
Central (Richmond)


Northern (Manassas)


Eastern (Norfolk)


Western (Roanoke)

Impaired Driving: Virginia Department of Forensic Science Perspective

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Presented to the Virginia State Crime Commission
November 16, 2022

Breath Alcohol Test Statistics

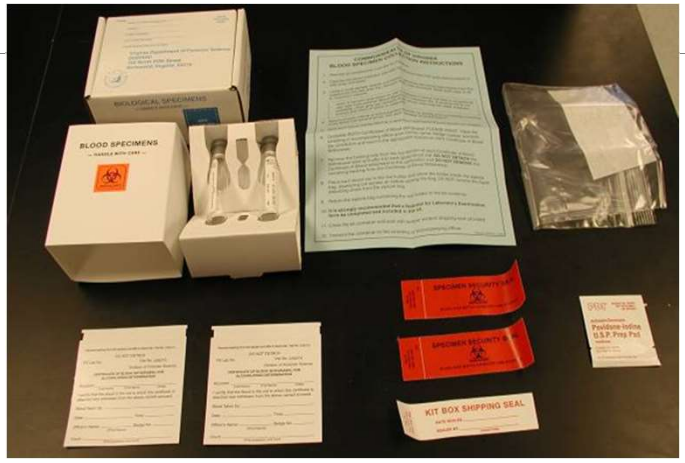
- Evidential Tests for Breath Alcohol
- During COVID-19, tests decreased (2020 - 2021)
- 2022 - on track for comparable number of evidential tests to 2020 and 2021
- Records online: https://breath.dfs.virginia.gov/

Calendar Year	Evidential Tests
2019	15,197
2020	11,257
2021	10,864
2022 (as of 11/7/22)	9,519

Alcohol Testing

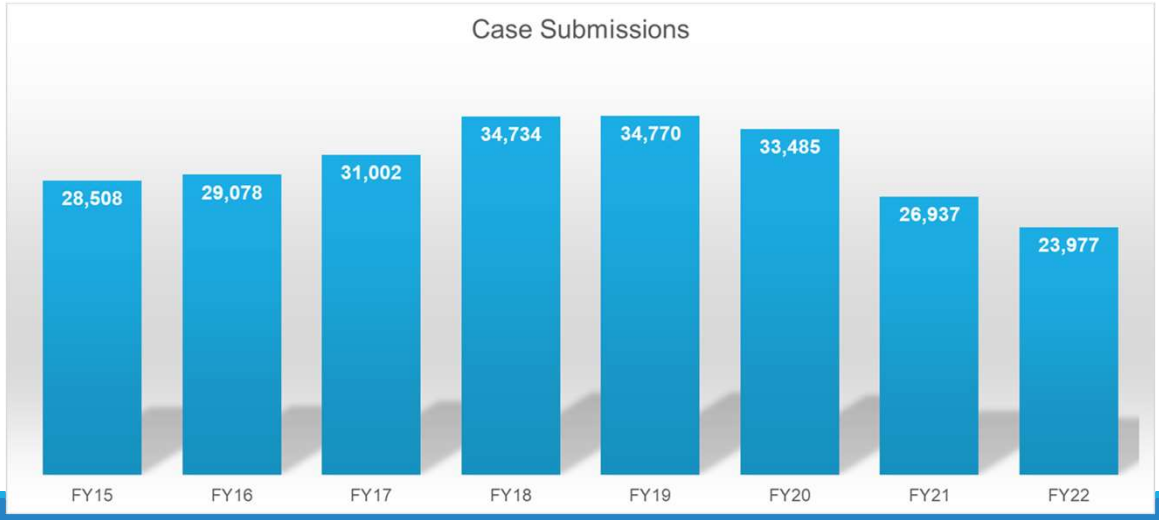
- Preliminary Breath Test (PBT) Devices
  - Approved for use (Virginia Code §18.2-267)
- Evidential Breath Tests
  - Implied consent for blood alcohol content
  - Must use the instrument approved by the Department of Forensic Science (DFS)
- Blood Draw
  - Can be obtained if:
    - Breath test is refused
    - Breath test not available
    - Subject is physically unable to provide breath sample
    - Drugs are suspected
  - Utilize DFS provided DUI/DUID kit

DFS-Provided Blood Kit



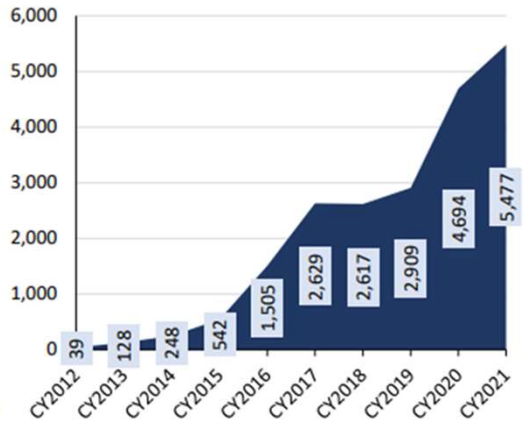
- VA Code §§18.2-268.5 - 18.2-268.7

Controlled Substances Submissions



Tracking Trends from Controlled Substances Assists Method Development in Toxicology

Illicit Synthetic Opioid Submissions
CY2012-2021



Illicit Synthetic Opioids Identified*

Substance Identified	CY2013-15	CY2016-18	CY2019-21
Fentanyl	697	5,253	12,800
Fentanyl Analogs			
Para-Fluorofentanyl	0	1	486
Acetyl Fentanyl	45	182	439
FIBF	0	591	39
Furanyl Fentanyl	0	794	2
Fentanyl Analog - Other	1	219	77
Other			
Other	186	359	220

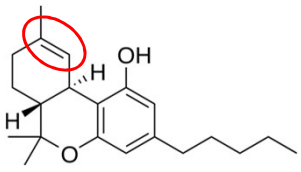
*Sum of individual substances will not match the total, as some cases involved more than one illicit synthetic opioid.

https://www.dfs.virginia.gov/wp-content/uploads/2021DfsDrugReport_web.pdf

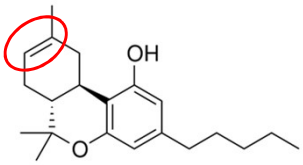
Top Drugs Comparison - CY 2021

Top 10 Seized Drugs	# Drug Items	Top 10 Drugs in DUID	# DUID Cases
Methamphetamine	11,707	THC/THC Carboxylic Acid	1,359
Cocaine	7,788	Fentanyl	848
Fentanyl	4,397	Methamphetamine/Amphetamine	713
Marijuana	2,873	Cocaine metabolite (Benzoylecgonine)	514
Heroin	2,277	Alprazolam	251
Buprenorphine	1,527	Etizolam	218
Eutylone	983	Methadone	210
Oxycodone	691	Morphine	207
Alprazolam	640	Buprenorphine	174
Amphetamine	546	Phencyclidine	123

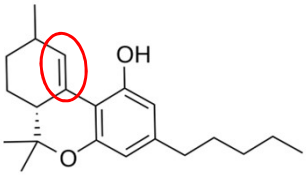
Changing Landscape - THC



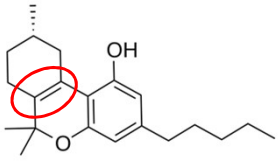
Delta 9 THC



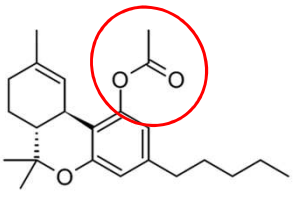
Delta 8 THC



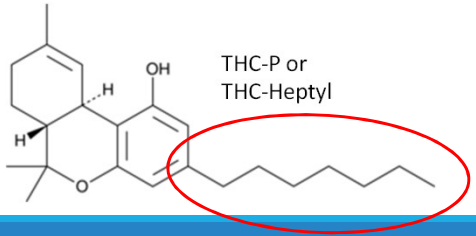
Delta 10 THC



Delta 6a,10a THC



THC acetate ester (THC-O)



THC-P or
THC-Heptyl

Toxicology Case Workload and Resources

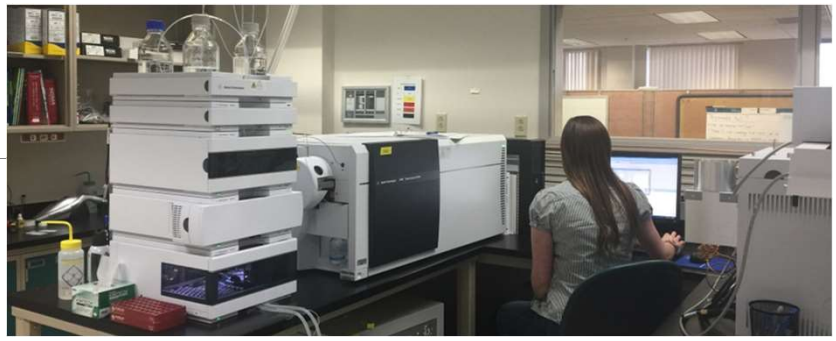
	Submissions (CY)				
	2018	2019	2020	2021	Difference from 2018 to 2021
OCME (Post-Mortem)	4261	4490	5088	5202	22%
DUID (Driving Under the Influence of Drugs)	1932	2407	3090	2761	43%
DUI (Driving Under the Influence of Alcohol)	1558	2454	2489	2421	55%
Alcohol (Open Containers)	136	125	48	7	-95%
Other (Drug Facilitated Crimes, etc.)	730	666	713	699	-4%
Total	**8617**	**10142**	**11428**	**11090**	**29%**

- In FY23, DFS was provided funding for 5 Forensic Scientists and 4 Toxicologists to address increases in workload and plan to increase testing for THC in Driving samples.
- The Chemistry Research Section develops and validates new methods for Toxicology with 3 scientists (GF). Hiring 1 scientist and 1 lab specialist (1 year CDC Grant).
- OCME directly outsourced some suspected overdose cases to a private lab.

Implied Consent DUI/DUID Testing

- Level 1: Blood Alcohol Content (BAC) (Counted as a DUI Case at DFS)
  - If BAC ≥ 0.100%, report will be issued
  - If BAC < 0.100%, proceed with Level 2 testing
  - **Note:** Beginning January 2023, THC Screening will be added to Level 1 and will be performed on all impaired driving samples.
- Level 2: ELISA Drug Screen (Counted as a DUID case at DFS)
  - Marijuana (THC), Fentanyl, Methamphetamine/MDMA, Cocaine, Benzodiazepines

    AND
  - Amphetamine/Phentermine, Barbiturates, Buprenorphine, Carisoprodol (Soma), Dextromethorphan, Diphenhydramine (Benadryl), Methadone, Opiates, Oxycodone, PCP (Angel Dust), Tramadol, Tricyclic Antidepressants, Zolpidem (Ambien)



- Level 2: Drug Quantitation
  - Confirm/quantitate presumptive positive screens in second, more specific analysis
  - If significant results, issue report
  - If no significant results, may proceed to further screening by Toxicologist recommendation

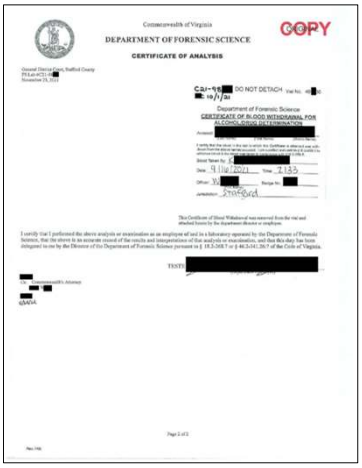
Certificate of Analysis

Commonwealth of Virginia

DEPARTMENT OF FORENSIC SCIENCE

COPY

CERTIFICATE OF ANALYSIS



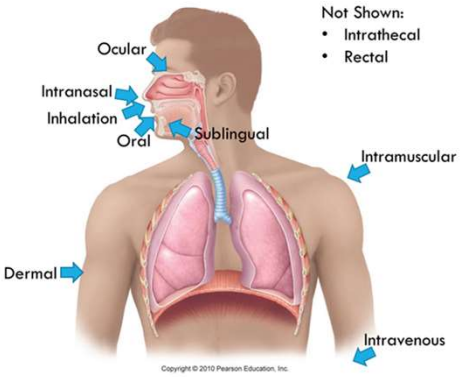
Commonwealth of Virginia

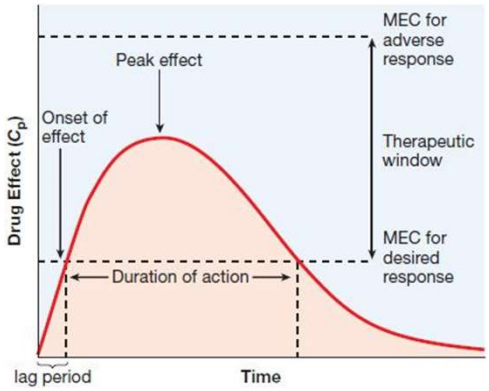
DEPARTMENT OF FORENSIC SCIENCE

COPY

CERTIFICATE OF ANALYSIS

Drugs and Alcohol in the Body





Toxicology Knowledge Base - Smoking

- Smoking 3.5% THC cigarettes
- Pharmacology
  - Absorption, Distribution, Metabolism, Elimination (ADME)
  - Concentrations
    - Mean peak concentrations – 0.085-0.160 mg/L (85-160 ng/mL)
    - After ~40 mins, 0.010-0.020 mg/L (10-20 ng/mL)
    - Within 2 hours, concentrations below 0.005 mg/L (5 ng/mL)
- THC Carboxylic Acid (THCCOOH)
  - Inactive metabolite
  - Indicator of usage

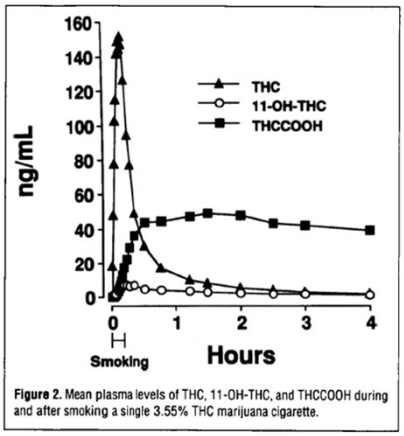
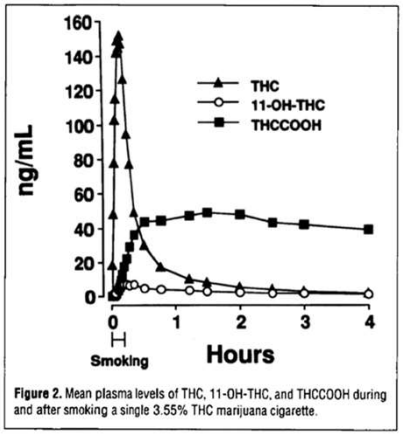


Figure 2. Mean plasma levels of THC, 11-OH-THC, and THCCOOH during and after smoking a single 3.55% THC marijuana cigarette.

Huestis, MA, et al (1992) Journal of Analytical Toxicology, 16 (5).

Toxicology Knowledge Base



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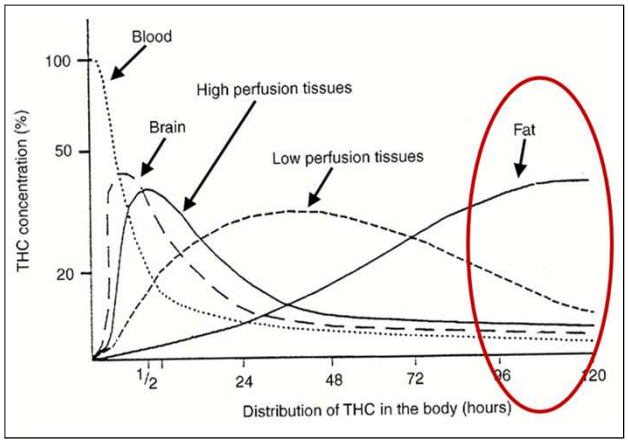


Ashton, CH (2018) British Journal of Psychology, 178 (2).

Toxicology Knowledge Base - Oral Ingestion

- Pharmacology – Oral Ingestion
  - Vandrey, et al. (2017) Journal of Analytical Toxicology, 41: 83-99.
  - Cannabis brownies

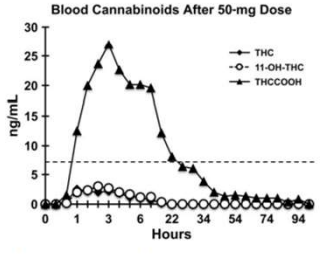


Figure 2. Cannabinoid profile in whole blood after oral administration of 50 mg THC.

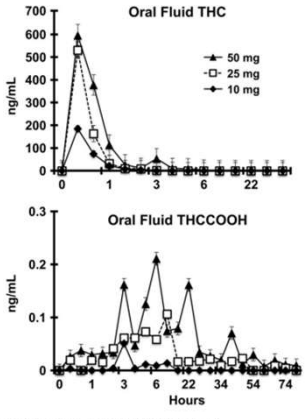
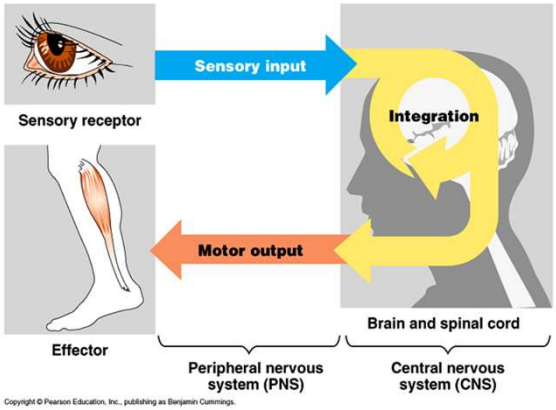


Figure 3. Quantitative THC and THCCOOH in oral fluid.

Basic Tasks of the Nervous System

- **Sensory Input**
  - Monitor both external and internal environments.
- **Integration**
  - Process the information and often integrate it with stored information.
- **Motor output**
  - If necessary, signal effector organs to make an appropriate response.



How do drugs affect driving?

- **Coordination**
  Effects on nerves/muscles - steering, braking, accelerating, manipulation of vehicle
- **Reaction Time**
  Insufficient response – delayed reaction, over-correction
- **Judgment**
  Cognitive effects, avoidance of potential hazards, anticipation, risk-taking behavior, inattention, fatigue, decreased fear, exhilaration, loss of control
- **Tracking**
  Staying in lane, maintaining distance
- **Attention**
  Not focused, inattentive, lack of vigilance
- **Perception**
  90% of info processed while driving is visual. Glare resistance, recovery, dark and light adaptation, dynamic visual acuity

Potential Impacts of THC on Driving

Marijuana Effects

- Short-term memory disruption
- Relaxation and euphoria
- Lack of concentration/focus
- Poor decision-making
- Altered time and space perception
- Hallucinations (at high concentrations)

Driving Requirements

- Coordination
- Reaction Time
- Judgment
- Tracking
- Attention
- Perception

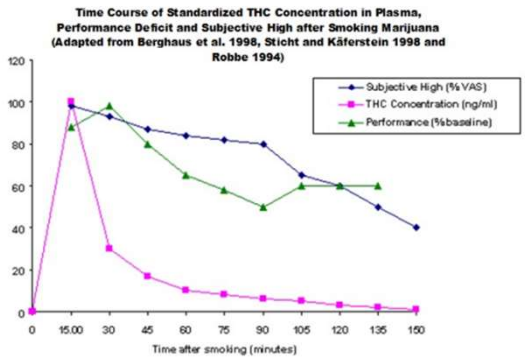
THC Concentration vs. Impairment

- THC concentration cannot be related to a measurable level of impairment
- This does NOT mean that impairment doesn't exist or cannot happen

Marijuana-Impaired Driving: A Report to Congress

Figure 4 "shows this lack of clear correspondence between THC level in plasma and impairment…the peak THC level is reached soon after smoking ends. However, peak performance deficits are observed long after the peak THC level occurs."

Figure 4



Compton, R.P. (July 2017) Report No. DOT HS 812 440 - NHTSA

AAA Foundation for Traffic Safety Evaluation of Cannabis *Per se* Limits

- AAA study concluded that a quantitative threshold for *per se* laws for THC following cannabis use **cannot** be scientifically supported
- All of the candidate THC concentration thresholds examined would have either:
  - misclassified a substantial number of drivers as impaired who did not demonstrate impairment on the SFST, or
  - misclassified a substantial number of drivers as unimpaired who did demonstrate impairment on the SFST

Logan, B., Kacinko, S.L. & Beirness, D.J. (2016). *An Evaluation of Data from Drivers Arrested for Driving Under the Influence in Relation to Per se Limits for Cannabis* (Technical Report). Washington, D.C.: AAA Foundation for Traffic Safety.

Oral Fluid Testing

- National Highway Traffic Safety Administration (NHTSA) has evaluated several on-site oral fluid screening devices
- Devices could be approved for roadside use to help establish probable cause
- Results are presumptive and are not recommended for evidentiary purposes
- Blood testing for confirmation
- Literature regarding effects on driving are based on blood concentrations, not oral fluid concentrations

Statutory Authority for Oral Fluid Testing

- Statutory amendments would need to be made to permit the collection of oral fluid samples as part of any DUI roadside investigation.
- To establish such a program, Code amendments would be needed to the preliminary breath test statute (Virginia Code § 18.2-267) to expand the scope of preliminary testing to include oral fluid.
- Department of Forensic Science (DFS) would need to establish a process via its regulations for the approval of these roadside testing instruments.

Thank you!

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