

Supplementary material

Table 1 Diagnostic performance of single marker in gastrointestinal tumors

	Marker	Sensitivity	Specificity	AUC (95%CI)
Tumor	CEA	33.217%	93.429%	0.703 (0.675~0.732)
	CA199	26.573%	95.000%	0.589 (0.557~0.621)
	CA125	22.378%	96.286%	0.647 (0.616~0.678)
	CA724	27.273%	61.286%	0.551 (0.519~0.582)
GC	CEA	34.715%	93.429%	0.750 (0.712~0.787)
	CA199	24.870%	95.000%	0.572 (0.521~0.623)
	CA125	13.990%	96.286%	0.585 (0.537~0.633)
	CA724	23.834%	61.286%	0.595 (0.550~0.640)
EC	CEA	17.424%	93.429%	0.600 (0.546~0.651)
	CA199	15.151%	95.000%	0.538 (0.484~0.592)
	CA125	21.970%	96.286%	0.622 (0.561~0.682)
	CA724	33.333%	61.286%	0.503 (0.455~0.551)
PC	CEA	37.705%	93.429%	0.749 (0.680~0.818)
	CA199	72.131%	95.000%	0.866 (0.798~0.934)
	CA125	42.623%	96.286%	0.789 (0.715~0.863)
	CA724	24.590%	61.286%	0.521 (0.458~0.584)
GBC	CEA	31.429%	93.429%	0.735 (0.649~0.821)
	CA199	45.714%	95.000%	0.641 (0.508~0.774)
	CA125	31.429%	96.286%	0.632 (0.508~0.757)
	CA724	48.571%	61.286%	0.574 (0.481~0.666)
CRC	CEA	43.709%	93.429%	0.709 (0.655~0.763)
	CA199	15.894%	95.000%	0.532 (0.476~0.587)
	CA125	23.179%	96.286%	0.694 (0.642~0.746)
	CA724	22.517%	61.286%	0.582 (0.532~0.632)

Tumor: gastrointestinal tumor group; GC: gastric cancer group; EC: esophageal cancer group;
PC: pancreatic cancer group; GBC: gallbladder cancer group; CRC: colorectal cancer group

Table 2 Diagnostic performance of combined detection of multiple markers in the tumor group

Markers	Sensitivity	Specificity	AUC (95%CI)
CEA+CA199	49.301%	88.429%	0.735 (0.707~0.764)
CEA+CA125	48.077%	89.857%	0.755 (0.729~0.782)
CEA+CA724	53.147%	56.286%	0.701 (0.673~0.730)
CA199+CA125	42.307%	91.429%	0.703 (0.673~0.733)
CA199+CA724	46.154%	57.714%	0.581 (0.548~0.613)
CA125+CA724	44.056%	58.857%	0.645 (0.614~0.677)
CEA+CA199+CA125	59.790%	85.000%	0.780 (0.754~0.807)
CEA+CA199+CA724	63.811%	52.857%	0.734 (0.705~0.762)
CEA+CA125+CA724	63.986%	54.000%	0.754 (0.727~0.781)
CA199+CA125+CA724	58.566%	55.429%	0.701 (0.671~0.731)
CEA+CA199+CA125+CA724	71.678%	50.143%	0.780 (0.752~0.806)

Table 3 Diagnostic performance of combined detection of multiple markers in GC

Markers	Sensitivity	Specificity	AUC (95%CI)
CEA+CA199	49.223%	88.429%	0.766 (0.725~0.806)
CEA+CA125	43.005%	89.857%	0.754 (0.715~0.792)
CEA+CA724	51.813%	56.286%	0.746 (0.707~0.784)
CA199+CA125	36.269%	91.429%	0.642 (0.592~0.691)
CA199+CA724	44.041%	57.714%	0.556 (0.502~0.610)
CA125+CA724	34.197%	58.857%	0.552 (0.502~0.603)
CEA+CA199+CA125	55.959%	85.000%	0.776 (0.736~0.816)
CEA+CA199+CA724	62.176%	52.857%	0.761 (0.720~0.802)
CEA+CA125+CA724	57.513%	54.000%	0.750 (0.711~0.790)
CA199+CA125+CA724	52.332%	55.429%	0.632 (0.581~0.684)
CEA+CA199+CA125+CA724	66.839%	50.143%	0.773 (0.732~0.815)

Table 4 Diagnostic performance of combined detection of multiple markers in EC

Markers	Sensitivity	Specificity	AUC (95%CI)
CEA+CA199	21.970%	88.429%	0.578 (0.520~0.637)
CEA+CA125	31.818%	89.857%	0.650 (0.592~0.709)

CEA+CA724	43.182%	56.286%	0.596 (0.542~0.649)
CA199+CA125	31.061%	91.429%	0.621 (0.563~0.679)
CA199+CA724	43.182%	57.714%	0.541 (0.488~0.596)
CA125+CA724	50.758%	58.857%	0.620 (0.562~0.677)
CEA+CA199+CA125	36.364%	85.000%	0.665 (0.611~0.720)
CEA+CA199+CA724	49.242%	52.857%	0.585 (0.528~0.643)
CEA+CA125+CA724	58.333%	54.000%	0.660 (0.605~0.715)
CA199+CA125+CA724	56.061%	55.429%	0.620 (0.560~0.674)
CEA+CA199+CA125+CA724	60.606%	50.143%	0.649 (0.591~0.707)

Table 5 Diagnostic performance of combined detection of multiple markers in PC

Markers	Sensitivity	Specificity	AUC (95%CI)
CEA+CA199	77.049%	88.429%	0.888 (0.827~0.949)
CEA+CA125	59.016%	89.857%	0.836 (0.775~0.896)
CEA+CA724	55.738%	56.286%	0.756 (0.689~0.822)
CA199+CA125	81.967%	91.429%	0.895 (0.832~0.958)
CA199+CA724	81.967%	57.714%	0.866 (0.797~0.934)
CA125+CA724	57.377%	58.857%	0.791 (0.721~0.861)
CEA+CA199+CA125	81.967%	85.000%	0.896 (0.832~0.959)
CEA+CA199+CA724	85.246%	52.857%	0.888 (0.826~0.949)
CEA+CA125+CA724	73.770%	54.000%	0.830 (0.766~0.894)
CA199+CA125+CA724	90.164%	55.429%	0.894 (0.831~0.957)
CEA+CA199+CA125+CA724	90.164%	50.143%	0.896 (0.833~0.960)

Table 6 Diagnostic performance of combined detection of multiple markers in GBC

Markers	Sensitivity	Specificity	AUC (95%CI)
CEA+CA199	62.857%	88.429%	0.796 (0.702~0.890)
CEA+CA125	48.571%	89.857%	0.790 (0.710~0.870)
CEA+CA724	60.000%	56.286%	0.738 (0.653~0.822)
CA199+CA125	57.143%	91.429%	0.721 (0.596~0.846)
CA199+CA724	68.571%	57.714%	0.641 (0.508~0.774)
CA125+CA724	62.857%	58.857%	0.632 (0.507~0.757)
CEA+CA199+CA125	71.429%	85.000%	0.840 (0.756~0.924)
CEA+CA199+CA724	77.143%	52.857%	0.797 (0.705~0.890)

CEA+CA125+CA724	68.571%	54.000%	0.795 (0.719~0.871)
CA199+CA125+CA724	77.143%	55.429%	0.721 (0.596~0.847)
CEA+CA199+CA125+CA724	82.857%	50.143%	0.839 (0.754~0.924)

Table7 Diagnostic performance of combined detection of multiple markers in CRC

Markers	Sensitivity	Specificity	AUC (95%CI)
CEA+CA199	50.993%	88.429%	0.720 (0.663~0.776)
CEA+CA125	59.603%	89.857%	0.791 (0.743~0.839)
CEA+CA724	58.278%	56.286%	0.705 (0.650~0.761)
CA199+CA125	37.086%	91.429%	0.698 (0.646~0.749)
CA199+CA724	35.099%	57.714%	0.510 (0.450~0.569)
CA125+CA724	41.722%	58.857%	0.678 (0.625~0.731)
CEA+CA199+CA125	65.563%	85.000%	0.793 (0.743~0.843)
CEA+CA199+CA724	62.252%	52.857%	0.721 (0.663~0.779)
CEA+CA125+CA724	70.861%	54.000%	0.789 (0.740~0.837)
CA199+CA125+CA724	68.212%	55.429%	0.687 (0.633~0.741)
CEA+CA199+CA125+CA724	75.497%	50.143%	0.792 (0.741~0.842)