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| Table 2. Confirmatory methods for analysis of synthetic cannabinoids in biological samples |
| Method | Analyte(s) | Biological Sample(s)Number of cases (n) | LOD(ng/mL) | Type of article | Year of Publication | Reference No. |
| LC-MS-MS | AMB-FUBINACA and EMB-FUBINACA | Postmortem samples (blood, urine, liver, kidney, stomach, intestine, lung and brain)(n=1) | <0.1 | Case report | 2016 | 12 |
| LC-MS/MS | AB-CHMINACA, JWH-203, 5F-APINACA and JWH-122 | Whole blood | 0.1-0.5 | Original article | 2019 | 81 |
| LC-MS/MS | AB-CHMINACA, AB-CHMINACA M2, JWH-210, 5F-AKB-48, XLR-11, UR-144 and their metabolites | Hair(n=43) | 0.0001- 0.01 | Original article | 2020 | 82 |
| LC-ESI-MS/MS | AMB-FUBINACA, 5F-ADB, ADB-FUBINACA, 5F-MDMB-PICA acid, MDMB-FUBINACA acid | Whole blood(n=132) | 0.1-6 | Original article | 2020 | 83 |
| LC-HR-MS/MS | 75 SCs and their metabolites such as: 5F-ADB‐M, 5F-AKB48‐M, JWH‐018‐M, MDMB‐CHMICA, MAM‐2201‐M | Urine(n=7) | <0.05 | Original article | 2019 | 84 |
| LC-MS/MS | AM2233, JWH-200, AB-005, AB-FUBINACA, AB-PINACA, AB-CHMINACA, AM2201, RCS-4, JWH-250, STS-135, JWH-73, XLR-11, JWH-251, JWH-18, JWH-122, JWH-19, UR-144, JWH-20 and AKB-48 | Oral fluid | 1 | Original article | 2019 | 85 |
| LC-MS/MS | 72 SCs including : A-834,735, AB-001, AB-001-5F, AB005, AB-FUBINACA, AB-PINACA, ADB-FUBINACA, ADBICA, ADBICA-5F, ADB-PINACA, ADBPINACA-5F, AKB48, AKB48-5F, AM-1220, AM-2201, AM-2201 | Hair(n=294) | 0.0005- 0.005 | Original article | 2018 | 86 |
| LC-MS/MS | 72 SCs from different chemical groups including naphthoylindoles, naphthoylindazoles, benzoylindoles, phenylacetylindoles, tetramethylcyclopropylindoles, indole-3-carboxylic acid esters, indole-3-carboxylic acid amides, indazole-3-carboxylic acid amides | Whole blood(n=14) | 0.01-0.48 | Original article | 2018 | 87 |
| MIP based QCM sensor | JWH-073, JWH-073 butanoic acid, JWH-018 and JWH-018 pentanoic acid | Urine | 0.0003- 0.00045 | Original article | 2018 | 88 |
| Triple Quadrupole LC-MS-MS | 32 SCs and metabolites including PINACA, FUBINACA, PB-22, AKB-48 | Urine(n=25) | 0.5 | Original article | 2017 | 89 |
| LC-MS/MS | Phytocannabinoids (THC, CBD, CBN), their main metabolites (11-OH-THC, THC-COOH, THC-COOH-glucuronide) and common synthetic cannabinoids (HU-210, JWH-018, JWH-073, JWH-250) | Urine(n=5) | 0.01-0.5 | Original article | 2016 | 90 |
| LC-MS/MS | MDMB-CHMICA, AB-CHMINACA, and 5 F-PB-22 | Human serum(n=189) | <1 | Original article | 2017 | 91 |
| RF-MS-MS | 15 SCs including JWH-018, JWH-073, JWH, 250, JWH-081, JWH-122, AM2201, MAM2201, UR-144, XLR-11, AKB48 | Urine(n=18000) | 1 | Original article | 2016 | 92 |
| MEC-MS | 15 SCs including JWH-018, JWH-019, JWH-073, JWH-200 and JWH-250 | Urine and Serum(n=8) | 0.9-3 | Original article | 2016 | 93 |
| LC-MS/MS | 15 SCs as parent molecules | Urine and blood | 0.01-0.5 | Original article | 2016 | 94 |
| UHPSFC-MS/MS and by UHPLC-MS/MS. | AM-2201 N-4-OH-pentyl, AM-2233, JWH-018 N-5-OH-pentyl, JWH-018 N-pentanoic acid, JWH-073 N-4-OH-butyl, JWH-073 N-butanoic acid, JWH-122 N-5-OH-pentyl, MAM-2201, MAM-2201 N-4-OH-pentyl, RCS-4 N-5-OH-pentyl, UR-144 degradant N-pentanoic acid, UR-144 N-4-OH-pentyl, and UR-144 N-pentanoic acid. | Urine(n=130) | 300-500 | Original article | 2016 | 95 |
| Miniature MS with ambient ionization | 15 SCs | Urine and blood | 10 | Original article | 2015 | 96 |
| *LOD: Limit of detection**LC-MS-MS: Liquid chromatography-tandem mass spectrometry**LC-ESI-MS/MS: Liquid chromatography-electrospray-tandem mass spectrometry**LC-HR-MS/MS: Liquid chromatography-High resolution -tandem mass spectrometry**MIP based QCM sensor: Molecularly imprinted polymer based quartz crystal microbalance sensor**RF-MS-MS: RapidFire-Tandem Mass Spectrometry**MEC-MS: Micellar electrokinetic chromatography-mass spectrometry**UHPSFC-MS/MS: Ultra-high performance liquid chromatography-tandem mass spectrometry* |