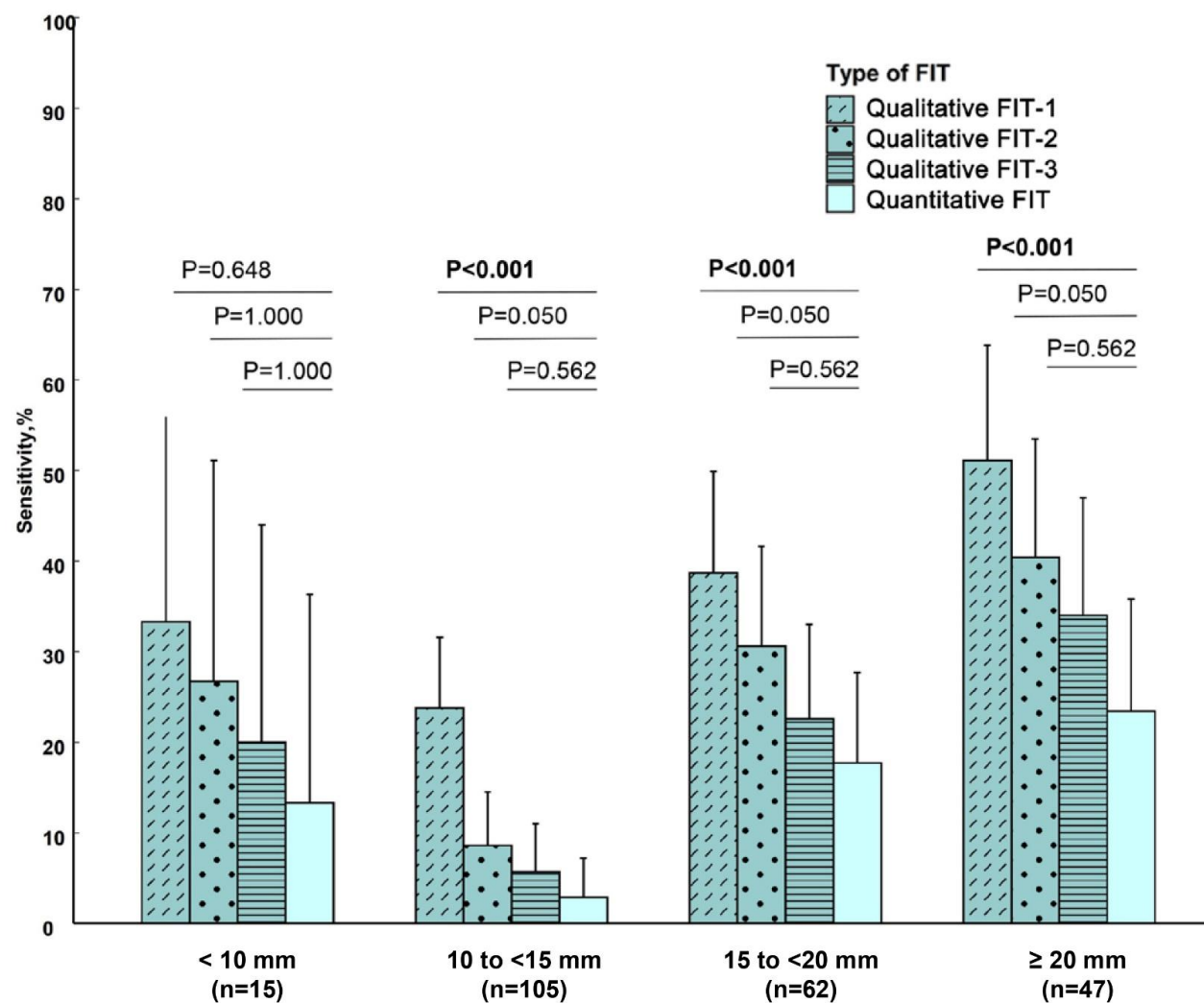
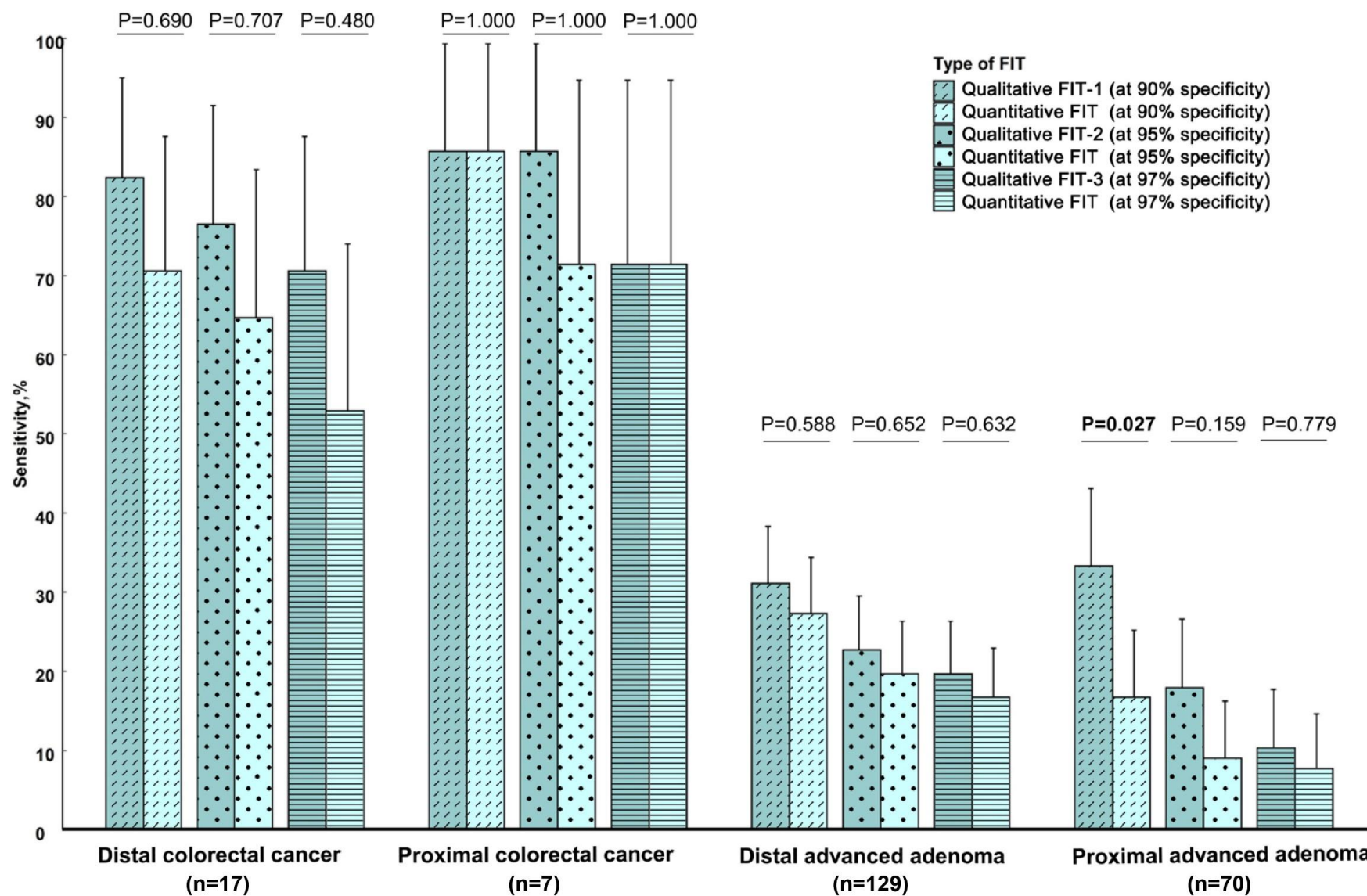


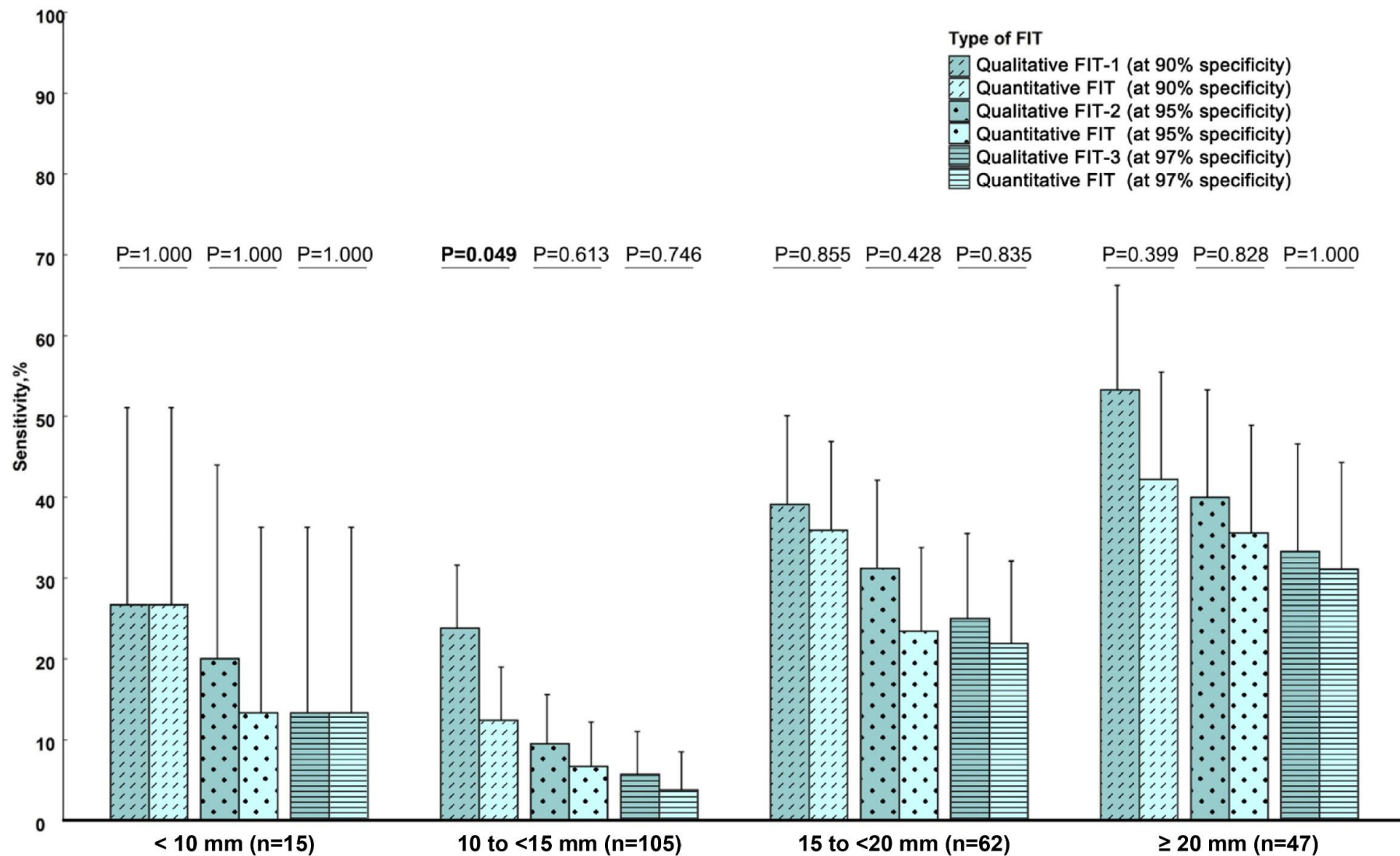
**Supplementary Figure 1: Comparison of sensitivity for CRC and advanced adenoma by anatomical site between the qualitative FITs (Pupu tube) vs. the quantitative FIT (OC-Sensor) with the preset thresholds by manufacturers. (Positivity threshold: qualitative FIT-1, 8.0 µg Hb/g; qualitative FIT-2, 14.4 µg Hb/g; qualitative FIT-3, 20.8 µg Hb/g; quantitative FIT, 20 µg Hb/g) CRC: Colorectal cancer; FITs: Fecal immunochemical tests; Hb: Hemoglobin.**



**Supplementary Figure 2: Comparison of sensitivity for advanced adenoma by size between the qualitative FITs (Pupu tube) vs. the quantitative FIT (OC-Sensor) with the preset thresholds by the manufacturers. (Positivity threshold: qualitative FIT-1, 8.0 µg Hb/g; qualitative FIT-2, 14.4 µg Hb/g; qualitative FIT-3, 20.8 µg Hb/g; quantitative FIT, 20 µg Hb/g) FITs: Fecal immunochemical tests; Hb: Hemoglobin.**



**Supplementary Figure 3: Comparison of sensitivity for CRC and advanced adenoma by anatomical site between the qualitative FITs (Pupu tube) vs. the quantitative FIT (OC-Sensor) with thresholds adjusted to comparable specificities. CRC: Colorectal cancer; FITs: Fecal immunochemical tests; Hb: Hemoglobin.**



**Supplementary Figure 4: Comparison of sensitivity for advanced adenoma by size between the qualitative FITs (Pupu tube) vs. the quantitative FIT (OC-Sensor) with thresholds adjusted to comparable specificities. FITs: Fecal immunochemical tests; Hb: Hemoglobin.**

**Supplementary Table 1: Comparison of diagnostic performance for different colorectal neoplasms between the qualitative FITs (Pupu tube) vs. quantitative FIT (OC-Sensor) with the preset thresholds by the manufacturers, stratified by age and sex.**

Items	Qualitative FIT-1	Qualitative FIT-2	Qualitative FIT-3	Quantitative FIT
Age 50–59 ( <i>n</i> =1381)				
Threshold, µg Hb/g	8	14.4	20.8	20
Positivity rate, %	9.2*	4.9*	3.3	2.2
Sensitivity (95% CI), %				
CRC	75.0 (40.0-95.4)	75.0 (40.0-95.4)	75.0 (40.0-95.4)	62.5 (28.9-88.9)
Advanced adenomas	32.9 (24.5-42.3)*	25.9 (18.2-34.9)	16.5 (10.2-24.5)	14.1 (8.4-21.9)
Non-advanced adenomas	11.1 (7.8-15.1)*	4.4 (2.4-7.4)*	3.1 (1.5-5.7)	0.9 (0.2-2.8)
Advanced neoplasia	36.6 (28.2-45.6)*	30.1 (22.3-38.9)	21.5 (14.7-29.7)	18.3 (12-26.1)
Any neoplasia	18.5 (15.0-22.4)*	11.9 (9.0-15.3)*	8.5 (6.0-11.5)	6.0 (3.9-8.6)
Specificity (95% CI), % <sup>#</sup>	92.8 (91.5-93.9)*	96.9 (96.0-97.6)*	98.1 (97.3-98.6)*	98.9 (98.3-99.3)
PPV (95% CI), % <sup>#</sup>				
CRC	4.7 (2.1-9.1)	8.8 (3.9-16.7)	13.3 (6.0-24.6)	16.1 (6.6-31.0)
Advanced adenomas	22.0 (16.1-29.0)	32.4 (23.0-42.9)	31.1 (19.9-44.3)	38.7 (24.1-55.0)
Non-advanced adenomas	19.7 (14.1-26.4)	14.7 (8.2-23.7)	15.6 (7.5-27.2)	6.5 (1.2-18.9)
Advanced neoplasia	26.8 (20.4-34.0)*	41.2 (31.1-51.9)	44.4 (31.7-57.7)	54.8 (38.7-70.3)
Any neoplasia	46.5 (38.9-54.1)	55.9 (45.2-66.2)	60.0 (46.7-72.3)	61.3 (45.0-75.9)
NPV (95% CI), %	95.3 (94.2-96.2)	95.0 (93.9-96.0)	94.5 (93.4-95.5)	94.4 (93.2-95.4)
LR+ (95% CI)				
CRC	10.4 (6.3-17.2)	24.2 (13.9-42.2)	38.6 (21.1-70.7)	57.5 (24.4-135.5)
Advanced adenomas	4.6 (2.6-8.1)	8.3 (3.8-18.0)	8.5 (2.5-29.5)	13.0 (2.9-57.7)
Non-advanced adenomas	1.5 (0.5-4.6)	1.4 (0.1-25.4)	1.6 (0-102.7)	0.8 (0-1892680.4)
Advanced neoplasia	5.1 (3.1-8.3)	9.7 (5.1-18.5)	11.1 (4.4-28)	16.8 (5.4-52.2)
Any neoplasia	2.6 (1.5-4.6)	3.8 (1.5-9.5)	4.4 (1.2-16.2)	5.5 (0.9-35.4)
LR– (95% CI)	0.7 (0.5-0.9)	0.7 (0.5-0.9)	0.8 (0.6-1.0)	0.8 (0.6-1.0)
Age 60–74 ( <i>n</i> =1763)				

Threshold, µg Hb/g	8	14.4	20.8	20
Positivity rate, %	14.4*	8.0*	5.4*	3.2
Sensitivity (95% CI), % <sup>#</sup>				
CRC	87.5 (65.6-97.7)	81.2 (58.3-94.7)	68.8 (45.2-86.8)	56.2 (33.3-77.3)
Advanced adenomas	34.5 (27.9-41.5)*	20.0 (14.7-26.3)*	17.2 (12.3-23.2)	10.3 (6.5-15.5)
Non-advanced adenomas	13.9 (11.1-17.1)*	7.6 (5.5-10.1)*	5.3 (3.6-7.5)	2.5 (1.4-4.2)
Advanced neoplasia	39.8 (33.3-46.5)*	26.1 (20.5-32.4)*	22.4 (17.1-28.4)	14.9 (10.5-20.3)
Any neoplasia	21.4 (18.5-24.4)*	12.9 (10.6-15.5)*	10.2 (8.2-12.6)*	6.1 (4.5-8.0)
Specificity (95% CI), % <sup>#</sup>	88.2 (86.8-89.5)*	93.8 (92.7-94.8)*	96.3 (95.4-97.1)*	98 (97.3-98.5)
PPV (95% CI), % <sup>#</sup>				
CRC	5.5 (3.4-8.5)*	9.2 (5.5-14.3)	11.6 (6.6-18.4)	16.1 (8.6-26.4)
Advanced adenomas	19.8 (15.7-24.3)	20.6 (15.1-27.0)	26.3 (19.0-34.8)	26.8 (17.3-38.2)
Non-advanced adenomas	21.7 (17.5-26.4)	21.3 (15.8-27.7)	22.1 (15.3-30.2)	17.9 (10.0-28.4)
Advanced neoplasia	25.3 (20.8-30.2)*	29.8 (23.5-36.8)	37.9 (29.6-46.8)	42.9 (31.6-54.7)
Any neoplasia	47.0 (41.7-52.4)	51.1 (43.8-58.3)	60.0 (51.1-68.5)	60.7 (48.9-71.7)
NPV (95% CI), % <sup>#</sup>	93.6 (92.4-94.6)	92.7 (91.5-93.7)	92.5 (91.4-93.5)	92.0 (90.8-93.0)
LR+ (95% CI)				
CRC	7.4 (5.8-9.4)	13.1 (9.4-18.2)	18.7 (11.7-30.0)	28.2 (14.4-55.2)
Advanced adenomas	2.9 (1.9-4.4)	3.2 (1.5-6.8)	4.7 (1.9-11.5)	5.2 (1.1-24.0)
Non-advanced adenomas	1.2 (0.6-2.4)	1.2 (0.3-4.3)	1.4 (0.2-8.7)	1.3 (0-62.1)
Advanced neoplasia	3.4 (2.4-4.7)	4.2 (2.4-7.2)	6.1 (3.2-11.8)	7.5 (2.7-20.7)
Any neoplasia	1.8 (1.2-2.6)	2.1 (1.1-3.9)	2.8 (1.2-6.3)	3.1 (0.8-12.1)
LR- (95% CI)	0.7 (0.6-0.9)	0.8 (0.7-1.0)	0.8 (0.7-1.0)	0.9 (0.8-1.1)
Men (n=1619)				
Threshold, µg Hb/g	8	14.4	20.8	20
Positivity rate, %	14.4*	8.3*	5.7*	3.5
Sensitivity (95% CI), % <sup>#</sup>				
CRC	86.7 (63.7-97.6)	86.7 (63.7-97.6)	80.0 (56-94.3)	73.3 (48.9-90.3)
Advanced adenomas	37.5 (31.3-44.1)*	24.4 (19.0-30.5)*	19.6 (14.7-25.4)	12.5 (8.5-17.5)
Non-advanced adenomas	13.2 (10.5-16.3)*	6.7 (4.8-9.2)*	5.2 (3.5-7.5)*	2.0 (1.0-3.6)
Advanced neoplasia	41.5 (35.4-47.9)*	29.5 (24.0-35.6)*	24.6 (19.4-30.4)	17.5 (13.0-22.8)

Any neoplasia	22.1 (19.3-25.1)*	13.9 (11.6-16.4)*	11.3 (9.2-13.7)*	6.8 (5.2-8.8)
Specificity (95% CI), % <sup>#</sup>	89.1 (87.6-90.4)*	94.4 (93.3-95.4)*	96.7 (95.8-97.4)*	98.3 (97.7-98.8)
PPV (95% CI), % <sup>#</sup>				
CRC	5.6 (3.3-8.7)*	9.7 (5.8-15.0)	12.9 (7.6-20.1)	19.6 (11.4-30.4)
Advanced adenomas	27.0 (22.3-32.2)	30.6 (24.1-37.8)	35.5 (27.2-44.4)	37.5 (26.7-49.3)
Non-advanced adenomas	22.7 (18.3-27.7)	20.1 (14.6-26.7)	22.6 (15.7-30.9)	14.3 (7.3-24.3)
Advanced neoplasia	32.6 (27.5-38.0)*	40.3 (33.2-47.8)	48.4 (39.5-57.4)	57.1 (45.3-68.4)
Any neoplasia	55.4 (49.8-60.9)*	60.4 (53.0-67.5)	71.0 (62.3-78.7)	71.4 (59.9-81.2)
NPV (95% CI), % <sup>#</sup>	92.3 (91.0-93.4)	91.3 (90.0-92.5)	91.0 (89.7-92.1)	90.3 (89.0-91.5)
LR+ (95% CI)				
CRC	7.9 (6.1-10.3)	15.6 (11.5-21.2)	23.9 (16-35.7)	43.9 (25.7-75)
Advanced adenomas	3.4 (2.4-4.8)	4.4 (2.5-7.9)	5.9 (2.8-12.4)	7.5 (2.3-24.9)
Non-advanced adenomas	1.2 (0.6-2.4)	1.2 (0.3-5.0)	1.6 (0.3-10.1)	1.2 (0-156.9)
Advanced neoplasia	3.8 (2.8-5.2)	5.3 (3.3-8.5)	7.4 (4.1-13.3)	10.5 (4.5-24.6)
Any neoplasia	2.0 (1.4-2.9)	2.5 (1.4-4.5)	3.4 (1.6-7.1)	4.1 (1.2-13.8)
LR- (95% CI)	0.7 (0.6-0.8)	0.7 (0.6-0.8)	0.8 (0.7-0.9)	0.8 (0.7-0.9)
Women (n=1525)				
Threshold, µg Hb/g	8	14.4	20.8	20
Positivity rate, %	9.6*	4.9*	3.1	2.0
Sensitivity (95% CI), % <sup>#</sup>				
CRC	77.8 (45.0-95.9)	66.7 (34.5-90.2)	55.6 (25.1-83.1)	33.3 (9.8-65.5)
Advanced adenomas	24.2 (15.5-34.8)	16.1 (9.0-25.8)	9.7 (4.3-18.2)	9.7 (4.3-18.2)
Non-advanced adenomas	12.2 (8.8-16.5)*	5.9 (3.5-9.2)	3.2 (1.5-5.9)	1.8 (0.6-4.1)
Advanced neoplasia	31.0 (22.0-41.2)*	22.5 (14.7-32.2)	15.5 (8.9-24.3)	12.7 (6.8-21.1)
Any neoplasia	16.8 (13.3-20.8)*	9.9 (7.2-13.3)*	6.2 (4.0-9.0)	4.5 (2.7-7.0)
Specificity (95% CI), % <sup>#</sup>	91.4 (90.1-92.6)*	95.9 (95.0-96.8)*	97.5 (96.7-98.2)	98.5 (97.8-99.0)
PPV (95% CI), % <sup>#</sup>				
CRC	4.8 (2.3-8.8)	8.0 (3.5-15.2)	10.6 (4.3-21.1)	9.7 (2.7-23.2)
Advanced adenomas	10.2 (6.4-15.3)	13.3 (7.4-21.6)	12.8 (5.7-23.6)	19.4 (8.8-34.7)
Non-advanced adenomas	18.4 (13.3-24.4)	17.3 (10.6-26.1)	14.9 (7.2-26.2)	12.9 (4.5-27.1)
Advanced neoplasia	15 (10.4-20.7)	21.3 (13.9-30.6)	23.4 (13.7-35.8)	29.0 (16.1-45.2)

Any neoplasia	33.3 (26.9-40.3)	38.7 (29.2-48.8)	38.3 (26.4-51.3)	41.9 (26.9-58.2)
NPV (95% CI), % <sup>#</sup>	96.4 (95.5-97.2)	96.2 (95.3-97.0)	95.9 (95.0-96.7)	95.9 (94.9-96.7)
LR+ (95% CI)				
CRC	9.0 (5.8-13.9)	16.4 (8.8-30.5)	22.4 (9.6-52.4)	22.0 (4.2-115.0)
Advanced adenomas	2.8 (1.1-7.0)	4.0 (1.0-16.8)	3.9 (0.3-45.9)	6.4 (0.5-76.4)
Non-advanced adenomas	1.4 (0.5-3.9)	1.4 (0.2-12.5)	1.3 (0-79.2)	1.2 (0-1656.7)
Advanced neoplasia	3.6 (1.9-6.9)	5.6 (2.2-14.4)	6.3 (1.5-26.0)	8.4 (1.4-49.1)
Any neoplasia	2.0 (1.0-3.8)	2.4 (0.8-7.4)	2.5 (0.4-15.6)	2.9 (0.2-37.2)
LR- (95% CI)	0.8 (0.6-1.1)	0.8 (0.6-1.0)	0.9 (0.7-1.2)	0.9 (0.7-1.2)

CRC: Colorectal cancer; FITs: Fecal immunochemical tests; Hb: Hemoglobin; LR+: Positive likelihood ratio; LR-: Negative likelihood ratio; NPV: Negative predictive value; PPV: Positive predictive value. <sup>#</sup>Indicating that statistical tests using Chi-square test were performed for each of the qualitative FIT and the quantitative FIT. <sup>\*</sup>Indicating statistical significance between each of the qualitative FIT and the quantitative FIT using the Chi-square test.



**Supplementary Table 2: Comparison of diagnostic performance for different colorectal neoplasms between the qualitative FITs (Pupu tube) vs. the quantitative FIT (OC-Sensor) with thresholds adjusted to comparable specificities, stratified by age and sex.**

Items	Thresholds adjusted to comparable specificity					
	Qualitative FIT-1	Quantitative FIT	Qualitative FIT-2	Quantitative FIT	Qualitative FIT-3	Quantitative FIT
Age 50–59 ( <i>n</i> = 1381)						
Threshold, µg Hb/g	8.0	3.4	14.4	6.4	20.8	10.2
Positivity rate, %	9.2	8.5	4.9	4.4	3.3	3.1
Sensitivity (95% CI), % <sup>#</sup>						
CRC	75.0 (40.0–95.4)	75.0 (40.0–95.4)	75.0 (40.0–95.4)	62.5 (28.9–88.9)	75.0 (40.0–95.4)	62.5 (28.9–88.9)
Advanced adenomas	32.9 (24.5–42.3)	24.7 (17.2–33.6)	25.9 (18.2–34.9)	18.8 (12.2–27.2)	16.5 (10.2–24.5)	15.3 (9.3–23.2)
Non-advanced adenomas	11.1 (7.8–15.1)	8.0 (5.2–11.6)	4.4 (2.4–7.4)	3.5 (1.8–6.3)	3.1 (1.5–5.7)	2.2 (0.9–4.6)
Advanced neoplasia	36.6 (28.2–45.6)	29.0 (21.3–37.7)	30.1 (22.3–38.9)	22.6 (15.7–30.9)	21.5 (14.7–29.7)	19.4 (12.9–27.3)
Any neoplasia	18.5 (15.0–22.4)	14.1 (11.0–17.7)	11.9 (9.0–15.3)	9.1 (6.6–12.2)	8.5 (6.0–11.5)	7.2 (5.0–10.1)
Specificity (95% CI), % <sup>#</sup>	92.8 (91.5–93.9)	92.9 (91.6–94.1)	96.9 (96–97.6)	96.9 (96–97.6)	98.1 (97.3–98.6)	98.1 (97.3–98.6)
PPV (95% CI), % <sup>#</sup>						
CRC	4.7 (2.1–9.1)	5.1 (2.2–9.8)	8.8 (3.9–16.7)	8.2 (3.3–16.5)	13.3 (6.0–24.6)	11.6 (4.7–22.9)
Advanced adenomas	22.0 (16.1–29.0)	17.8 (12.2–24.6)	32.4 (23.0–42.9)	26.2 (17.2–37.1)	31.1 (19.9–44.3)	30.2 (18.9–43.7)
Non-advanced adenomas	19.7 (14.1–26.4)	15.3 (10.1–21.8)	14.7 (8.2–23.7)	13.1 (6.7–22.4)	15.6 (7.5–27.2)	11.6 (4.7–22.9)
Advanced neoplasia	26.8 (20.4–34.0)	22.9 (16.7–30.1)	41.2 (31.1–51.9)	34.4 (24.4–45.7)	44.4 (31.7–57.7)	41.9 (29.1–55.5)
Any neoplasia	46.5 (38.9–54.1)	38.1 (30.6–46.1)	55.9 (45.2–66.2)	47.5 (36.5–58.8)	60.0 (46.7–72.3)	53.5 (39.9–66.7)
NPV (95% CI), % <sup>#</sup>	95.3 (94.2–96.2)	94.8 (93.6–95.8)	95.0 (93.9–96.0)	94.5 (93.4–95.5)	94.5 (93.4–95.5)	94.4 (93.2–95.4)
LR+ (95% CI)						
CRC	10.4 (6.3–17.2)	10.6 (6.4–17.6)	24.2 (13.9–42.2)	20.1 (9.5–42.4)	38.6 (21.1–70.7)	32.2 (14.7–70.5)
Advanced adenomas	4.6 (2.6–8.1)	3.5 (1.6–7.6)	8.3 (3.8–18.0)	6.1 (2.1–17.7)	8.5 (2.5–29.5)	7.9 (2.1–30.1)
Non-advanced adenomas	1.5 (0.5–4.6)	1.1 (0.2–5.4)	1.4 (0.1–25.4)	1.1 (0–41.5)	1.6 (0–102.7)	1.1 (0–378.4)
Advanced neoplasia	5.1 (3.1–8.3)	4.1 (2.2–7.7)	9.7 (5.1–18.5)	7.3 (3.1–17.1)	11.1 (4.4–28.0)	10.0 (3.6–27.8)
Any neoplasia	2.6 (1.5–4.6)	2.0 (0.9–4.2)	3.8 (1.5–9.5)	2.9 (0.9–9.6)	4.4 (1.2–16.2)	3.7 (0.8–16.9)
LR– (95% CI)	0.7 (0.5–0.9)	0.8 (0.6–1.0)	0.7 (0.5–0.9)	0.8 (0.6–1.0)	0.8 (0.6–1.0)	0.8 (0.6–1.0)

Age 60–74 ( <i>n</i> = 1763)						
Threshold, µg Hb/g	8.0	3.0	14.4	4.6	20.8	6.8
Positivity rate, %	14.4	13.6	8.0	7.7	5.4	5.0
Sensitivity (95% CI), % <sup>#</sup>						
CRC	87.5 (65.6–97.7)	81.2 (58.3–94.7)	81.2 (58.3–94.7)	62.5 (39.1–82.2)	68.8 (45.2–86.8)	62.5 (39.1–82.2)
Advanced adenomas	34.5 (27.9–41.5)	26.2 (20.3–32.9)	20.0 (14.7–26.3)	16.6 (11.7–22.5)	17.2 (12.3–23.2)	13.1 (8.8–18.6)
Non-advanced adenomas	13.9 (11.1–17.1)	13.4 (10.7–16.5)	7.6 (5.5–10.1)	7.3 (5.3–9.9)	5.3 (3.6–7.5)	5.1 (3.4–7.3)
Advanced neoplasia	39.8 (33.3–46.5)	31.7 (25.6–38.2)	26.1 (20.5–32.4)	21.1 (16.0–27.1)	22.4 (17.1–28.4)	18 (13.2–23.7)
Any neoplasia	21.4 (18.5–24.4)	18.7 (16.0–21.6)	12.9 (10.6–15.5)	11.3 (9.2–13.8)	10.2 (8.2–12.6)	8.8 (6.9–11.0)
Specificity (95% CI), % <sup>#</sup>	88.2 (86.8–89.5)	88.3 (86.9–89.6)	93.8 (92.7–94.8)	93.7 (92.6–94.7)	96.3 (95.4–97.1)	96.3 (95.4–97.0)
PPV (95% CI), % <sup>#</sup>						
CRC	5.5 (3.4–8.5)	5.4 (3.2–8.5)	9.2 (5.5–14.3)	7.4 (4.1–12.2)	11.6 (6.6–18.4)	11.2 (6.2–18.3)
Advanced adenomas	19.8 (15.7–24.3)	15.9 (12.1–20.3)	20.6 (15.1–27)	17.8 (12.6–24.1)	26.3 (19–34.8)	21.3 (14.5–29.7)
Non-advanced adenomas	21.7 (17.5–26.4)	22.2 (17.8–27.1)	21.3 (15.8–27.7)	21.5 (15.8–28.1)	22.1 (15.3–30.2)	22.5 (15.4–31.0)
Advanced neoplasia	25.3 (20.8–30.2)	21.3 (17.1–26.2)	29.8 (23.5–36.8)	25.2 (19.1–32.1)	37.9 (29.6–46.8)	32.6 (24.4–41.7)
Any neoplasia	47 (41.7–52.4)	43.5 (38.1–49)	51.1 (43.8–58.3)	46.7 (39.3–54.1)	60 (51.1–68.5)	55.1 (45.8–64.1)
NPV (95% CI), % <sup>#</sup>						
LR+ (95% CI)	71.0 (69.0–72.9)	70.3 (68.3–72.2)	70.1 (68.2–72.0)	69.7 (67.7–71.5)	70.0 (68.1–71.9)	69.7 (67.8–71.5)
CRC	7.4 (5.8–9.4)	6.9 (5.1–9.3)	13.1 (9.4–18.2)	9.9 (5.9–16.6)	18.7 (11.7–30.0)	16.7 (9.7–28.7)
Advanced adenomas	2.9 (1.9–4.4)	2.2 (1.3–3.8)	3.2 (1.5–6.8)	2.6 (1.0–6.5)	4.7 (1.9–11.5)	3.5 (1.1–11.5)
Non-advanced adenomas	1.2 (0.6–2.4)	1.1 (0.5–2.2)	1.2 (0.3–4.3)	1.2 (0.3–4.4)	1.4 (0.2–8.7)	1.3 (0.2–8.8)
Advanced neoplasia	3.4 (2.4–4.7)	2.7 (1.8–4.1)	4.2 (2.4–7.2)	3.3 (1.7–6.5)	6.1 (3.2–11.8)	4.8 (2.1–10.9)
Any neoplasia	1.8 (1.2–2.6)	1.6 (1.0–2.4)	2.1 (1.1–3.9)	1.8 (0.9–3.7)	2.8 (1.2–6.3)	2.3 (0.9–5.9)
LR– (95% CI)	0.7 (0.6–0.9)	0.8 (0.7–1.0)	0.8 (0.7–1.0)	0.8 (0.7–1.0)	0.8 (0.7–1.0)	0.9 (0.8–1.1)
Men ( <i>n</i> = 1619)						
Threshold, µg Hb/g	8.0	3.0	14.4	4.8	20.8	7.4
Positivity rate, %	14.4	12.7	8.3	7.5	5.7	5.3
Sensitivity (95% CI), % <sup>#</sup>						
CRC	86.7 (63.7–97.6)	80.0 (56.0–94.3)	86.7 (63.7–97.6)	73.3 (48.9–90.3)	80.0 (56.0–94.3)	73.3 (48.9–90.3)

Advanced adenomas	37.5 (31.3–44.1)	25.6 (20.1–31.7)	24.4 (19–30.5)	17.3 (12.6–22.8)	19.6 (14.7–25.4)	15.5 (11.1–20.8)
Non-advanced adenomas	13.2 (10.5–16.3)	11.2 (8.7–14.2)	6.7 (4.8–9.2)	7.0 (5.0–9.4)	5.2 (3.5–7.5)	4.2 (2.7–6.3)
Advanced neoplasia	41.5 (35.4–47.9)	30.1 (24.5–36.1)	29.5 (24.0–35.6)	21.9 (16.9–27.5)	24.6 (19.4–30.4)	20.2 (15.5–25.7)
Any neoplasia	22.1 (19.3–25.1)	17.1 (14.6–19.9)	13.9 (11.6–16.4)	11.6 (9.5–14.1)	11.3 (9.2–13.7)	9.2 (7.3–11.5)
Specificity (95% CI), % <sup>#</sup>	89.1 (87.6–90.4)	89.5 (88.1–90.8)	94.4 (93.3–95.4)	94.3 (93.2–95.3)	96.7 (95.8–97.4)	96.7 (95.8–97.4)
PPV (95% CI), % <sup>#</sup>						
CRC	5.6 (3.3–8.7)	5.8 (3.4–9.3)	9.7 (5.8–15)	9 (5.1–14.5)	12.9 (7.6–20.1)	12.9 (7.4–20.5)
Advanced adenomas	27.0 (22.3–32.2)	20.9 (16.3–26.1)	30.6 (24.1–37.8)	23.8 (17.6–31)	35.5 (27.2–44.4)	30.6 (22.4–39.8)
Non-advanced adenomas	22.7 (18.3–27.7)	21.8 (17.2–27.1)	20.1 (14.6–26.7)	23 (16.8–30.1)	22.6 (15.7–30.9)	20.0 (13.2–28.5)
Advanced neoplasia	32.6 (27.5–38)	26.7 (21.7–32.2)	40.3 (33.2–47.8)	32.8 (25.8–40.5)	48.4 (39.5–57.4)	43.5 (34.4–53.0)
Any neoplasia	55.4 (49.8–60.9)	48.5 (42.6–54.5)	60.4 (53–67.5)	55.7 (47.9–63.4)	71 (62.3–78.7)	63.5 (54.1–72.2)
NPV (95% CI), % <sup>#</sup>	92.3 (91.0–93.4)	90.9 (89.6–92.2)	91.3 (90–92.5)	90.4 (89.1–91.7)	91 (89.7–92.1)	90.5 (89.2–91.7)
LR+ (95% CI)						
CRC	7.9 (6.1–10.3)	7.6 (5.5–10.5)	15.6 (11.5–21.2)	12.8 (8.4–19.4)	23.9 (16–35.7)	21.9 (13.9–34.5)
Advanced adenomas	3.4 (2.4–4.8)	2.4 (1.4–4.1)	4.4 (2.5–7.9)	3 (1.3–6.9)	5.9 (2.8–12.4)	4.6 (1.8–11.8)
Non-advanced adenomas	1.2 (0.6–2.4)	1.1 (0.5–2.5)	1.2 (0.3–5.0)	1.2 (0.3–4.7)	1.6 (0.3–10.1)	1.3 (0.1–12.7)
Advanced neoplasia	3.8 (2.8–5.2)	2.9 (1.9–4.5)	5.3 (3.3–8.5)	3.8 (2–7.1)	7.4 (4.1–13.3)	6.0 (3.0–12.1)
Any neoplasia	2.0 (1.4–2.9)	1.6 (1.0–2.5)	2.5 (1.4–4.5)	2.0 (1.0–4.0)	3.4 (1.6–7.1)	2.8 (1.2–6.8)
LR– (95% CI)	0.7 (0.6–0.8)	0.8 (0.7–1.0)	0.7 (0.6–0.8)	0.8 (0.7–0.9)	0.8 (0.7–0.9)	0.8 (0.7–0.9)
Women ( <i>n</i> = 1525)						
Threshold, µg Hb/g	8.0	3.4	14.4	5.0	20.8	9.0
Positivity rate, %	9.6	9.4	4.9	4.9	3.1	3.1
Sensitivity (95% CI), % <sup>#</sup>						
CRC	77.8 (45.0–95.9)	66.7 (34.5–90.2)	66.7 (34.5–90.2)	55.6 (25.1–83.1)	55.6 (25.1–83.1)	33.3 (9.8–65.5)
Advanced adenomas	24.2 (15.5–34.8)	27.4 (18.3–38.2)	16.1 (9.0–25.8)	17.7 (10.3–27.7)	9.7 (4.3–18.2)	12.9 (6.6–22.1)
Non-advanced adenomas	12.2 (8.8–16.5)	10.9 (7.6–14.9)	5.9 (3.5–9.2)	3.6 (1.8–6.4)	3.2 (1.5–5.9)	2.7 (1.2–5.3)
Advanced neoplasia	31.0 (22.0–41.2)	32.4 (23.3–42.7)	22.5 (14.7–32.2)	22.5 (14.7–32.2)	15.5 (8.9–24.3)	15.5 (8.9–24.3)
Any neoplasia	16.8 (13.3–20.8)	16.1 (12.7–20.1)	9.9 (7.2–13.3)	8.2 (5.7–11.4)	6.2 (4.0–9.0)	5.8 (3.7–8.6)

Specificity (95% CI), % <sup>#</sup>	91.4 (90.1–92.6)	91.7 (90.5–92.9)	95.9 (95.0–96.8)	96.0 (95.1–96.8)	97.5 (96.7–98.2)	97.5 (96.7–98.2)
PPV (95% CI), % <sup>#</sup>						
CRC	4.8 (2.3–8.8)	4.2 (1.8–8.1)	8 (3.5–15.2)	6.8 (2.7–13.7)	10.6 (4.3–21.1)	6.4 (1.8–15.7)
Advanced adenomas	10.2 (6.4–15.3)	11.9 (7.7–17.3)	13.3 (7.4–21.6)	14.9 (8.6–23.4)	12.8 (5.7–23.6)	17 (8.8–28.6)
Non-advanced adenomas	18.4 (13.3–24.4)	16.8 (11.9–22.8)	17.3 (10.6–26.1)	10.8 (5.5–18.7)	14.9 (7.2–26.2)	12.8 (5.7–23.6)
Advanced neoplasia	15 (10.4–20.7)	16.1 (11.2–22)	21.3 (13.9–30.6)	21.6 (14.1–31)	23.4 (13.7–35.8)	23.4 (13.7–35.8)
Any neoplasia	33.3 (26.9–40.3)	32.9 (26.4–39.9)	38.7 (29.2–48.8)	32.4 (23.5–42.5)	38.3 (26.4–51.3)	36.2 (24.5–49.2)
NPV (95% CI), % <sup>#</sup>	96.4 (95.5–97.2)	96.5 (95.6–97.3)	96.2 (95.3–97)	96.2 (95.3–97)	95.9 (95–96.7)	95.9 (95–96.7)
LR+ (95% CI)						
CRC	9.0 (5.8–13.9)	8.1 (4.5–14.7)	16.4 (8.8–30.5)	13.9 (6.1–31.7)	22.4 (9.6–52.4)	13.5 (2.6–69.1)
Advanced adenomas	2.8 (1.1–7.0)	3.3 (1.5–7.3)	4.0 (1.0–16.8)	4.4 (1.2–16.1)	3.9 (0.3–45.9)	5.2 (0.8–32.4)
Non-advanced adenomas	1.4 (0.5–3.9)	1.3 (0.4–4.1)	1.4 (0.2–12.5)	0.9 (0–32.4)	1.3 (0–79.2)	1.1 (0–133.8)
Advanced neoplasia	3.6 (1.9–6.9)	3.9 (2.1–7.2)	5.6 (2.2–14.4)	5.6 (2.2–14.4)	6.3 (1.5–26.0)	6.3 (1.5–26.0)
Any neoplasia	2.0 (1.0–3.8)	2.0 (1.0–3.9)	2.4 (0.8–7.4)	2.1 (0.5–8.2)	2.5 (0.4–15.6)	2.4 (0.3–16.7)
LR– (95% CI)	0.8 (0.6–1.1)	0.7 (0.5–0.9)	0.8 (0.6–1.0)	0.8 (0.6–1.0)	0.9 (0.7–1.2)	0.9 (0.7–1.2)

CRC: Colorectal cancer; FITs: Fecal immunochemical tests; Hb: Hemoglobin; LR+: Positive likelihood ratio; LR–: Negative likelihood ratio; NPV: Negative predictive value; PPV: Positive predictive value. <sup>#</sup>Indicating that statistical tests using Chi-square test were performed for each of the qualitative FIT and the quantitative FIT.

**Supplementary Table 3: Comparison of diagnostic performance for different colorectal neoplasms between the qualitative FITs (Pupu tube) vs. the quantitative FIT (OC-Sensor) with thresholds adjusted to comparable positivity rates, stratified by age and sex.**

Items	Thresholds adjusted to comparable positivity rate					
	Qualitative FIT-1	Quantitative FIT	Qualitative FIT-2	Quantitative FIT	Qualitative FIT-3	Quantitative FIT
Age 50–59 ( <i>n</i> = 1381)						
Threshold, µg Hb/g	8.0	3.2	14.4	6.2	20.8	10.0
Positivity rate, %	9.2	9.3	4.9	4.9	3.3	3.3
Sensitivity (95% CI), % <sup>#</sup>						
CRC	75.0 (40–95.4)	75.0 (40.0–95.4)	75.0 (40.0–95.4)	75.0 (40.0–95.4)	75.0 (40.0–95.4)	62.5 (28.9–88.9)
Advanced adenomas	32.9 (24.5–42.3)	25.9 (18.2–34.9)	25.9 (18.2–34.9)	18.8 (12.2–27.2)	16.5 (10.2–24.5)	16.5 (10.2–24.5)
Non-advanced adenomas	11.1 (7.8–15.1)	8.0 (5.2–11.6)	4.4 (2.4–7.4)	4.4 (2.4–7.4)	3.1 (1.5–5.7)	3.1 (1.5–5.7)
Advanced neoplasia	36.6 (28.2–45.6)	30.1 (22.3–38.9)	30.1 (22.3–38.9)	23.7 (16.6–32.0)	21.5 (14.7–29.7)	20.4 (13.8–28.5)
Any neoplasia	18.5 (15.0–22.4)	14.4 (11.3–18.1)	11.9 (9.0–15.3)	10.0 (7.4–13.2)	8.5 (6.0–11.5)	8.2 (5.8–11.1)
Specificity (95% CI), % <sup>#</sup>	92.8 (91.5–93.9)	92.2 (90.9–93.4)	96.9 (96–97.6)	96.4 (95.5–97.2)	98.1 (97.3–98.6)	97.9 (97.1–98.5)
PPV (95% CI), % <sup>#</sup>						
CRC	4.7 (2.1–9.1)	4.7 (2.1–9.0)	8.8 (3.9–16.7)	8.8 (3.9–16.7)	13.3 (6–24.6)	10.9 (4.4–21.5)
Advanced adenomas	22 (16.1–29.0)	17.2 (11.9–23.6)	32.4 (23–42.9)	23.5 (15.4–33.5)	31.1 (19.9–44.3)	30.4 (19.4–43.4)
Non-advanced adenomas	19.7 (14.1–26.4)	14.1 (9.3–20.1)	14.7 (8.2–23.7)	14.7 (8.2–23.7)	15.6 (7.5–27.2)	15.2 (7.4–26.7)
Advanced neoplasia	26.8 (20.4–34)	21.9 (16.0–28.7)	41.2 (31.1–51.9)	32.4 (23–42.9)	44.4 (31.7–57.7)	41.3 (29.0–54.5)
Any neoplasia	46.5 (38.9–54.1)	35.9 (28.9–43.5)	55.9 (45.2–66.2)	47.1 (36.6–57.7)	60 (46.7–72.3)	56.5 (43.4–69.0)
NPV (95% CI), % <sup>#</sup>	95.3 (94.2–96.2)	94.8 (93.7–95.8)	95 (93.9–96)	94.6 (93.5–95.6)	94.5 (93.4–95.5)	94.5 (93.3–95.5)
LR+ (95% CI)						
CRC	10.4 (6.3–17.2)	9.7 (5.9–16.0)	24.2 (13.9–42.2)	21 (12.2–36.2)	38.6 (21.1–70.7)	29.8 (13.7–64.8)
Advanced adenomas	4.6 (2.6–8.1)	3.3 (1.6–6.9)	8.3 (3.8–18.0)	5.3 (1.8–15.3)	8.5 (2.5–29.5)	7.9 (2.3–27.3)
Non-advanced adenomas	1.5 (0.5–4.6)	1.0 (0.2–4.9)	1.4 (0.1–25.4)	1.2 (0.1–21.7)	1.6 (0–102.7)	1.5 (0–96.2)
Advanced neoplasia	5.1 (3.1–8.3)	3.9 (2.1–7.1)	9.7 (5.1–18.5)	6.6 (3.0–14.8)	11.1 (4.4–28.0)	9.7 (3.7–25.4)
Any neoplasia	2.6 (1.5–4.6)	1.9 (0.9–3.9)	3.8 (1.5–9.5)	2.8 (1.0–8.2)	4.4 (1.2–16.2)	3.9 (1.0–15.0)

LR– (95% CI)	0.7 (0.5–0.9)	0.8 (0.6–1.0)	0.7 (0.5–0.9)	0.8 (0.6–1.0)	0.8 (0.6–1.0)	0.8 (0.6–1.0)
Age 60–74 ( <i>n</i> = 1763)						
Threshold, µg Hb/g	8.0	3.0	14.4	4.6	20.8	6.6
Positivity rate, %	14.4	13.6	8.0	7.7	5.4	5.3
Sensitivity (95% CI), % <sup>#</sup>						
CRC	87.5 (65.6–97.7)	81.2 (58.3–94.7)	81.2 (58.3–94.7)	62.5 (39.1–82.2)	68.8 (45.2–86.8)	62.5 (39.1–82.2)
Advanced adenomas	34.5 (27.9–41.5)	26.2 (20.3–32.9)	20.0 (14.7–26.3)	16.6 (11.7–22.5)	17.2 (12.3–23.2)	13.8 (9.3–19.4)
Non-advanced adenomas	13.9 (11.1–17.1)	13.4 (10.7–16.5)	7.6 (5.5–10.1)	7.3 (5.3–9.9)	5.3 (3.6–7.5)	5.6 (3.8–7.8)
Advanced neoplasia	39.8 (33.3–46.5)	31.7 (25.6–38.2)	26.1 (20.5–32.4)	21.1 (16.0–27.1)	22.4 (17.1–28.4)	18.6 (13.7–24.4)
Any neoplasia	21.4 (18.5–24.4)	18.7 (16.0–21.6)	12.9 (10.6–15.5)	11.3 (9.2–13.8)	10.2 (8.2–12.6)	9.3 (7.4–11.6)
Specificity (95% CI), % <sup>#</sup>	88.2 (86.8–89.5)	88.3 (86.9–89.6)	93.8 (92.7–94.8)	93.7 (92.6–94.7)	96.3 (95.4–97.1)	96 (95.1–96.8)
PPV (95% CI), % <sup>#</sup>						
CRC	5.5 (3.4–8.5)	5.4 (3.2–8.5)	9.2 (5.5–14.3)	7.4 (4.1–12.2)	11.6 (6.6–18.4)	10.6 (5.9–17.4)
Advanced adenomas	19.8 (15.7–24.3)	15.9 (12.1–20.3)	20.6 (15.1–27)	17.8 (12.6–24.1)	26.3 (19–34.8)	21.3 (14.6–29.4)
Non-advanced adenomas	21.7 (17.5–26.4)	22.2 (17.8–27.1)	21.3 (15.8–27.7)	21.5 (15.8–28.1)	22.1 (15.3–30.2)	23.4 (16.4–31.7)
Advanced neoplasia	25.3 (20.8–30.2)	21.3 (17.1–26.2)	29.8 (23.5–36.8)	25.2 (19.1–32.1)	37.9 (29.6–46.8)	31.9 (24.0–40.7)
Any neoplasia	47.0 (41.7–52.4)	43.5 (38.1–49)	51.1 (43.8–58.3)	46.7 (39.3–54.1)	60 (51.1–68.5)	55.3 (46.3–64.1)
NPV (95% CI), % <sup>#</sup>	93.6 (92.4–94.6)	92.8 (91.6–93.8)	92.7 (91.5–93.7)	92.2 (91–93.3)	92.5 (91.4–93.5)	92.2 (91.0–93.2)
LR+ (95% CI)						
CRC	7.4 (5.8–9.4)	6.9 (5.1–9.3)	13.1 (9.4–18.2)	9.9 (5.9–16.6)	18.7 (11.7–30)	15.6 (9.1–26.7)
Advanced adenomas	2.9 (1.9–4.4)	2.2 (1.3–3.8)	3.2 (1.5–6.8)	2.6 (1.0–6.5)	4.7 (1.9–11.5)	3.5 (1.1–10.8)
Non-advanced adenomas	1.2 (0.6–2.4)	1.1 (0.5–2.2)	1.2 (0.3–4.3)	1.2 (0.3–4.4)	1.4 (0.2–8.7)	1.4 (0.2–8.0)
Advanced neoplasia	3.4 (2.4–4.7)	2.7 (1.8–4.1)	4.2 (2.4–7.2)	3.3 (1.7–6.5)	6.1 (3.2–11.8)	4.7 (2.1–10.3)
Any neoplasia	1.8 (1.2–2.6)	1.6 (1.0–2.4)	2.1 (1.1–3.9)	1.8 (0.9–3.7)	2.8 (1.2–6.3)	2.3 (1.0–5.6)
LR– (95% CI)	0.7 (0.6–0.9)	0.8 (0.7–1.0)	0.8 (0.7–1.0)	0.8 (0.7–1.0)	0.8 (0.7–1.0)	0.8 (0.7–0.9)
Men ( <i>n</i> = 1619)						
Threshold, µg Hb/g	8.0	2.8	14.4	4.4	20.8	6.6
Positivity rate, %	14.4	14.2	8.3	8.6	5.7	5.9
Sensitivity (95% CI), % <sup>#</sup>						

CRC	86.7 (63.7–97.6)	93.3 (72.1–99.7)	86.7 (63.7–97.6)	73.3 (48.9–90.3)	80.0 (56.0–94.3)	73.3 (48.9–90.3)
Advanced adenomas	37.5 (31.3–44.1)	29.8 (24.0–36.1)	24.4 (19.0–30.5)	17.9 (13.2–23.4)	19.6 (14.7–25.4)	16.1 (11.6–21.5)
Non-advanced adenomas	13.2 (10.5–16.3)	12.0 (9.4–15.0)	6.7 (4.8–9.2)	8.2 (6.1–10.8)	5.2 (3.5–7.5)	5.7 (4.0–8.0)
Advanced neoplasia	41.5 (35.4–47.9)	35.0 (29.1–41.2)	29.5 (24.0–35.6)	22.4 (17.4–28.1)	24.6 (19.4–30.4)	20.8 (15.9–26.3)
Any neoplasia	22.1 (19.3–25.1)	19.2 (16.5–22.1)	13.9 (11.6–16.4)	12.7 (10.5–15.2)	11.3 (9.2–13.7)	10.4 (8.4–12.8)
Specificity (95% CI), % <sup>#</sup>	89.1 (87.6–90.4)	88.4 (87.0–89.8)	94.4 (93.3–95.4)	93.2 (92.0–94.2)	96.7 (95.8–97.4)	96.0 (95.1–96.8)
PPV (95% CI), % <sup>#</sup>						
CRC	5.6 (3.3–8.7)	6.1 (3.7–9.4)	9.7 (5.8–15)	7.9 (4.5–12.8)	12.9 (7.6–20.1)	11.6 (6.6–18.4)
Advanced adenomas	27.0 (22.3–32.2)	21.7 (17.3–26.7)	30.6 (24.1–37.8)	21.6 (16.0–28.1)	35.5 (27.2–44.4)	28.4 (20.9–37.0)
Non-advanced adenomas	22.7 (18.3–27.7)	20.9 (16.5–25.8)	20.1 (14.6–26.7)	23.7 (17.9–30.4)	22.6 (15.7–30.9)	24.2 (17.1–32.5)
Advanced neoplasia	32.6 (27.5–38.0)	27.8 (23–33.1)	40.3 (33.2–47.8)	29.5 (23.2–36.5)	48.4 (39.5–57.4)	40.0 (31.5–48.9)
Any neoplasia	55.4 (49.8–60.9)	48.7 (43.1–54.3)	60.4 (53–67.5)	53.2 (45.9–60.5)	71.0 (62.3–78.7)	64.2 (55.3–72.4)
NPV (95% CI), % <sup>#</sup>	92.3 (91–93.4)	91.4 (90.1–92.6)	91.3 (90–92.5)	90.4 (89.1–91.6)	91.0 (89.7–92.1)	90.5 (89.2–91.7)
LR+ (95% CI)						
CRC	7.9 (6.1–10.3)	8.1 (6.6–10)	15.6 (11.5–21.2)	10.7 (7.1–16.1)	23.9 (16.0–35.7)	18.5 (11.9–28.8)
Advanced adenomas	3.4 (2.4–4.8)	2.6 (1.7–4.1)	4.4 (2.5–7.9)	2.6 (1.2–5.7)	5.9 (2.8–12.4)	4.0 (1.6–9.8)
Non-advanced adenomas	1.2 (0.6–2.4)	1 (0.5–2.2)	1.2 (0.3–5)	1.2 (0.4–3.8)	1.6 (0.3–10.1)	1.4 (0.3–7.5)
Advanced neoplasia	3.8 (2.8–5.2)	3 (2.1–4.3)	5.3 (3.3–8.5)	3.3 (1.8–6.0)	7.4 (4.1–13.3)	5.2 (2.7–10.2)
Any neoplasia	2.0 (1.4–2.9)	1.7 (1.1–2.6)	2.5 (1.4–4.5)	1.9 (1.0–3.6)	3.4 (1.6–7.1)	2.6 (1.2–5.7)
LR– (95% CI)	0.7 (0.6–0.8)	0.7 (0.6–0.8)	0.7 (0.6–0.8)	0.8 (0.7–0.9)	0.8 (0.7–0.9)	0.8 (0.7–0.9)
Women ( <i>n</i> = 1525)						
Threshold, µg Hb/g	8.0	3.4	14.4	5.0	20.8	9.0
Positivity rate, %	9.6	9.4	4.9	4.9	3.1	3.1
Sensitivity (95% CI), % <sup>#</sup>						
CRC	77.8 (45.0–95.9)	66.7 (34.5–90.2)	66.7 (34.5–90.2)	55.6 (25.1–83.1)	55.6 (25.1–83.1)	33.3 (9.8–65.5)
Advanced adenomas	24.2 (15.5–34.8)	27.4 (18.3–38.2)	16.1 (9–25.8)	17.7 (10.3–27.7)	9.7 (4.3–18.2)	12.9 (6.6–22.1)
Non-advanced adenomas	12.2 (8.8–16.5)	10.9 (7.6–14.9)	5.9 (3.5–9.2)	3.6 (1.8–6.4)	3.2 (1.5–5.9)	2.7 (1.2–5.3)
Advanced neoplasia	31.0 (22.0–41.2)	32.4 (23.3–42.7)	22.5 (14.7–32.2)	22.5 (14.7–32.2)	15.5 (8.9–24.3)	15.5 (8.9–24.3)

Any neoplasia	16.8 (13.3–20.8)	16.1 (12.7–20.1)	9.9 (7.2–13.3)	8.2 (5.7–11.4)	6.2 (4.0–9.0)	5.8 (3.7–8.6)
Specificity (95% CI), % <sup>#</sup>	91.4 (90.1–92.6)	91.7 (90.5–92.9)	95.9 (95.0–96.8)	96.0 (95.1–96.8)	97.5 (96.7–98.2)	97.5 (96.7–98.2)
PPV (95% CI), % <sup>#</sup>						
CRC	4.8 (2.3–8.8)	4.2 (1.8–8.1)	8.0 (3.5–15.2)	6.8 (2.7–13.7)	10.6 (4.3–21.1)	6.4 (1.8–15.7)
Advanced adenomas	10.2 (6.4–15.3)	11.9 (7.7–17.3)	13.3 (7.4–21.6)	14.9 (8.6–23.4)	12.8 (5.7–23.6)	17.0 (8.8–28.6)
Non-advanced adenomas	18.4 (13.3–24.4)	16.8 (11.9–22.8)	17.3 (10.6–26.1)	10.8 (5.5–18.7)	14.9 (7.2–26.2)	12.8 (5.7–23.6)
Advanced neoplasia	15.0 (10.4–20.7)	16.1 (11.2–22.0)	21.3 (13.9–30.6)	21.6 (14.1–31.0)	23.4 (13.7–35.8)	23.4 (13.7–35.8)
Any neoplasia	33.3 (26.9–40.3)	32.9 (26.4–39.9)	38.7 (29.2–48.8)	32.4 (23.5–42.5)	38.3 (26.4–51.3)	36.2 (24.5–49.2)
NPV (95% CI), % <sup>#</sup>	96.4 (95.5–97.2)	96.5 (95.6–97.3)	96.2 (95.3–97.0)	96.2 (95.3–97)	95.9 (95.0–96.7)	95.9 (95.0–96.7)
LR+ (95% CI)						
CRC	9.0 (5.8–13.9)	8.1 (4.5–14.7)	16.4 (8.8–30.5)	13.9 (6.1–31.7)	22.4 (9.6–52.4)	13.5 (2.6–69.1)
Advanced adenomas	2.8 (1.1–7.0)	3.3 (1.5–7.3)	4.0 (1.0–16.8)	4.4 (1.2–16.1)	3.9 (0.3–45.9)	5.2 (0.8–32.4)
Non-advanced adenomas	1.4 (0.5–3.9)	1.3 (0.4–4.1)	1.4 (0.2–12.5)	0.9 (0–32.4)	1.3 (0–79.2)	1.1 (0–133.8)
Advanced neoplasia	3.6 (1.9–6.9)	3.9 (2.1–7.2)	5.6 (2.2–14.4)	5.6 (2.2–14.4)	6.3 (1.5–26.0)	6.3 (1.5–26.0)
Any neoplasia	2.0 (1.0–3.8)	2.0 (1.0–3.9)	2.4 (0.8–7.4)	2.1 (0.5–8.2)	2.5 (0.4–15.6)	2.4 (0.3–16.7)
LR– (95% CI)	0.8 (0.6–1.1)	0.7 (0.5–0.9)	0.8 (0.6–1.0)	0.8 (0.6–1.0)	0.9 (0.7–1.2)	0.9 (0.7–1.2)

CRC: Colorectal cancer; FITs: Fecal immunochemical tests; Hb: Hemoglobin; LR+: Positive likelihood ratio; LR–: Negative likelihood ratio; NPV: Negative predictive value; PPV: Positive predictive value. <sup>#</sup>Indicating that statistical tests using Chi-square test were performed for each of the qualitative FIT and the quantitative FIT.



**Supplementary Table 4: Comparison of diagnostic performance for different colorectal neoplasms between the qualitative FITs (Pupu tube) vs. the quantitative FIT (OC-Sensor) with thresholds adjusted to comparable Hb concentration, stratified by age and sex.**

Items	Thresholds adjusted to comparable Hb concentration					
	Qualitative FIT-1	Quantitative FIT	Qualitative FIT-2	Quantitative FIT	Qualitative FIT-3	Quantitative FIT
Age 50–59 ( <i>n</i> = 1381)						
Threshold, µg Hb/g	8.0	8.0	14.4	14.4	20.8	20.8
Positivity rate, %	9.2*	3.8	4.9*	2.5	3.3*	2.2
Sensitivity (95% CI), % <sup>#</sup>						
CRC	75.0 (40.0–95.4)	62.5 (28.9–88.9)	75.0 (40.0–95.4)	62.5 (28.9–88.9)	75.0 (40.0–95.4)	62.5 (28.9–88.9)
Advanced adenomas	32.9 (24.5–42.3)	17.6 (11.2–25.9)	25.9 (18.2–34.9)	14.1 (8.4–21.9)	16.5 (10.2–24.5)	14.1 (8.4–21.9)
Non-advanced adenomas	11.1 (7.8–15.1)*	3.5 (1.8–6.3)	4.4 (2.4–7.4)*	0.9 (0.2–2.8)	3.1 (1.5–5.7)	0.9 (0.2–2.8)
Advanced neoplasia	36.6 (28.2–45.6)*	21.5 (14.7–29.7)	30.1 (22.3–38.9)	18.3 (12.0–26.1)	21.5 (14.7–29.7)	18.3 (12.0–26.1)
Any neoplasia	18.5 (15.0–22.4)*	8.8 (6.3–11.8)	11.9 (9.0–15.3)*	6.0 (3.9–8.6)	8.5 (6.0–11.5)	6.0 (3.9–8.6)
Specificity (95% CI), % <sup>#</sup>	92.8 (91.5–93.9)*	97.4 (96.6–98.1)	96.9 (96–97.6)*	98.6 (97.9–99.1)	98.1 (97.3–98.6)	99 (98.4–99.4)
PPV (95% CI), % <sup>#</sup>						
CRC	4.7 (2.1–9.1)	9.4 (3.8–18.8)	8.8 (3.9–16.7)	14.3 (5.8–27.7)	13.3 (6.0–24.6)	16.7 (6.8–31.9)
Advanced adenomas	22.0 (16.1–29.0)	28.3 (18.3–40.2)	32.4 (23.0–42.9)	34.3 (21.1–49.6)	31.1 (19.9–44.3)	40.0 (25–56.6)
Non-advanced adenomas	19.7 (14.1–26.4)	15.1 (7.7–25.6)	14.7 (8.2–23.7)	5.7 (1.0–16.9)	15.6 (7.5–27.2)	6.7 (1.2–19.5)
Advanced neoplasia	26.8 (20.4–34.0)	37.7 (26.6–49.9)	41.2 (31.1–51.9)	48.6 (33.8–63.5)	44.4 (31.7–57.7)	56.7 (40.2–72.1)
Any neoplasia	46.5 (38.9–54.1)	52.8 (40.7–64.7)	55.9 (45.2–66.2)	54.3 (39.2–68.8)	60.0 (46.7–72.3)	63.3 (46.7–77.9)
NPV (95% CI), % <sup>#</sup>	95.3 (94.2–96.2)	94.5 (93.4–95.5)	95.0 (93.9–96.0)	94.4 (93.2–95.4)	94.5 (93.4–95.5)	94.4 (93.2–95.4)
LR+ (95% CI)						
CRC	10.4 (6.3–17.2)	24.4 (11.4–52.2)	24.2 (13.9–42.2)	44.7 (19.7–101.6)	38.6 (21.1–70.7)	61.9 (25.9–147.7)
Advanced adenomas	4.6 (2.6–8.1)	6.9 (2.2–21.7)	8.3 (3.8–18.0)	10.1 (2.3–43.9)	8.5 (2.5–29.5)	14.0 (3.1–62.6)
Non-advanced adenomas	1.5 (0.5–4.6)	1.4 (0–53.0)	1.4 (0.1–25.4)	0.6 (0–1416564.3)	1.6 (0–102.7)	0.9 (0–2130797.1)
Advanced neoplasia	5.1 (3.1–8.3)	8.4 (3.4–20.7)	9.7 (5.1–18.5)	13.1 (4.3–39.6)	11.1 (4.4–28)	18.1 (5.8–56.7)
Any neoplasia	2.6 (1.5–4.6)	3.4 (1.0–11.8)	3.8 (1.5–9.5)	4.3 (0.7–27.2)	4.4 (1.2–16.2)	5.9 (0.9–38.2)

LR- (95% CI)	0.7 (0.5–0.9)	0.8 (0.6–1.0)	0.7 (0.5–0.9)	0.8 (0.6–1.0)	0.8 (0.6–1.0)	0.8 (0.6–1.0)
Age 60–74 ( <i>n</i> = 1763)						
Threshold, µg Hb/g	8.0	8.0	14.4	14.4	20.8	20.8
Positivity rate, %	14.4*	4.5	8.0*	3.6	5.4*	3.1
Sensitivity (95% CI), % <sup>#</sup>						
CRC	87.5 (65.6–97.7)	56.2 (33.3–77.3)	81.2 (58.3–94.7)	56.2 (33.3–77.3)	68.8 (45.2–86.8)	56.2 (33.3–77.3)
Advanced adenomas	34.5 (27.9–41.5)*	13.1 (8.8–18.6)	20.0 (14.7–26.3)*	1.01 (7–16.3)	17.2 (12.3–23.2)	9.7 (5.9–14.7)
Non-advanced adenomas	13.9 (11.1–17.1)*	4.0 (2.6–6.1)	7.6 (5.5–10.1)*	3.0 (1.8–4.9)	5.3 (3.6–7.5)*	2.5 (1.4–4.2)
Advanced neoplasia	39.8 (33.3–46.5)*	17.4 (12.7–23.1)	26.1 (20.5–32.4)*	15.5 (11.0–21.0)	22.4 (17.1–28.4)	14.3 (10.0–19.6)
Any neoplasia	21.4 (18.5–24.4)*	7.9 (6.1–10.0)	12.9 (10.6–15.5)*	6.6 (5.0–8.6)	10.2 (8.2–12.6)*	5.9 (4.4–7.8)
Specificity (95% CI), % <sup>#</sup>	88.2 (86.8–89.5)*	96.8 (95.9–97.4)	93.8 (92.7–94.8)*	97.6 (96.9–98.2)	96.3 (95.4–97.1)*	98 (97.3–98.5)
PPV (95% CI), % <sup>#</sup>						
CRC	5.5 (3.4–8.5)	11.2 (6.0–18.8)	9.2 (5.5–14.3)	14.3 (7.7–23.6)	11.6 (6.6–18.4)	16.4 (8.8–26.8)
Advanced adenomas	19.8 (15.7–24.3)	23.8 (16.1–32.9)	20.6 (15.1–27)	25.4 (16.6–36.0)	26.3 (19.0–34.8)	25.5 (16.1–36.9)
Non-advanced adenomas	21.7 (17.5–26.4)	20.0 (13.0–28.8)	21.3 (15.8–27.7)	19.0 (11.4–29)	22.1 (15.3–30.2)	18.2 (10.2–28.9)
Advanced neoplasia	25.3 (20.8–30.2)	35.0 (26.1–44.7)	29.8 (23.5–36.8)	39.7 (29.3–50.8)	37.9 (29.6–46.8)	41.8 (30.5–53.8)
Any neoplasia	47.0 (41.7–52.4)	55.0 (45.2–64.5)	51.1 (43.8–58.3)	58.7 (47.6–69.2)	60.0 (51.1–68.5)	60.0 (48–71.1)
NPV (95% CI), % <sup>#</sup>	93.6 (92.4–94.6)	92.1 (90.9–93.2)	92.7 (91.5–93.7)	92 (90.8–93.1)	92.5 (91.4–93.5)	91.9 (90.8–93)
LR+ (95% CI)						
CRC	7.4 (5.8–9.4)	17.3 (9.1–32.7)	13.1 (9.4–18.2)	23.7 (12.3–45.8)	18.7 (11.7–30)	28.2 (14.4–55.2)
Advanced adenomas	2.9 (1.9–4.4)	4.0 (1.2–13.1)	3.2 (1.5–6.8)	4.7 (1.1–19.6)	4.7 (1.9–11.5)	4.8 (0.9–24.7)
Non-advanced adenomas	1.2 (0.6–2.4)	1.2 (0.1–13.3)	1.2 (0.3–4.3)	1.3 (0.1–32.4)	1.4 (0.2–8.7)	1.3 (0–62.1)
Advanced neoplasia	3.4 (2.4–4.7)	5.4 (2.3–12.7)	4.2 (2.4–7.2)	6.5 (2.5–17.1)	6.1 (3.2–11.8)	7.2 (2.5–20.8)
Any neoplasia	1.8 (1.2–2.6)	2.4 (0.8–6.8)	2.1 (1.1–3.9)	2.8 (0.8–9.8)	2.8 (1.2–6.3)	3.0 (0.7–12.2)
LR- (95% CI)	0.7 (0.6–0.9)	0.9 (0.8–1.1)	0.8 (0.7–1.0)	0.9 (0.8–1.1)	0.8 (0.7–1)	0.9 (0.8–1.1)
Men ( <i>n</i> = 1619)						
Threshold, µg Hb/g	8.0	8.0	14.4	14.4	20.8	20.8
Positivity rate, %	14.4*	5.1	8.3*	4.0	5.7*	3.3
Sensitivity (95% CI), % <sup>#</sup>						

CRC	86.7 (63.7–97.6)	73.3 (48.9–90.3)	86.7 (63.7–97.6)	73.3 (48.9–90.3)	80.0 (56.0–94.3)	73.3 (48.9–90.3)
Advanced adenomas	37.5 (31.3–44.1)*	15.5 (11.1–20.8)	24.4 (19.0–30.5)	13.1 (9.0–18.2)	19.6 (14.7–25.4)	11.9 (8–16.8)
Non-advanced adenomas	13.2 (10.5–16.3)*	4.2 (2.7–6.3)	6.7 (4.8–9.2)*	2.5 (1.4–4.2)	5.2 (3.5–7.5)	2.0 (1.0–3.6)
Advanced neoplasia	41.5 (35.4–47.9)*	20.2 (15.5–25.7)	29.5 (24.0–35.6)*	18 (13.5–23.4)	24.6 (19.4–30.4)	16.9 (12.5–22.2)
Any neoplasia	22.1 (19.3–25.1)*	9.2 (7.3–11.5)	13.9 (11.6–16.4)*	7.4 (5.7–9.4)	11.3 (9.2–13.7)*	6.7 (5.1–8.6)
Specificity (95% CI), % <sup>#</sup>	89.1 (87.6–90.4)*	96.8 (95.9–97.5)	94.4 (93.3–95.4)*	97.8 (97.1–98.4)	96.7 (95.8–97.4)*	98.4 (97.7–98.9)
PPV (95% CI), % <sup>#</sup>						
CRC	5.6 (3.3–8.7)	13.3 (7.6–21.0)	9.7 (5.8–15.0)	17.2 (9.9–26.8)	12.9 (7.6–20.1)	20.4 (11.9–31.5)
Advanced adenomas	27.0 (22.3–32.2)	31.3 (23.0–40.7)	30.6 (24.1–37.8)	34.4 (24.5–45.3)	35.5 (27.2–44.4)	37.0 (26.1–49.1)
Non-advanced adenomas	22.7 (18.3–27.7)	20.5 (13.5–29.1)	20.1 (14.6–26.7)	15.6 (8.7–25.1)	22.6 (15.7–30.9)	14.8 (7.6–25.1)
Advanced neoplasia	32.6 (27.5–38)	44.6 (35.3–54.2)	40.3 (33.2–47.8)	51.6 (40.6–62.4)	48.4 (39.5–57.4)	57.4 (45.3–68.9)
Any neoplasia	55.4 (49.8–60.9)	65.1 (55.5–73.7)	60.4 (53.0–67.5)	67.2 (56.3–76.8)	71.0 (62.3–78.7)	72.2 (60.5–82.0)
NPV (95% CI), % <sup>#</sup>	92.3 (91.0–93.4)	90.5 (89.2–91.7)	91.3 (90.0–92.5)	90.4 (89.0–91.6)	91.0 (89.7–92.1)	90.3 (89.0–91.5)
LR+ (95% CI)						
CRC	7.9 (6.1–10.3)	22.9 (14.5–36.2)	15.6 (11.5–21.2)	34 (20.6–56.1)	23.9 (16–35.7)	45.8 (26.6–78.8)
Advanced adenomas	3.4 (2.4–4.8)	4.8 (1.9–12.3)	4.4 (2.5–7.9)	6.1 (2.0–18.9)	5.9 (2.8–12.4)	7.4 (2.1–26.1)
Non-advanced adenomas	1.2 (0.6–2.4)	1.3 (0.1–12.7)	1.2 (0.3–5.0)	1.2 (0–58.8)	1.6 (0.3–10.1)	1.2 (0–157.0)
Advanced neoplasia	3.8 (2.8–5.2)	6.3 (3.1–12.7)	5.3 (3.3–8.5)	8.4 (3.7–18.8)	7.4 (4.1–13.3)	10.6 (4.4–25.6)
Any neoplasia	2.0 (1.4–2.9)	2.9 (1.2–7.0)	2.5 (1.4–4.5)	3.4 (1.1–10.4)	3.4 (1.6–7.1)	4.2 (1.2–14.5)
LR– (95% CI)	0.7 (0.6–0.8)	0.8 (0.7–0.9)	0.7 (0.6–0.8)	0.8 (0.7–0.9)	0.8 (0.7–0.9)	0.8 (0.7–0.9)
Women ( <i>n</i> = 1525)						
Threshold, µg Hb/g	8.0	8.0	14.4	14.4	20.8	20.8
Positivity rate, %	9.6*	3.3	4.9*	2.2	3.1*	2.0
Sensitivity (95% CI), % <sup>#</sup>						
CRC	77.8 (45–95.9)	33.3 (9.8–65.5)	66.7 (34.5–90.2)	33.3 (9.8–65.5)	55.6 (25.1–83.1)	33.3 (9.8–65.5)
Advanced adenomas	24.2 (15.5–34.8)*	12.9 (6.6–22.1)	16.1 (9.0–25.8)	9.7 (4.3–18.2)	9.7 (4.3–18.2)	9.7 (4.3–18.2)
Non-advanced adenomas	12.2 (8.8–16.5)*	3.2 (1.5–5.9)	5.9 (3.5–9.2)*	1.8 (0.6–4.1)*	3.2 (1.5–5.9)	1.8 (0.6–4.1)
Advanced neoplasia	31.0 (22.0–41.2)*	15.5 (8.9–24.3)	22.5 (14.7–32.2)	12.7 (6.8–21.1)	15.5 (8.9–24.3)	12.7 (6.8–21.1)

Any neoplasia	16.8 (13.3–20.8)*	6.2 (4.0–9.0)	9.9 (7.2–13.3)*	4.5 (2.7–7.0)	6.2 (4.0–9.0)	4.5 (2.7–7.0)
Specificity (95% CI), % <sup>#</sup>	91.4 (90.1–92.6)*	97.3 (96.5–98.0)	95.9 (95.0–96.8)*	98.3 (97.6–98.8)	97.5 (96.7–98.2)	98.5 (97.8–99.0)
PPV (95% CI), % <sup>#</sup>						
CRC	4.8 (2.3–8.8)	6.0 (1.7–14.8)	8.0 (3.5–15.2)	8.8 (2.4–21.3)	10.6 (4.3–21.1)	9.7 (2.7–23.2)
Advanced adenomas	10.2 (6.4–15.3)	16.0 (8.2–27.0)	13.3 (7.4–21.6)	17.6 (8.0–31.9)	12.8 (5.7–23.6)	19.4 (8.8–34.7)
Non-advanced adenomas	18.4 (13.3–24.4)	14.0 (6.8–24.7)	17.3 (10.6–26.1)	11.8 (4.1–24.9)	14.9 (7.2–26.2)	12.9 (4.5–27.1)
Advanced neoplasia	15.0 (10.4–20.7)	22.0 (12.9–33.8)	21.3 (13.9–30.6)	26.5 (14.6–41.6)	23.4 (13.7–35.8)	29.0 (16.1–45.2)
Any neoplasia	33.3 (26.9–40.3)	36.0 (24.7–48.6)	38.7 (29.2–48.8)	38.2 (24.3–53.8)	38.3 (26.4–51.3)	41.9 (26.9–58.2)
NPV (95% CI), % <sup>#</sup>	96.4 (95.5–97.2)	95.9 (95.0–96.7)	96.2 (95.3–97.0)	95.8 (94.9–96.7)	95.9 (95–96.7)	95.9 (94.9–96.7)
LR+ (95% CI)						
CRC	9.0 (5.8–13.9)	12.4 (2.4–63.3)	16.4 (8.8–30.5)	19.4 (3.7–100.8)	22.4 (9.6–52.4)	22.0 (4.2–115.0)
Advanced adenomas	2.8 (1.1–7.0)	4.8 (0.8–29.8)	4.0 (1.0–16.8)	5.6 (0.5–66.6)	3.9 (0.3–45.9)	6.4 (0.5–76.4)
Non-advanced adenomas	1.4 (0.5–3.9)	1.2 (0–73.0)	1.4 (0.2–12.5)	1.1 (0–1516.4)	1.3 (0–79.2)	1.2 (0–1656.7)
Advanced neoplasia	3.6 (1.9–6.9)	5.8 (1.4–23.9)	5.6 (2.2–14.4)	7.4 (1.3–43.0)	6.3 (1.5–26.0)	8.4 (1.4–49.1)
Any neoplasia	2.0 (1.0–3.8)	2.3 (0.4–14.3)	2.4 (0.8–7.4)	2.6 (0.2–33.3)	2.5 (0.4–15.6)	2.9 (0.2–37.2)
LR– (95% CI)	0.8 (0.6–1.1)	0.9 (0.7–1.2)	0.8 (0.6–1.0)	0.9 (0.7–1.2)	0.9 (0.7–1.2)	0.9 (0.7–1.2)

CRC: Colorectal cancer; FITs: Fecal immunochemical tests; Hb: Hemoglobin; LR+: Positive likelihood ratio; LR–: Negative likelihood ratio; NPV: Negative predictive value; PPV: Positive predictive value. <sup>#</sup>Indicating that statistical tests using Chi-square test were performed for each of the qualitative FIT and the quantitative FIT. \*Indicating statistical significance between each of the qualitative FIT and the quantitative FIT using the Chi-square test.

**Supplementary Table 5: Multivariate-adjusted OR and 95% CI of the sensitivity of FITs for advanced neoplasm in relation to multiple variables.**

Items	OR (95% CI)			
	Qualitative FIT-1	Qualitative FIT-2	Qualitative FIT-3	Quantitative FIT
Age (years) <sup>#</sup>	0.99 (0.95–1.03)	0.98 (0.93–1.03)	1 (0.95–1.06)	0.99 (0.93–1.05)
Sex (%) <sup>#</sup>				
Female	1.00	1.00	1.00	1.00
Male	1.78 (0.87–3.7)	1.73 (0.79–3.86)	2.1 (0.9–5.12)	1.51 (0.59–4.08)
BMI (%) <sup>#</sup>				
<24.0	1.00	1.00	1.00	1.00
24.0–28.0	1.05 (0.6–1.84)	0.75 (0.41–1.36)	0.92 (0.47–1.77)	1.28 (0.61–2.77)
≥28.0	1.78 (0.77–4.12)	0.57 (0.2–1.43)	0.91 (0.32–2.38)	1.72 (0.58–4.81)
Smoking status (%) <sup>#</sup>				
Never	1.00	1.00	1.00	1.00
Current	1.04 (0.53–2.07)	0.92 (0.44–1.92)	0.83 (0.38–1.82)	1.15 (0.49–2.74)
Ever	1.01 (0.35–2.89)	0.83 (0.24–2.55)	0.75 (0.19–2.46)	0.26 (0.01–1.46)
Alcohol drinking (%) <sup>#</sup>				
Never	1.00	1.00	1.00	1.00
<4 times per week	0.65 (0.3–1.35)	0.96 (0.43–2.09)	1.25 (0.54–2.83)	1.03 (0.39–2.57)
≥ 4 times per week	0.67 (0.33–1.33)	0.84 (0.39–1.78)	0.72 (0.3–1.64)	0.85 (0.33–2.1)
Medical history of NSAID or anticoagulant drugs (%) <sup>#</sup>				
Never	1.00	1.00	1.00	1.00
Current or ever	1.09 (0.34–3.22)	0.68 (0.15–2.26)	0.22 (0.01–1.17)	0.77 (0.12–3.05)
Family history of CRC among 1st-degree relatives (%) <sup>#</sup>				
No	1.00	1.00	1.00	1.00
Yes	0.64 (0.29–1.33)	0.73 (0.31–1.59)	0.74 (0.28–1.74)	0.83 (0.29–2.05)

BMI: Body mass index; CRC: Colorectal cancer; CI: Confidence interval; NSAID: Non-steroidal anti-inflammatory drug; OR: Odd ratio.

<sup>#</sup>Indicating that statistical tests were performed for each of the qualitative FIT and the quantitative FIT.

**Supplementary Table 6: Comparison of diagnostic performance for different colorectal neoplasms between the qualitative FITs (Pupu tube) vs. the quantitative FIT (OC-Sensor) with the preset thresholds by manufacturers among the average-risk population.**

Items	Qualitative FIT-1	Qualitative FIT-2	Qualitative FIT-3	Quantitative FIT
Threshold, µg Hb/g	8	14.4	20.8	20
Positivity rate, %	10.5*	5.2*	3.3*	1.6
Sensitivity (95% CI), % <sup>#</sup>				
CRC	85.7 (47.9–99.3)	85.7 (47.9–99.3)	71.4 (34.1–94.7)	57.1 (22.5–87.1)
Advanced adenomas	25.8 (17.1–36.1)*	13.6 (7.3–22.6)	4.5 (1.3–11.3)	4.5 (1.3–11.3)
Non-advanced adenomas	12.5 (9.3–16.4)*	4.2 (2.4–6.8)	3.4 (1.8–5.9)	1.5 (0.5–3.4)
Advanced neoplasia	31.5 (22.6–41.6)*	20.5 (13.1–29.9)	11.0 (5.6–18.9)	9.6 (4.6–17.3)
Any neoplasia	16.6 (13.4–20.3)*	7.7 (5.5–10.5)*	5.0 (3.2–7.5)	3.3 (1.8–5.3)
Specificity (95% CI), % <sup>#</sup>	90.6 (89.2–92.0)*	95.6 (94.6–96.5)*	97.1 (96.2–97.8)*	98.8 (98.2–99.3)
PPV (95% CI), % <sup>#</sup>				
CRC	4.2 (1.8–8.1)	8.5 (3.7–16.0)	11.1 (4.5–22.0)	18.2 (6.5–36.9)
Advanced adenomas	11.9 (7.7–17.3)	12.7 (6.8–21.1)	6.7 (1.8–16.3)	13.6 (3.8–31.6)
Non-advanced adenomas	23.1 (17.4–29.6)	15.5 (8.9–24.3)	20.0 (10.9–32.3)	18.2 (6.5–36.9)
Advanced neoplasia	16.1 (11.2–22)	21.1 (13.5–30.7)	17.8 (9.2–29.8)	31.8 (16.0–51.5)
Any neoplasia	39.2 (32.3–46.3)	36.6 (27.1–47.0)	37.8 (25.7–51.1)	50.0 (31.1–68.9)
NPV (95% CI), % <sup>#</sup>	95.9 (94.8–96.8)	95.5 (94.4–96.4)	95.0 (93.9–96.0)	95.1 (94.0–96.0)
LR+ (95% CI)				
CRC	9.2 (6.3–13.4)	19.6 (12.9–29.8)	24.8 (13.1–47.1)	48.9 (18.2–131.4)
Advanced adenomas	2.8 (1.2–6.4)	3.1 (0.6–16.4)	1.6 (0–288.8)	3.9 (0–714.3)
Non-advanced adenomas	1.3 (0.5–3.3)	1.0 (0.1–17.2)	1.2 (0–39.4)	1.3 (0–3567.3)
Advanced neoplasia	3.4 (1.8–6.4)	4.7 (1.7–13.2)	3.8 (0.5–28.1)	8.2 (0.8–84.3)
Any neoplasia	1.8 (1.0–3.3)	1.8 (0.5–7.0)	1.7 (0.2–13.7)	2.8 (0.1–72.7)
LR– (95% CI)	0.8 (0.6–1.1)	0.8 (0.6–1.0)	0.9 (0.7–1.1)	0.9 (0.7–1.1)

CRC: Colorectal cancer; FITs: Fecal immunochemical tests; Hb: Hemoglobin; LR+: Positive likelihood ratio; LR–: Negative likelihood ratio; NPV: Negative predictive value; PPV: Positive predictive value. <sup>#</sup>Indicating that statistical tests using Chi-square test were performed for each of the qualitative FIT and the quantitative FIT. \*Indicating statistical significance between each of the qualitative FIT and the quantitative FIT using the Chi-square test.

**Supplementary Table 7: Comparison of diagnostic performance for different colorectal neoplasms between the qualitative FITs (Pupu tube) vs. the quantitative FIT (OC-Sensor) with thresholds adjusted to comparable specificities among the average-risk population.**

Items	Thresholds adjusted to comparable specificity					
	Qualitative FIT-1	Quantitative FIT	Qualitative FIT-2	Quantitative FIT	Qualitative FIT-3	Quantitative FIT
Threshold, µg Hb/g	8.0	3.0	14.4	5.0	20.8	8
Positivity rate, %	10.5	10.3	5.2	4.9	3.3	3.1
Sensitivity (95% CI), % <sup>#</sup>						
CRC	85.7 (47.9–99.3)	85.7 (47.9–99.3)	85.7 (47.9–99.3)	71.4 (34.1–94.7)	71.4 (34.1–94.7)	57.1 (22.5–87.1)
Advanced adenomas	25.8 (17.1–36.1)	19.7 (12.1–29.5)	13.6 (7.3–22.6)	10.6 (5.1–19.0)	4.5 (1.3–11.3)	10.6 (5.1–19.0)
Non-advanced adenomas	12.5 (9.3–16.4)	9.8 (7.0–13.4)	4.2 (2.4–6.8)	4.5 (2.6–7.3)	3.4 (1.8–5.9)	3.0 (1.5–5.4)
Advanced neoplasia	31.5 (22.6–41.6)	26.0 (17.8–35.8)	20.5 (13.1–29.9)	16.4 (9.8–25.3)	11.0 (5.6–18.9)	15.1 (8.7–23.7)
Any neoplasia	16.6 (13.4–20.3)	13.4 (10.4–16.8)	7.7 (5.5–10.5)	7.1 (5.0–9.9)	5.0 (3.2–7.5)	5.6 (3.7–8.2)
Specificity (95% CI), % <sup>#</sup>	90.6 (89.2–92.0)	90.6 (89.2–92.0)	95.6 (94.6–96.5)	95.8 (94.7–96.7)	97.1 (96.2–97.8)	97.6 (96.8–98.2)
PPV (95% CI), % <sup>#</sup>						
CRC	4.2 (1.8–8.1)	4.3 (1.9–8.3)	8.5 (3.7–16.0)	7.6 (3.0–15.3)	11.1 (4.5–22.0)	9.5 (3.3–20.5)
Advanced adenomas	11.9 (7.7–17.3)	9.4 (5.6–14.5)	12.7 (6.8–21.1)	10.6 (5.1–19.0)	6.7 (1.8–16.3)	16.7 (8.1–29.0)
Non-advanced adenomas	23.1 (17.4–29.6)	18.7 (13.4–25.0)	15.5 (8.9–24.3)	18.2 (10.8–27.8)	20.0 (10.9–32.3)	19.0 (9.8–31.8)
Advanced neoplasia	16.1 (11.2–22.0)	13.7 (9.1–19.4)	21.1 (13.5–30.7)	18.2 (10.8–27.8)	17.8 (9.2–29.8)	26.2 (15.4–39.6)
Any neoplasia	39.2 (32.3–46.3)	32.4 (25.8–39.5)	36.6 (27.1–47.0)	36.4 (26.5–47.2)	37.8 (25.7–51.1)	45.2 (32.0–59.0)
NPV (95% CI), % <sup>#</sup>	95.9 (94.8–96.8)	95.6 (94.5–96.5)	95.5 (94.4–96.4)	95.3 (94.2–96.2)	95 (93.9–96)	95.3 (94.2–96.2)
LR+ (95% CI)						
CRC	9.2 (6.3–13.4)	9.2 (6.3–13.4)	19.6 (12.9–29.8)	17.0 (9.2–31.5)	24.8 (13.1–47.1)	23.6 (9.4–59.1)
Advanced adenomas	2.8 (1.2–6.4)	2.1 (0.7–6.4)	3.1 (0.6–16.4)	2.5 (0.3–21.8)	1.6 (0–288.8)	4.4 (0.5–38.9)
Non-advanced adenomas	1.3 (0.5–3.3)	1.1 (0.3–3.6)	1.0 (0.1–17.2)	1.1 (0.1–14.9)	1.2 (0–39.4)	1.3 (0–66.6)
Advanced neoplasia	3.4 (1.8–6.4)	2.8 (1.3–6.1)	4.7 (1.7–13.2)	3.9 (1.1–14.4)	3.8 (0.5–28.1)	6.2 (1.5–26.3)
Any neoplasia	1.8 (1.0–3.3)	1.4 (0.7–3.0)	1.8 (0.5–7.0)	1.7 (0.4–7.4)	1.7 (0.2–13.7)	2.3 (0.4–15.0)
LR– (95% CI)	0.8 (0.6–1.1)	0.8 (0.6–1.0)	0.8 (0.6–1.0)	0.9 (0.7–1.2)	0.9 (0.7–1.1)	0.9 (0.7–1.2)

CRC: Colorectal cancer; FITs: Fecal immunochemical tests; Hb: Hemoglobin; LR+: Positive likelihood ratio; LR–: Negative likelihood ratio; NPV: Negative predictive value; PPV: Positive predictive value. <sup>#</sup>Indicating that statistical tests using Chi-square test were performed for each of the qualitative FIT and the quantitative FIT.

**Supplementary Table 8: Comparison of diagnostic performance for different colorectal neoplasms between the qualitative FITs (Pupu tube) vs. the quantitative FIT (OC-Sensor) with thresholds adjusted to comparable positivity rates among the average-risk population.**

Items	Thresholds adjusted to comparable positivity rate					
	Qualitative FIT-1	Quantitative FIT	Qualitative FIT-2	Quantitative FIT	Qualitative FIT-3	Quantitative FIT
Threshold, µg Hb/g	8.0	3.0	14.4	4.8	20.8	7.2
Positivity rate, %	10.5	10.3	5.2	5.3	3.3	3.4
Sensitivity (95% CI), % <sup>#</sup>						
CRC	85.7 (47.9–99.3)	85.7 (47.9–99.3)	85.7 (47.9–99.3)	71.4 (34.1–94.7)	71.4 (34.1–94.7)	71.4 (34.1–94.7)
Advanced adenomas	25.8 (17.1–36.1)	19.7 (12.1–29.5)	13.6 (7.3–22.6)	10.6 (5.1–19.0)	4.5 (1.3–11.3)	10.6 (5.1–19.0)
Non-advanced adenomas	12.5 (9.3–16.4)	9.8 (7.0–13.4)	4.2 (2.4–6.8)	4.9 (2.9–7.7)	3.4 (1.8–5.9)	3.0 (1.5–5.4)
Advanced neoplasia	31.5 (22.6–41.6)	26.0 (17.8–35.8)	20.5 (13.1–29.9)	16.4 (9.8–25.3)	11.0 (5.6–18.9)	16.4 (9.8–25.3)
Any neoplasia	16.6 (13.4–20.3)	13.4 (10.4–16.8)	7.7 (5.5–10.5)	7.4 (5.2–10.2)	5.0 (3.2–7.5)	5.9 (4.0–8.5)
Specificity (95% CI), % <sup>#</sup>	90.6 (89.2–92.0)	90.6 (89.2–92.0)	95.6 (94.6–96.5)	95.3 (94.2–96.3)	97.1 (96.2–97.8)	97.3 (96.5–98.0)
PPV (95% CI), % <sup>#</sup>						
CRC	4.2 (1.8–8.1)	4.3 (1.9–8.3)	8.5 (3.7–16.0)	6.9 (2.8–14.0)	11.1 (4.5–22.0)	10.9 (4.4–21.5)
Advanced adenomas	11.9 (7.7–17.3)	9.4 (5.6–14.5)	12.7 (6.8–21.1)	9.7 (4.7–17.5)	6.7 (1.8–16.3)	15.2 (7.4–26.7)
Non-advanced adenomas	23.1 (17.4–29.6)	18.7 (13.4–25.0)	15.5 (8.9–24.3)	18.1 (11–27.2)	20.0 (10.9–32.3)	17.4 (9.0–29.2)
Advanced neoplasia	16.1 (11.2–22.0)	13.7 (9.1–19.4)	21.1 (13.5–30.7)	16.7 (9.9–25.6)	17.8 (9.2–29.8)	26.1 (15.8–38.8)
Any neoplasia	39.2 (32.3–46.3)	32.4 (25.8–39.5)	36.6 (27.1–47)	34.7 (25.4–45.0)	37.8 (25.7–51.1)	43.5 (31.0–56.6)
NPV (95% CI), % <sup>#</sup>	95.9 (94.8–96.8)	95.6 (94.5–96.5)	95.5 (94.4–96.4)	95.2 (94.2–96.2)	95.0 (93.9–96.0)	95.3 (94.3–96.3)
LR+ (95% CI)						
CRC	9.2 (6.3–13.4)	9.2 (6.3–13.4)	19.6 (12.9–29.8)	15.3 (8.3–28.1)	24.8 (13.1–47.1)	27.0 (14.1–51.6)
Advanced adenomas	2.8 (1.2–6.4)	2.1 (0.7–6.4)	3.1 (0.6–16.4)	2.3 (0.3–20.1)	1.6 (0–288.8)	4.0 (0.5–35.3)
Non-advanced adenomas	1.3 (0.5–3.3)	1.1 (0.3–3.6)	1.0 (0.1–17.2)	1.1 (0.1–12.1)	1.2 (0–39.4)	1.1 (0–56.2)
Advanced neoplasia	3.4 (1.8–6.4)	2.8 (1.3–6.1)	4.7 (1.7–13.2)	3.5 (1.0–12.8)	3.8 (0.5–28.1)	6.2 (1.7–23.2)
Any neoplasia	1.8 (1.0–3.3)	1.4 (0.7–3.0)	1.8 (0.5–7.0)	1.6 (0.4–6.5)	1.7 (0.2–13.7)	2.2 (0.4–13.0)
LR– (95% CI)	0.8 (0.6–1.1)	0.8 (0.6–1.0)	0.8 (0.6–1.0)	0.9 (0.7–1.2)	0.9 (0.7–1.1)	0.9 (0.7–1.2)

FITs: Fecal immunochemical tests; Hb: Hemoglobin; LR+: Positive likelihood ratio; LR–: Negative likelihood ratio; NPV: Negative predictive value; PPV: Positive predictive value. <sup>#</sup>Indicating that statistical tests using Chi-square test were performed for each of the qualitative FIT and the quantitative FIT.



**Supplementary Table 9: Comparison of diagnostic performance for different colorectal neoplasms between the qualitative FITs (Pupu tube) vs. the quantitative FIT (OC-Sensor) with thresholds adjusted to comparable Hb concentration among the average-risk population.**

Items	Thresholds adjusted to same Hb concentration					
	Qualitative FIT-1	Quantitative FIT	Qualitative FIT-2	Quantitative FIT	Qualitative FIT-3	Quantitative FIT
Threshold, µg Hb/g	8.0	8.0	14.4	14.4	20.8	20.8
Positivity rate, %	10.5*	3.1	5.2*	2.0	3.3*	1.6
Sensitivity (95% CI), % <sup>#</sup>						
CRC	85.7 (47.9–99.3)	57.1 (22.5–87.1)	85.7 (47.9–99.3)	57.1 (22.5–87.1)	71.4 (34.1–94.7)	57.1 (22.5–87.1)
Advanced adenomas	25.8 (17.1–36.1)*	10.6 (5.1–19.0)	13.6 (7.3–22.6)	6.1 (2.1–13.3)	4.5 (1.3–11.3)	4.5 (1.3–11.3)
Non-advanced adenomas	12.5 (9.3–16.4)*	3.0 (1.5–5.4)	4.2 (2.4–6.8)	1.9 (0.7–3.9)	3.4 (1.8–5.9)	1.5 (0.5–3.4)
Advanced neoplasia	31.5 (22.6–41.6)*	15.1 (8.7–23.7)	20.5 (13.1–29.9)	11.0 (5.6–18.9)	11.0 (5.6–18.9)	9.6 (4.6–17.3)
Any neoplasia	16.6 (13.4–20.3)*	5.6 (3.7–8.2)	7.7 (5.5–10.5)*	3.9 (2.3–6.1)	5.0 (3.2–7.5)	3.3 (1.8–5.3)
Specificity (95% CI), % <sup>#</sup>	90.6 (89.2–92.0)*	97.6 (96.8–98.2)	95.6 (94.6–96.5)*	98.5 (97.8–99.0)	97.1 (96.2–97.8)*	98.8 (98.2–99.3)
PPV (95% CI), % <sup>#</sup>						
CRC	4.2 (1.8–8.1)	9.5 (3.3–20.5)	8.5 (3.7–16.0)	14.8 (5.2–30.8)	11.1 (4.5–22)	18.2 (6.5–36.9)
Advanced adenomas	11.9 (7.7–17.3)	16.7 (8.1–29.0)	12.7 (6.8–21.1)	14.8 (5.2–30.8)	6.7 (1.8–16.3)	13.6 (3.8–31.6)
Non-advanced adenomas	23.1 (17.4–29.6)	19.0 (9.8–31.8)	15.5 (8.9–24.3)	18.5 (7.6–35.1)	20 (10.9–32.3)	18.2 (6.5–36.9)
Advanced neoplasia	16.1 (11.2–22.0)	26.2 (15.4–39.6)	21.1 (13.5–30.7)	29.6 (15.7–47.1)	17.8 (9.2–29.8)	31.8 (16–51.5)
Any neoplasia	39.2 (32.3–46.3)	45.2 (32–59)	36.6 (27.1–47.0)	48.1 (31.3–65.3)	37.8 (25.7–51.1)	50 (31.1–68.9)
NPV (95% CI), % <sup>#</sup>	95.9 (94.8–96.8)	95.3 (94.2–96.2)	95.5 (94.4–96.4)	95.1 (94–96)	95 (93.9–96)	95.1 (94–96)
LR+ (95% CI)						
CRC	9.2 (6.3–13.4)	23.6 (9.4–59.1)	19.6 (12.9–29.8)	38.6 (14.8–100.9)	24.8 (13.1–47.1)	48.9 (18.2–131.4)
Advanced adenomas	2.8 (1.2–6.4)	4.4 (0.5–38.9)	3.1 (0.6–16.4)	4.1 (0.1–199.4)	1.6 (0–288.8)	3.9 (0–714.3)
Non-advanced adenomas	1.3 (0.5–3.3)	1.3 (0–66.6)	1.0 (0.1–17.2)	1.3 (0–725.6)	1.2 (0–39.4)	1.3 (0–3567.3)
Advanced neoplasia	3.4 (1.8–6.4)	6.2 (1.5–26.3)	4.7 (1.7–13.2)	7.4 (1–56.1)	3.8 (0.5–28.1)	8.2 (0.8–84.3)
Any neoplasia	1.8 (1.0–3.3)	2.3 (0.4–15.0)	1.8 (0.5–7.0)	2.6 (0.2–40.7)	1.7 (0.2–13.7)	2.8 (0.1–72.7)
LR– (95% CI)	0.8 (0.6–1.1)	0.9 (0.7–1.2)	0.8 (0.6–1.0)	0.9 (0.7–1.1)	0.9 (0.7–1.1)	0.9 (0.7–1.1)

CRC: Colorectal cancer; FITs: Fecal immunochemical tests; Hb: Hemoglobin; LR+: Positive likelihood ratio; LR–: Negative likelihood ratio; NPV: Negative predictive value; PPV: Positive predictive value. <sup>#</sup>Indicating that statistical tests using Chi-square test were performed for each of the qualitative FIT and the quantitative FIT. \*Indicating statistical significance between each of the qualitative FIT and the quantitative FIT using the Chi-square test.