PRISMA 2009 Flow Diagram

Identification

Records identified through database searching
(n = 2830)

Additional records identified through other sources
(n = 1)

Screening

Records after duplicates removed
(n = 9)

Records screened
(n = 2822)

Records excluded
(n = 2623)

Eligibility

Full-text articles assessed for eligibility
(n = 199)

Full-text articles excluded, with reasons
(n = 118)

Included

Studies included in qualitative synthesis
(n = 81)

Studies included in quantitative synthesis (meta-analysis)
(n = 81)

For more information, visit www.prisma-statement.org.

Text S2   Search strategies of meta analysis.

#1   ((HBV[Title/Abstract]) OR Hepatitis B Virus) OR Hepatitis B

#2   (((diagnosis test[Title/Abstract]) OR diagnosis test) OR diagnosed test) OR test of diagnosis

#3   (((((((((Liver stiffness measurement) OR LSM) OR transient elastography) OR FibroScan) OR MR Elastography) OR MRE) OR ARFI) OR acoustic radiation force impulse) OR point shear-wave elastography) OR imaging techniques

#4   ((chronic hepatitis B) OR CHB) OR chronic hepatitis B[Title/Abstract]

#5   #1 OR #4

#6   #2 OR #3

#7   #5 AND #6

Text S3 Serum biomarkers and their corresponding methodology of calculation.

APRI = ([AST/ULN]/platelet count [10^9/L]) $\times$ 100

FIB-4 = Age (years) $\times$ AST [U/L]/(platelet count [109/L] $\times$ (ALT [U/L])1/2

Text S4 Characteristics of the 81 studies included in the meta-analysis.

Test	Author, Year, Region	Study/Center Description	N	Interval Between Biopsy &Predictive index	Mean Age (%male)	Biopsy System	Length of liver Specimen	Prevalence F2-4/F4	BMI
APRI	Celikbilek, 2013, Turkey	Retrospective, single	89	Unclear	42(56%)	Ishak	Unclear	62%, 15%	NA
APRI	Liang, 2012, China	Prospective, single	101	Unclear	39(70%)	METAVIR	≥10mm	53%, 7%	21.8
APRI	Guzelbulut, 2012, Turkey	Retrospective, single	250	Unclear	39(58%)	Ishak	Unclear	26%, 16%	NA
APRI	Eminler, 2015, Turkey	Retrospective single	237	<1 week	42(68%)	Ishak	≥15mm	37, NA	NA
APRI	Dong, 2016, China	Retrospective, single	151	Unclear	38(77%)	METAVIR	≥20mm	61%, 25%	24.3
APRI	Sebastiani, 2011, Italy	Retrospective, multicenter	253	Unclear	44(73%)	METAVIR	Unclear	58%, 8%	24.2
APRI	Yu, 2015, China	Retrospective, single	88	same day	9(7%)	Scheuer	≥15mm	49%, .1%	NA
APRI	Zhou, 2010, China	Retrospective, multicenter	146	same day	33(85%)	Scheuer	≥15mm	47%, 10%	NA
APRI	Ren, 2017, China	Retrospective, single	160	same day	39(63%)	METAVIR	≥15	40%, 14%	NA
APRI	Shin, 2008, Korea	Retrospective, single	264	Unclear	28(87%)	METAVIR	22mm	53%, 3%	NA
ARFI	Rust, 2013, Germany	Prospective, multicenter	92	<1 month	38(65%)	METAVIR	27mm	24%, 3%	NA
ARFI	Ozturker, 2017, Turkey	Retrospective, single	130	same day	38(82%)	Ishak	≥20mm	32%, 9%	NA
ARFI	Liu, 2016, China	Prospective, single	187	same day	33(61%)	METAVIR	≥15mm	60%, 11%	23.1
ARFI	Liu, 2016, China	Retrospective, single	145	same day	41(68%)	Chinese Hospital system	≥15mm	70%, 19%	NA
ARFI	Park, 2016, Korea	Prospective, multicenter	105	same day	47(70%)	Batts Ludwing	≥20mm	74%, 29%	23.4
FIB-4	Coskun, 2015, Turkey	Retrospective, single	228	same day	46(67%)	Ishak	16±0.8mm	50%, NA	NA
FIB-4	Zhang, 2010, China	Retrospective, single	212	Unclear	31(88%)	Scheuer	20mm	76%, 21%	NA
FibroScan	Leung, 2013, China	Prospective, single	226	<1 year	49(65%)	METAVIR	≥15mm	60%, 15%	24.3
FibroScan	Degos, 2010, France	Retrospective, multicenter	284	<1 month	38(81%)	METAVIR	≥18mm	42%, 10%	23.6
FibroScan	Cho, 2011, Korea	Retrospective, single	121	Same day	39(67%)	Batts Ludwing	≥15mm	73%, 7%	23.9
FibroScan	Zeng, 2015, China	Retrospective, single	262	two day	36(76%)	METAVIR	≥10mm	35%, 8%	22.9
FibroScan	Dong, 2018, China	retrospective, single	70	Unclear	39(73%)	Scheuer	Unclear	34%, NA	NA
FibroScan	Huang, 2016, China	retrospective, multicenter	263	≤6 month	34(61%)	Batts Ludwig	Unclear	15%, 1%	NA
FibroScan	Kongtawelert, 2013, Thailand	retrospective, single	156	≤1 Month	40(72%)	METAVIR	≥15mm	56%, 14%	23.6
FibroScan	Kumar, 2013, India	retrospective, single	200	≤1 week	38(80%)	METAVIR	≥15mm	35%, 12%	NA
FibroScan	Goyal, 2013, India	Retrospective, single	357	<38 days	30(85%)	METAVIR	≥15mm	23%, 6%	22.3
FibroScan	Cardoso, 2012, France	Retrospective, single	202	Same day	41(80%)	METAVIR	≥15mm	42%, 8%	24.2
FibroScan	Gaia, 2011, Italy	Retrospective, single	70	<6 months	44(72%)	METAVIR	≥20mm	53%, 31%	24.3
FibroScan	Fung, 2010, China	Retrospective, single	157	<1 week	41(64%)	METAVIR	Unclear	15%, 8%	NA
FibroScan	Lee, , 2011, Korea	Retrospective, multicenter	208	Same day	39(72%)	Batts Ludwing	≥15mm	71%, 12%	23.8
FibroScan	Zhao, 2017, China	Prospective, single	99	same day	38(65%)	METAVIR	≥15mm	18.2, NA	23.9
FibroScan	Myers, 2010, Canada	Retrospective, multicenter	68	Unclear	49(66%)	METAVIR	≥15mm	46%, 4%	26
FibroScan	Sporea, 2010, Romania	Retrospective, single	140	Same day	39(78%)	METAVIR	≥20mm	76%, 5%	NA
FibroScan	Marcellin, 2009, France	Retrospective, multicenter	173	<3 months	40(67%)	METAVIR	≥10mm	50%, 8%	24.5
FibroScan	Kim, 2012, Korea	Prospective, single	170	Same day	45(60%)	Batts Ludwing	>20mm	71%, 28%	23.4
FibroScan	Kim, 2012, Korea	Retrospective, single	194	same day	47(61%)	Batts Ludwing	≥20mm	85%, 39%	23.4
MRE	Lee, 2014, Korea	Retrospective, single	334	Unclear	48(72%)	METAVIR	≥10mm	45%, 24%	22.5
MRE	Wu, 2015, Tai	Retrospective, single	185	<3 months	55(73%)	METAVIR	≥10mm	77%, 35%	23.9
MRE	Hennedige, 2017, America	Retrospective, single	63	<6 months	50(70%)	METAVIR	≥15mm	70%, 33%	24.9
MRE	Shi, 2014, China	Prospective, single	113	Same day	42(43%)	METAVIR	Unclear	35%, 4%	21.7
MRE	Chang, 2016, Korea	Retrospective, single	138	<3 months	53(76%)	METAVIR	≥25mm	77%, 42%	22.9

MRE	Venkatesh, 2014, Singapore	Prospective, single	63	<6 months	50(70%)	METAVIR	Unclear	62%, 33%	24.8
APRI/ARFI	Li, 2017, China	Retrospective, single	126	Unclear	48(64%)	METAVIR	Unclear	60%, 16%	24.2
APRI/ARFI	Dong, 2016, China	Prospective, single	246	same day	39(80%)	METAVIR	≥15mm	67%, 22%	22.5
APRI/ARFI	Chen, 2017, China	Prospective, single	127	same day	38(85%)	METAVIR	≥15mm	65%, 24%	21.6
APRI/FIB-4	Zhang, 2016, China	Prospective, single	1543	two day	32(77%)	Scheuer	≥15mm	83%, 20%	NA
APRI/FIB-4	Li, 2017, China	Retrospective, single	822	two day	35(63%)	METAVIR	≥15mm	19%, 4%	NA
APRI/FIB-4	Kun Wang, 2018, China	Prospective, multicenter	398	<1 week	39(67%)	METAVIR	≥15mm	84%, 25%	22.8
APRI/FIB-4	Gumusay, 2013, Turkek	Prospective, single	58	Unclear	41(57%)	Ishak	≥20mm	17%, NA	25.9
APRI/FIB-4	Chen, 2018, China	Retrospective, single	246	<1 week	31(82%)	METAVIR	23.4mm	76%, 20%	NA
APRI/FIB-4	Kim, 2016, USA	Retrospective, single	575	<6 month	40(75%)	Ishak	Unclear	57%, 24%	NA
APRI/FIB-4	Wang, 2017, China	Retrospective, single	308	same day	39(75%)	METAVIR	≥10mm	72%, 33%	NA
APRI/FIB-4	Liu, 2011, china	Retrospective, single	623	<1 week	32(55%)	METAVIR	≥10mm	35%, 6%	NA
APRI/FIB-4	Liu, 2012, china	Retrospective, multicenter	114	same day	38(80%)	Chinese hospital system	15-20mm	51%, 11%	NA
APRI/FIB-4	Wang, 2013, China	Retrospective, single	231	same day	34(68%)	Scheuer	≥15mm	29%, 7%	21.8
APRI/FIB-4	Lin, 2015, China	retrospective, multicenter	631	≤1 month	44(45%)	METAVIR	≥10mm	67%, 26%	NA
APRI/FIB-4	Zhou, 2016, China	Retrospective single	389	two day	35(61%)	Chinese hospital system	≥10mm	17%, 1%	NA
APRI/FIB-4	Li, 2016, China	Retrospective, single	372	same day	39(69%)	Scheuer	≥15mm	47%, 19%	22.4
APRI/FIB-4	Ma, 2017, China	retrospective, single	171	same day	43(60%)	METAVIR	≥9mm	54%, , 6%	NA
APRI/FIB-4	Liu, 2018, China	retrospective, multicenter	2016	Unclear	37(70%)	Scheuer	>=10mm	66%, 20%	NA
APRI/FIB-4	Noguchi, 2017, Japan	retrospective, single	70	same day	49(53%)	METAVIR	Unclear	51%, 9%	NA
APRI/FIB-4	Wu, 2018, China	retrospective, single	323	same day	36(66%)	Scheuer	Unclear	22%, 3%	NA
APRI/FIB-4	Wang, 2013, China	Retrospective, multicenter	349	same day	37(92%)	Scheuer	≥10mm	60%, 7%	NA
APRI/FIB-4	Wu, 2010, China	Retrospective, single	78	Unclear	33(85%)	METAVIR	18.2±3.4mm	41%, 12%	NA
APRI/FIB-4	Salkic, 2015, Bosnia and Herzegovina	Prospective, single	211	<1 week	42(73%)	METAVIR	≥15mm	56%, 15%	28.9
APRI/FIB-4	Erdogan, 2013, Turkey	Retrospective, single	221	Same day	44(63%)	Ishak	≥15mm	31%, NA	NA
APRI/FIB-4	Ucar, 2013, Turkey	Retrospective, single	73	same day	45(64%)	METAVIR	Unclear	56%, 11%	25.7
APRI/FIB-4	Basar, 2013, Turkey	Retrospective, single	76	same day	45(45%)	METAVIR	≥10mm	67%, 17%	NA
APRI/FIB-4	Liu, 2017, China	Retrospective, single	174	<1 week	37(61%)	METAVIR	≥15mm	66%, 12%	22.9
APRI/FIB-4	Yang, 2017, China	Retrospective, single	126	<1 week	53(86%)	Scheuer	Unclear	68%, 36%	NA
APRI/FIB-4	Li, 2016, China	Retrospective, single	401	same day	34(63%)	METAVIR	≥15mm	30%, 7%	NA
APRI/FibroScan	Li, 2018, China	Retrospective, single	188	<1 week	37(63%)	METAVIR	≥15mm	50%, 15%	22.5
APRI/FibroScan	Lemoine, 2016, Africa	Prospective, single	198	same day	35(74%)	METAVIR	≥15mm	42%, 6%	21.6
APRI/FibroScan	Lesmana, 2011, Indonesia	Retrospective, single	117	Unclear	41(54%)	METAVIR	≥15mm	62%, 3%	23.2
ARFI/FibroScan	Zhang, 2015, China	retrospective, single	180	≤3 days	36(77%)	Scheuer	≥15mm	72%, 18%	24.4
ARFI/FibroScan	Dong, 2015, China	Retrospective, single	81	two week	41(88%)	Chinese hospital system	Unclear	61%, 10%	23
APRI/ARFI/ FibroScan	Liu, 2015, China	Retrospective, single	108	two day	40(75%)	METAVIR	≥15mm	61%, 27%	22
APRI/FIB-4/FibroScan	Cao, 2017, China	prospective, multicenter	400	same day	37(67%)	Scheuer	≥10mm	52%, 17%	22.7
APRI/FIB-4/FibroScan	Li, 2016, China	retrospective, single	307	same day	40(73%)	METAVIR	≥13mm	72%, 8%	23.5
APRI/FIB-4/FibroScan	Yan, 2018, China	retrospective, single	175	≤1 week	34(73%)	METAVIR	≥15mm	38%, NA	NA
APRI/FIB-4/FibroScan	Bonnard, 2010, France	Retrospective, single	57	Same time	35(69%)	METAVIR	21±6mm	70%, 24%	24

Text S5 QUADAS- 2 of studies included in the meta-analysis.

Study	Risk of bias				Applicability concerns		
	Patient Selection	Index Test	Reference Standard	Flow and Timing	Patient Selection	Index Test	Reference Standard
Kun Wang,2018,China	Low	Low	Low	Low	Low	Low	Low
Ozturker,2017,Turkey	High	Low	Low	Low	Low	Low	Low
Chen,2018,China	Low	Low	Low	Low	Low	Low	Low
Celikbilek,2013,Turkey	Low	Low	Low	Low	Low	Low	Low
Gumusay,2013,Turkek	Low	Low	Low	Low	Low	Low	Low
Li,2018,China	Low	High	Low	Low	Low	Low	Low
Chen,2017,China	Low	Low	Low	Low	Low	Low	Low
Zhang,2016,China	Low	Low	Low	Low	Low	Low	Low
Zhao,2017,China	Low	Low	Low	Low	Low	Low	Low
Liang,2012,China	Low	Low	Low	Low	Low	Low	Low
Zhou,2010,China	Low	Low	Low	Low	Low	Low	Low
Guzelbulut,2012,Turkey	Low	Low	Low	Low	Low	Low	Low
Eminler,2015,Turkey	Low	High	Low	Low	Low	Low	Low
Liu,2017,China	Low	Low	Low	Low	Low	Low	Low
Yang,2017,China	Low	High	Low	Low	Low	Low	Low
Li,2016,China	Low	Low	Low	Low	Low	Low	Low
Lemoine,2016,Africa	Low	Low	Low	Low	Low	Low	Low
Zhou,2016,China	Low	High	Low	Low	Low	Low	Low
Li,2016,China	Low	High	Low	Low	Low	Low	Low
Shin,2008,Korea	Low	High	Low	Low	Low	Low	Low
Coskun,2015,Turkey	Low	High	Low	Low	Low	Low	Low
Zeng,2015,China	Low	Low	Low	Low	Low	Low	Low
Dong,2015,China	Low	Low	Low	Low	Low	Low	Low
Rust,2013,Germany	Low	Low	Low	Low	Low	Low	Low
Liu,2016,China	High	High	Low	Low	Low	Low	Low
Liu,2016,China	Unclear	Unclear	Low	Low	Low	High	Low
Liu,2015,China	Unclear	Low	Low	Low	Low	Low	Low
Leung,2013,China	Low	Low	Low	Low	Low	Low	Low
Degos,2010,France	Low	Low	Low	Low	Low	Low	Low
Park,2016,Korea	High	Low	Low	Low	Low	Low	Low
Salkic,2015,Bosnia and Herzegovina	Unclear	Low	Low	Low	Low	Low	Low
Cho,2011,Korea	Low	Low	Low	Low	Low	Low	Low
ERDOGAN,2013,Turkey	Unclear	Low	Low	Low	Low	Low	Low
Kim,2012,Korea	Unclear	Low	Low	Low	Low	Low	Low
Lee,2014,Korea	Low	Low	Low	High	Low	Low	Low
KIM，2016，USA	Unclear	High	Low	Low	Low	Low	Low
Basar,2013,Turkey	Low	High	Low	Low	Low	Low	Low
Dong,2018,China	Low	High	Low	High	Low	Low	Low
Liu,2018,China	Low	Low	Low	Low	Low	Low	Low
Wu,2018,China	Low	Low	Low	Low	Low	Low	Low

Yan,2018,China	Low	High	Low	Low	Low	Low	Low
Wu,2015,Tai	High	Low	Low	High	Low	Low	Low
Cao,2017,China	Low	Low	Low	Low	Low	Low	Low
Noguchi,2017,,Japan	Low	High	Low	Low	Low	Low	Low
Ma,2017,China	Low	Low	Low	Low	Low	Low	Low
Li,2017,China	Low	High	Low	Low	Low	Low	Low
Wang,2017,China	Low	Unclear	Low	Low	Low	Low	Low
Ren,2017,China	Low	Low	Low	Low	Low	Low	Low
Li,2016,China	Low	Low	Low	Low	Low	Low	Low
Huang,2016,China	Low	High	Low	Low	Low	Low	Low
Dong,2016,China	High	Unclear	Low	High	High	Low	Low
Lin,2014,China	Low	Unclear	Low	Low	Low	Low	Low
Zhang,2015,China	Low	Low	Low	Low	Low	Low	Low
Yu,2015,China	Low	Unclear	Low	Low	Low	Low	Low
Kongtawelert,2013,Thailand	Low	High	Low	Low	Low	Low	Low
Kumar,2013,India	Low	Low	Low	Low	Low	Low	Low
Bonnard,2010,France	Unclear	High	Low	Low	Low	Low	Low
Hennedige,2017,America	Unclear	Low	Low	Low	Low	High	Low
Kim,2012,Korea	Low	High	Low	Low	Low	Low	Low
Lesmana,2011,Indonesia	Low	High	Low	Low	Low	Low	Low
Shi,2014,China	High	Low	Low	Low	Low	High	Low
Liu,2011,china	Low	High	Low	Low	Low	Low	Low
Liu,2012,china	Low	Low	Low	Low	Low	Low	Low
Chang,2016,Korea	High	Low	Low	High	Low	Low	Low
Sebastiani,2011,Italy	Low	Low	Low	Low	Low	Low	Low
Ucar,2013,Turkey	Unclear	High	Low	Low	Low	Low	Low
Wang,2013,China	Low	Low	Low	Low	Low	Low	Low
Wang,2013,China	Low	Low	Low	Low	Low	Low	Low
Wu,2010,China	Low	Low	Low	Low	Low	Low	Low
Zhang,2010,China	Low	High	Low	Low	Low	Low	Low
Venkatesh,2014,Singapore	High	Unclear	Unclear	Low	Low	Low	Low
Goyal,2013,India	Low	Low	Low	Low	Low	Low	Low
Cardoso,2012,France	Low	Low	Low	Low	Low	Low	Low
Gaia,2011,Italy	Low	Low	Low	Low	Low	Low	Low
Fung,2010,China	Low	Low	Low	Low	Low	Low	Low
Lee,,2011,Korea	Low	Low	Low	Low	Low	Low	Low
Myers,2010,Alberta	Low	Low	Low	Low	Low	Low	Low
Sporea,2010,Romania	Low	High	Low	Low	Low	Low	Low
Li,2017,China	Unclear	Low	Unclear	Low	Low	Low	Low
Marcellin,2009,France	Low	Low	Low	Low	Low	Low	Low
Dong,2016,China	High	Low	Unclear	Low	Low	Low	Low

Text S6 Subgroup analysis of sample size in APRI, FIB-4, ARFI and FibroScan.

Diagnostic test	Sample size	Number of studies (N)	AUSROC (95%CI)	SEN (95%CI)	SPE (95%CI)
	n < 100	8 (588)	0.73 (0.69 - 0.77)	0.67 (0.60 - 0.74)	0.68 (0.61 - 0.75)
	100 ⩽ n < 200	15 (2192)	0.77 (0.73 - 0.81)	0.73 (0.66 - 0.79)	0.70 (0.63 - 0.76)
APRI	200 ⩽ n < 300	12 (3094)	0.77 (0.73 - 0.80)	0.65 (0.50 - 0.78)	0.75 (0.63 - 0.85)
	300 ⩽ n < 400	6 (1848)	0.76 (0.72 - 0.80)	0.61 (0.46 - 0.74)	0.78 (0.66 - 0.86)
	n ⩾ 400	6 (6003)	0.73 (0.69 - 0.77)	0.72 (0.60 - 0.82)	0.62 (0.46 - 0.75)
	n < 100	6 (411)	0.77 (0.73 - 0.80)	0.64 (0.54 - 0.73)	0.77 (0.67 - 0.85)
	100 ⩽ n < 200	6 (886)	0.78 (0.74 - 0.81)	0.66 (0.62 - 0.71)	0.70 (0.65 - 0.74)
FIB-4	200 ⩽ n < 300	8 (2031)	0.75 (0.71 - 0.78))	0.56 (0.46 - 0.66)	0.80 (0.72 - 0.86)
	300 ⩽ n < 400	6 (1848)	0.73 (0.69 - 0.76)	0.59 (0.55 - 0.62)	0.71 (0.68 - 0.73)
	n ⩾ 400	6 (6003)	0.74 (0.70 - 0.77)	0.61 (0.49 - 0.71)	0.74 (0.66 - 0.82)
	n < 100	2 (173)	0.72/0.75	0.83/0.50	0.65/0.90
	100 ⩽ n < 200	8 (1108)	0.89 (0.86 - 0.92)	0.77 (0.69 - 0.84)	0.88 (0.80 - 0.93)
ARFI	200 ⩽ n < 300	1 (246)	0.91	0.84	0.90
	300 ⩽ n < 400	0	-	-	-
	n ⩾ 400	0	-	-	-
	n < 100	6 (445)	0.80 (0.76 - 0.83)	0.70 (0.57 - 0.80)	0.76 (0.68 - 0.83)
	100 ⩽ n < 200	13 (2014)	0.84 (0.80 - 0.87)	0.74 (0.70 - 0.77)	0.82 (0.78 - 0.86)
Fibroscan	200 ⩽ n < 300	7 (1645)	0.85 (0.81 - 0.87)	0.74 (0.61 - 0.84)	0.84 (0.67 - 0.93)
	300 ⩽ n < 400	2 (664)	0.64/0.84	0.29/0.61	0.88/0.95
	n ⩾ 400	1 (267)	0.82	0.64	0.85

Text S7 Threshold effect in all tests.

	Correlation (Mixed Model)	*P*
APRI	-0.82	0.67
ARFI	-0.55	0.31
FIB-4	-0.95	0.90
FibroScan	-0.51	0.26
MRE	1.00	1.00

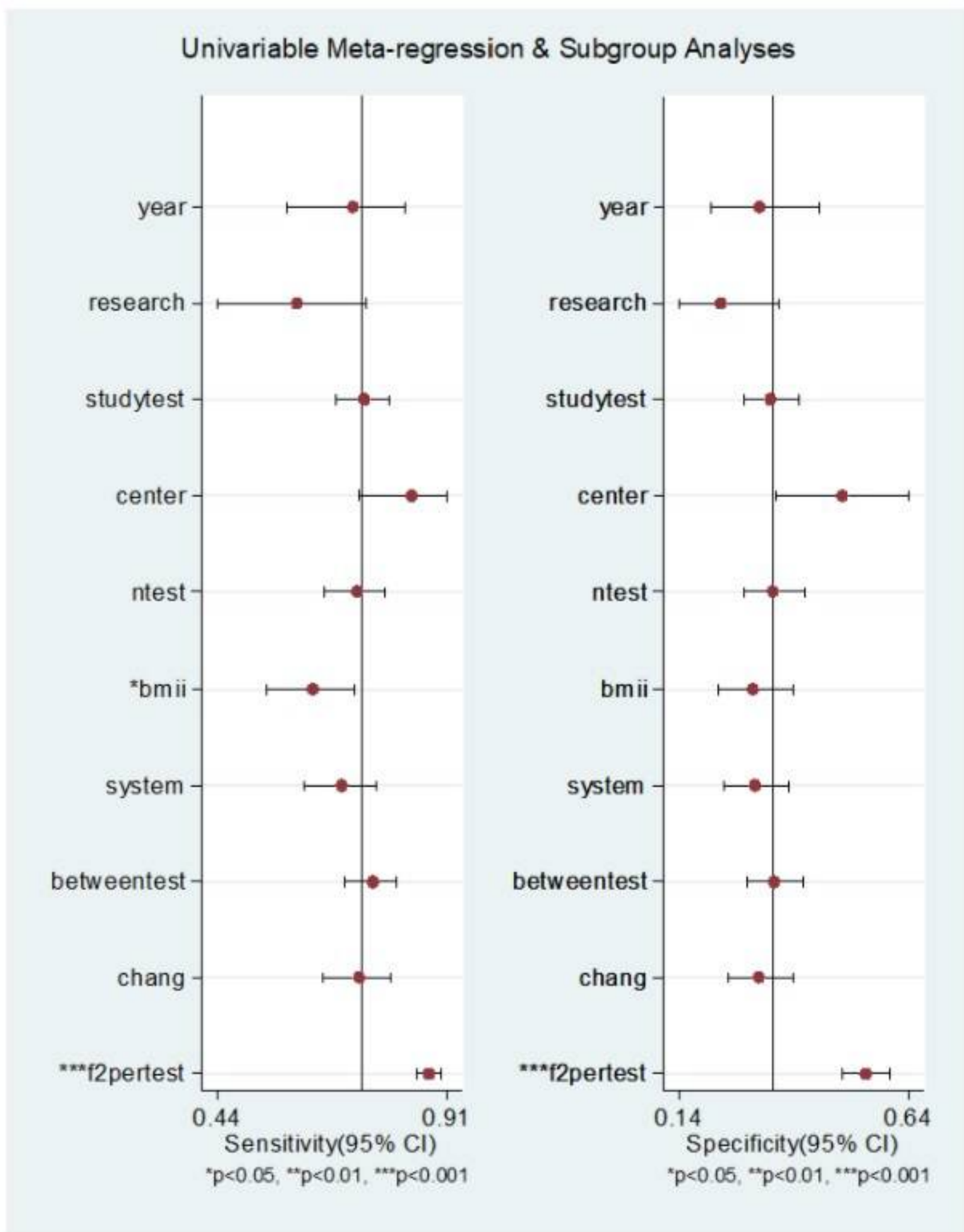|	Correlation (Mixed Model)	*P*
APRI	-0.82	0.67
ARFI	-0.55	0.31
FIB-4	-0.95	0.90

Figure S1 Meta-regression analysis of the APRI for detecting significant fibrosis.
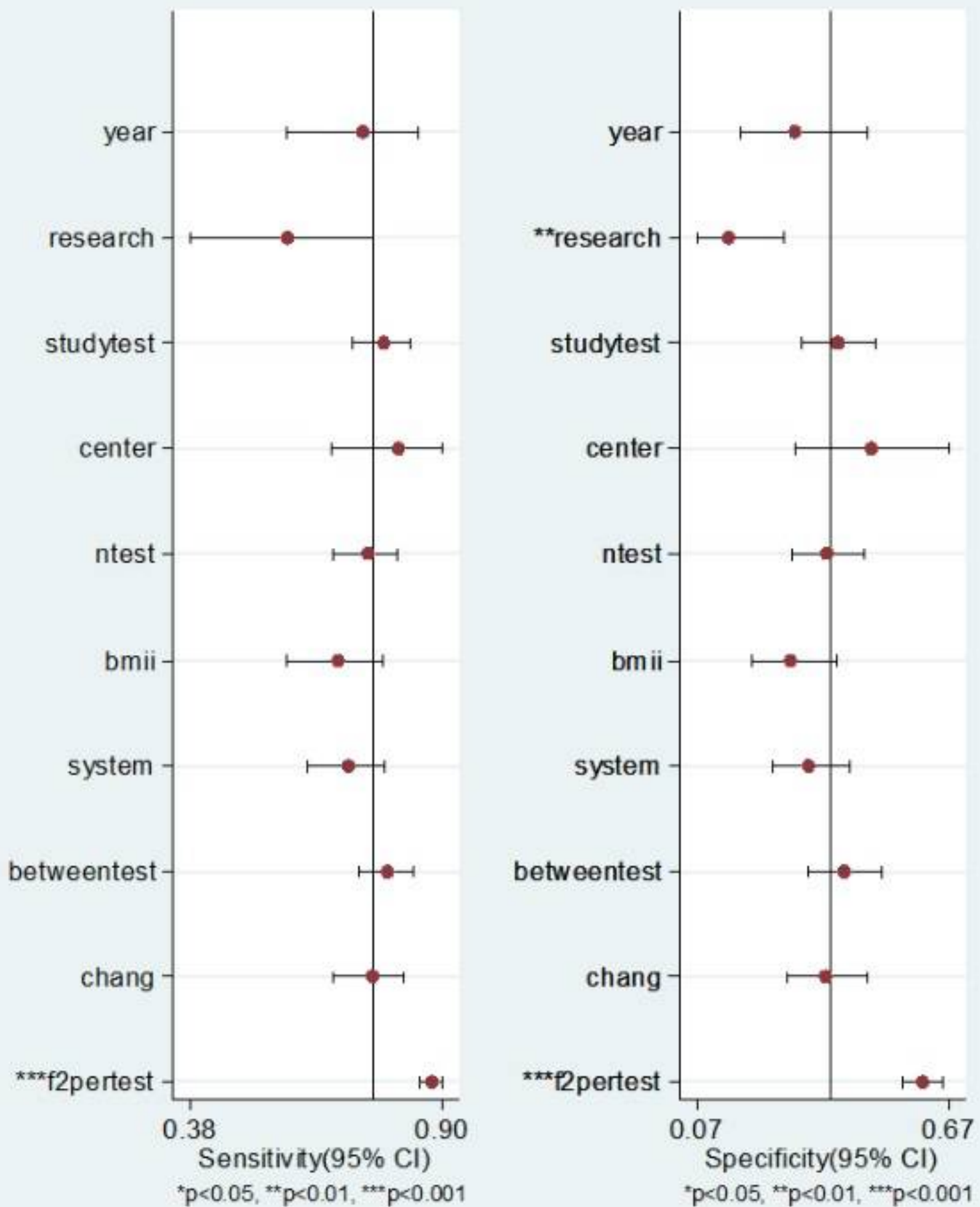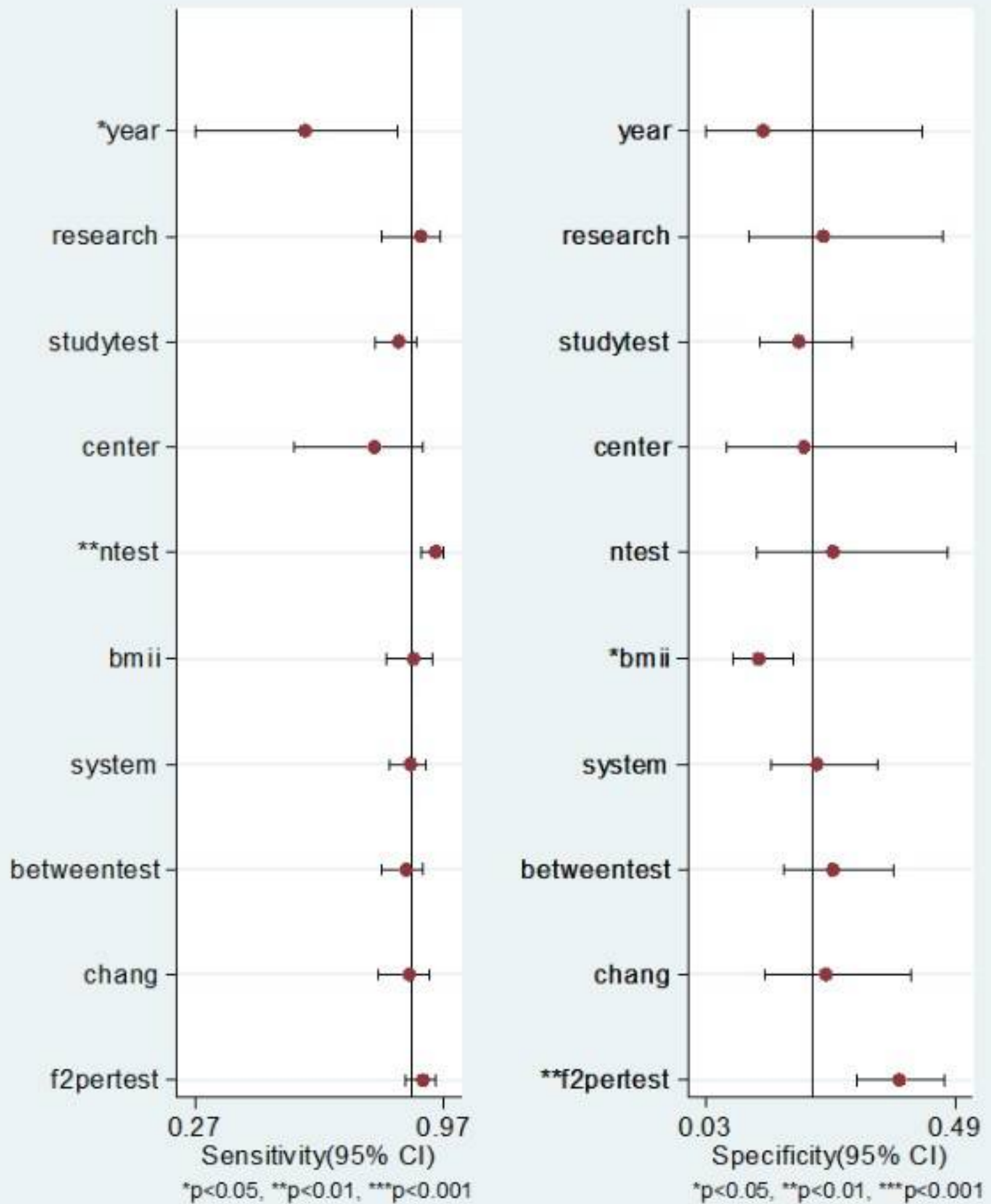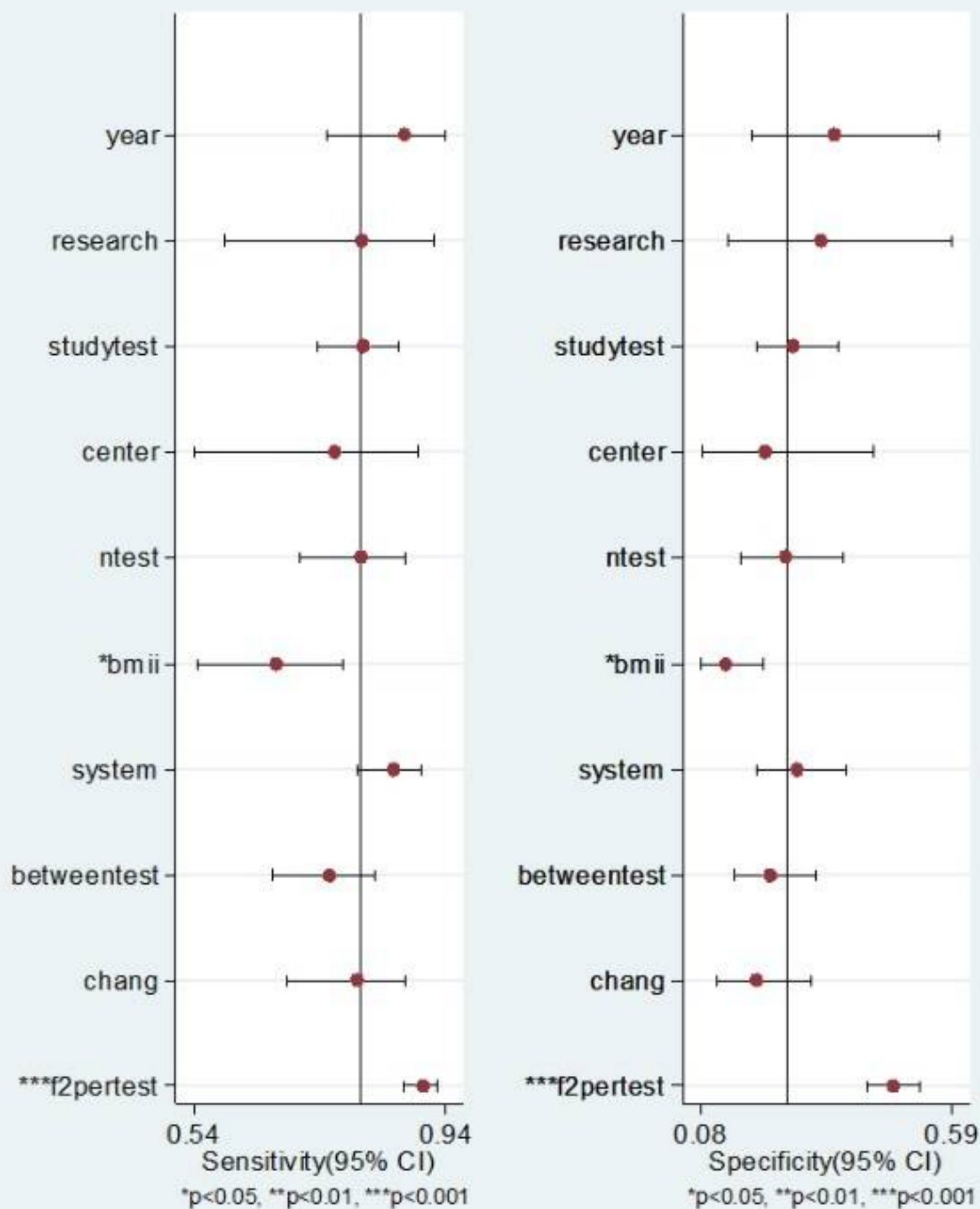
Univariable Meta-regression & Subgroup Analyses

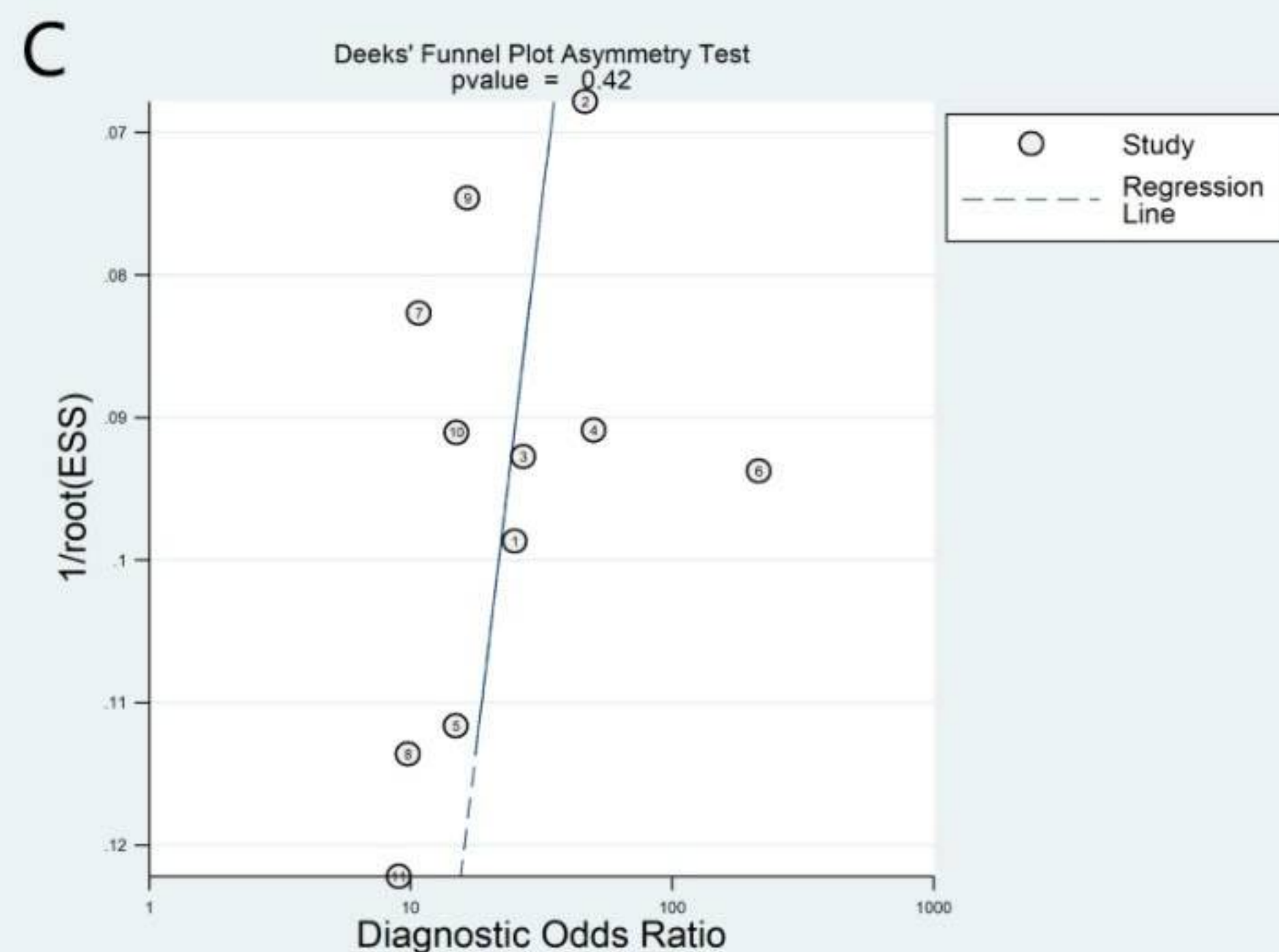Figure S2 Meta-regression analysis of the FIB-4 for detecting significant fibrosis.

Figure S3 Meta-regression analysis of the ARFI for detecting significant fibrosis.

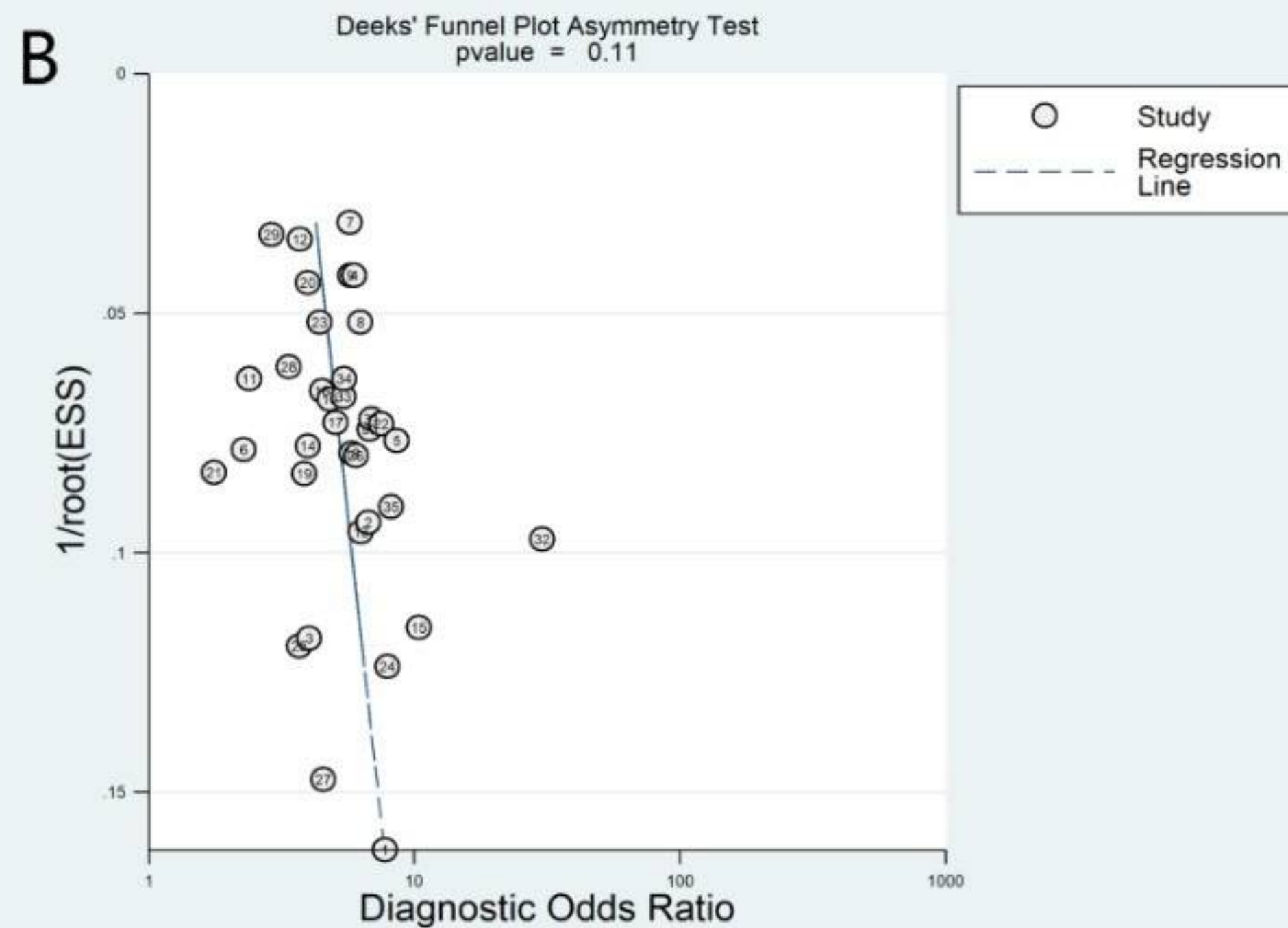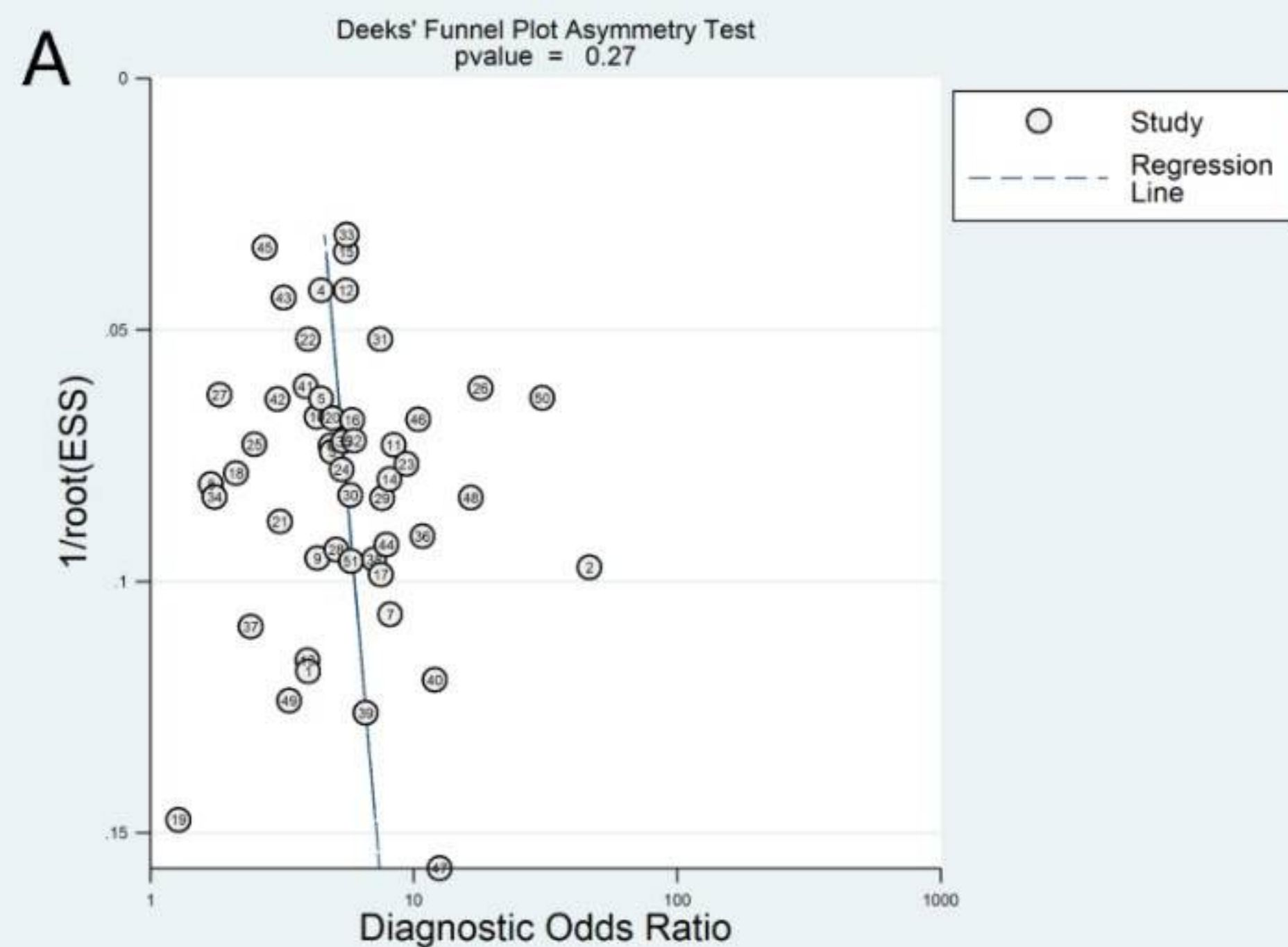Figure S4 Meta-regression analysis of the Fibroscan for detecting significant fibrosis.

Figure S5 Funnel plot of publication bias. A: APRI to predict significant fibrosis B: FIB-4 to predict significant fibrosis C: ARFI to predict significant fibrosis D: FibroScan to predict significant fibrosis E: MRE to predict significant fibrosis