

In this study, the multi-walled carbon nanotubes (MWCNTs) were applied in lateral flow strips (LFS) for semi-quantitative and quantitative assays. Firstly, the solubility of MWCNTs was improved using various surfactants to enhance their biocompatibility for practical application. The dispersed MWCNTs were conjugated with the methamphetamine (MET) antibody in a non-covalent manner and then manufactured into the LFS for the quantitative detection of MET. The MWCNTs-based lateral flow assay (MWCNTs-LFA) exhibited an excellent linear relationship between the values of test line and MET when its concentration ranges from 62.5 to 1500 ng/mL. The sensitivity of the LFS was evaluated by conjugating MWCNTs with HCG antibody and the MWCNTs conjugated method is 10 times more sensitive than the one conjugated with classical colloidal gold nanoparticles. Taken together, our data demonstrate that MWCNTs-LFA is a more sensitive and reliable assay for semi-quantitative and quantitative detection which can be used in forensic analysis.

Schematic diagram: (A) Ultrasonic processing of MWCNTs in the media solutions. (B) MWCNTs conjugated with antibody in an non-covalent manner. (C) MWCNTs labeled lateral flow strips for detection.

