

**A label-free amperometric immunosensor for detection of
carcinoembryonic antigen based on gold nanoparticles functionalized
magnetic multi-walled carbon nanotubes loaded with lead ions**

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Table S1 Comparison of different methods for the detection of CEA.

Methods	Linear range	Limit of detection	References
FL quenching method	0.257~12.9 ng/mL	5 pg/mL	[1]
ECL immunosensor	20 fg/mL~1.0 ng/mL	6.7 fg/mL	[2]
Electrochemical immunosensor	0.01~80 ng/mL	2.36 pg/mL	[3]
Paper-based microfluidic electrochemical immunodevice	0.01~100 ng/mL	0.01 ng/mL	[4]
Electrochemical immunosensor	5 fg/mL~50 ng/mL	1.7 fg/mL	This method

Table S2 Determination of CEA in human serum sample.

Initial CEA concentration in sample (ng/mL)	Added CEA concentration (ng/mL)	Measured concentration after addition (ng/mL)	Average value (ng/mL)	RSD (% ,n=5)	Recovery (% ,n=5)
		1.58, 1.49,			
	1.00	1.53, 1.39, 1.44	1.49	4.38	97.5
		3.80, 3.42,			
0.53	3.00	3.60, 3.55, 3.67	3.61	3.90	102.2
		5.28, 5.58,			
	5.00	5.43, 5.29, 5.82	5.48	4.12	99.1

References

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