K27 A Field Performance of the DrugTest 5000® and DDS®2 Onsite Oral Fluid (OF) Devices by Oregon and Vermont Drug Recognition Experts (DREs)

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After attending this presentation, attendees will be able to describe the field performance of the Draeger DrugTest 5000® (DT5000®) and Alere™ DDS®2 Onsite OF devices compared to Mass Spectrometry (MS) OF confirmatory tests and understand the usefulness of drug tests in Driving Under the Influence of Drugs (DUID) cases.

This presentation will impact the forensic science community by informing attendees regarding the use of onsite OF tests in identifying drug use.

Background: OF is easily collected and tested at the roadside to rapidly identify recent drug intake. Collection is non-invasive and gender neutral, with results available in minutes rather than hours for urine or invasive blood collection. During this delay, blood drug concentrations may decrease greatly, especially Δ9-Tetrahydrocannabinol (THC), hampering identification of recent drug consumption.

Methods: OF was collected with the DT5000® in Oregon ((OR), N=57) and Vermont ((VT), N=35), and the DDS®2 (N=23) in VT. Only one device was utilized per individual. Cutoff concentrations and performance for the combined OR and VT DT5000® data and the VT DDS®2 data are in the tables below. NMS Labs performed confirmation testing on OF collected with Immunalysis™ Quantisal® devices. All OR samples were collected in DUID cases, while 49 VT cases were from a court-ordered rapid intervention program and 9 from DUID cases.

Results:

DT5000 (OR & VT)

Drug, cutoff ng/mL	TP	FN	FP	TN	Sensitivity %	Specificity%	Efficiency %	PPV %	NPV %
THC, 5	47	1	0	44	97.9	100	98.9	100	97.8
Cocaine, 20	5	0	1	85	100	98.8	98.9	83.3	100
Amphetamine, 50	23	7	2	60	76.7	96.8	90.2	92	89.6
Methamphetamine, 35	34	0	2	56	100	96.6	97.8	94.4	100
Benzodiazepines, 15	2	0	0	90	100	100	100	100	100
Opiates, 20	31	1	3	56	96.9	94.9	95.6	91.2	98.2
Methadone, 20	3	0	0	89	100	100	100	100	100
Overall	145	9	7	480	94.2	98.6	96.9	95.4	98.2

DDS®2 (VT)

Drug, cutoff ng/mL	TP	FN	FP	TN	Sensitivity %	Specificity %	Efficiency %	PPV %	NPV %
THC, 25	3	2	0	15	60	100	90	100	88.2
Cocaine, 30	2	0	0	21	100	100	100	100	100
Amphetamine, 50	3	0	3	17	100	85	87	50	100
Methamphetamine, 50	0	0	0	23	n/a	100	100	n/a	100
Benzodiazepines, 20	0	0	0	23	n/a	100	100	n/a	100
Opiates, 40	3	1	1	18	75	94.7	91.3	75	94.7
Overall	11	3	4	117	78.6	96.7	94.8	73.3	97.5

Discussion: For the DT5000® device, sensitivity, specificity, and efficiency exceeded 94.9%, except for the amphetamine assay, which had 7 FN tests. This could have been due to the much lower 10ng/mL OF amphetamine confirmation test, and the 2 FP tests could have been due to cross-reactivity of the DT5000® antibodies with other sympathomimetic amines. For 641 OF samples and seven drug classes, the DT5000® had sensitivity, specificity, and efficiency of more than 94.2%, with high Positive Predictive Values (PPV) and Negative Predictive Values (NPV) of ≥95.4%. The DDS®2 device had 78.6% sensitivity, 96.7% specificity, and 94.8% efficiency, with a high NPV of 97.5% and a lower PPV of 73.3%. The poorer THC DT5000® results may be the result of a higher THC cutoff or that there were only five confirmed positive THC samples or that different individuals were tested. The amphetamine assay specificity was problematic with a PPV of only 50%. Although there were many cocaine tests for the DT5000® evaluation, there were too few positive cocaine, benzodiazepines, and methadone cases to draw conclusions about sensitivity, and for the DDS®2, there were only 11 positive cases in the entire set. For DUID cases, PPV is important because of the consequences on the driver from an FP test. There were only 1.1% FP tests for the DT5000® and 3.0% FP for the DDS®2. In drivers with negative field tests or when results are inconsistent with observed intoxication, supplemental tests should be ordered because the onsite OF devices test for a limited number of drug classes.

Conclusion: The devices achieved good specificity, with better sensitivity for the DT5000® as compared to the DDS®2 device. In addition, savings on cost of transport time, officer time, phlebotomist costs, and a reduction in the number of witnesses required for testimony may be substantial.

Oral Fluid, Onsite, DUID

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