Abesi et al. (2012) Hintze (2003)	0	1		2	3	
7	Neuhaus et al. (2015)	0	1		2	3	4
8	da Silva Neto et al (2008) Espellid et al. (1986)	0	1	2	3	4	5
9	Berkhout (2007)	0	1	2	3		
10	Behere et al. (2011)	0	1		2		
11	Peers et al. (2003)	1			2		
12	Wojtovicz et al. (2003) Verdonschot et al. (1993)^	0	1		2 ^{##}	3	
13	Haak et al (2003)	0	1	2	3	4	5
14	Wenzel et al. (2007a)	0	1		2	3	
15	Wenzel et al. (2013)	0-sound 1-lesion in enamel without cavitation 2- lesion in enamel with cavitation 3-lesion 1/3 or less in dentine without cavitation 4-lesion 1/3 or less in dentine with cavitation 5-lesion more than 1/3 in dentine without cavitation 6-lesion more than 1/3 in dentine with cavitation 7-surface not recordable					
16	Mehare et al. (1999), Shimada et al. (2014)	0-sound 1-Superficial enamel demineralization 2-Localized enamel breakkdown 3-Superficial dentin caries 4-Deep dentin caries					
17	Wong et al. (2002)	1-less than halfaway through enamel 2-greater than halfaway through enamel 3-to the DEJ					

		4-beyond the DEJ 5-no lesion 6-unsure if a lesion is present
18	Hintze et al. (1994) Wenzel et al. (1995) Espelid et al. (1986)	<i>"5 point- confidence rating scale"</i> score 1 = caries definitely absent; score 2 = caries probably absent; score 3 = unsure if present or absent; score 4 = caries probably present score 5 = caries definitely present.
19	Kay et al. (1992)	1- I would definitely restore this tooth surface 2- I would probably restore this tooth surface 3- I would possibly restore this tooth surface 4- I would possibly leave this tooth surface unrestored 5- I would probably leave this tooth surface unrestored 6- I would definitely leave this tooth surface unrestored
20	Castro et al. (2007)	Continuous confidence-rating scale from 1 to 100 with 1 representing "lesion definitely not present" and 100 representing "lesion definitely present.
21	Safi et al. (2015)	0: Definitely no caries 1: Enamel caries (radiolucency in enamel) 2: Dentine caries (radiolucency in dentine) 3: Deep dentine caries (radiolucency extending to pulp)
22	Booshehry et al. (2010)	0: No caries 1: Caries present

#+/- dentin-enamel junction (DEJ); ##reaches and affects DEJ

Table S1c Laser fluorescence criteria

Criteria No.	Authors	Criteria description	
1	Kühnisch et al. (2016) Huth et al. (2010)	Interproximal dentin caries was associated with values ≥ 16	
2	Neuhaus et al. (2015)	D0—(0–6) D1—(6.1–13) D2—(13.1–17) D3, D4—(>17)	
3	Tagtekin et al. (2008) Lussi et al. (2001)	(D1 sound fissures and enamel fissure lesions _ 0-13) (D2 enamel caries _ 14–19) and (D3 dentinal caries _ 20)	
4	Rodrigues. (2009) Lussi et al. (2006)	Wedge shaped tip D0=0-6 D1=6.1-9 D2=9.1-15 D3, D4>15	Tapered wedge shaped tip D0= 0-9 D1= 9.1- 13 D2=13.1- 22 D3, D4> 22

Table S1d FOTI criteria

Criteria No.	Authors	Healthy	Enamel caries		Dentine caries	
1	Astvaldsdottir et al. (2012)	0	1	2	3	4
2	Hintze et al. (1998)	0	1		2	
3	Bin-Shuwaish et al. (2008)	They determined the extent of the lesion according to the size of the black area on the image and scored each lesion as 0, lesion not present; 1, small lesion present; 2, medium lesion present; 3, large lesion present.				
4	Peers et al. (1993)	1. Shadow or opacity beneath the marginal ridge up to DEJ 2. 1. Shadow or opacity beneath the marginal ridge beyond DEJ				
5	Abogazalah et al. (2019)	0. No caries present 1. Probably no caries present 2. Not sure if caries present 3. Probably present				

Table S1e Semiquantitative histological criteria

Criteria No.	Authors	Healthy	Enamel caries			Dentine caries		
1	Marthaler (1966)	0	1	2		3	4	
2	Lussi (1991)	0	1	2		3		
3	Nytun et al. (1992), Lazarchik et al. (1995), Gray und Paterson (1997), El-Housseiny und Jamjoum (2001), Costa et al. (2002), Fung et al. (2004), de Paula et al. (2009)	0	1			2		
4	Wenzel und Fejerskov (1992), Rodrigues et al. (2009)	0	1			2	3	
5	Ekstrand et al. (1997)	0	1	2		3	4	
6	Krzizostaniak et al. (2014)	0	1	2		3	4	
7	Cheng et al. (2012)	0	1	2	3*	4	5	
8	Espelid et al. (1986)	1	2	3		4	5	6
9	Khan et al. (2005) Pabla et al. (2003) Nair et al. (2001) Abreu et al. (2001) Abreu et al. (1999) Ludlow et al. (1999)	0	1	2**		3	4	5
10	Haak et al. (2003)	0	1	2		3	4	5
11	Haak et al. (2005)	0	1			2	3	4
12	Adibi et al. (2018)	0	1	2	3		4	5***
13	Isidor et al. (2009)	0	1			2	3	
14	Hellen-Halme et al. (2010)	0	1	2	3			
15	Booshehry et al. (2010)	0	1					
16	Peker et al. (2009)	0	1	2	3		4	
17	Moystad et al. (1996)	0	1	2	3	4		

* Caries reached but not crossed DEJ; ** +/-DEJ; *** caries reaching pulp

Risk of bias assessment

Table S2 Risk of bias assessment tool

Signalling questions	RoB	Description of the criteria (Domain 1)				
Patient selection bias 1. Is an eligible sample selected from the study participants/population? <i>In vivo studies only</i>	Indicators for low RoB	The eligible sample from the study participants/population is representative of the patients for whom the results of the study was applicable. The eligible sample is homogenous, enrolled consecutively or randomly, and obtained from the research question, e.g., PIRD.				
	Indicators for high RoB	The eligible sample is not representative, the clinical indication for the application of the diagnostic test(s) is not completely described, and the sample is not enrolled consecutively or randomly; there is no research question.				
	Response options	Yes (low RoB)	Most likely yes (low RoB)	Most likely no (high RoB)	No (high RoB)	No information (unclear)
Tooth selection bias 2. Is an eligible sample of teeth selected?	Indicators for low RoB	Eligible selection of the target teeth and surfaces: - In vitro/in vivo studies on <i>occlusal</i> caries detection = permanent molars/primary molars - In vitro/in vivo studies on <i>proximal</i> caries detection = permanent molars & premolars/primary molars.				
	Indicators for high RoB	The selected teeth and surfaces are not homogeneous; there is over/underrepresentation of at least one group of teeth, a mixture of posterior and anterior teeth, a mixture of permanent and primary teeth or a mixture of occlusal surfaces from premolars and molars.				
	Response options	Yes (low RoB)	Most likely yes (low RoB)	Most likely no (high RoB)	No (high RoB)	No information (unclear)

Signalling questions	RoB	Description of the criteria (Domain 1)				
<i>Spectrum bias</i> 3. Is an appropriate spectrum of caries lesions selected?	Indicators for low RoB	All stages of caries (e.g., sound/enamel/dentin caries/caries at least in the inner half of the dentin or non-cavitated/cavitated caries) are included. The sampled caries spectrum should be pre-assessed.				
	Indicators for high RoB	At least one stage of caries is excluded or under/over-represented in the study.				
	Response options	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)
<i>Sample size</i> 4. Is the sample size appropriate for validity and reproducibility testing?	Indicators for low RoB	The sample size is statistically determined.				
	Indicators for high RoB	There is no sample size calculation, etc.				
	Response options	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)

Signalling questions	RoB	Description of the criteria (Domain 2)				
Index test criteria 5. Do/does the index test(s) correctly classify the target condition?	Indicators for low RoB	Exact pre-definition/prescription of the criteria used, thresholds for the index test. Correct usage of the index test(s) according to latest recommendations (justified on the basis of the references).				
	Indicators for high RoB	Modifications of the index test(s), mis-usage, misinterpretation.				
	Response options	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)
Blinding bias (index test) 6. Are the index test(s) data interpreted without knowledge of the results of the reference standard?	Indicators for low RoB	Appropriate blinding of the examiners who are making the decisions/diagnoses from index test(s), e.g., at least a one-week interval between examinations, randomized/shuffled allocation of the order of specimen/images and/or inclusion of multiple examiners who are performing only one test each.				
	Indicators for high RoB	Insufficient blinding. Same examiner performed multiple tests.				
	Response options	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)
Calibration bias (index test) 7. Were the examiners trained/calibrated for the performing the index test(s)?	Indicators for low RoB	Details and outcomes of the calibration training, including the Kappa values for intra- and inter-examiner reliability, are given. Calibration training must include an independent sample of individuals or teeth. Calibration data should not be interpreted/misunderstood as intra-examiner reliability.				
	Indicators for high RoB	Insufficient training/calibration.				
	Response options	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)

Signalling questions	RoB	Description of the criteria (Domain 3)				
Reference test criteria 8. Does the reference test correctly classify the target condition?	Indicators for low RoB	Usage of an optimal ("perfect") reference standard, e.g., histology, microradiography or μ CT. Exact pre-definition/prescription of the used criteria, thresholds for the reference test. Correct usage of the reference test according to the latest recommendations (justified on the basis of references). The reference test is conditionally independent of the index tests.				
	Indicators for high RoB	Usage of a sub-optimal ("imperfect") reference standard, e.g., radiography. Modifications of the reference test; mis-usage; misinterpretation. The reference test is conditionally not independent of the index test. Differential misclassification – the error rate is associated with the index test results. Non-differential misclassification – the error rate is independent of the index test results, but this can underestimate SE and SP.				
	Response options	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)
Blinding bias (reference test) 9. Is the reference test data interpreted without knowledge of the results of the index test(s)?	Indicators for low RoB	Appropriate blinding of the examiners who are making the decisions/diagnoses from reference test(s). For example, there is at least a one-week interval between examinations, randomized/shuffled allocation of the order of specimen/images and/or inclusion of multiple examiners, who are performing only one test each, with unawareness of the outcome of index test(s).				
	Indicators for high RoB	Insufficient blinding. For example, the same examiner performs multiple tests within a few days.				
	Response options	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)
Calibration bias (reference test) 10. Are the examiners trained/calibrated for performing the reference test(s)?	Indicators for low RoB	Details and outcomes of the calibration training, including Kappa values for intra- and inter-examiner reliability, are given. Calibration training must include an independent sample of individuals or teeth. Calibration data should not be interpreted/misunderstood as intra-examiner reliability.				
	Indicators for high RoB	Insufficient training/calibration.				
	Response options	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)
Signalling questions	RoB	Description of the criteria (Domain 4)				

<i>Incorporation bias</i> 11. Are the reference test(s) performed separately from the index test(s)?	Indicators for low RoB	The reference and index test are performed separately.				
	Indicators for high RoB	The index test is incorporated in a (composite) reference test; the result of the index test is explicitly used as a criterion for the reference test.				
	Response options	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)
<i>Partial verification bias</i> 12. Do all patients/teeth/surfaces undergo both the reference tests and the index tests?	Indicators for low RoB	Ensure that all patients/teeth/surfaces undergo both the reference tests and the index tests.				
	Indicators for high RoB	Identified when a non-random set of patients/teeth/surfaces does not undergo the reference test and the verification rate depends on the index test results.				
	Categories of RoB	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)
<i>Differential verification bias</i> 13. Do all patients/teeth/surfaces receive the same reference standard?	Indicators for low RoB	Ensure that all patients/teeth/surfaces receive the same reference standard.				
	Indicators for high RoB	Identified when a non-random set of patients/teeth/surfaces is verified with a second or third reference test, especially when this selection depends on the index test result.				
	Response options	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)

Signalling questions	RoB	Description of the criteria (Domain 4)				
Bias in the analysis 14. Are all patient/teeth/surfaces, uninterpretable or intermediate test results and withdrawals included in the analysis?	Indicators for low RoB	All patients (teeth) who entered the study are accounted for, and all uninterpretable or intermediate test results and withdrawals (including lost specimens of the teeth) are explained.				
	Indicators for high RoB	Not all patients (teeth) who entered the study are accounted for, and not all uninterpretable or intermediate test results and withdrawals (including lost specimens of the teeth) are explained.				
	Response options	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)
Validity bias 15. Are the validation of results for the test method(s) included in the analysis?	Indicators for low RoB	Full presentation of results: Cross-tabulation (or distribution) of the index and reference test results by the reference standard results. Estimates of diagnostic accuracy and their precision are included (SE, SP, Az value).				
	Indicators for high RoB	Insufficient/incomplete information's, e.g., missing 2x2 contingency tables and/or SE, SP, Az values. Incorrect statistics. Biased interpretation.				
	Response options*	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)
Reproducibility bias 16. Are the reliability data of results for the test method(s) included in analysis?	Indicators for low RoB	Full presentation of results: Intra- and inter-examiner reliability for all examiners and for all teeth. Correct statistical procedures, e.g., Kappa values, Bland-Altman-Plots, etc. Data from the calibration training have not been mis/interpreted as reliability.				
	Indicators for high RoB	Insufficient/incomplete information on intra- and inter-examiner reliability or incorrect statistics. Data for calibration purposes only. Biased interpretation.				
	Response options	Yes (low RoB)	Probably yes (low RoB)	Probably no (high RoB)	No (high RoB)	No information (unclear)

Visual Examination

Table S3a Results of Systematic Literature Review for in vitro visual validation studies on proximal surfaces

Visual Examination	Study material		Diagnostics	Histology				Validity					
In vitro validation studies on proximal surfaces	Teeth (N)	Molars /PM (N)	Visual criteria ¹	Hard tissue processing	Caries staining	Visualisation /magnification	Scoring criteria ²	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
Peers et al. (1993)	240	-/-	nr	Slices	-	Microscopy	nr	-	-	-	38	99	-
Haak et al. (2002)	160	-/-	6	Slices	-	Microscopy	nr	71	75	0.76	-	-	-
Hintze et al. (2003)	373 ^{surfaces}	304/57	7	Slices	-	Microscopy	2	-	-	-	-	-	-
Silva Neto et al. (2008)	44	22/22	8	Slices/Groun	-	Microscopy	9	65.6	83.3	-	-	-	-
Peker et al. (2009)	48	-/-	10	Slices	-	Microscopy	16	-	-	0.65/0.53	-	-	-
Mitropoulos et al. (2010)	20	8/12	2	Slices	-	Microscopy	2	96/92	50/63	0.73/0.77	100/94	41/50	0.71-0.68
Senel et al. (2010)	138	-/-	4	Slices	-	Scanner	4	-	-	0.63-0.67	-	-	-
Ekstrand et al. (2011)	140 ^{*,**}	-/-	2	Slices	-	Microscopy	5	-	-	-	93 [#]	84 [#]	-
Ko et al. (2015)	95	-/-	2	Slices	-	Microscopy	1	80	68	0.74	64	68	0.66
Neuhaus et al. (2015)	118	118/-	2	Ground	-	Microscopy/Photo	4	33	84	-	4	89	-
Bozdemir et al. (2016)	156 ^{surfaces}	-/-	9	Slices	-	Microscopy	3	32.5/31.3	94.5/95.9	0.75/0.78	15.4/2.7	99.1/99.1	0.84/0.84
Jan et al. (2016)	50 [*]	-/-	2	Slices	-	Microscopy	1	73	65	0.68	-	-	-
Abogazalah et al. (2019)	30 ^{surfaces}	-/-	2	-	-	Micro-CT	6	89	30 ^{surfaces}	83	0.90	-	-
Tonkaboni et al. (2019)	108 ^{surfaces}	-/-	2	Slices	-	Microscopy	1	49	99	-	-	-	-

¹See Table S1a; ²See Table S1e; nr-not reported; *canines, ** front teeth, [#]threshold:outer 1/3 dentin

Table S3b Results of Systematic Literature Review for in vivo visual validation studies on proximal surfaces

Visual Examination	Study material			Diagnostics	In vivo validation methodology			Validity					
In vivo validation studies on proximal surfaces	Patients (N)	Age (years)	Teeth (N)	Visual Criteria	Histology technique	Validation	Reference method	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
Hintze et al. (1998)	53	20-38	338 ^{surfaces}	3	nr	Tooth separation	3	-	-	-	34	98	-
Mialhe et al. (2003)	70	13-15	199 ^{surfaces}	3	nr	Tooth separation	3	-	-	-	-	-	-
Bin-Shuwaish et al. (2008)	21	20-54	51	1	nr	Radiography	nr	-	-	-	100	27	-
Kühnisch et al. (2016)	85	25	127 ^{surfaces}	2	Cav.Preparation	Visual/Radiography		-	-	-	16	-	0.68
Ozkan et al. (2017)	157	12-18	161 ^{surfaces}	2	Cav.Preparation	Visual/Radiography	4	-	-	-	54	100	0.77

nr-not reported

Table S3c Reproducibility/Reliability results of Systematic Literature Review for in vitro visual studies on proximal surfaces

Visual Examination	Study material			Diagnostics	Reproducibility/Reliability detection & diagnostic methods		
In vitro validation studies on proximal surfaces	Examiners (N)	Teeth (N)	Molars/PM (N)	Visual Criteria	Reproducibility/Reliability testing	Intraexaminer	Interexaminer
Peers et al. (1993)	1	240	-/-	nr	Cohen's Kappa	0.76	-
Haak et al. (2002)	14	160	-/-	6	Cohen's Kappa	0.41-0.46	-
Hintze et al. (2003)	2	373 ^{surfaces}	-/-	7	Cohen's Kappa	0.78	-
Silva Neto et al. (2008)	3	44	22/22	8	Cohen's Kappa	-	0.64
Peker et al. (2009)	3	48	-/-	10	nr	-	-
Mitropoulos et al. (2010)	2	20	-/-	2	Cohen's Kappa	-	0.51
Senel et al. (2010)	3	138	-/-	4	Cohen's Kappa	0.74-0.91	-
Ekstrand et al. (2011)	3	140*	-/-	2	Cohen's Kappa	0.87-0.94	0.85-0.87
Ko et al. (2015)	1	95	-/-	2	ICC	0.96	-
Neuhaus et al. (2015)	2	118	118/-	2	Cohen's Kappa	0.40-0.43	0.64
Bozdemir et al. (2016)	2	156 ^{surfaces}	-/-	9	Cohen's Kappa	-	0.55
Jan et al. (2016)	2	50*	-/-	2	nr	-	-
Abogazalah et al. (2019)	3	30 ^{surfaces}	-/-	2	ICC	0.79	0.72
Tonkaboni et al. (2019)	1	108 ^{surf}	-/-	2	nr	-	-

nr-not reported; *canines

Table S3d Reproducibility/Reliability results of Systematic Literature Review for in vivo visual studies on proximal surfaces

Visual Examination	Study material				Diagnostics	Reproducibility/Reliability detection & diagnostic methods		
In vivo validation studies on proximal surfaces	Patients (N)	Examiners (N)	Teeth (N)	Molars/PM (N)	Visual Criteria	Reproducibility/Reliability testing	Intraexaminer	Interexaminer
Hintze et al. (1998)	53	4	338 ^{surfaces}	163/176	3	Cohen's Kappa	-	0.40-0.50
Mialhe et al. (2003)	70	3	199 ^{surfaces}	-/-	3	Cohen's Kappa	0.79	-
Bin-Shuwaish et al. (2008)	21	1	51	-/-	1	nr	-	-
Kühnisch et al. (2016)	85	2	127 ^{surfaces}	46/81	2	nr	-	-
Ozkan et al. (2017)	157	2	161 ^{surfaces}	-/-	2	Cohen's Kappa	0.76/0.63	0.41

Table S3e Risk of bias assessment for visual examination of *in vitro* validation studies on proximal surfaces

Visual examination of <i>in vitro</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Peers et al. (1993)	x	?	?	■	?	+	■	?	+	?	+	?	■	■	?	?
Haak et al. (2002)	x	+	+	■	+	+	■	■	?	■	+	+	+	+	+	?
Hintze et al. (2003)	x	?	■	■	+	+	■	+	+	■	+	+	+	+	■	?
Silva Neto et al. (2008)	x	+	?	■	+	■	■	+	■	■	+	+	+	+	+	?
Peker et al. (2009)	x	?	+	■	+	+	■	+	■	+	+	+	+	+	?	■
Mitropoulos et al. (2010)	x	+	■	■	+	+	?	+	?	?	+	+	+	+	+	?
Senel et al. (2010)	x	?	?	■	+	?	■	+	?	■	+	+	+	+	+	+
Ekstrand et al. (2011)	x	■	+	■	+	+	+	+	+	+	+	+	+	+	+	+
Ko et al. (2015)	x	?	■	■	+	■	?	+	■	■	+	■	■	■	?	?
Neuhaus et al. (2015)	x	?	?	■	+	+	?	+	+	■	+	+	+	+	?	+
Bozdemir et al. (2016)	x	■	?	■	+	■	■	+	+	■	+	+	+	+	+	?
Jan et al. (2016)	x	+	+	+	+	+	+	+	+	?	+	+	+	+	+	■
Abogazalah et al. (2019)	x	■	■	+	+	+	+	+	+	+	+	+	+	+	+	+
Tonkaboni et al. (2019)	x	?	■	■	+	?	■	+	+	?	+	+	+	+	?	■

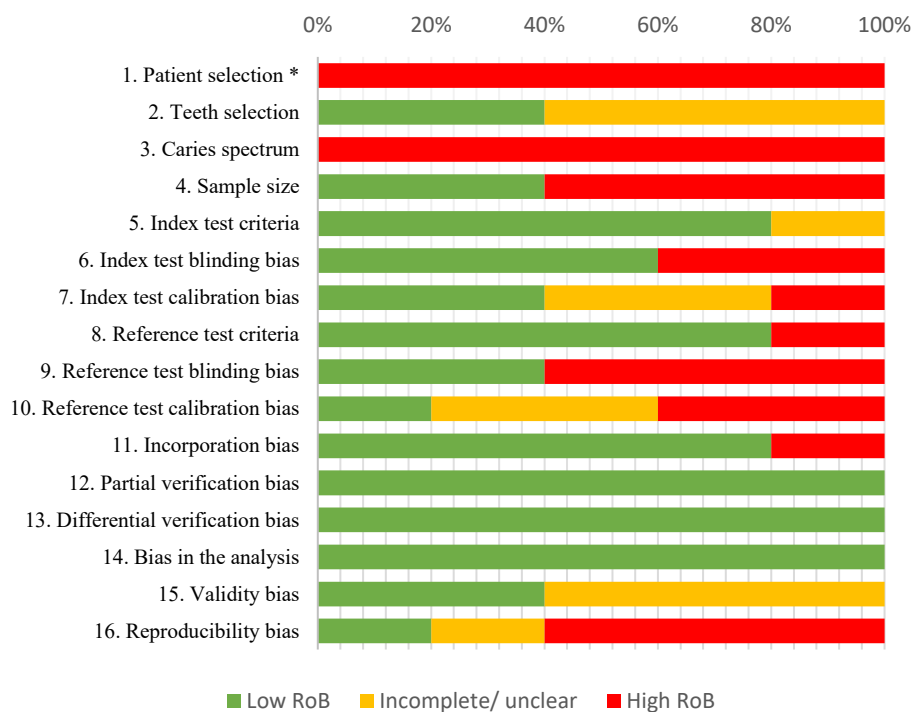
Legend: + = Low risk of bias (Yes); ■ = High risk of bias (Probably No, No); ? = Unclear (No information, Incomplete reporting, Probably Yes) x = Question for *in vivo* studies

Table S3f Risk of bias assessment for visual examination of in vivo validation studies on proximal surfaces

Visual examination of <i>in vivo</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Hintze et al. (1998)																
Mialhe et al. (2003)																
Bin-Shuwaish et al. (2008)																
Kühnisch et al. (2016)																
Ozkan et al. (2017)																

Legend: =Low risk of bias (Yes); =High risk of bias (No); =Unclear (No information, Incomplete reporting, Probably Yes, Probably No)

RISK OF BIAS IN IN VIVO CARIES DIAGNOSIS STUDIES WITH VISUAL EXAMINATION



RISK OF BIAS IN IN VITRO CARIES DIAGNOSIS STUDIES WITH VISUAL EXAMINATION

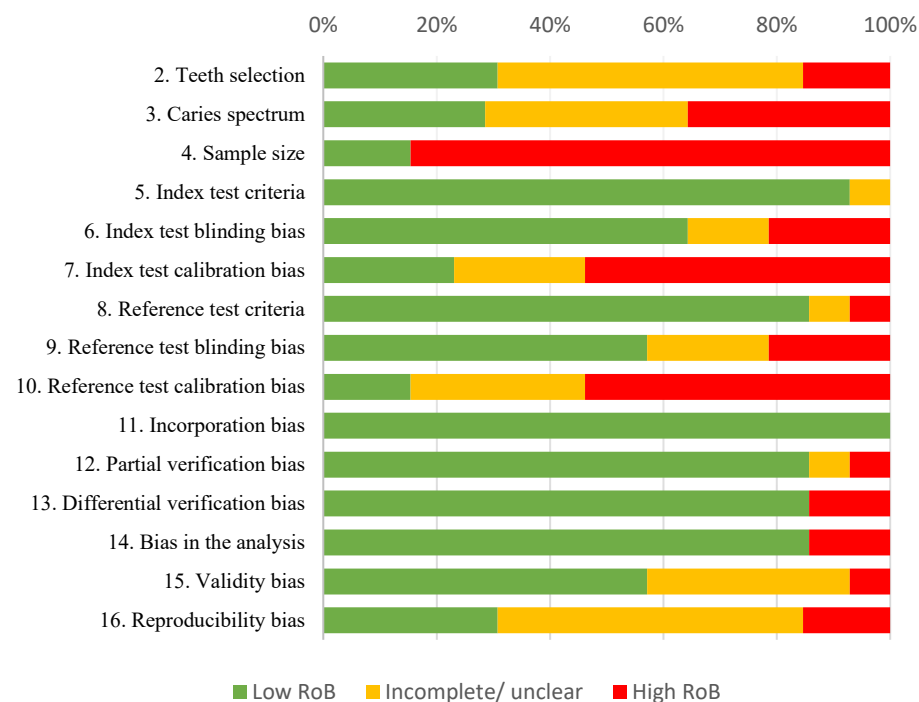


Figure S1 Risk of bias graph for in vivo and in vitro caries diagnostic studies with visual examination: review authors' judgements about each risk of bias item presented as percentages across all included studies

* Item no 1 (Patient selection bias) is only available for clinical diagnostic studies

Table S3g Studies assessed for inclusion in the meta-analysis- visual examination of in vitro validation studies on proximal surfaces

Studies selected in the 1 st round	ITC	RTC	Sample size and caries distribution				Cut-off	Status in the 2 nd round of selection	Reason for exclusion in the 2 nd round	Cross-tabulation given	SE	SP	Az	Status in the 3 th round of selection
			Total	S	E	D								
Hintze et al. 2003	7	2	373 ^{surf.}	208	113	52	Caries detection level	included		yes	-	-	-	included
Silva Neto et al. 2008	8	9	88 ^{surf}	24	46	18	Caries detection level	included		yes	65.6	83.3	-	included
Mitropoulos et al. 2010	2	2	40 ^{surf.}	16	6	18	Caries detection level	included		yes	96/92	50/63	0.73/0.77	included
							Dentin detection level	excluded	ITC not fitting Cut-off					excluded
Senel et al. 2010	4	4	276 ^{surf.}	142	40	94	Caries detection level	included		no	24*	92*	0.63-0.67	included
Ekstrand et al. 2011	2	5	151 ^{surf}	33	52	28/38 (outer 1/3 dentin)	Ekstrand outer 1/3 dentin	included		yes	93	84	-	included
Neuhaus et al. 2014	2	4	118 ^{surf}	38	45	35	Caries detection level	included		yes	33	84	-	included
							Dentin detection level	excluded	ITC not fitting Cut-off					excluded
Bozdemir et al. (2016)	9	3	156 ^{surf}	73	44	39	Caries detection level	included		no	32.5/ 31.3	94.5/ 95.9	0.75/0.78	included
							Dentin detection level	included		no	15.4/ 2.7	99.1/ 99.1	0.84/0.84	included
Jan et al. 2016	2	1	100 ^{surf}	40	47	13	Caries detection level	included		yes	73	65	0.68	included
Tonkaboni et al. 2019	2	1	108 ^{surf}	245	13	66	Caries detection level	included		yes	49	99	-	included
Abogazalah et al. 2018	2	6	30 ^{surf}	12	12	6	Caries detection level	included		no	89	83	0.90	included

ITC-Index test criteria, RTC- Reference test criteria, S-Sound, E-Caries in enamel, D- Caries in dentin, *calculated by us

Table S3h Studies assessed for inclusion in the meta-analysis- visual examination of in vivo validation studies on proximal surfaces

Studies selected in the 1 st round	ITC	RTC	Sample size and caries distribution				Cut-off	2 nd round of selection	Cross-tabulation given	SE	SP	Az	3 th round of selection
			Total	S	E	D							
Kühnisch et al. 2016	2	*	127 ^{surf}	0	0	127	Dentin detection level	included	yes	16	-	0.68	included
Ozkan et al. (2017)	2	4	161 ^{surf}	0	5	156	Dentin detection level	included	no	54	100	0.77	included

ITC-Index test criteria, RTC- Reference test criteria, S-Sound, E-Caries in enamel, D- Caries in dentin

Conventional Radiography

Table S4a Results of Systematic Literature Review for in vitro conventional radiography validation studies on proximal surfaces

Conventional bitewing radiography examination	Study material		Diagnostics	Validation methodology				Validity					
In vitro validation studies on proximal surfaces	Teeth (N)	Molars/PM (N)	Radiographic Criteria ¹	Hard tissue processing	Caries Staining	Visualisation /magnification	Scoring criteria ²	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
Mileman et al. (1990) ^{D-speed}	105 ^{surf}	-/-	18	Hemi/Slices	-	Micro radiography	nr	-	-	-	54	97	0.88
Kay et al. (1992) ^{unclear}	341 ^{surf}	-/-	19	Slices	-	Microscopy	1	-	-	-	26	96	-
Dove et al. (1992) ^{D-speed}	80	40/40	1	Slices	-	Microscopy	1	-	-	0.75	-	-	-
Russel et al. (1993) ^{E-speed}	120	-/-	1	Hemi/Slices	-	Microscopy	1	25	90	-	30	96	-
Russel et al. (1993) ^{D-speed}	120	-/-	1	Hemi/Slices	-	Microscopy	1	25	90	-	29	92	-
Peers et al. (1993) ^{D-speed}	240	-/-	11	Slices	-	Microscopy	nr	-	-	-	59	96	-
Hintze et al. (1994) ^{D-speed}	66	-/-	18	Slices	-	Microscopy	1	-	-	0.61	-	-	-
Hintze et al. (1994) ^{E-speed}	66	-/-	18	Slices	-	Microscopy	1	-	-	0.61	-	-	-
Hintze et al. (1996a) ^{D-speed}	116	-/-	18	Slices	-	Microscopy	3	-	-	0.56/0.69	-	-	-
Hintze et al. (1996a) ^{E-speed}	116	-/-	18	Slices	-	Microscopy	3	-	-	0.55	-	-	-
Hintze et al. (1996b) ^{E-speed}	130	-/-	18	Slices	-	Microscopy	1	-	-	0.61-0.88	-	-	-
Downer et al. (1996) ^{D-speed}	344 ^{surf}	-/-	19	Slices	-	Microscopy	1	-	-	-	0.5-52	92-99	-
Moystad et al. (1996) ^{E-speed}	50	25/25	18	Slices	-	Microscopy	17	-	-	0.69	-	-	0.79
Svanaes et al. (1996) ^{E-speed}	50	25/25	18	Hemisection	-	Microscopy	3	-	-	0.73	-	-	0.75
Ricketts et al. (1997) ^{D-speed}	180 ^{surf}	84/96	1	Slices	-	Microscopy	1	20-29	96-99	-	8-22	98-100	-
Ricketts et al. (1997) ^{E-speed}	180 ^{surf}	84/96	1	Slices	-	Microscopy	1	17-27	95-99	-	8-15	100	-
Ludlow et al. (1997) ^{D-speed}	64		18	Slices	-	Microscopy	9	-	-	-	-	-	-
Ludlow et al. (1997) ^{E-speed}	64		18	Slices	-	Microscopy	9	-	-	-	-	-	-
Ludlow et al. (1997) ^{F-speed}	64		18	Slices	-	Microscopy	9	-	-	-	-	-	-
Schneiderman et al. (1997) ^{E-speed}	50 ^{*,**}	14/12	nr	Slices/Groun	SvB ³ /Fuchsi n	Microscopy	nr	21	91	-	-	-	-
White et al. (1997) ^{E-speed}	320 ^{surf} ^{*,**}	80/80	18	Slices	-	Microscopy	1	43.2	88.8	-	49.6	97.1	-
Ariji et al. (1998) ^{E-speed}	118	-/-	1	Slices	-	Microscopy	1	30	88	-	34	98	-
Abreu et al. (1999) ^{E-speed}	40	20/20	18	Slices	-	Microscopy	9	-	-	-	-	-	-
Jessee et al. (1999) ^{D-speed}	26	-/-	1	Slices	-	Microscopy/Photo	1	-	-	-	-	-	-
Jessee et al. (1999) ^{E-speed}								-	-	-	-	-	-
Ludlow et al. (1999) ^{E-speed}	117 ^{urf}	-/-	18	Slices	-	Microscopy/Photo	9	-	-	-	-	-	0.75
Svanaes et al. (2000) ^{E-speed}	120	61/59	18	Slices	-	Microscopy	1	48	94	0.77	-	-	-
White et al. (2000) ^{E-speed}	80	-/-	18	Hemisection	-	Microscopy/Probin g	1	52/54	75/78	0.67/0.68	61/63	91/92	0.79/0.81
Abreu et al. (2001) ^{E-speed}	40	20/20	18	Slices	-	Microscopy	1	-	-	0.85	-	-	-

Conventional bitewing radiography examination	Study material		Diagnostics	Validation methodology				Validity					
In vitro validation studies on proximal surfaces	Teeth (N)	Molars/PM (N)	Radiographic Criteria ¹	Hard tissue processing	Caries Staining	Visualisation /magnification	Scoring criteria ²	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
Espelid et al. (2001) ^{D-speed}	24	2/22	18	Ground/Drill	-	Visually	3	-	-	-	-	-	0.82
Ludlow et al. (2001) ^{D-speed}	40	20/20	18	Slices	-	Microscopy	9	-	-	0.88	-	-	-
Ludlow et al. (2001) ^{E-speed}	40	20/20	18	Slices	-	Microscopy	9	-	-	0.85	-	-	-
Ludlow et al. (2001) ^{F-speed}	40	20/20	18	Slices	-	Microscopy	9	-	-	0.84	-	-	-
Nair et al. (2001) ^{E-speed}	46	-/-	18	Slices	-	Microscopy	9	71	86	0.76	80	89	-
Nair et al. (2001) ^{F-speed}	46	-/-	18	Slices	-	Microscopy	9	74	88	0.77	85	92	-
Hintze et al. (2002a) ^{E-speed}	190	159/31	18	Slices	-	Microscopy	4	-	-	0.69	-	-	-
Hintze et al. (2002b) ^{E-speed}	177	146/31	18	Slices	-	Microscopy	4	-	-	0.70	-	-	-
Hintze et al. (2002b) ^{F-speed}	177	146/31	18	Slices	-	Microscopy	4	-	-	0.67	-	-	-
Matsuda et al. (2002) ^{D-speed}	30	-/30	18	-	-	Micro-CT	nr	-	-	0.71	-	-	-
Mileman et al. (2002) ^{D-speed}	105 ^{surf}	-/-	18	Slices	-	Micro-radiography	nr	-	-	-	54/67.2	3.1/8.3	0.81/0.81
Wong et al. (2002) ^{D-speed}	40	-/-	17	Slices	-	Microscopy	nr	-	-	-	-	-	-
Wong et al. (2002) ^{E-speed}	40	-/-	17	Slices	-	Microscopy	nr	-	-	-	-	-	-
Hintze et al. (2003) ^{E-speed}	373 ^{surf}	304/57	6	Slices	-	Microscopy	2	-	-	-	-	-	-
Hintze et al. (2003) ^{E-speed}	60	60/-	6	Hemisection	-	Microscopy	2	-	-	-	-	-	-
Matalon et al. (2003) ^{E-speed}	36	-/-	1	Slices	-	Microscopy	3	-	-	-	90	92	0.93
Wojtowicz et al. (2003) ^{F-speed}	96	-/-	12	Slices	-	Microscopy	2	-	-	-	-	-	-
Khan et al. (2004) ^{F-speed}	45	17/28	18	Slices	-	Microscopy	9	-	-	0.73	-	-	-
De Araujo et al. (2005) ^{E-speed}	52	-/52	1	Slices	-	Microscopy	1	-	-	0.87-0.95	-	-	-
De Araujo et al. (2005) ^{F-speed}	52	-/52	1	Slices	-	Microscopy	1	-	-	0.76-0.95	-	-	-
Erten et al. (2005) ^{D-speed}	40	-/-	18	Slices	-	Microscopy	6	39	91	-	-	-	-
Erten et al. (2005) ^{E-speed}	40	-/-	18	Slices	-	Microscopy	6	48	88	-	-	-	-
Erten et al. (2005) ^{F-speed}	40	-/-	18	Slices	-	Microscopy	6	45	84	-	-	-	-
Gungor et al. (2005) ^{F-speed}	80	40/40	18	Hemisection	-	Microscopy	9	-	-	-	-	-	-
Gungor et al. (2005) ^{E-speed}	80	40/40	18	Hemisection	-	Microscopy	9	-	-	-	-	-	-
Khan et al. (2005) ^{E-speed}	40	20/20	18	Slices	-	Microscopy	9	-	-	0.85	-	-	-
Rocha et al. (2005) ^{unclear}	48	-/-	11	Slices	-	Microscopy	nr	65/71	93/100	-	-	-	-
Akdeniz et al. (2006) ^{F-speed}	30	16/14	nr	Slices	-	Microscopy	nr	-	-	-	-	-	-
Lussi et al. (2006) ^{F-speed}	75	75/-	1	Ground	-	Microscopy/Photo	1	68	67	-	45	89	-
Kalathingal et al. (2007) ^{unclear}	20	-/-	18	Slices	-	Microscopy	2	51	92	0.79	-	-	-
Alkurt et al. (2007) ^{E-speed}	48	24/24	18	Hemisection	fuchsin	Microscopy	5	-	-	0.81/0.84	-	-	-
Alkurt et al. (2007) ^{F-speed}	48	24/24	18	Hemisection	fuchsin	Microscopy	5	-	-	0.79/0.80	-	-	-
Castro et al. (2007) ^{E-speed}	174	-/-	nr	Slices	-	Microscopy	nr	-	-	0.77	-	-	-
Peker et al. (2007) ^{E-speed}	48	24/24	18	Hemisection	fuchsin	Microscopy	5	-	-	0.84	-	-	-
Wenzel et al. (2007b) ^{F-speed}	80	40/40	13	Slices	-	Microscopy	5	18	92	-	-	-	-
Silva Neto et al. (2008) ^{E-speed}	44	22/22	8	Slices/Groun	-	Microscopy	9	30	96	-	-	-	-

Conventional bitewing radiography examination	Study material		Diagnostics	Validation methodology				Validity					
In vitro validation studies on proximal surfaces	Teeth (N)	Molars/PM (N)	Radiographic Criteria ¹	Hard tissue processing	Caries Staining	Visualisation /magnification	Scoring criteria ²	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
Forner-Navarro et al. (2008) D-speed	192	-/-	1	Abrasion	-	Photomicroscope	1	14/18	91/98	-	5/3	100/96	-
Haïter Neto et al. (2008) F-speed	80	40/40	18+9	Slices	-	Microscopy	3	18	92	-	-	-	-
Rockenbach et al. (2008) F-speed	75	51/24	12	Hemisection	-	Microscopy	4	55.6	67.9	0.62	-	-	-
Peker et al. (2009) F-speed	48	-/-	1	Slices	-	Microscopy	16	-	-	0.77/0.80	-	-	-
Mitropoulos et al. (2010) F-speed	20	8/12	9	Slices	-	Microscopy	2	45/50	100/93	0.73/0.72	61/61	100/90	0.74/0.74
Pontual et al. (2010) F-speed	80	40/40	9	Slices	-	Microscopy	2	16	92	-	-	-	-
Senel et al. (2010) E-speed	138	-/-	6	Slices	-	Scanner	4	-	-	0.70-0.76	-	-	-
Bottenberg et al. (2011) D-speed	116 ^{surf}	-/-	2	Slices/Groun	-	Microscopy/Photo	1	82-93	11-21	0.52/0.54	-	-	-
Bottenberg et al. (2011) F-speed	116 ^{surf}	-/-	2	Slices/Groun	-	Microscopy/Photo	1	85-92	2-22	0.50/0.53	-	-	-
Ekstrand et al. (2011) F-speed	140*	-/-	3	Slices	-	Microscopy	5	-	-	-	-	-	-
Kayipmaz et al. (2011) E-speed	72	27/45	18	Slices	-	Microscopy	1	-	-	0.78	-	-	-
Zhang et al. (2011) E-speed	78 ^{surf}	-/-	18	Slices	-	Microscopy	2	-	-	0.54	-	-	-
Abesi et al. (2012) E-speed	66 ^{surf}	-/-	6	Slices	-	Microscopy	4	55	100	-	-	-	-
Astvaldsdottr et al. (2012) E-speed	56	-/56	1	Slices	-	Microscopy/M-rad	1	13-60	56-100	0.56-0.65	27-53	91-100	0.65-0.92
Kamburoglu et al. (2012) F-speed	80	-/-	18	Slices	-	Microscopy	4	69-84	94-99	0.83-0.92	-	-	-
Minston et al. (2013) E-speed	46	-/-	18	Slices	-	Microscopy	3	-	-	0.52/0.56	-	-	0.74/0.78
Pontual et al. (2013) F-speed	160 ^{surf}	-/-	18	Slices	-	Microscopy	3	-	-	0.51-0.63	-	-	-
De Souza et al. (2014) F-speed	51**	-/-	1	Slices	Rhodamine B	Microscopy	1	57	96	0.77	51	96	0.83
Krzyzostaniak et al. (2014) F-speed	135	68/67	4	Slices	-	Microscopy	6	-	-	0.67	-	-	-
Zayet et al. (2014) E-speed	75	-/-	1	Slices	-	Microscopy	1	90/90	63.3/66.7	0.80/0.72	100/100	46.2/44.2	-
Neuhaus et al. (2015) F-speed	118	118/-	7	Ground	-	Microscopy/Photo	4	23	86	0.80	27	94	0.65
Safi et al. (2015) E-speed	42	-/-	21	Slices	-	Microscopy	4	31.8	95.4	-	-	-	-
Jan et al. (2016) F-speed	50*	-/-	6	Slices	-	Microscopy	1	27	88	0.57	-	-	-
Melo et al. (2015) F-speed	20	10/10	18	Slices	-	Microscopy	3	-	-	0.49-0.63	-	-	-
Dehghani et al. (2017) E-speed	50	16/34	18	Slices	-	Microscopy	1	16.6	82.9	0.71/ 0.68	-	-	-
Tonkaboni et al. (2019) F-speed	108 ^{surf}	-/-	1	Slices	-	Microscopy	1	53	100	-	-	-	-

¹See Table S1b; ²See Table S1e; nr-not reported *canines; **incisors

Table S4b Results of Systematic Literature Review for in vivo conventional radiography validation studies on proximal surfaces

Conventional bitewing radiography examination	Study material			Diagnostics	In vivo validation methodology			Validity					
In vivo validation studies on proximal surfaces	Patients (N)	Age (years)	Teeth (N)	Radiographic Criteria	Histology technique	Validation	Reference method	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
Hintze et al. (1996b) ^{E-speed}	nr	nr	130	18	Histo prep	<i>in vivo</i>	1	-	-	0.69-0.7	-	-	-
Hintze et al. (1998) ^{E-speed}	53	20-38	338 ^{surfaces}	4	nr	Tooth separation	3	-	-	-	41	99.9	-
Mialhe et al. (2003) ^{E-speed}	70	13-15	199 ^{surfaces}	4	nr	Tooth separation	3	-	-	-	-	-	-
Shimada et al. (2014) ^{E-speed}	53	21-64	86 ^{surfaces}	16	Cav.Preparation	Visual/Radiograph	5	-	-	-	35	91	0.63

nr-not reported

Table S4c Reproducibility/Reliability results of Systematic Literature Review for in vitro conventional bitewing studies on proximal surfaces

Conventional bitewing radiography examination	Study material			Diagnostics	Reproducibility/Reliability detection & diagnostic methods		
In vitro validation studies on proximal surfaces	Examiners (N)	Teeth (N)	Molars/PM (N)	Radiographic Criteria	Reproducibility/Reliability testing	Intraexaminer	Interexaminer
Mileman et al. (1990)	276	105	-/-	18	Cohen's Kappa	-	0.53
Kay et al. (1992)	20	341 ^{surfaces}	-/-	19	nr	-	-
Dove et al. (1992)	8	80	40/40	1	nr	-	-
Russel et al. (1993)	3	120	-/-	1	nr	-	-
Peers et al. (1993)	1	240	-/-	11	Cohen's Kappa	0.79	-
Hintze et al. (1994)	3	66	-/-	18	nr	-	-
Hintze et al. (1996a)	3	116	-/-	18	nr	-	-
Hintze et al. (1996a)	3	116	-/-	18	nr	-	-
Hintze et al. (1996b)	4	130	-/-	18	nr	-	-
Downer et al. (1996)	8	344 ^{surf}	-/-	19	nr	-	-
Moystad et al. (1996)	10	50	25/25	18	nr	-	-
Svanaes et al. (1996)	10	50	25/25	18	nr	-	-
Ricketts et al. (1997)	5	180 ^{surf}	84/96	1	ANOVA	-	-
Ludlow et al. (1997)	6	64		18	nr	-	-
Schneiderman et al. (1997)	5	50	14/12	nr	nr	-	-
White et al. (1997)	16	160 ^{surfaces}	80/80	18	nr	-	-
Ariji et al. (1998)	6	118	-/-	1	nr	-	-
Abreu et al. (1999)	8	40	20/20	18	ICC	0.74	0.60
Jessee et al. (1999)	8	26	-/-	1	nr	-	-
Ludlow et al. (1999)	6	122 ^{surf}	-/-	18	nr	-	-
Svanaes et al. (2000)	9	120	61/59	18	nr	-	-
White et al. (2000)	12	80	-/-	18	nr	-	-
Abreu et al. (2001)	6	40	20/20	18	nr	-	-
Espelid et al. (2001)	240	24	2/22	18	Cohen's Kappa	-	0.74
Ludlow et al. (2001)	6	40	20/20	18	ANOVA	-	-
Nair et al. (2001)	8	46	-/-	18	Cohen's Kappa	0.66	0.42
Hintze et al. (2002a)	4	190	159/31	18	nr	-	-
Hintze et al. (2002b)	4	177	143/31	18	nr	-	-
Matsuda et al. (2002)	3	30	-/30	18	nr	-	-
Mileman et al. (2002)	259	105 ^{surfaces}	-/-	18	nr	-	-
Wong et al. (2002)	6	40	-/-	17	nr	-	-
Hintze et al. (2003)	2	220 ^{surfaces}	-/-	6	Cohen's Kappa	0.76	-
Hintze et al. (2003)	2	26 ^{surfaces}	-/-	6	Cohen's Kappa	0.94	-
Matalon et al. (2003)	7	36	-/-	1	nr	-	-
Wojtowicz et al. (2003)	94	96	-/-	12	nr	-	-
Khan et al. (2004)	9	45	17/28	18	nr	-	-
De Araujo et al. (2005)	4	52	-/52	1	nr	-	-

Conventional bitewing radiography examination	Study material			Diagnostics	Reproducibility/Reliability detection & diagnostic methods		
In vitro validation studies on proximal surfaces	Examiners (N)	Teeth (N)	Molars/PM (N)	Radiographic Criteria	Reproducibility/Reliability testing	Intraexaminer	Interexaminer
Erten et al.(2005)	3	40	-/-	18	Spearman's rho test	-	-
Gungor et al. (2005)	3	80	-/-	18	Gama Values	-	-
Khan et al. (2005)	4	40	20/20	18	nr	-	-
Rocha et al. (2005)	14	48	-/-	12	Cohen's Kappa	0.51-0.55	-
Akdeniz et al. (2006)	2	30	16/14	nr	Bland Altman	-	-
Lussi et al. (2006)	5	75	75.-	1	Cohen's Kappa	-	-
Kalathingal et al. (2007)	8	20	-/-	18	Cohen's Kappa	-	0.46
Alkurt et al. (2007)	2	48	24/24	18	ANOVA	-	-
Castro et al. (2007)	7	174	-/-	nr	Pearson corr. coeff./ Kendall	-0.02	0.43
Peker et al. (2007)	2	48	24/24	18	nr	-	-
Wenzel et al. (2007b)	6	80	40/40	5	nr	-	-
Silva Neto et al. (2008)	3	44	22/22	8	Cohen's Kappa	-	0.64
Forner-Navarro et al. (2008)	1	192	-/-	1	Cohen's Kappa	0.98	-
Haider Neto et al. (2008)	6	80	40/40	18+9	nr	-	-
Rockenbach et al. (2008)	1	75	51/24	12	Kendall's test	0.85	-
Peker et al. (2009)	3	48	-/-	1	nr	-	-
Mitropoulos et al. (2010)	2	20	-/-	9	Cohen's Kappa	-	0.67
Pontual et al. (2010)	17	80	40/40	9	nr	-	-
Senel et al. (2010)	3	138	-/-	6	Cohen's Kappa	0.83-0.89	-
Bottenberg et al. (2011)	3	116 ^{surfaces}	-/-	1	Cohen's Kappa	0.72-0.80	-
Ekstrand et al. (2011)	3	140*	-/-	3	Cohen's Kappa	0.62-0.81	0.56-0.60
Kayipmaz et al. (2011)	2	72	27/45	18	nr	-	-
Zhang et al. (2011)	7	78 ^{surfaces}	-/-	18	Paired t test	-	-
Abesi et al. (2012)	4	66 ^{surfaces}	-/-	6	nr	-	-
Astvaldsdottr et al. (2012)	8	56	-/56	1	Cohen's Kappa	0.82	0.63-0.78
Kamburoglu et al. (2012)	3	80	-/-	18	Cohen's Kappa	0.88-0.96	0.71-0.74
Minston et al. (2013)	20	46	-/-	18	nr	-	-
Pontual et al. (2013)	6	160 ^{surfaces}	-/-	18	nr	-	-
De Souza et al. (2014)	2	51**	-/-	1	Cohen's Kappa	0.68/0.90	0.69
Krzyzostaniak et al. (2014)	2	135	68/67	4	nr	-	-
Zayet et al. (2014)	6	75	-/-	1	Cohen's Kappa	0.76-0.79	0.75-0.78
Neuhaus et al. (2015)	2	120	120/-	7	Cohen's Kappa	0.68-0.73	0.66
Safi et al. (2015)	4	42	-/-	21	nr	-	-
Jan et al. (2016)	2	50*	-/-	6	nr	-	-
Melo et al. (2015) ^{F-speed}	3	20	10/10	18	Cohen's Kappa	-	-
Dehghani et al. (2017)	2	50	16/34	18	nr	-	-
Tonkaboni et al. (2019)	1	108 ^{surf}	-/-	1	nr	-	-

nr-not reported; *canines; **incisors

Table S4d Reproducibility/Reliability results of Systematic Literature Review for in vivo conventional bitewing studies on proximal surfaces

Conventional bitewing radiography examination	Study material				Diagnostics	Reproducibility/Reliability detection & diagnostic methods		
In vivo validation studies on proximal surfaces	Patients (N)	Examiners (N)	Teeth (N)	Molars/PM (N)	Radiographic Criteria	Reproducibility/Reliability testing	Intraexaminer	Interexaminer
Hintze et al. (1996b)	nr	4	130	123/7	18	nr	-	-
Hintze et al. (1998)	53	4	338 ^{surfaces}	163/176	4	Cohen's Kappa	-	0.48-0.65
Mialhe et al. (2003)	70	3	199 ^{surfaces}	-/-	4	Cohen's Kappa	0.85	-
Shimada et al. (2014)	53	5	86 ^{surfaces}	-/-	16	nr	-	-

nr-not reported

Table S4e Risk of bias assessment for conventional bitewing radiography of *in vitro* validation studies on proximal surfaces

Conventional bitewing of <i>in vitro</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Mileman et al. (1990)	x	?	?	+	+	+	+	+	+	+	+	+	+	+	?	?
Kay et al. (1992)	x	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Dove et al. (1992)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Russel et al. (1993)	x	?	+	+	+	+	+	+	+	+	+	+	+	+	?	?
Peers et al. (1993)	x	?	?	+	?	+	+	?	+	?	+	?	+	+	?	?
Hintze et al. (1994)	x	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Downer et al. (1996)	x	?	+	+	+	+	?	+	+	?	+	+	+	+	?	+
Hintze et al. (1996a)	x	?	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Hintze et al. (1996b)	x	+	+	+	+	+	?	+	?	+	+	+	+	+	?	+
Moystad et al. (1996)	x	+	?	+	+	?	?	+	+	+	+	+	+	+	?	+
Svanaes et al. (1996)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	?	+
Ricketts et al. (1997)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	?	+
Ludlow et al. (1997)	x	+	+	+	+	+	+	+	?	+	+	+	+	+	+	+
Schneiderman et al. (1997)	x	+	+	+	+	+	?	+	+	+	+	+	+	+	+	+
White et al. (1997)	x	+	+	+	+	+	+	+	?	+	+	+	+	+	?	+
Ariji et al. (1998)	x	?	+	+	+	?	+	+	?	+	+	+	+	+	?	+
Abreu et al. (1999)	x	+	+	+	+	+	?	+	+	+	+	+	+	+	?	+
Jessee et al. (1999)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Ludlow et al. (1999)	x	+	?	+	+	+	+	+	?	+	+	+	+	+	?	+
Svanaes et al. (2000)	x	+	?	+	+	+	+	+	?	+	+	+	+	+	?	+

Conventional bitewing of <i>in vitro</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
White et al. (2000)	x	+	?	-	-	+	-	+	?	-	+	+	+	+	?	-
Abreu et al.(2001)	x	+	+	-	-	+	?	+	?	-	+	+	+	+	?	-
Espelid et al. (2001)	x	-	-	-	-	+	-	+	+	-	+	+	+	+	?	-
Ludlow et al. (2001)	x	+	+	-	-	+	?	+	?	-	+	+	+	+	?	-
Nair et al. (2001)	x	?	-	-	-	+	?	+	?	-	+	+	+	+	?	+
Hintze et al. (2002a)	x	+	-	-	-	+	-	+	+	?	+	+	+	+	?	-
Hintze et al. (2002b)	x	+	-	-	-	?	-	+	?	-	+	+	+	+	?	-
Matsuda et al. (2002)	x	-	-	-	-	+	-	-	-	-	+	+	+	+	?	-
Mileman et al. (2002)	x	?	-	-	-	+	-	-	+	-	+	+	+	+	+	-
Wong et al. (2002)	x	+	+	-	+	+	-	?	+	-	+	+	+	+	?	-
Hintze et al. (2003)	x	?	-	-	+	+	-	+	+	-	+	+	+	+	-	?
Matalon et al. (2003)	x	?	?	-	+	+	-	+	+	-	+	+	+	+	?	-
Wojtowiec et al. (2003)	x	?	+	-	+	+	-	-	+	-	+	+	+	+	-	-
Khan et al. (2004)	x	+	+	-	-	+	-	+	+	-	?	+	+	+	?	-
De Araujo et al. (2005)	x	-	+	-	+	-	+	+	-	-	+	+	+	+	?	-
Erten et al. (2005)	x	?	?	-	-	+	-	+	-	-	+	+	+	+	?	?
Gungor et al. (2005)	x	+	?	-	-	+	-	+	+	-	+	+	+	+	?	?
Khan et al. (2005)	x	+	+	-	-	+	?	+	+	-	+	+	+	+	?	-
Setti da Rocha et al. (2005)	x	-	-	-	-	+	-	-	-	-	?	+	+	+	?	?
Akdeniz et al. (2006)	x	+	?	-	-	-	-	-	-	-	+	+	+	+	-	-

Conventional bitewing of <i>in vitro</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Kalathingal et al. (2007)	x	?	?	+	+	+	?	+	+	?	+	+	+	+	?	?
Lussi et al. (2006)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Alkurt et al. (2007)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	?
Castro et al. (2007)	x	?	?	+	+	+	+	+	?	+	+	+	+	+	?	?
Peker et al. (2007)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	?	+
Wenzel et al. (2007b)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Silva Neto et al. (2008)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	+	?
Forner-Navarro et al. (2008)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Haiter Neto et al. (2008)	x	+	+	+	+	+	+	+	+	?	+	+	+	+	?	+
Rockenbach et al. (2008)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	?
Peker et al. (2009)	x	?	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Mitropoulos et al. (2010)	x	+	+	+	+	+	?	+	+	?	+	+	+	+	+	?
Pontual et al. (2010)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	+	?
Senel et al. (2010)	x	?	?	+	+	?	+	+	?	+	+	+	+	+	+	+
Bottenberg et al. (2011)	x	?	?	+	+	?	+	+	+	+	+	+	+	+	+	+
Ekstrand et al. (2011)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Kayipmaz et al. (2011)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Zhang et al. (2011)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	?
Abesi et al. (2012)	x	?	?	+	+	+	+	+	+	+	+	+	+	+	+	+
Astvaldsdottir et al. (2012)	x	?	?	+	+	+	+	+	+	?	+	+	+	+	+	+
Kamburoglu et al. (2012)	x	?	+	+	+	+	+	+	+	+	+	+	+	+	?	+

Conventional bitewing of <i>in vitro</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Minston et al. (2013)	x	?	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Pontual et al. (2013)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
De Souza et al. (2014)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Krzyzostaniak et al. (2014)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Zayet et al. (2014)	x	?	?	+	+	+	+	+	+	+	+	+	+	+	+	+
Neuhaus et al. (2015)	x	?	?	+	+	+	?	+	+	+	+	+	+	+	?	+
Safi et al. (2015)	x	?	?	+	+	+	+	+	+	+	+	+	+	+	+	+
Jan et al. (2016)	x	+	+	+	+	+	+	+	+	?	+	+	+	+	+	+
Melo et al. (2015)	x	+	+	+	+	+	+	+	?	?	+	+	+	+	?	?
Dehghani et al. (2017)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+
Tonkaboni et al. (2019)	x	?	+	+	+	?	+	+	+	?	+	+	+	+	?	+

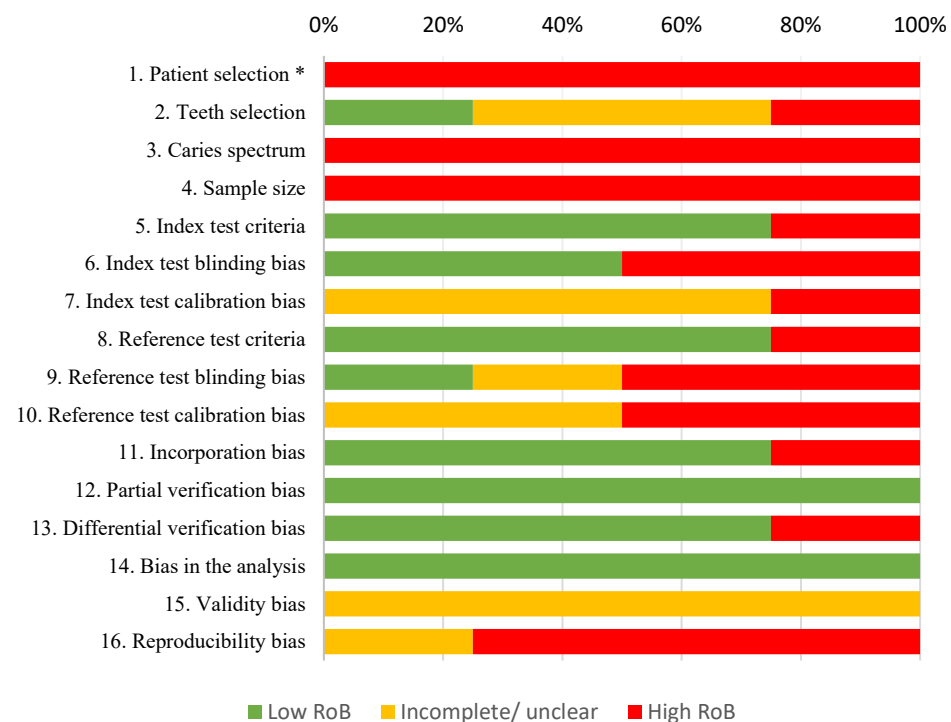
Legend: + = Low risk of bias (Yes); + = High risk of bias (Probably No, No); ? = Unclear (No information, Incomplete reporting, Probably Yes) x = Question for in vivo studies

Table S4f Risk of bias assessment for conventional bitewing radiography of *in vivo* validation studies on proximal surfaces

Conventional bitewing of <i>in vivo</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Hintze et al. (1996b)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Hintze et al. (1998)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Mialhe et al. (2003)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Shimada et al. (2014)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Legend: + = Low risk of bias (Yes); - = High risk of bias (Probably No, No); ? = Unclear (No information, Incomplete reporting, Probably Yes)

RISK OF BIAS IN IN VIVO CARIES DIAGNOSIS STUDIES WITH CONVENTIONAL BW RADIOGRAPHY



RISK OF BIAS IN IN VITRO CARIES DIAGNOSIS STUDIES WITH CONVENTIONAL BW RADIOGRAPHY

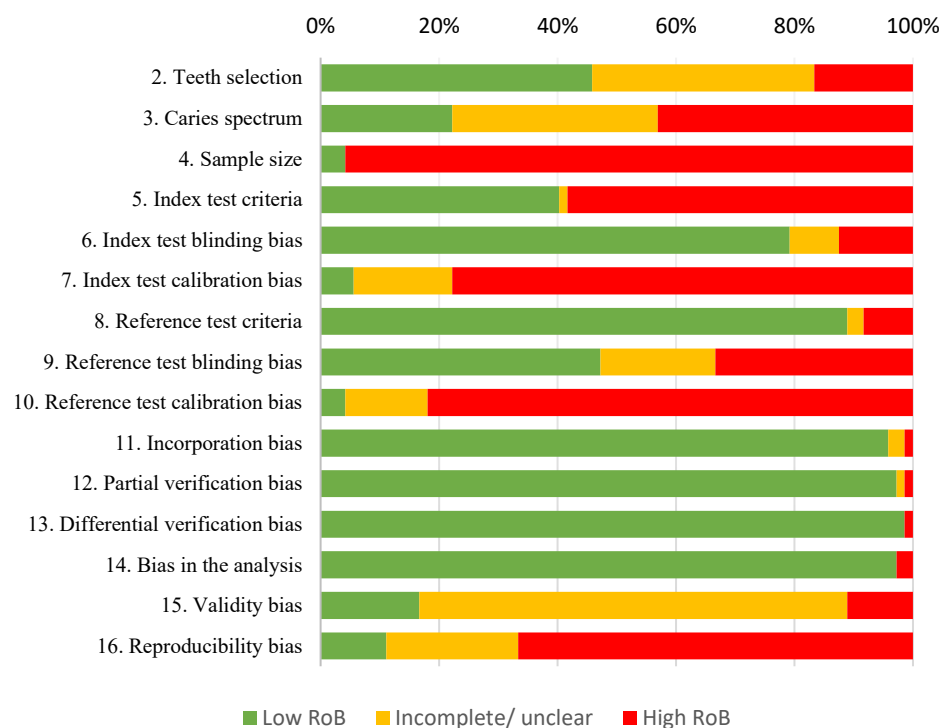


Figure S2 Risk of bias graph for in vivo and in vitro caries diagnostic studies with conventional bitewing radiography: review authors' judgements about each risk of bias item presented as percentages across all included studies

* Item no 1 (Patient selection bias) is only available for clinical diagnostic studies

Table S4g Studies assessed for inclusion in the meta-analysis- conventional bitewing radiography of in vitro validation studies on proximal surfaces

Studies that passed 1 st round of selection	ITC	RTC	Sample size and caries distribution				Radiogr. mode	Cut-off	2 nd round of selection	Cross-tabulation given	SE	SP	Az	3 th round of selection
			Total	S	E	D								
Russel et al. 1993	1	1	120 ^{teeth}				E-speed	Caries detection level	included	no	25	90	-	excluded
							E-speed	Dentin detection level	included	no	30	96	-	
							D-speed	Caries detection level	included	no	26	90	-	
							D-speed	Dentin detection level	included	no	29	92	-	
Ricketts et al. 1997	1	1	180 ^{surf}	111	45	24	E-speed	Caries detection level	included	no	17-27	95-99	-	included
							E-speed	Dentin detection level	included	no	8-15	100	-	
							D-speed	Caries detection level	included	no	20-29	96-99	-	
							D-speed	Dentin detection level	included	no	8-22	98-100	-	
Ariji et al. (1998)	1	1	236 ^{surf}	54	86	96	E-speed	Caries detection level	included	no	30	88	-	included
								Dentin detection level	included	no	34	98	-	
Matalon et al. 2003	1	3	36 ^{surf}	14	0	22	E-speed	Dentin detection level	included	no	90	92	0.93	included
Hintze et al. 2003	6	2	373 ^{surf}	208	113	52	E-speed	Caries detection level	included	yes	-	-	-	included
Lussi et al. 2006	1	1	150 ^{surf}	61	52	37	F-speed	Caries detection level	included	no	68	67	-	included
								Dentin detection level	included	no	45	89	-	
Wenzel et al. 2007b	13	5	160 ^{surf}	101	50	9	F speed	Caries detection level	included	no	18	92	-	included
Silva Neto et al. 2008	8	9	88 ^{surf}	24	46	18	E-speed	Caries detection level	included	yes	30	96	-	included
Rockenbach et al. 2008	12	4	100 ^{surf}	28	49	23	F-speed	Caries detection level	included	no	55.6	67.9	0.62	included
Forner-Navarro et al. 2008	1	1	384 ^{surf}	-	-	-	D-speed	Caries detection level	included	no	14/18	91/98	-	excluded
								Dentin detection level	included	no	5/3	100/96	-	
Pontual et al. 2010	9	2	152 ^{surf}	88	64	-	F-speed	Caries detection level	included	no	16	92	-	excluded
Mitropoulos et al. 2010	9	2	40 ^{surf}	16	6	18	F-speed	Caries detection level	included	yes	45/50	100/93	0.73/0.72	Included
								Dentin detection level	included	yes	61/61	100/90	0.74/0.74	excluded

Senel et al. 2010	6	4	276 ^{surf.}	142	40	94	E-speed	Caries detection level	included	no	-	-	0.70-0.76	included
Bottenberg et al. 2011	2	1	116 ^{surf.}	61	55	-	F-speed	Caries detection level	included	no	85-92	2-22	0.50-0.53	excluded
							D-speed	Caries detection level	included	no	82-93	11-21	0.52-0.54	
Astvaldsdottr et al. 2012	1	1	97 ^{surf.}	34	48	15	E-speed	Caries detection level	included	no	13-60	56-100	0.56-0.65	included
								Dentin detection level	included	no	27-53	91-100	0.65-0.92	
Abesi et al. 2012	6	4	66 ^{surf}	46	13	7	E-speed	Caries detection level	included	no	55	100		included
De Souza et al. 2014	1	1	102 ^{surf}	53	14	35	F-speed	Caries detection level	included	no	57	96	0.77	included
								Dentin detection level	included	no	51	96	0.83	
Zayet et al. (2014)	1	1	150 ^{surf}	80	22	48	E-speed	Caries detection level	included	no	90/90	63.3/66.7	0.80/0.72	included
								Dentin detection level	included	no	100/100	46.2/44.2	-	
Neuhaus et al. 2015	7	4	118 ^{surf}	38	45	35	F speed	Caries detection level	included	yes	23	86	0.80	included
								Dentin detection level	included	yes	27	94	0.65	
Safi et al. (2015)	21	4	84 ^{surf}	54	11	19	E speed	Caries detection level	included	yes	31.8	95.4	-	included
Jan et al. 2016	6	1	100 ^{surf}	40	47	13	F speed	Caries detection level	included	yes	27	88	0.57	included
Krzyostaniak et al. 2014	4	6	270 ^{surf}	157	74	39	F-speed	Caries detection level	included	no	-	-	0.67	excluded
Ekstrand et al. 2011	3	5	151 ^{surf}	33	52	28/38 (outer 1/3 dentin)	F-speed	Ekstrand outer 1/3 dentin	included	yes	54	100	-	included
Tonkaboni et al. 2019	1	1	108 ^{surf}	245	13	66	F-speed	Caries detection level	included	yes	53	100	-	included

ITC-Index test criteria, RTC- Reference test criteria, S-Sound, E-Caries in enamel, D- Caries in dentin

Table S4h Studies assessed for inclusion in the meta-analysis- visual examination of in vivo validation studies on proximal surfaces

Studies selected in the 1 st round	ITC	RTC	Sample size and caries distribution				Cut-off	2 nd round of selection	Cross-tabulation given	SE	SP	Az	3 th round of selection
			Total	S	E	D							
Shimada et al. et 2014	5	16	86 ^{surf}	28	25	33	Dentin detection level	included	no	35	91	0.63	included

ITC-Index test criteria, RTC- Reference test criteria, S-Sound, E-Caries in enamel, D- Caries in dentin

Digital Radiography

Table S5a Results of Systematic Literature Review for in vitro digital radiography validation studies on proximal surfaces

Digital bitewing radiography examination	Study material		Diagnostics	Validation methodology				Validity					
In vitro validation studies on proximal surfaces	Teeth (N)	Molars/ PM (N)	Radiographic Criteria ¹	Hard tissue processing	Caries Staining	Visualisation /magnification	Scoring criteria ²	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
Hintze et al. (1994) ^{sensor}	66	-/-	18	Slices	-	Microscopy	1	-	-	0.54	-	-	-
Wenzel et al. (1995) ^{phosph. plate}	116	-/-	18	Slices	-	Microscopy	3	-	-	0.58-0.68	-	-	-
Wenzel et al. (1995) ^{sensor}	116	-/-	18	Slices	-	Microscopy	3	-	-	0.42-0.7	-	-	-
Moystad et al. (1996) ^{phosph. plate}	50	25/25	18	Slices	-	Microscopy	17	-	-	0.78	-	-	0.79
Svanaes et al. (1996) ^{phosph. plate}	50	25/25	18	Hemisection	-	Microscopy	3	-	-	0.72	-	-	0.68
Huysmans et al. (1997) ^{phosph. plate}	220	-/-	18	Slices	-	Stereomicroscopy	1	26-33	93-95	0.61-0.69	-	-	-
White et al. (1997) ^{sensor}	320 ^{surf}	80/80	18	Slices	-	Microscopy	1	34.2	91.5-	-	-	-	-
Ariji et al. (1998) ^{sensor}	118	-/-	1	Slices	-	Microscopy	1	29	87	-	35	96	-
Wenzel et al. (1999) ^{phosph. plate}	230 ^{surf}	-/-	18	Slices/Groun	-	Microscopy	3	-	-	0.60-0.71	-	-	-
Abreu et al. (1999) ^{sensor}	40	20/20	18	Slices	-	Microscopy	9	-	-	0.77	-	-	-
Svanaes et al. (2000) ^{phosph. plate}	120	61/59	18	Slices	-	Microscopy	1	48	94	0.77	-	-	-
Abreu et al. (2001) ^{sensor}	40	20/20	18	Slices	-	Microscopy	1	-	-	0.82-0.84	-	-	-
Nair et al. (2001) ^{sensor}	46	-/-	18	Slices	-	Microscopy	9	69	85	0.73	82	88	-
Hintze et al. (2002a) ^{phosph. plate}	190	159/31	18	Slices	-	Microscopy	4	-	-	0.64-0.69	-	-	-
Hintze et al. (2002b) ^{sensor}	177	146/31	18	Slices	-	Microscopy	4	-	-	0.64-0.71	-	-	-
Li et al. (2002) ^{sensor}	40	-/-	18	Hemi/Slices	-	Microscopy	3	-	-	0.57	-	-	0.84
Matsuda et al. (2002) ^{sensor}	30	-/30	18	-	-	Micro-CT	nr	-	-	0.66-0.78	-	-	-
Wenzel et al. (2002) ^{sensor}	363 ^{surf}	-/-	10	Slices	-	Microscopy	3	22-58	85-99	-	-	-	-
Haak et al. (2003) ^{sensor}	160	-/-	13	Slices	-	Microscopy	10	38	93	-	33	95	-
Moystad et al. (2003) ^{phosph. plate}	120	61/59	18	Hemisection	-	Microscopy	1	-	-	0.84	-	-	-
Pabla et al. (2003) ^{phosph. plate}	41	22/19	18	Slices	-	Microscopy	9	-	-	0.86	-	-	-
Jacobsen et al. (2004) ^{sensor}	177	-/-	nr	Slices	-	Microscopy	nr	-	-	-	-	-	-
Jacobsen et al. (2004) ^{phosph. plate}	177	-/-	nr	Slices	-	Microscopy	nr	-	-	-	-	-	-
De Araujo et al. (2005) ^{Sensor}	52	-/52	1	Slices	-	Microscopy	1	-	-	0.74-0.88	-	-	-
Khan et al. (2005) ^{sensor}	40	20/20	18	Slices	-	Microscopy	9	-	-	0.80	-	-	-
Rocha et al. (2005) ^{sensor}	48	-/-	11	Slices	-	Microscopy	nr	56-71	86-100	-	-	-	-
Haak et al. (2005) ^{sensor}	320 ^{surf}	-/-	13	Slices	-	Microscopy	11	-	-	0.69	-	-	0.74
Akdeniz et al. (2006) ^{phosph.plate}	30	16/14	nr	Slices	-	Microscopy	nr	-	-	-	-	-	-

Digital bitewing radiography examination	Study material		Diagnostics	Validation methodology				Validity					
In vitro validation studies on proximal surfaces	Teeth (N)	Molars/PM (N)	Radiographic Criteria ¹	Hard tissue processing	Caries Staining	Visualisation /magnification	Scoring criteria ²	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
Kutcher et al. (2006) ^{phosp.plate}	40	19/21	18	Slices	-	Microscopy	9	43-54	0.97-0.98	0.79-0.87	-	-	-
Berkhout et al.(2007) ^{phosp.plate}	65	0/65	9	Slices	-	Microscopy	2	-	-	-	-	-	-
Berkhout et al. (2007) ^{sensor}	65	0/65	9	Slices	-	Microscopy	2	-	-	-	-	-	-
Haiter-Neto et al. (2007) ^{Phosp. plate}	80	40/40	18	Slices	new!	Microscopy		15/22	91/85	-	-	-	-
Haiter-Neto et al. (2007) ^{sensor}	80	40/40	18	Slices	new!	Microscopy		19/23	90/90	-	-	-	-
Castro et al. (2007) ^{sensor}	174	-/-	20	Slices	-	Microscopy	nr	-	-	0.73	-	-	-
Li et al. (2007) ^{) phosp.plate}	90	-/90	18	Slices	-	Microscopy	2	-	-	0.71/0.76	-	-	0.78/0.83
Peker et al. (2007) ^{Sensor}	48	24/24	18	Hemisection	fuchsin	Microscopy	5	-	-	0.79	-	-	-
Wenzel et al. (2007a) ^{phosph plate}	80	40/40	14	Slices	-	Microscopy	4	-	-	-	-	-	-
Wenzel et al. (2007a) ^{Sensor}	80	40/40	14	Slices	-	Microscopy	4	-	-	-	-	-	-
Wenzel et al. (2007b) ^{phosph plate}	80	40/40	13	Slices	-	Microscopy	5	16-26	85-94	-	-	-	-
Wenzel et al. (2007b) ^{Sensor}	80	40/40	13	Slices	-	Microscopy	5	19-20	92-93	-	-	-	-
Forner-Navarro et al. (2008) ^{Sensor}	192	-/-	1	Abrasion	-	Photomicroscope	1	17/20	85/80	-	5/7	95/90	-
Haiter Neto et al. (2008) ^{phosph plate}	80	40/40	18+9	Slices	-	Microscopy	3	17	91	-	-	-	-
Li et al. (2008) ^{phosp.plate}	72 ^{surf}	72/-	18	Slices	-	Microscopy	14	-	-	0.60-0.74	-	-	-
Rockenbach et al. (2008) ^{Phosphor plate}	75	51/24	12	Hemisection	-	Microscopy	4	51.4-56.9	75-85.7	-	-	-	-
Schulte et al. (2008) ^{Sensor}	30	-/30	1	Slices/Groun	-	Photography	?	-	-	-	46-53	96-100	-
Schulte et al. (2008) ^{Phosphor plate}	30	-/30	1	Slices/Groun	-	Photography	?	-	-	-	27-53	96-100	-
Schulze et al. (2008) ^{Sensor}	100	44/23	18	Slices	-	Microscopy	4	15	91	-	19	91	-
Haiter Neto et al. (2009) ^{phosph plate}	80	40/40	22	Slices	-	Microscopy	3	29	86	-	-	-	-
Hellen-Halme et al. (2009) ^{Sensor}	100	60/40	18	Slices	-	Microscopy	14	-	-	0.60/0.61	-	-	0.71/0.73
Isidor et al. (2009) ^{Phosphor plate}	80	40/40	14	Slices	-	Microscopy	13	13-17	93-96	-	-	-	-
Peker et al. (2009) ^{Sensor}	48	-/-	1	Slices	-	Microscopy	16	-	-	0.76/0.79	-	-	-
Shi et al. (2009) ^{Sensor}	130	-/130	18	Hemi/Slices	-	Microscopy	1	-	-	0.61	-	-	0.82
Shi et al. (2009) ^{Phosphor plate}	130	-/130	18	Hemi/Slices	-	Microscopy	1	-	-	0.67	-	-	0.83
Young et al. (2009) ^{Sensor}	100 ^{surf}	-/-	-	-	-	Micro-CT	1	-	-	0.18-0.96	-	-	0.33-0.96
Booshehry et al. (2010) ^{Sensor}	102 ^{surf}	-/-	22	Slices	-	Microscopy	15	66.7	60	-	-	-	-
Hellen-Halme et al. (2010) ^{Sensor}	100	60/40	18	Slices	-	Microscopy	14	-	-	0.60	-	-	0.76
Li et al. (2010) ^{Phosphor plate}	35	19/16	18	Slices	-	Microscopy	2	-	-	0.57	-	-	-
Mitropoulos et al. (2010) ^{Sensor}	20	8/12	9	Slices	-	Microscopy	2	46/50	100/94	0.73/0.72	52/50	87/81	0.76/0.74

Digital bitewing radiography examination	Study material		Diagnostics	Validation methodology				Validity					
In vitro validation studies on proximal surfaces	Teeth (N)	Molars/PM (N)	Radiographic Criteria ¹	Hard tissue processing	Caries Staining	Visualisation /magnification	Scoring criteria ²	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
Pontual et al. (2010) phosphor plate	80	40/40	9	Slices	-	Microscopy	2	14-16	89-94	-	-	-	-
Senel et al. (2010) Sensor	138	-/-	6	Slices	-	Scanner	4	-	-	0.75-0.78	-	-	-
Senel et al. (2010) phosphor plate	138	-/-	6	Slices	-	Scanner	4	-	-	0.80-0.81	-	-	-
Behere et al. (2011) Sensor	100 ^{surf}	-/-	10	Slices	-	Photography	3	33	96	-	100	96	-
Bottenberg et al. (2011) Sensor	116 ^{surf}	-/-	2	Slices/Groun	-	Microscopy/Photo	1	85-95	9-40	0.53-0.58	-	-	-
Hellen-Halme et al. (2011) Sensor	100	60/40	18	Slices	-	Microscopy	14	-	-	0.60/0.59	-	-	0.67/0.71
Kayipmaz et al.(2011) Phosphor plate	72	27/45	18	Slices	-	Microscopy	1	-	-	0.68	-	-	-
Zhang et al. (2011) phosphor plate	78 ^{surf}	-/-	18	Slices	-	Microscopy	2	-	-	0.52	-	-	-
Abesi et al. (2012) sensor	66 ^{surf}	-/-	6	Slices	-	Microscopy	4	15	96	-	-	-	-
Abesi et al. (2012) phosph. plate	66 ^{surf}	-/-	6	Slices	-	Microscopy	4	23	98	-	-	-	-
Astvaldsdottr et al. (2012) sensor	56	-/56	1	Slices	-	Microscopy/M-rad	1	22-64	74-100	0.52-0.71	40-60	92-100	0.78-0.98
Cheng et al. (2012) phosph. plate	45	-/-	18	Slices	-	Microscopy	7	-	-	0.59	-	-	-
Pakkala et al. (2012) phosph. plate	80	40/40	9	Slices	-	Microscopy	?	16-25	89-95	0.64-0.67	-	-	-
Minston et al. (2013) sensor	46	-/-	18	Slices	-	Microscopy	3	-	-	0.52/0.55	-	-	0.73/0.74
Pontual et al. (2013) sensor	160 ^{surf}	-/-	18	Slices	-	Microscopy	3	-	-	0.51-0.62	-	-	-
Pontual et al. (2013) phosph. plate	160 ^{surf}	-/-	18	Slices	-	Microscopy	3	-	-	0.49-0.59	-	-	-
Krzymosianiak et al. (2014) phosph. plate	135	68/67	4	Slices	-	Microscopy	6	-	-	0.67	-	-	-
Zayet et al. (2014) phosph. plate	75	-/-	1	Slices	-	Microscopy	1	90/90	55/70	0.73/0.83	100/100	48.1/44.2	-
Ko et al. (2015) sensor	95	-/-	1	Slices	-	Microscopy	1	71	89	0.80	50	94	0.72
Melo et al. (2015) phosph. plate	20	10/10	18	Slices	-	Microscopy	3	-	-	0.49-0.55	-	-	-
Miri et al. (2015) sensor	80	-/80	18	Slices	hematoxylin/ eosin	Microscopy		-	-	-	72.5	90	80.9
Vivek et al. (2015) phosph. plate	50	-/-	6	Slices	-	Microscopy	4	81	74	0.85	-	-	-
Barbosa et al. (2015) phosph. plate	40	20/20	18	Slices	-	Microscopy	3	-	-	-	-	-	-
Abdinian et al. (2015) phosph. plate	100*	-/-	18	Slices	-	Microscopy	4	74.1	91.6	0.80	-	-	-
Safi et al. (2015) phosph. plate	42	-/-	21	Slices	-	Microscopy	4	56.8	94.9	-	-	-	-
Bozdemir et al. (2016) phosph. plate	156	-/-	10	Slices	-	Microscopy	3	32.5/36.1	97.3/95.9	0.65/0.66	28.2/28.2	99.1/98.3	0.74/0.73
Milosavljevic (2016) sensor	100	60/40	18	Slices	-	Microscopy	14	-	-	0.55-0.61	-	-	0.63-0.70
Dehghani et al. (2017) phosph. plate	50	16/34	18	Slices	-	Microscopy	1	27.7/44.4	76.6/78.0	0.70/0.68	-	-	-
Dehghani et al. (2017) sensor	50	16/34	18	Slices	-	Microscopy	1	5.5	82.9/73.1	0.69/0.61	-	-	-

Digital bitewing radiography examination	Study material		Diagnostics	Validation methodology				Validity					
In vitro validation studies on proximal surfaces	Teeth (N)	Molars/PM (N)	Radiographic Criteria ¹	Hard tissue processing	Caries Staining	Visualisation /magnification	Scoring criteria ²	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
Ghoncheh et al. (2017) ^{phosph. plate}	52	26/26	18	Slices	-	Microscopy	10	30.68	-	-	80.63	90.24	-
Nascimento et al. (2018) ^{sensor}	40	20/20	18	-	-	Micro-CT	3	45	84	0.67	-	-	-
Adibi et al. (2018) ^{phosph. plate}	240 ^{surf}	-/-	18	Slices	-	Microscopy	12	36.5-37.7	96.3-97.1	0.83-0.88	-	-	-

¹See Table S1b; ²See Table S1e; nr-not reported *canines; **incisors

Table S5b Results of Systematic Literature Review for in vivo digital radiography validation studies on proximal surfaces

Digital bitewing radiography examination	Study material			Diagnostics	In vivo validation methodology			Validity					
In vivo validation studies on proximal surfaces	Patients (N)	Age (years)	Teeth (N)	Radiographic Criteria	Histology technique	Validation	Reference method	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
Huth et al. (2010) ^{sensor}	117	8-54	117	1	Cav.Preparation	Visual/Radiography	1	-	-	-	-	-	-
Li et al. (2010) ^{phosph. plate}	11	nr	35	18	Histo preparation	<i>in vivo</i>	2	-	-	0.60	-	-	-
Kühnisch et al. (2016) ^{sensor}	85	25	127	1	Cav.Preparation	Visual/Radiography		-	-	-	96	-	0.98
Baltacioglu et al. (2017) ^{phosph. plate}	26	28.1-32.4	52 (32)	18	Cav.Preparation	Visually	nr	-	-	-	-	-	0.63-0.87
Jablonski- Momeni et al. (2017) ^{sensor}	18	29.5	193 ^{surfaces}	9	nr	Tooth separation	2	-	-	-	-	-	-
Menem et al. (2017) ^{sensor}	30	18-37	90 ^{surfaces}	6	nr	Tooth separation	3	55	93	0.81			
Ozkan et al. (2017) ^{phosph. plate}	157	12-18	161 ^{surfaces}	8	Cav.Preparation	Visual/Radiography	4	-	-	-	83	60	71

nr-not reported

Table S5c Reproducibility/Reliability results of Systematic Literature Review for in vitro digital bitewing studies on proximal surfaces

Digital bitewing radiography examination	Study material			Diagnostics	Reproducibility/Reliability detection & diagnostic methods		
In vitro validation studies on proximal surfaces	Examiners (N)	Teeth (N)	Molars/PM (N)	Radiographic Criteria	Reproducibility/Reliability testing	Intraexaminer	Interexaminer
Hintze et al. (1994)	2	66	-/-	18	nr	-	-
Wenzel et al. (1995)	6	116	-/-	18	nr	-	-
Moystad et al. (1996)	10	50	25/25	18	nr	-	-
Svanaes et al. (1996)	10	50	25/25	18	nr	-	-
Huysmans et al. (1997)	3	220	-/-	18	Cohen's Kappa	-	0.53-0.69
White et al. (1997)	16	160 ^{surfaces}	80/80	18	nr	-	-
Ariji et al. (1998)	6	118	-/-	1	nr	-	-
Wenzel et al. (1999)	5	230 ^{surfaces}	-/-	18	nr	-	-
Abreu et al. (1999)	8	40	20/20	18	ICC	0.67	0.54
Svanaes et al. (2000)	9	120	61/59	18	nr	-	-
Abreu et al. (2001)	6	40	20/20	18	nr	-	-
Nair et al. (2001)	8	46	-/-	18	Cohen's Kappa	0.66	0.42
Hintze et al. (2002a)	4	190	159/31	18	nr	-	-
Hintze et al. (2002b)	4	177	143/31	18	nr	-	-
Li et al. (2002)	10	40	-/-	18	nr	-	-
Matsuda et al. (2002)	3	30	-/30	18	nr	-	-
Wenzel et al. (2002)	4	363 ^{surfaces}	-/-	10	nr	-	-
Haak et al. (2003)	5	160	-/-	13	nr	-	-
Moystad et al. (2003)	7	120	61/59	18	nr	-	-
Pabla et al. (2003)	7	41	22/19	18	nr	-	-
Jacobsen et al. (2004)	4	177	-/-	nr	nr	-	-
De Araujo et al. (2005)	4	52	-/52	1	nr	-	-
Khan et al. (2005)	4	40	20/20	18	nr	-	-
Rocha et al. (2005)	14	48	-/-	11	Cohen's Kappa	0.38-0.54	-
Haak et al. (2005)	5	320 ^{surf}	-/-	13	nr	-	-
Akdeniz et al. (2006)	2	30	16/14	nr	Bland Altman	-	-
Kutcher et al. (2006)	6	40	19/21	18	nr	-	-
Berkhout et al. (2007)	5	65	0/65	9	nr	-	-
Haiter-Neto et al. (2007)	8	80	40/40	18	nr	-	-
Castro et al. (2007)	7	174	-/-	20	Pearson corr. coeff./ Kendall's	-0.02	0.43
Peker et al. (2007)	2	48	24/24	18	nr	-	-
Wenzel et al. (2007a)	8	80	40/40	14	nr	-	-
Wenzel et al. (2007b)	6	80	40/40	5	nr	-	-
Forner-Navarro et al. (2008)	1	192	-/-	1	Cohen's Kappa	0.98	-
Haiter Neto et al. (2008)	6	80	40/40	18+9	nr	-	-
Li et al. (2008)	10	72 ^{surf}	72/-	18	nr	-	-
Rockenbach et al. (2008)	1	75	51/24	12	Kendall's test	0.79-0.86	-

Digital bitewing radiography examination	Study material			Diagnostics	Reproducibility/Reliability detection & diagnostic methods		
In vitro validation studies on proximal surfaces	Examiners (N)	Teeth (N)	Molars/PM (N)	Radiographic Criteria	Reproducibility/Reliability testing	Intraexaminer	Interexaminer
Schulte et al. (2008) ^{Sensor}	4	30	-/30	?	Cohen's Kappa	0.47-0.57	-
Schulte et al. (2008) ^{Phosphor plate}	4	30	-/30	?	Cohen's Kappa	0.47-0.57	-
Schulze et al. (2008)	10	100	44/23	18	Cohen's Kappa	0.33-0.52	0.35-0.40
Haider Neto et al. (2009)	6	80	40/40	22	nr	-	-
Hellen-Halme et al. (2009)	7	100	60/40	18	Cohen's Kappa	0.30-0.66	-
Isidor et al. (2009)	7	80	40/40	14	nr	-	-
Peker et al. (2009)	3	48	-/-	1	nr	-	-
Shi et al (2009)	7	130	-/130	18	nr	-	-
Young et al. (2009)	8	100 ^{surf}	-/-	nr	nr	-	-
Booshehry et al. (2010)	3	102 ^{surf}	-/-	22	Cohen's Kappa	-	0.33-0.70
Hellen-Halme et al. (2010)	7	100	60/40	18	Cohen's Kappa	0.63	-
Li et al. (2010)	6	35	19/16	18	nr	-	-
Mitropoulos et al. (2010)	2	20	-/-	9	Cohen's Kappa	-	0.72
Pontual et al. (2010)	17	80	40/40	9	nr	-	-
Senel et al. (2010) ^{sensor}	3	138	-/-	6	Cohen's Kappa	0.79-0.86	-
Senel et al. (2010) ^{phosphor plate}	3	138	-/-	6	Cohen's Kappa	0.81-0.88	-
Behere et al. (2011)	3	100 ^{surfaces}	-/-	10	Cohen's Kappa	-	-
Bottenberg et al. (2011)	3	116 ^{surfaces}	-/-	2	Cohen's Kappa	0.72-0.80	-
Hellen-Halme et al. (2011)	7	100	60/40	18	Cohen's Kappa	0.85	-
Kayipmaz et al. (2011)	2	72	27/45	18	nr	-	-
Zhang et al. (2011)	7	78 ^{surfaces}	-/-	18	paired t test	-	-
Abesi et al. (2012) ^{sensor}	4	66 ^{surfaces}	-/-	6	nr	-	-
Abesi et al. (2012) ^{phosphor plate}	4	66 ^{surfaces}	-/-	6	nr	-	-
Astvaldsdottr et al. (2012)	8	56	-/56	1	Cohen's Kappa	0.79	0.67-0.78
Cheng et al. (2012)	8	45	-/-	18	nr	-	-
Pakkala et al. (2012)	2	80	40/40	9	nr	-	-
Minston et al. (2013)	20	46	-/-	18	nr	-	-
Pontual et al. (2013) ^{sensor}	6	160 ^{surfaces}	-/-	18	nr	-	-
Pontual et al. (2013) ^{phosphor plate}	6	160 ^{surfaces}	-/-	18	nr	-	-
Krzyzostaniak et al. (2014)	2	135	68/67	4	nr	-	-
Zayet et al. (2014)	6	75	-/-	1	Cohen's Kappa	0.79/0.81	0.80/0.77
Ko et al. (2015)	1	95	-/-	1	ICC	0.88	-
Melo et al. (2015)	3	20	10/10	18	Cohen's Kappa	-	-
Miri et al. (2015)	4	80	-/80	18	nr	-	-
Vivek et al. (2015)	1	50	-/-	6	nr	-	-
Barbosa et al. (2015)	36	40	20/20	18	nr	-	-
Abdinian et al. (2015)	2	100*	-/-	18	Cohen's Kappa	-	-
Safi et al. (2015)	4	42	-/-	21	nr	-	-
Bozdemir et al. (2016)	2	156 ^{surfaces}	-/-	10	Cohen's Kappa	-	0.75

Digital bitewing radiography examination	Study material			Diagnostics	Reproducibility/Reliability detection & diagnostic methods		
In vitro validation studies on proximal surfaces	Examiners (N)	Teeth (N)	Molars/PM (N)	Radiographic Criteria	Reproducibility/Reliability testing	Intraexaminer	Interexaminer
Milosavljevic (2016)	7	100	60/40	18	Cohen's Kappa	0.14-0.54	-
Dehghani et al. (2017)	2	50	16/34	18	nr	-	-
Ghoncheh et al. (2017)	4	52	26/26	18	nr	-	-
Nascimento et al. (2018)	5	40	20/20	18	Cohen's Kappa	0.72	0.46
Adibi et al. (2018)	2	240 ^{surfaces}	-/-	18	Cohen's Kappa	0.81-0.95	0.77-0.85

Table S5d Reproducibility/Reliability results of Systematic Literature Review for in vivo digital bitewing studies on proximal surfaces

Digital bitewing radiography examination	Study material				Diagnostics	Reproducibility/Reliability detection & diagnostic methods		
In vivo validation studies on proximal surfaces	Patients (N)	Examiners (N)	Teeth (N)	Molars/PM (N)	Radiographic Criteria	Reproducibility/Reliability testing	Intraexaminer	Interexaminer
Huth et al. (2010)	117	4	117	-/-	1	Cohen's Kappa	0.73-0.89	0.74-0.84
Li et al. (2010)	11	6	35	19/16	18	nr	-	-
Kühnisch et al. (2016)	85	2	127	81/45	1	nr	-	-
Baltacioglu et al. (2017)	26	2	52 (32)	-/-	18	Cohen's Kappa	0.55/0.65	0.62/0.67
Jablonski- Momeni et al. (2017)	18	3	193 ^{surfaces}	95/98	9	nr	-	-
Menem et al. (2017)	30	1	90 ^{surfaces}	63/27	6	Cohen's Kappa	0.81	-
Ozkan et al. (2017)	157	2	161 ^{surfaces}	-/-	2	Cohen's Kappa	0.38/0.63	0.35

nr-not reported

Table S5e Risk of bias assessment for digital bitewing radiography of in vitro validation studies on proximal surfaces

Digital bitewing of <i>in vitro</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Hintze et al. (1994)	x	?	-	-	-	+	-	+	-	-	+	+	+	+	?	-
Wenzel et al. (1995)	x	?	?	-	-	+	-	+	+	-	+	+	+	+	-	-
Moystad et al. (1996)	x	+	?	-	-	?	?	+	-	-	+	+	+	+	?	-
Svanaes et al. (1996)	x	+	?	-	-	+	-	+	-	-	+	+	+	+	?	-
Huysmans et al. (1997)	x	-	-	-	-	+	-	+	-	-	+	+	+	+	?	?
White et al. (1997)	x	-	+	-	-	+	-	+	?	-	+	+	+	+	?	-
Ariji et al. (1998)	x	?	-	-	+	?	-	+	?	-	+	+	+	+	?	-
Wenzel et al. (1999)	x	?	-	-	-	?	-	+	?	-	+	+	+	+	?	-
Abreu et al. (1999)	x	+	-	-	-	-	-	+	+	-	+	+	+	+	-	-
Svanaes et al. (2000)	x	+	-	-	-	+	-	+	?	-	+	+	+	+	?	-
Abreu et al. (2001)	x	+	+	-	-	+	?	+	?	-	+	+	+	+	?	-
Nair et al. (2001)	x	?	-	-	-	+	?	+	?	-	+	+	+	+	?	+
Hintze et al. (2002a)	x	+	-	-	-	+	-	+	+	?	+	+	+	+	?	-
Hintze et al. (2002b)	x	+	-	-	-	+	-	+	+	-	+	+	+	+	?	-
Li et al. (2002)	x	-	-	-	-	+	-	+	?	-	+	+	+	+	?	-
Matsuda et al. (2002)	x	-	-	-	-	+	-	-	-	-	+	+	+	+	?	-
Wenzel et al. (2002)	x	?	-	-	+	-	-	+	-	-	+	+	+	+	?	-
Haak et al. (2003)	x	+	?	-	+	+	-	+	?	-	+	+	+	?	+	-
Moystad et al. (2003)	x	+	-	-	-	+	-	+	-	-	+	+	+	+	?	-

Digital bitewing of <i>in vitro</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Pabla et al. (2003)	x	+	-	-	-	+	-	+	+	-	+	+	+	+	?	-
Jacobsen et al. (2004)	x	?	-	-	-	?	-	-	?	-	+	-	+	+	-	-
De Araujo et al. (2005)	x	-	+	-	+	-	+	+	-	-	+	+	+	+	?	-
Khan et al. (2005)	x	+	+	-	-	+	?	+	+	-	+	+	+	+	?	-
Rocha et al. (2005)	x	-	-	-	-	+	-	-	-	-	?	+	+	+	?	?
Haak et al. (2005)	x	?	-	-	+	+	-	+	+	-	+	+	+	+	?	-
Akdeniz et al. (2006)	x	+	?	-	-	-	-	-	-	-	+	+	+	+	-	-
Kutcher et al. (2006)	x	+	-	-	-	+	-	+	+	-	+	+	+	+	?	-
Berkhout et al. (2007)	x	-	+	-	+	-	-	+	-	-	+	+	+	+	-	-
Haïter-Neto et al. (2007)	x	+	+	-	-	-	-	+	?	-	+	+	+	+	?	-
Castro et al. (2007)	x	?	?	-	-	+	-	+	?	-	+	+	+	+	?	?
Li et al. (2007)	x	-	-	-	-	+	-	+	+	-	+	+	+	+	?	-
Peker et al. (2007)	x	+	?	-	-	-	-	+	-	-	+	+	+	+	?	-
Wenzel et al. (2007a)	x	+	-	-	+	+	-	+	+	-	+	+	+	+	?	-
Wenzel et al. (2007b)	x	+	-	-	+	+	-	+	+	-	+	+	+	+	?	-
Forner-Navarro et al. (2008)	x	+	-	+	+	-	-	+	-	-	+	+	+	+	?	-
Haïter Neto et al. (2008)	x	+	+	-	-	+	-	+	+	?	+	+	+	+	?	-
Li et al. (2008)	x	-	-	-	-	+	-	+	+	-	+	+	+	+	?	-
Rockenbach et al. (2008)	x	+	-	-	+	+	-	+	+	-	+	+	+	+	?	?
Schulte et al. (2008)	x	-	+	-	+	+	-	?	-	-	+	+	+	+	?	?

Digital bitewing of <i>in vitro</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Schulze et al. (2008)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	?	+
Haider Neto et al. (2009)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	?	+
Hellen-Halme et al. (2009)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	?
Isidor et al. (2009)	x	+	?	+	+	+	?	+	+	+	+	+	+	+	?	+
Peker et al. (2009)	x	?	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Shi et al. (2009)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	?	+
Young et al. (2009)	x	?	+	+	+	+	?	+	+	+	+	+	+	+	?	+
Booshehry et al. (2010)		+	?	+	+	+	+	+	+	+	+	+	+	+	?	?
Hellen-Halme et al. (2010)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	?
Li et al. (2010)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Mitropoulos et al. (2010)	x	+	+	+	+	+	?	+	?	?	+	+	+	+	+	?
Pontual et al. (2010)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	+	?
Senel et al. (2010)	x	?	?	+	+	?	+	+	?	+	+	+	+	+	+	+
Behere et al. (2011)	x	?	+	+	+	+	?	+	+	+	+	+	+	+	?	?
Bottenberg et al. (2011)	x	?	?	+	+	+	+	+	+	+	+	+	+	+	+	+
Hellen-Halme et al. (2011)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	?
Kayipmaz et al. (2011)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Zhang et al. (2011)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	?
Abesi et al. (2012)	x	?	?	+	+	+	+	+	+	+	+	+	+	+	+	+
Astvaldsdottir et al. (2012)	x	?	?	+	+	+	+	+	+	?	+	+	+	+	+	+

Digital bitewing of <i>in vitro</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Cheng et al. (2012)	x	?	?	+	+	+	+	+	+	?	+	+	+	+	?	+
Pakkala et al. (2012)	x	+	?	+	+	?	?	?	?	+	+	+	+	+	+	+
Minston et al. (2013)	x	?	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Pontual et al. (2013)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+
Krzyzostaniak et al. (2014)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Zayet et al. (2014)	x	?	?	+	+	+	+	+	+	+	+	+	+	+	+	+
Ko et al. (2015)	x	?	+	+	+	+	?	+	+	+	+	+	+	+	?	?
Melo et al. (2015)	x	+	+	+	+	+	+	+	?	?	+	+	+	+	?	?
Miri et al. (2015)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Vivek et al. (2015)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Barbosa et al. (2015)	x	+	+	+	+	+	?	+	+	?	+	+	+	+	?	+
Abdinian et al. (2015)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	+	?
Safi et al. (2015)	x	?	?	+	+	+	+	+	+	+	+	+	+	+	+	+
Bozdemir et al. (2016)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	+	?
Milosavljevic (2016)	x	+	+	+	+	+	?	+	+	+	+	+	+	+	?	?
Dehghani et al. (2017)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+
Ghoncheh et al. (2017)	x	+	?	+	+	+	+	+	+	+	+	+	+	+	?	+
Nascimento et al. (2018)	x	+	+	+	+	+	+	?	+	+	+	+	+	+	+	+
Adibi et al. (2018)	x	?	?	+	+	+	?	+	+	?	+	+	+	+	+	+

Legend: + = Low risk of bias (Yes); + = High risk of bias (Probably No, No); ? = Unclear (No information, Incomplete reporting, Probably Yes) x = Question for in vivo studies

Table S5f Risk of bias assessment for digital bitewing radiography of in vivo validation studies on proximal surfaces

Digital bitewing of <i>in vivo</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Huth et al. (2010)	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Li et al. (2010)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Kühnisch et al. (2016)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Baltacioglu et al. (2017)	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Jablonski- Momeni et al. (2017)	?	+	+	+	+	+	?	+	+	+	+	+	+	+	+	+
Menem et al. (2017)	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ozkan et al. (2017)	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Legend: + = Low risk of bias (Yes); + = High risk of bias (Probably No, No); ? = Unclear (No information, Incomplete reporting, Probably Yes)

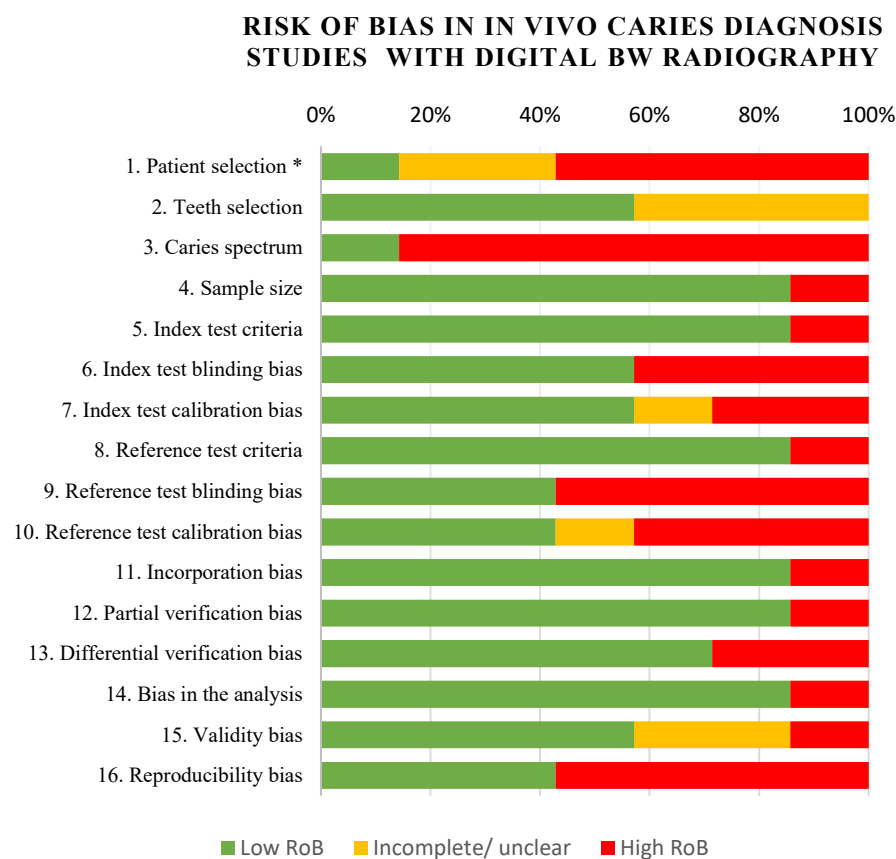
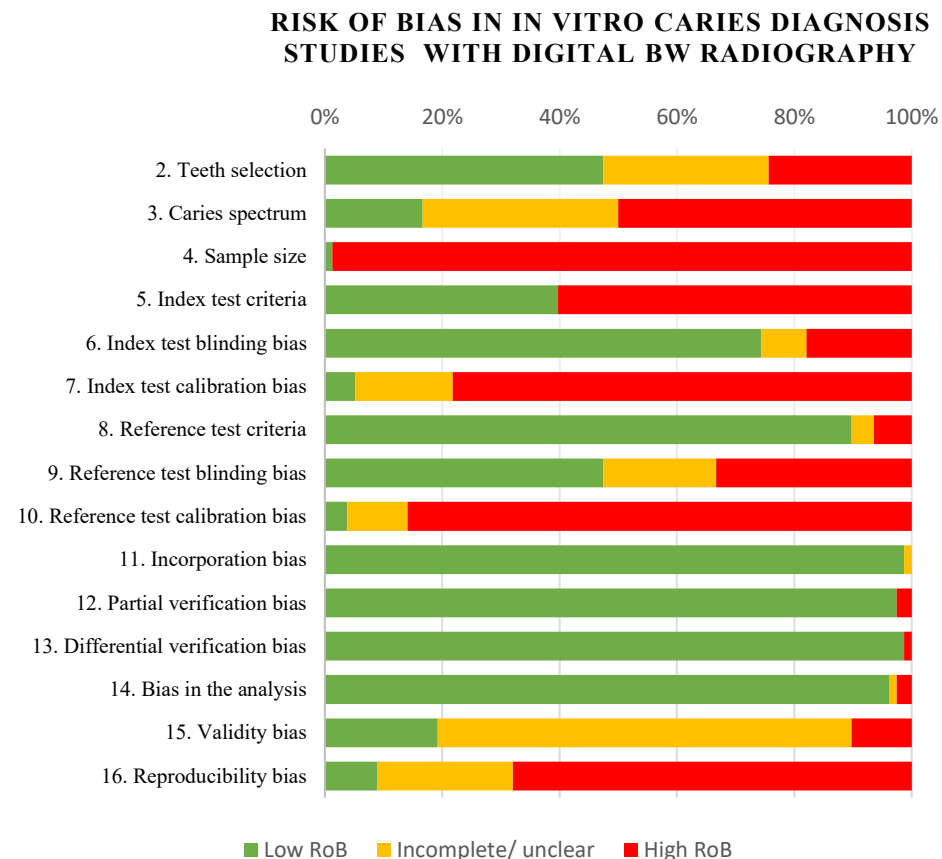


Figure S3 Risk of bias graph for in vivo and in vitro caries diagnostic studies with digital bitewing radiography: review authors' judgements about each risk of bias item presented as percentages across all included studies

* Item no 1 (Patient selection bias) is only available for clinical diagnostic studies

Table S5g Studies assessed for inclusion in the meta-analysis- digital bitewing radiography of in vitro validation studies on proximal surfaces

Studies that passed 1 st round of selection	ITC	RTC	Sample size and caries distribution				Radiogr. mode	Cut-off	2 nd round of selection	Cross-tabulation given	SE	SP	Az	3 th round of selection
			Total	S	E	D								
Ariji et al. (1998)	1	1	232 ^{surf}	54	86	96	sensor	Caries detection level	included	no	29	87	-	included
								Dentin detection level	included	no	35	96	-	
Wenzel et al. 2002	10	3	363 ^{surf}	226	82	55	sensor	Caries detection level	included	no	30*	94*	-	included
								Dentin detection level		no	-	-	-	excluded
Haak et al. 2003	13	10	320 ^{surf}	107	94	119	sensor	Caries detection level	included	no	38	93	-	included
								Dentin detection level		no	33	95	-	
Haak et al. 2005	13	11	320 ^{surf}				sensor	Caries detection level	included	no	-	-	0.69	excluded
								Dentin detection level		no	-	-	0.74	
Wenzel et al. 2007a	14	4	160 ^{surf}	101	50	9	sensor	Caries detection level	included	yes	-	-	-	included
							phosph. plate	Caries detection level	included	yes	-	-	-	
Wenzel et al. 2007b	13	5	160 ^{surf}	101	50	9	sensor	Caries detection level	included	no	19/20	92/93	-	included
							phosph. plate	Caries detection level	included	no	16/26	92/93	-	included
Berkhout et al. 2007	9	2	65 ^{surf}	17	27	21	sensor	Caries detection level	included	yes	-	-	-	excluded
							phosph. plate	Dentin detection level	included	yes	-	-	-	
							sensor	Caries detection level	included	yes	-	-	-	
							phosph. plate	Dentin detection level	included	yes	-	-	-	
Forner-Navarro et al. 2008	1	1	384 ^{surf}	-	-	-	sensor	Caries detection level	included	no	17/20	85/80	-	included
								Dentin detection level	included	no	5/7	95/90	-	excluded
Haiter Neto et al. 2009	22	3	160 ^{surf}	101	56	3	phosph. plate	Caries detection level	included	no	29	86	-	included
Isidor et al. 2009	14	13	160 ^{surf}	100	50	10	phosph. plate	Caries detection level	included	no	13-17	93-96	-	included
Booshehry et al. 2010	22	15	102 ^{surf}	30	72		sensor	Caries detection level	included	no	74	55	-	included
Mitropoulos et al. 2010	9	2	40 ^{surf}	245	13	66	sensor	Caries detection level	included	yes	46/50	100/94	0.73/0.72	included
								Dentin detection level	included	yes	52/50	87/81	0.76/0.74	excluded
Behere et al. 2011	10	3	100 ^{surf}	76	20	4	sensor	Caries detection level	included	yes	33	96	-	included
								Dentin detection level	included	yes	100	96	-	
Pontual et al. 2010	9	2	152 ^{surf}	88	64	-	phosph. plate	Caries detection level	included	no	14-15-16	93-94-89	-	included
Senel et al. 2010	6	4	276 ^{surf}	142	40	94	sensor	Caries detection level	included	no	56*	95*	0.75-0.78	included

							phosph. plate	Caries detection level	included	no	48*	91*	0.80-0.81	
Bottenberg et al. 2011	2	1	116 ^{surf.}	61	55	-	sensor	Caries detection level	included	no	85-95	9-40	0.53-0.58	Excluded
Astvaldsdottr et al. 2012	1	1	97 ^{surf.}	34	48	15	sensor	Caries detection level	included	no	22-64	74- 100	0.52-0.71	included
								Dentin detection level	included	no	40-60	92- 100	0.78-0.98	
Abesi et al. 2012	6	4	66 ^{surf}	46	13	7	sensor	Caries detection level	included	no	15	96	-	included
							phosph. plate	Caries detection level	included	no	23	98	-	
Krzyostaniak et al. 2014	4	6	270 ^{surf}	157	74	39	phosph. plate	Caries detection level	included	no	-	-	0.67	excluded
Zayet et al. (2014)	1	1	150 ^{surf}	80	22	48	phosph. plate	Caries detection level	included	no	90/90	55/70	0.73/0.83	included
								Dentin detection level	included	no	100/10 0	48.1/ 44.2	-	
Safi et al. (2015)	21	4	84 ^{surf}	54	11	19	phosph. plate	Caries detection level	included	yes	56.8	94.9	-	included
Vivek et al. 2015	6	4	100 ^{surf}	42	16	42	phosph. plate	Caries detection level	included	no	81	74	0.85	included
Bozdemir et al. (2016)	10	3	156 ^{surf.}	73	44	39	phosph. plate	Caries detection level	included	no	32.5/ 36.1	97.3/ 95.9	0.65/0.66	included
								Dentin detection level	included	no	28.2/ 28.2	99.1/ 98.3	0.74/0.73	included

ITC-Index test criteria, RTC- Reference test criteria, S-Sound, E-Caries in enamel, D- Caries in dentin, *-calculated by us

Table S5h Studies assessed for inclusion in the meta-analysis- digital bitewing radiography of in vivo validation studies on proximal surfaces

Studies that passed 1 st round of selection	ITC	RTC	Sample size and caries distribution				Radiogr. mode	Cut-off	2 nd round of selection	Cross-tabulation given	SE	SP	Az	3 th round of selection
			Total	S	E	D								
Jablonski- Momeni et al. 2017	9	2	193 ^{surf}	74	119	-	sensor	Caries detection level	included	yes	-	-	-	excluded
Menem et al. 2017	6	3	90 ^{surf}	30	60		sensor	Caries detection level	included	yes	55	93	0.81	included
Kühnisch et al. 2016	1	*	127 ^{surf}	0	0	127	sensor	Dentin caries detection level	included	yes	96	-	0.98	included
Ozkan et al. 2017	8	4	161 ^{surf}	0	5	156	phosph. plate	Dentin caries detection level	included	no	83	60	0.77	included

ITC-Index test criteria, RTC- Reference test criteria, S-Sound, E-Caries in enamel, D- Caries in dentin

Laser Fluorescence

Table S6a Results of Systematic Literature Review for in vitro LF validation studies on proximal surfaces

Laser Fluorescence examination	Study material		Diagnostics	Validation methodology				Validity					
In vitro validation studies on proximal surfaces	Teeth (N)	Molars /PM (N)	LF criteria ¹	Hard tissue processing	Caries Staining	Visualisation /magnification	Scoring criteria ²	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
<i>DIAGNOdent 2095</i>													
Tagtekin et al. (2008) cone shaped tip	38	-/-	3	Hemisection	-	Photography	9	-	24/57	-	71/85	-	-
Tagtekin et al. (2008) broad tip	38	-/-	3	Hemisection	-	Photography	9	-	24/76	-	48/52	-	-
<i>DIAGNOdent Pen 2190</i>													
Lussi et al. (2006) wedge shaped	75	75/-	4	Ground	-	Microscopy/Photo	1	88	92	-	89	82	-
Lussi et al. (2006) tapered wedge shaped	75	75/-	4	Ground	-	Microscopy/Photo	1	87	93	-	92	81	-
De Souza et al. (2014)	51**	-/-	1	Slices	Rhodamine B	Microscopy	1	80	96	0.93	94	95	0.98
Neuhaus et al. (2015)	120	120/-	2	Ground	-	Microscopy/Photo	4	47	78	-	39	84	-
Bozdemir et al. (2016)	156 ^{surf}	-/-	4	Slices	-	Microscopy	3	94/77.1	60.3/75.3	0.88/0.79	79.5/76.9	83.8/76.9	0.84/0.79

¹See Table S1c; ²See Table S1e; **incisors

Table S6b Results of Systematic Literature Review for in vivo Laser Fluorescence validation studies on proximal surfaces

Laser Fluorescence examination	Study material			Diagnostics	In vivo validation methodology			Validity					
In vivo validation studies on proximal surfaces	Patients (N)	Age (years)	Teeth (N)	LF Criteria	Histology technique	Validation	Reference method	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
<i>DIAGNOdent Pen 2190</i>													
Huth et al. (2010)	117	8-54	117	own	Cav.Preparation	Visual/Radiograph	1	68	70	-	60	84	-
Kühnisch et al. (2016)	85	25	127	1	Cav.Preparation	Visual/Radiography		-	-	-	67	-	0.82
Menem et al. (2017)	30	18/37	90 ^{surfaces}	own	Cav.Preparation	Visual/Radiography	3	92	90	0.95	-	-	-
Ozkan et al. (2017)	157	12-18	161 ^{surfaces}	1	Cav.Preparation	Visual/Radiography	4	-	-	-	60	20	0.40

Table S6c Reproducibility/Reliability results of Systematic Literature Review for in vitro laser fluorescence studies on proximal surfaces

Laser Fluorescence examination	Study material			Diagnostics	Reproducibility/Reliability detection & diagnostic methods		
In vitro validation studies on proximal surfaces	Examiners (N)	Teeth (N)	Molars/PM (N)	LF Criteria	Reproducibility/Reliability testing	Intraexaminer	Interexaminer
<i>DIAGNOdent 2095</i>							
Tagtekin et al. (2008) cone shaped tip	2	38	-/-	3	Cohen's Kappa	0.36/0.38	0.38
Tagtekin et al. (2008) broad tip	2	38	-/-	3	Cohen's Kappa	0.20/0.38	0.43
<i>DIAGNOdent Pen 2190</i>							
Lussi et al. (2006) wedge shaped	5	75	75/-	4	Cohen's Kappa	0.74	-
Lussi et al. (2006) tapered wedge shape	5	75	75/-	4	Cohen's Kappa	0.82	-
De Souza et al. (2014)	2	51**	-/-	own	ICC	0.86/0.86	0.71
Neuhaus et al. (2015)	2	120	120/-	2	ICC	0.69-0.84	0.86
Bozdemir et al. (2016)	2	156 ^{surf}	-/-	4	Cohen's Kappa	-	0.43

Table S6d Reproducibility/Reliability results of Systematic Literature Review for in vivo laser fluorescence studies on proximal surfaces

Laser Fluorescence examination	Study material				Diagnostics	Reproducibility/Reliability detection & diagnostic methods		
In vivo validation studies on proximal surfaces	Patients (N)	Examiners (N)	Teeth (N)	Molars/PM (N)	LF Criteria	Reproducibility/Reliability testing	Intraexaminer	Interexaminer
<i>DIAGNOdent Pen 2190</i>								
Huth et al. (2010)	117	4	117	-/-	own	ICC	0.84-0.98	0.97-0.98
Kühnisch et al. (2016)	85	2	127	46/81	1	nr	-	-
Menem et al. (2017)	30	1	90 surfaces	63/27	own	ICC	0.95	-
Ozkan et al. (2017)	157	12-18	161 surfaces	-/-	1	Cohen's Kappa	0.62/0.55	0.52

Table S6e Risk of bias assessment for laser fluorescence measurements of *in vitro* validation studies on proximal surfaces

Laser Fluorescence measurements of <i>in vitro</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibili ty bias
DIAGNOdent 2095																
Tagtekin et al. (2008)	x	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
DIAGNOdent Pen 2190																
Lussi et al. (2006)	x	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
De Souza et al. (2014)	x	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Neuhaus et al. (2015)	x	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Bozdemir et al. (2016)	x	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>	<div></div>
Legend: <div></div> =Low risk of bias (Yes); <div></div> =High risk of bias (Probably No, No); <div></div> =Unclear (No information, Incomplete reporting, Probably Yes) x=Question for <i>in vivo</i> studies																

Legend: ■=Low risk of bias (Yes); ■=High risk of bias (Probably No, No); ?=Unclear (No information, Incomplete reporting, Probably Yes) x=Question for *in vivo* studies

Table S6f Risk of bias assessment for laser fluorescence measurements of *in vivo* validation studies on proximal surfaces

Laser Fluorescence measurements of <i>in vivo</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibili ty bias
DIAGNOdent Pen 2190																
Huth et al. (2010)	■	?	■	+	+	+	?	+	+	?	+	+	■	+	■	+
Kühnisch et al. (2016)	■	+	■	+	+	+	+	+	+	+	+	+	+	+	+	■
Menem et al. (2017)	?	+	+	+	?	■	+	+	■	+	+	+	+	+	+	■
Ozkan et al. (2017)	■	?	■	+	+	■	+	+	■	■	+	+	+	+	+	+

Legend: ■=Low risk of bias (Yes); ■=High risk bias (Probably No, No); ?=Unclear (No information, Incomplete reporting, Probably Yes)

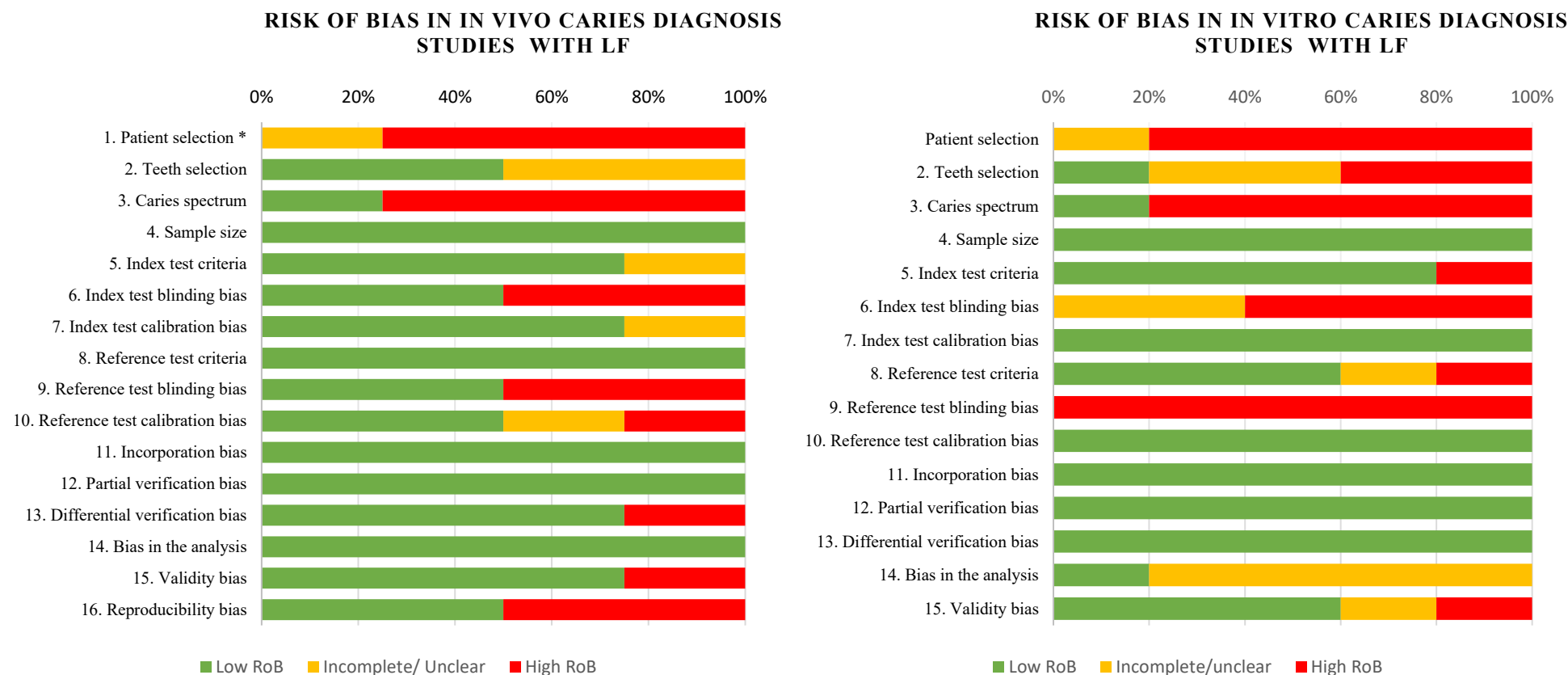


Figure S4 Risk of bias graph for in vitro and in vivo caries diagnostic studies with laser fluorescence: review authors' judgements about each risk of bias item presented as percentages across all included studies

* Item no 1 (Patient selection bias) is only available for clinical diagnostic studies

Table S6g Studies assessed for inclusion in the meta-analysis- laser fluorescence of in vitro validation studies on proximal surfaces

Studies that passed 1 st round of selection	ITC	RTC	Sample size and caries distribution				Device		Cut-off	2 nd round of selection	Cross-tabulation given	SE	SP	Az	3 th round of selection
			Total	S	E	D									
Bozdemir et al. (2016)	4	3	156 ^{surf}	73	44	39	<i>DIAGNOdent Pen 2190</i>		Caries detection level	included	no	94/77.1	60.3/75.3	0.88/0.79	included
									Dentin detection level	included	no	79.5/76.9	79.5/76.9	0.84/0.79	included
Neuhaus et al. 2015	2	4	118 ^{surf}	38	45	35	<i>DIAGNOdent Pen 2190</i>		Caries detection level	included	yes	47	78	-	included
									Dentin detection level	included	yes	39	84	-	
De Souza et al. 2014	1	1	102 ^{surf}	53	14	35	<i>DIAGNOdent Pen 2190</i>		Caries detection level	included	no	80	96	0.93	included
									Dentin detection level	included	no	94	95	0.98	
Tagtekin et al. 2008	3	9	42 ^{surf}	-	-	-	<i>DIAGNOdent 2095</i>	cone shaped tip	Caries detection level	included	no		24/57	-	excluded
									Dentin detection level	included	no	71/85	-	--	
								broad tip	Caries detection level	included	no	-	24/76		
									Dentin detection level	included	no	48/52	-	-	
Lussi et al. 2006	4	1	150 ^{surf}	61	52	37	<i>DIAGNOdent Pen 2190</i>	wedge shaped	Caries detection level	included	no	88	92	-	included
									Dentin detection level	included	no	89	82	--	
								tapered wedge shaped	Caries detection level	included	no	87	93	-	
									Dentin detection level	included	no	92	81		

ITC-Index test criteria, RTC- Reference test criteria, S-Sound, E-Caries in enamel, D- Caries in dentin

Table S6h Studies assessed for inclusion in the meta-analysis- laser fluorescence of in vivo validation studies on proximal surfaces

Studies that passed 1 st round of selection	ITC	RTC	Sample size and caries distribution				Device	Cut-off	2 nd round of selection	Cross-tabulation given	SE	SP	Az	3 th round of selection
			Total	S	E	D								
Huth et al. 2010	own	1	117 ^{surf}	40	34	43	<i>DIAGNOdent Pen 2190</i>	Dentine detection level	included	no	60	84	-	included
Kühnisch et al. 2016	1	*	127 ^{surf}	0	0	127	<i>DIAGNOdent Pen 2190</i>	Dentine detection level	included	yes	67	-	0.82	included
Menem et al. 2017	own	3	90 ^{surf}	30	60		<i>DIAGNOdent Pen 2190</i>	Caries detection level	included	yes	92	90	95	included
Ozkan et al. 2017	1	4	161 ^{surf}	0	5	156	<i>DIAGNOdent Pen 2190</i>	Dentin caries detection level	included	no	60	20	0.40	included

ITC-Index test criteria, RTC- Reference test criteria, S-Sound, E-Caries in enamel, D- Caries in dentin

FOTI

Table S7a Results of Systematic Literature Review for in vitro FOTI validation studies on proximal surfaces

FOTI examination	Study material		Diagnostics	Validation methodology				Validity					
In vitro validation studies on proximal surfaces	Teeth (N)	Molars/PM (N)	FOTI Criteria ¹	Hard tissue processing	Caries Staining	Visualisation /magnification	Scoring criteria ²	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
Peers et al. (1993)	240	-/-	4	Slices	-	Microscopy	nr	-	-	-	67	96	-
Schneiderman et al. (1997)	50	14/12	nr	Slices/Grown	SvB ^s /Fuchsin	Microscopy	nr	56	76	-	-	-	-
Astvaldsdottir et al. (2012)	56	-/56	1	Slices	-	Microscopy/M-rad	1	-	-	-	-	-	-
Abogazalah et al. (2019)	30 ^{surf}	-/-	5	-	-	Micro-CT	0	93 ⁰ _{surfaces}	69	0.91	-	-/-	-

¹See Table S1d; ²See Table S1e; nr-not reported

Table S7b Results of Systematic Literature Review for in vivo FOTI validation studies on proximal surfaces

FOTI Examination	Study material			Diagnostics	In vivo validation methodology			Validity					
In vivo validation studies on proximal surfaces	Patients (N)	Age (years)	Teeth (N)	FOTI Criteria	Histology technique	Validation	Reference method	Caries detection level			Dentin caries detection level		
								SE (%)	SP (%)	Az (ROC)	SE (%)	SP (%)	Az (ROC)
Hintze et al. (1998)	53	20-38	338 ^{surfaces}	2	nr	Tooth separation	3	-	-	-	63	93	-
Mialhe et al. (2003)	70	13-15	199 ^{surfaces}	2	nr	Tooth separation	3	-	-	-	-	-	-
Bin-Shuwaish et al. (2008)	21	20-54	51	3	nr	Radiography	nr	-	-	-	100	27	-

nr-not reported

Table S7c Reproducibility/Reliability results of Systematic Literature Review for in vitro FOTI studies on proximal surfaces

FOTI examination	Study material			Diagnostics	Reproducibility/Reliability detection & diagnostic methods		
In vitro validation studies on proximal surfaces	Examiners (N)	Teeth (N)	Molars/PM (N)	FOTI Criteria	Reproducibility/Reliability testing	Intraexaminer	Interexaminer
Peers et al. (1993)	1	240	-/-	4	Cohen's Kappa	0.65	-
Schneiderman et al. (1997)	4	50	14/12	nr	nr	-	-
Astvaldsdottr et al. (2012)	8	56	-/56	1	Cohen's Kappa	0.82	0.62-0.76
Abogazalah et al. (2019)	3	30 ^{surfaces}	-/-	5	ICC	0.85	0.83

nr-not reported

Table S7d Reproducibility/Reliability results of Systematic Literature Review for in vivo FOTI studies on proximal surfaces

FOTI examination	Study material				Diagnostics	Reproducibility/Reliability detection & diagnostic methods		
In vivo validation studies on proximal surfaces	Patients (N)	Examiners (N)	Teeth (N)	Molars/PM (N)	FOTI Criteria	Reproducibility/Reliability testing	Intraexaminer	Interexaminer
Hintze et al. (1998)	53	4	338 ^{surfaces}	163/176	2	Cohen's Kappa	-	0.14-0.26
Mialhe et al. (2003)	70	3	199 ^{surfaces}	-/-	2	Cohen's Kappa	0.83	-
Bin-Shuwaish et al. (2008)	21	1	51		3	nr	-	-

Table S7e Risk of bias assessment for FOTI of in vitro validation studies on proximal surfaces

FOTI of <i>in vitro</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Peers et al. (1993)	x	?	?	+	?	+	+	?	+	?	+	?	+	+	?	?
Schneiderman et al. (1997)	x	+	+	+	+	+	?	+	+	+	+	+	+	+	+	+
Astvaldsdottir et al. (2012)	x	+	?	+	+	+	?	+	+	?	+	+	+	+	+	+
Abogazalah et al. (2019)	x	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Legend: + = Low risk of bias (Yes); + = High risk of bias (Probably No, No); ? = Unclear (No information, Incomplete reporting, Probably Yes) x = Question for in vivo studies

Table S7f

Risk of bias assessment for FOTI of in vivo validation studies on proximal surfaces

FOTI of <i>in vivo</i> validation studies on proximal surfaces	Signaling questions															
	Selection bias				Index test bias			Reference test bias				Verification bias			Outcome bias	
	Patient selection	Teeth selection	Caries Spectrum	Sample size	Test Criteria	Blinding bias	Calibration bias	Test Criteria	Blinding bias	Calibration bias	Incorporation bias	Partial ver. bias	Differential ver. bias	Bias in the Analysis	Validity bias	Reproducibility bias
Hintze et al. (1998)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Mialhe et al. (2003)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Bin-Shuwaish et al. (2008)	x	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Legend: ■=Low risk of bias (Yes); ■=High risk of bias (Probably No, No); ■=Unclear (No information, Incomplete reporting, Probably Yes)

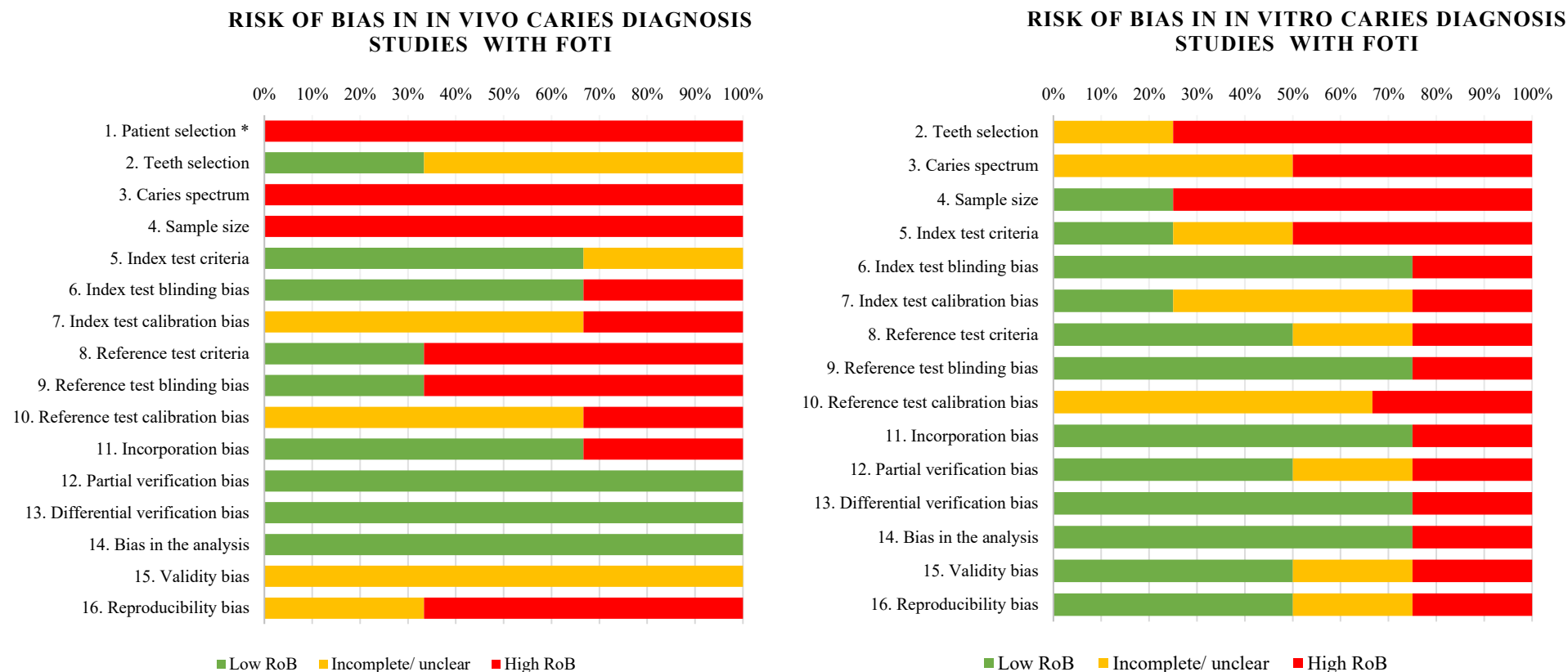
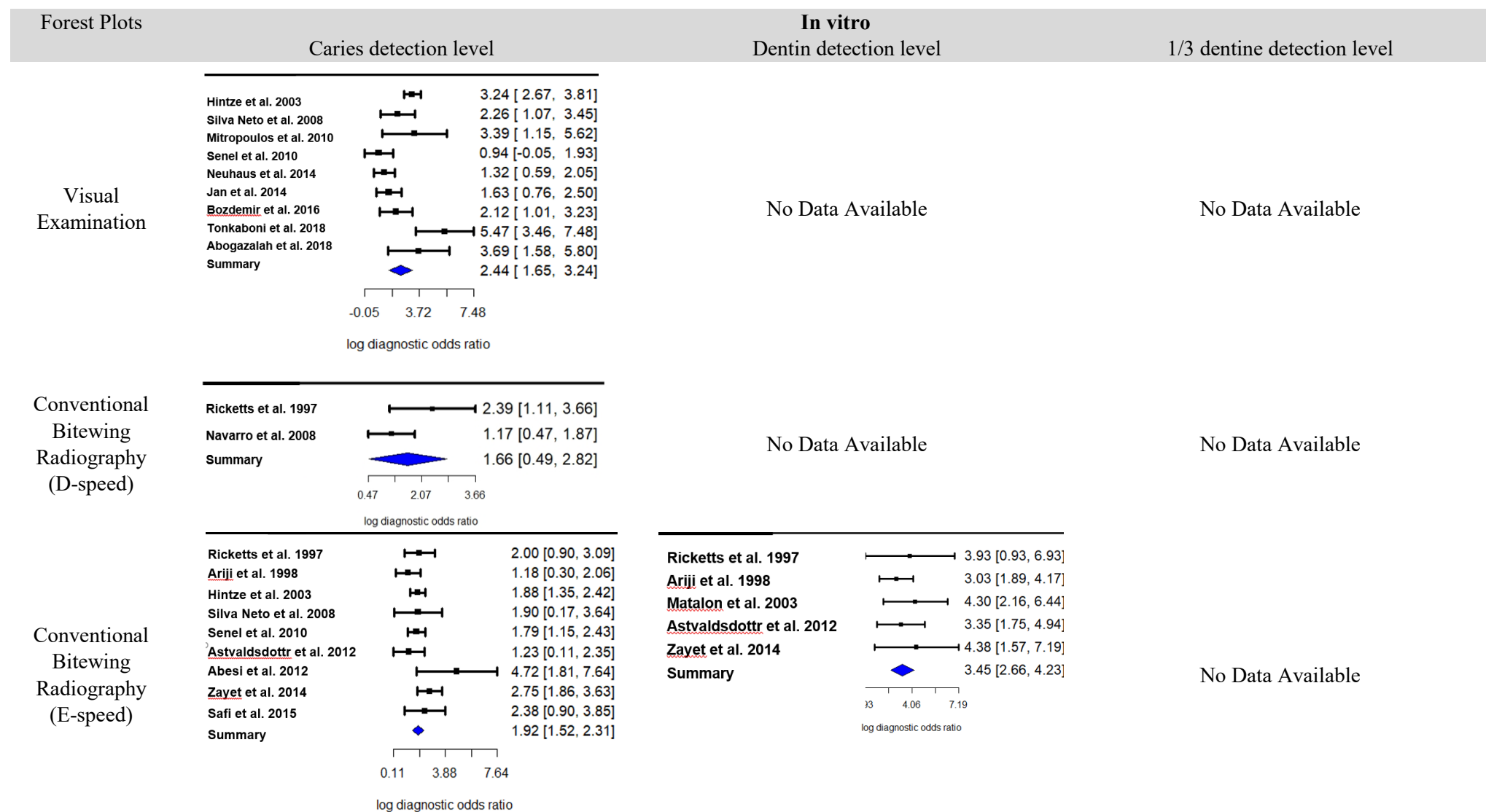


Figure S5 Risk of bias graph for in vivo and in vitro caries diagnostic studies with FOTI: review authors' judgements about each risk of bias item presented as percentages across all included studies

* Item no 1 (Patient selection bias) is only available for clinical diagnostic studies

Meta analytic statistics

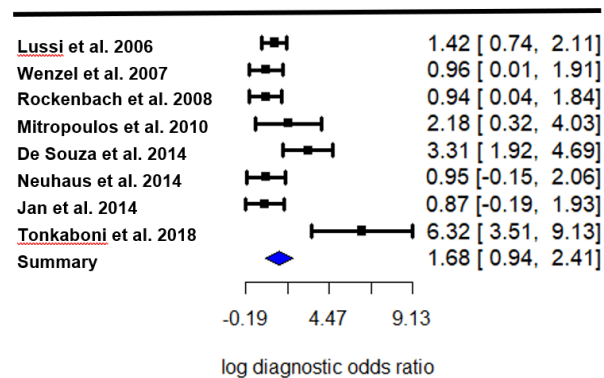
Table S8 Forest plots (DOR) for different caries diagnostic methods- in vitro validation studies on proximal surfaces



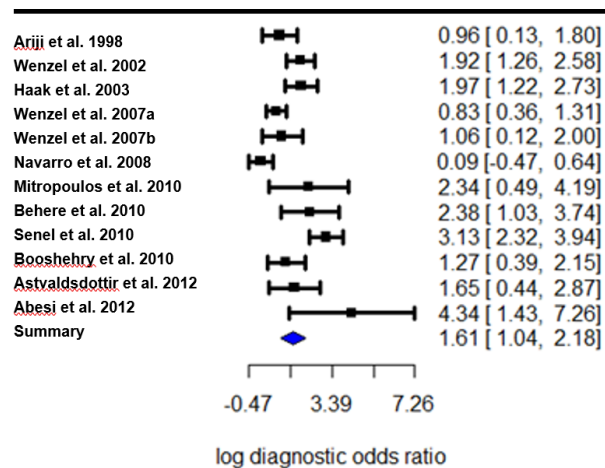
Forest Plots

Caries detection level

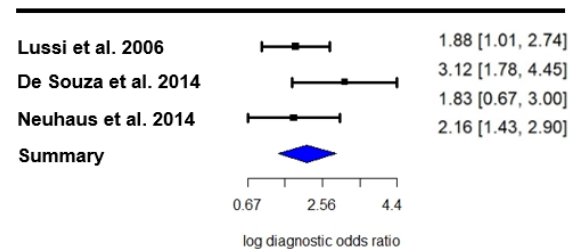
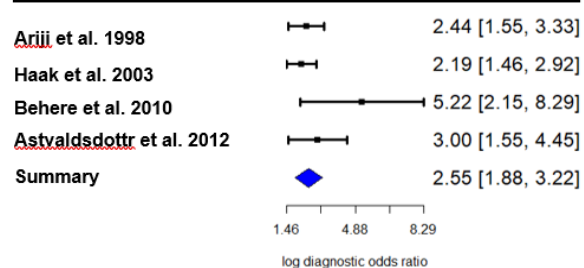
Conventional
Bitewing
Radiography
(F-speed)



Digital
Bitewing
Radiography
(Sensor)



In vitro Dentin detection level



1/3 dentine detection level

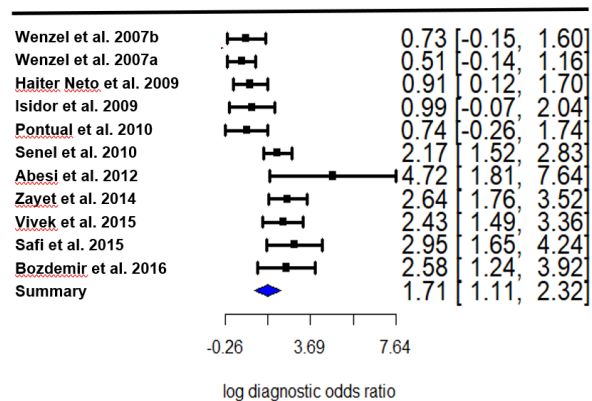
No Data Available

No Data Available

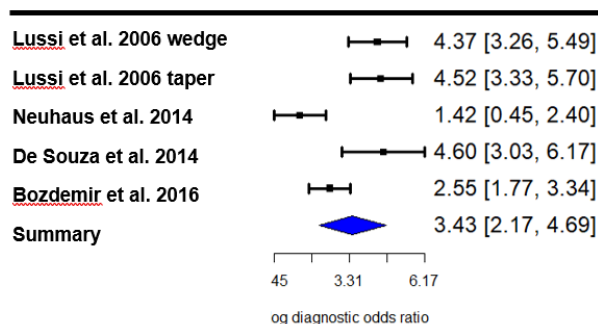
Forest Plots

Caries detection level

Digital
Bitewing
Radiography
(Phosphor
plate)

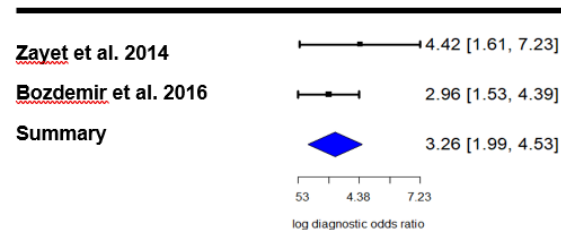


Laser
Fluorescence
Pen 2190

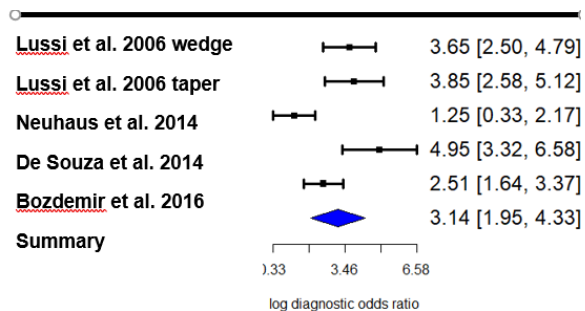


In vitro Dentin detection level

1/3 dentine detection level

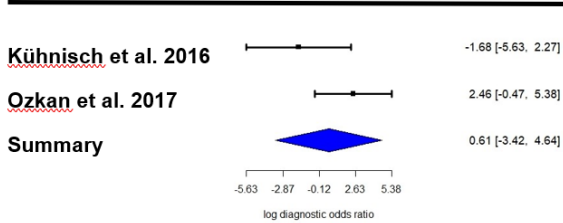


No Data Available



No Data Available

Table S9 Forest plots (DOR) for different caries diagnostic methods- in vivo validation studies on proximal surfaces

Forest Plots	Caries detection level	In vivo	
		Dentin detection level	1/3 dentine detection level
Visual Examination	No Data Available	 <p>Kühnisch et al. 2016 -1.68 [-5.63, 2.27]</p> <p>Ozkan et al. 2017 2.46 [-0.47, 5.38]</p> <p>Summary 0.61 [-3.42, 4.64]</p>	No Data Available
Conventional Bitewing Radiography (D-speed)	No Data Available	No Data Available	No Data Available
Conventional Bitewing Radiography (E-speed)	No Data Available	No Data Available	No Data Available
Conventional Bitewing Radiography (F-speed)	No Data Available	No Data Available	No Data Available
Digital Bitewing Radiography (Sensor)	No Data Available	No Data Available	No Data Available
Digital Bitewing Radiography (Phosphor plate)	No Data Available	No Data Available	No Data Available

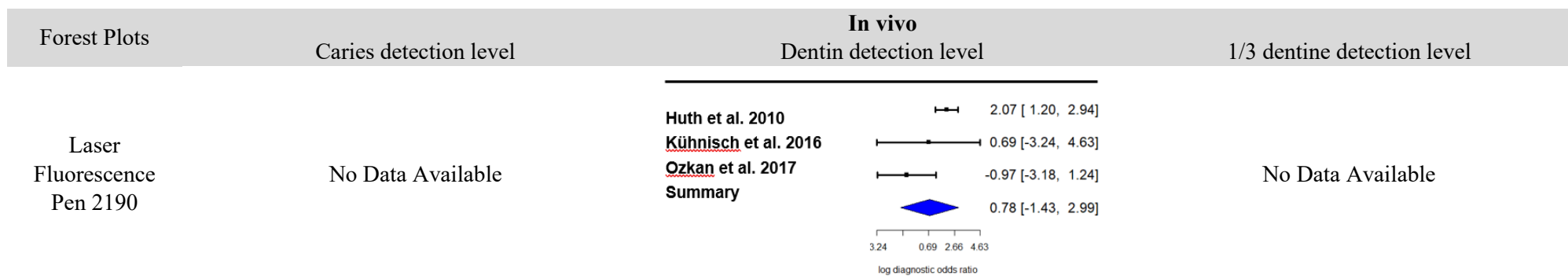
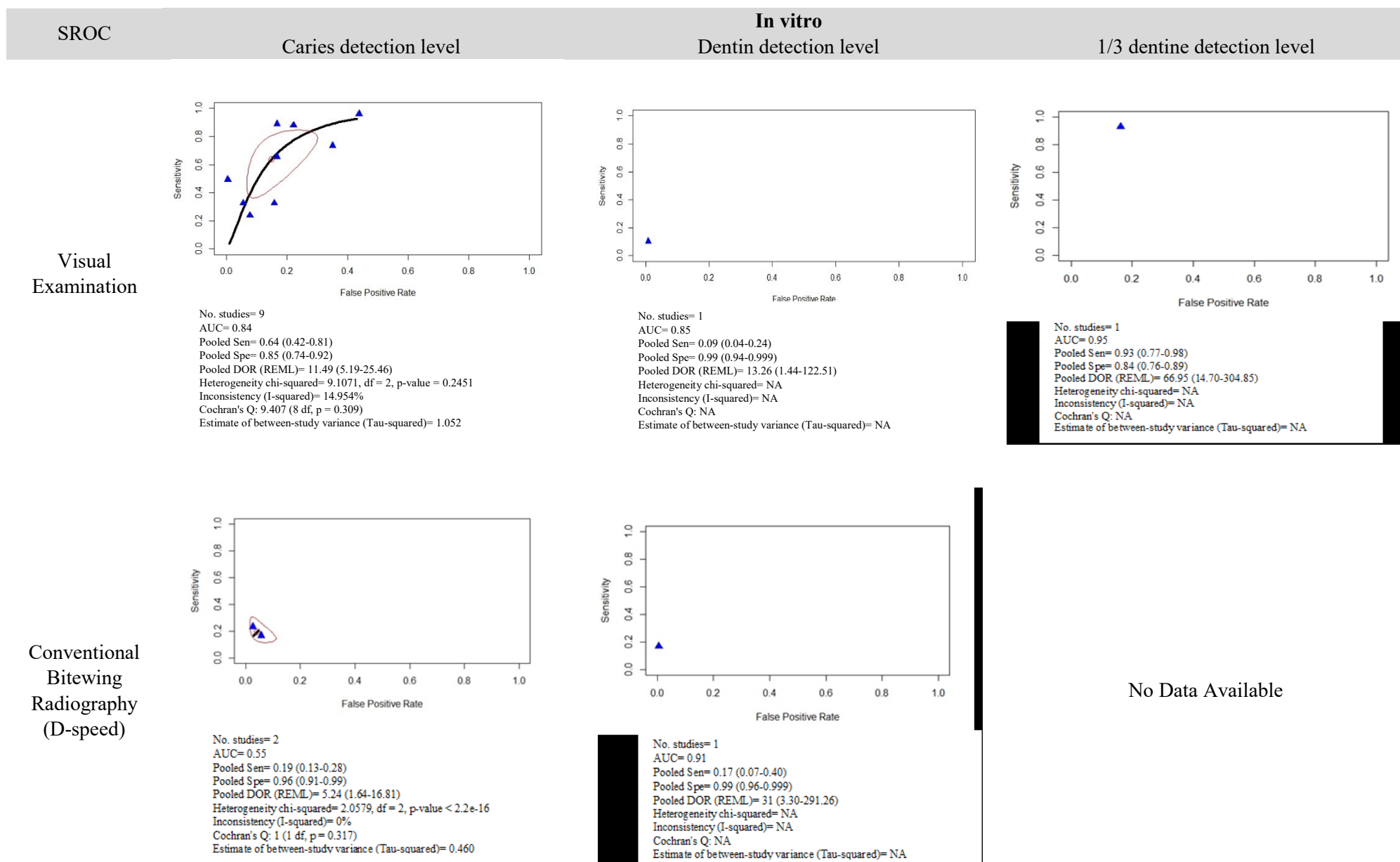


Table S10 SROC for different caries diagnostic methods- in vitro validation studies on proximal surfaces

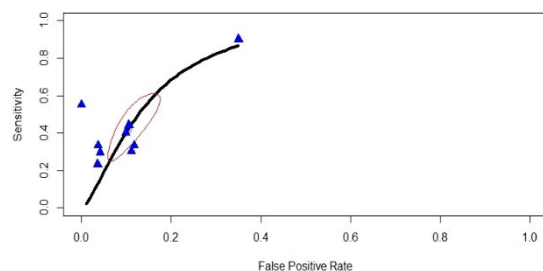


SROC

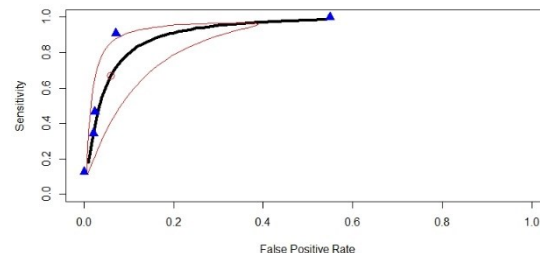
Caries detection level

In vitro
Dentin detection level

1/3 dentine detection level

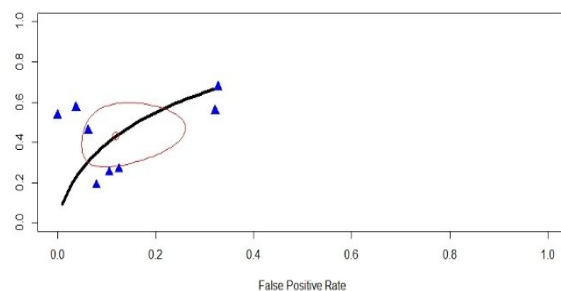
Conventional
Bitewing
Radiography
(E-speed)

No. studies= 9
AUC= 0.82
Pooled Sen= 0.42 (0.28-0.57)
Pooled Spe= 0.90 (0.84-0.93)
Pooled DOR (REML)= 6.80 (4.58-10.10)
Heterogeneity chi-squared= 8.8409, df = 2, p-value = 0.2643
Inconsistency (I-squared)= 10.157%
Cochran's Q: 8.904 (8 df, p = 0.35)
Estimate of between-study variance (Tau-squared)= 0.106

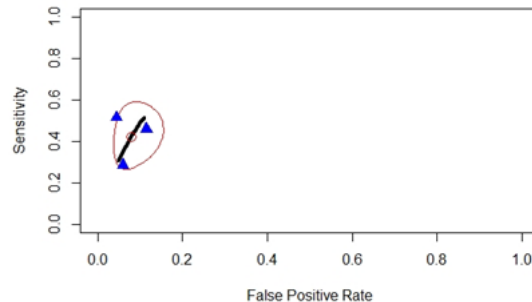


No. studies= 5
AUC= 0.92
Pooled Sen= 0.67 (0.19-0.95)
Pooled Spe= 0.94 (0.71-0.99)
Pooled DOR (REML)= 31.40 (14.31-68.93)
Heterogeneity chi-squared= 4.8359, df = 2, p-value = 0.1842
Inconsistency (I-squared)= 0%
Cochran's Q: 1.662 (4 df, p = 0.798)
Estimate of between-study variance (Tau-squared)= 0.000

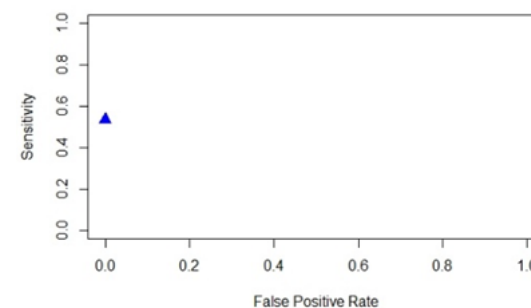
No Data Available

Conventional
Bitewing
Radiography
(F-speed)

No. studies= 8
AUC= 0.72
Pooled Sen= 0.43 (0.31-0.57)
Pooled Spe= 0.88 (0.74-0.95)
Pooled DOR (REML)= 5.34 (2.55-11.17)
Heterogeneity chi-squared= 7.6708, df = 2, p-value = 0.2632
Inconsistency (I-squared)= 43.716%
Cochran's Q: 12.437 (7 df, p = 0.087)
Estimate of between-study variance (Tau-squared)= 0.722



No. studies= 3
AUC= 0.81
Pooled Sen= 0.42 (0.29-0.56)
Pooled Spe= 0.92 (0.86-0.96)
Pooled DOR (REML)= 8.71 (4.19-18.09)
Heterogeneity chi-squared= 2.9074, df = 2, p-value = 0.08817
Inconsistency (I-squared)= 4.628%
Cochran's Q: 2.097 (2 df, p = 0.35)
Estimate of between-study variance (Tau-squared)= 0.109



No. studies= 1
AUC= 0.98
Pooled Sen= 0.054 (0.36-0.70)
Pooled Spe= 0.996 (0.96-1)
Pooled DOR (REML)= 283.59 (16.05-5010.02)
Heterogeneity chi-squared= NA
Inconsistency (I-squared)= NA
Cochran's Q: NA
Estimate of between-study variance (Tau-squared)= NA

SROC

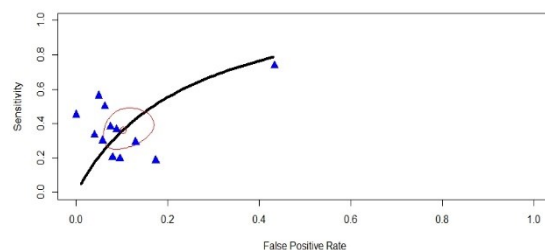
Caries detection level

In vitro

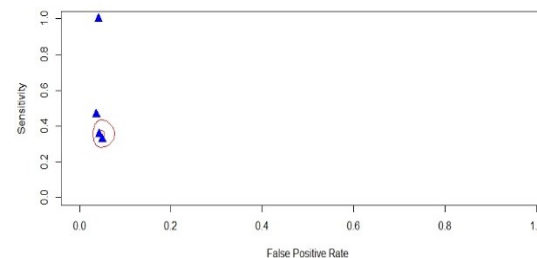
Dentin detection level

1/3 dentine detection level

Digital
Bitewing
Radiography
(Sensor)



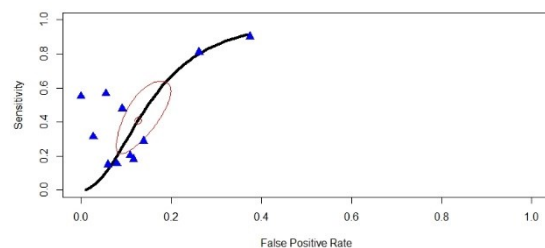
No. studies= 12
AUC= 0.74
Pooled Sen= 0.35 (0.26-0.45)
Pooled Spe= 0.90 (0.85-0.93)
Pooled DOR (REML)= 5.01 (2.83-8.88)
Heterogeneity chi-squared= 11.931, df = 2, p-value = 0.2897
Inconsistency (I-squared)= 0%
Cochran's Q: 10.631 (11 df, p = 0.475)
Estimate of between-study variance (Tau-squared)= 0.739



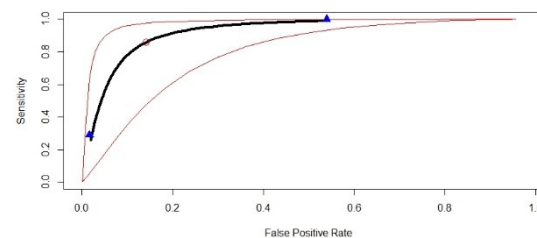
No. studies= 4
AUC= 0.90
Pooled Sen= 0.36 (0.30-0.42)
Pooled Spe= 0.95 (0.93-0.97)
Pooled DOR (REML)= 12.84 (6.56-25.13)
Heterogeneity chi-squared= 3.8226, df = 2, p-value = 0.1479
Inconsistency (I-squared)= 15.87%
Cochran's Q: 3.566 (3 df, p = 0.312)
Estimate of between-study variance (Tau-squared)= 0.132

No Data Available

Digital
Bitewing
Radiography
(Phosphor
plate)



No. studies= 11
AUC= 0.82
Pooled Sen= 0.41 (0.25-0.61)
Pooled Spe= 0.89 (0.83-0.93)
Pooled DOR (REML)= 5.56 (3.04-10.16)
Heterogeneity chi-squared= 11.099, df = 2, p-value = 0.269
Inconsistency (I-squared)= 13.267%
Cochran's Q: 11.53 (10 df, p = 0.318)
Estimate of between-study variance (Tau-squared)= 0.745



No. studies= 2
AUC= 0.92
Pooled Sen= 0.86 (0.03-0.99)
Pooled Spe= 0.86 (0.11-0.99)
Pooled DOR (REML)= 26.06 (7.29-93.21)
Heterogeneity chi-squared= 2.0136, df = 2, p-value < 2.2e-16
Inconsistency (I-squared)= 0%
Cochran's Q: 0.82 (1 df, p = 0.365)
Estimate of between-study variance (Tau-squared)= 0.00

No Data Available

SROC

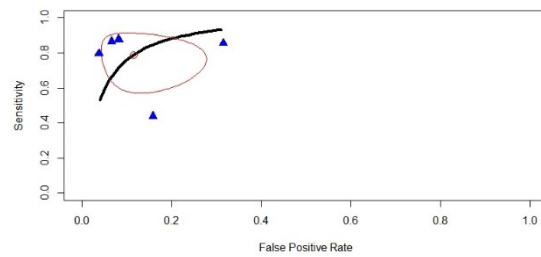
Caries detection level

In vitro

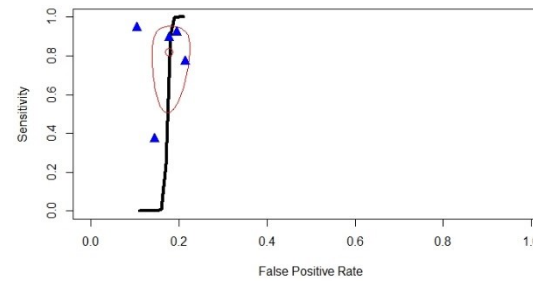
Dentin detection level

1/3 dentine detection level

Laser
Fluorescence



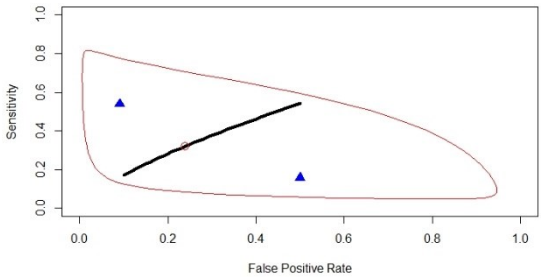
No. studies= 5
AUC= 0.91
Pooled Sen= 0.79 (0.62-0.90)
Pooled Spe= 0.89 (0.76-0.95)
Pooled DOR (REML)= 30.79 (8.74-108.51)
Heterogeneity chi-squared= 5.6875, df = 2, p-value = 0.1278
Inconsistency (I-squared)= 0.458%
Cochran's Q: 4.018 (4 df, p = 0.404)
Estimate of between-study variance (Tau-squared)= 1.729



No. studies= 5
AUC= 0.83
Pooled Sen= 0.82 (0.58-0.94)
Pooled Spe= 0.81 (0.78-0.85)
Pooled DOR (REML)= 23.09 (7.01-76.04)
Heterogeneity chi-squared= 6.7615, df = 2, p-value = 0.0799
Inconsistency (I-squared)= 5.414%
Cochran's Q: 4.229 (4 df, p = 0.376)
Estimate of between-study variance (Tau-squared)= 1.491

No Data Available

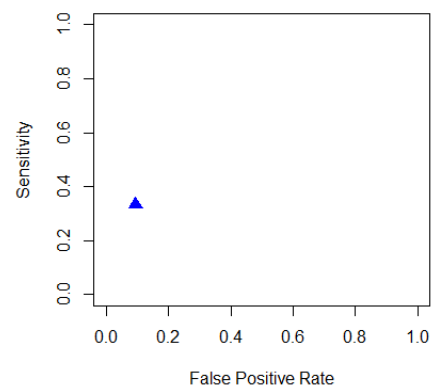
Table S11 SROC for different caries diagnostic methods- in vivo validation studies on proximal surfaces

SROC	Caries detection level	In vivo Dentin detection level	1/3 dentine detection level
Visual Examination	No Data Available	 <p>No. studies= 2 AUC= 0.53 Pooled Sen= 0.32 (0.07-0.74) Pooled Spe= 0.76 (0.11-0.99) Pooled DOR (REML)= 1.84 (0.03-103.47) Heterogeneity chi-squared= 2.9529, df = 2, p-value < 2.2e-16 Inconsistency (I-squared)= 0% Cochran's Q: 1 (1 df, p = 0.317) Estimate of between-study variance (Tau-squared)= 5.402</p>	No Data Available
Conventional Bitewing Radiography (D-speed)	No Data Available	No Data Available	No Data Available

SROC	Caries detection level	In vivo Dentin detection level	1/3 dentine detection level
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Conventional
Bitewing
Radiography
(E-speed)

No Data Available



No Data Available

No. studies= 1
AUC= 0.74
Pooled Sen= 0.35 (0.19-0.51)
Pooled Spe= 0.91 (0.80-0.96)
Pooled DOR (REML)= 4.8 (1.48-15.48)
Heterogeneity chi-squared= NA
Inconsistency (I-squared)= NA
Cochran's Q: NA
Estimate of between-study variance (Tau-squared)= NA

Conventional
Bitewing
Radiography
(F-speed)

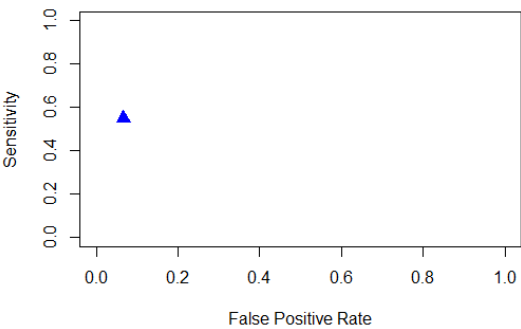
No Data Available

No Data Available

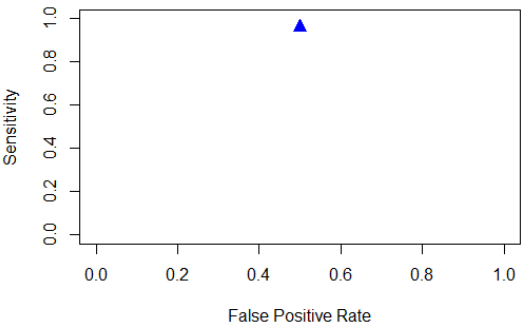
No Data Available

	SROC	In vivo	
	Caries detection level	Dentin detection level	1/3 dentine detection level

Digital Bitewing Radiography (Sensor)



No. studies= 1
AUC= 0.82
Pooled Sen= 0.55 (0.42-0.67)
Pooled Spe= 0.93 (0.77-0.98)
Pooled DOR (REML)= 17.11 (3.73-78.39)
Heterogeneity chi-squared= NA
Inconsistency (I-squared)= NA
Cochran's Q: NA
Estimate of between-study variance (Tau-squared)= NA

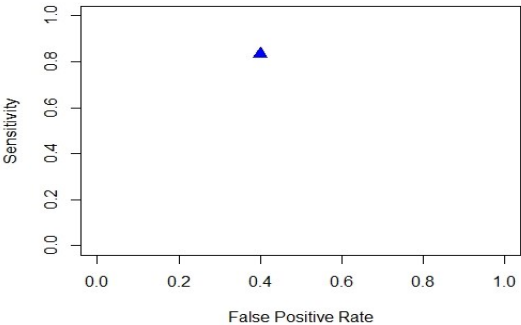


No. studies= 1
AUC= 0.89
Pooled Sen= 0.96 (0.91-0.98)
Pooled Spe= 0.50 (0.02-0.98)
Pooled DOR (REML)= 24.4 (0.44-1359.98)
Heterogeneity chi-squared= NA
Inconsistency (I-squared)= NA
Cochran's Q: NA
Estimate of between-study variance (Tau-squared)= NA

No Data Available

Digital Bitewing Radiography (Phosphor plate)

No Data Available



No. studies= 1
AUC= 0.79
Pooled Sen= 0.83 (0.77-0.88)
Pooled Spe= 0.60 (0.20-0.90)
Pooled DOR (REML)= 7.5 (1.19-47.13)
Heterogeneity chi-squared= NA
Inconsistency (I-squared)= NA
Cochran's Q: NA
Estimate of between-study variance (Tau-squared)= NA

No Data Available

SROC

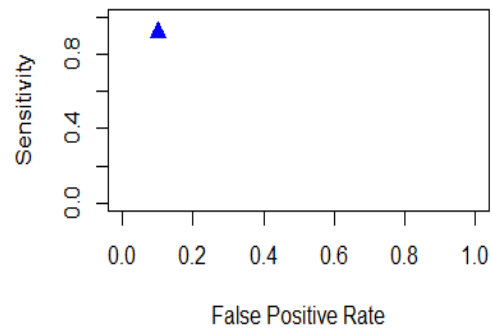
Caries detection level

In vivo

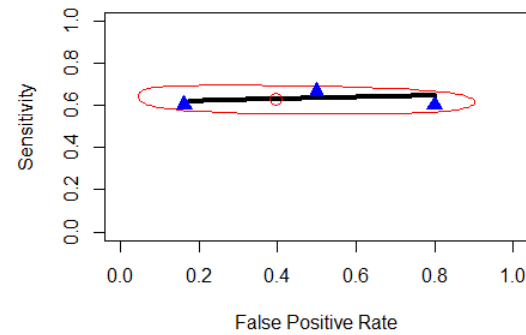
Dentin detection level

1/3 dentine detection level

Laser
Fluorescence
Pen 2190



No. studies= 1
AUC= 0.96
Pooled Sen= 0.92 (0.82-0.96)
Pooled Spe= 0.90 (0.73-0.97)
Pooled DOR (REML)= 99 (22.01-445.30)
Heterogeneity chi-squared= NA
Inconsistency (I-squared)= NA
Cochran's Q: NA
Estimate of between-study variance (Tau-squared)= NA



No. studies= 3
AUC= 0.63
Pooled Sen= 0.63 (0.58-0.68)
Pooled Spe= 0.60 (0.15-0.93)
Pooled DOR (REML)= 2.18 (0.24-19.95)
Heterogeneity chi-squared= 3.4273, df= 2, p-value < 2.2e-16
Inconsistency (I-squared)= 0%
Cochran's Q: 0.521 (1 df, p = 0.471)
Estimate of between-study variance (Tau-squared)= 0.000

No Data Available

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