

HOUND[®] TECHNOLOGY

GROUNDBREAKING SCIENCE + ENGINEERING



HOUND LABS[®]

DR. MIKE LYNN – CEO

STARTING HOUND LABS WAS DEEPLY PERSONAL

★ EMERGENCY PHYSICIAN ● 25 YEARS ● CURRENT

★ 9/11 ● PHYSICIAN ON STAFF ● U.S. SECRETARY OF STATE

★ RESERVE DEPUTY SHERIFF ● 12 YEARS ● CURRENT

★ 4 YOUNG KIDS

THE HOUND LABS STORY

SCIENTIFIC RIGOR

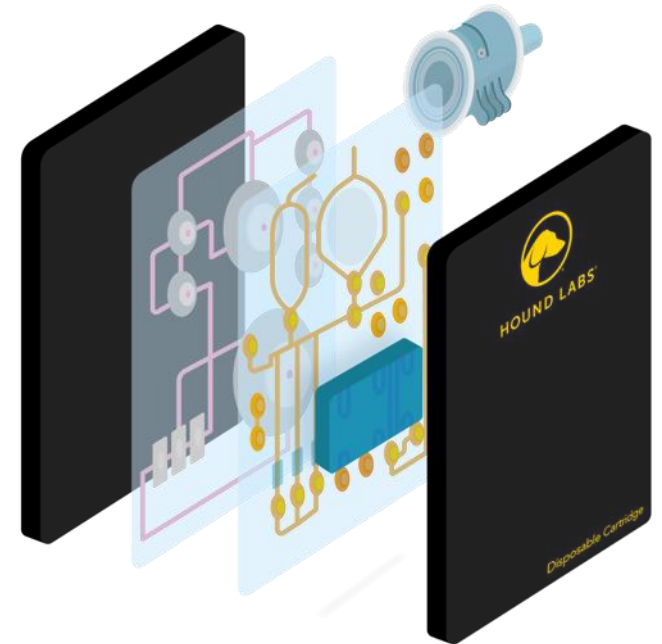
- 8,000 tests with human subjects
- 2 clinical studies with UCSF + others pending

INVESTMENT IN R&D

- Over \$50M spent on R&D
- 12 issued patents | 30 pending

COMMITMENT TO FIELD TESTING

- Law enforcement
- Employers
- Live track simulations at high speeds



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ULTRA-SENSITIVE TECHNOLOGY



HOUND BREATHALYZER

- Immunoassay
- Point-of-care
- Instrument-read
- Single-use cartridge
- Built-in calibration

VS



MASS SPECTROMETER

- Lab-based
- \$1+ million
- Trained technicians
- Only alternative with similar sensitivity



HOUND BREATHALYZER

1 BILLION times more sensitive than an alcohol breathalyzer.

It's equivalent to finding *1 person living among the populations of 130 Earths.*

OR *1 in ~1,000,000,000,000.*

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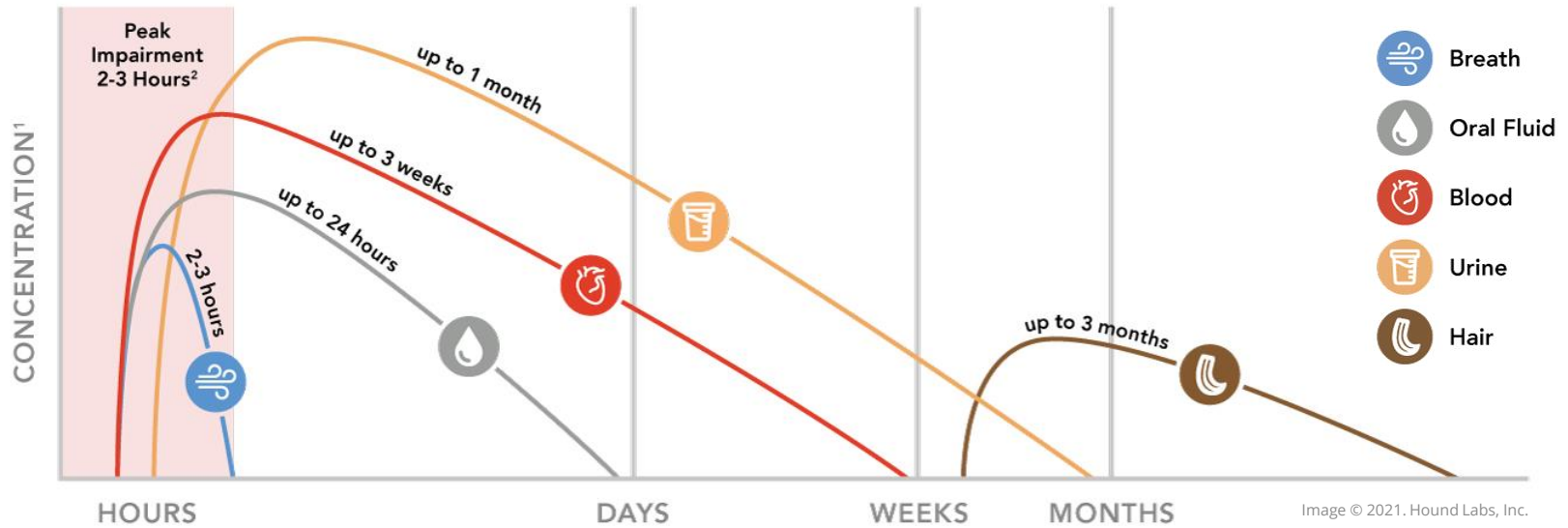
THC + BREATH

The Challenges



ZERO TOLERANCE NOT PRACTICAL

WINDOWS OF DETECTION FOR CANNABIS TESTING

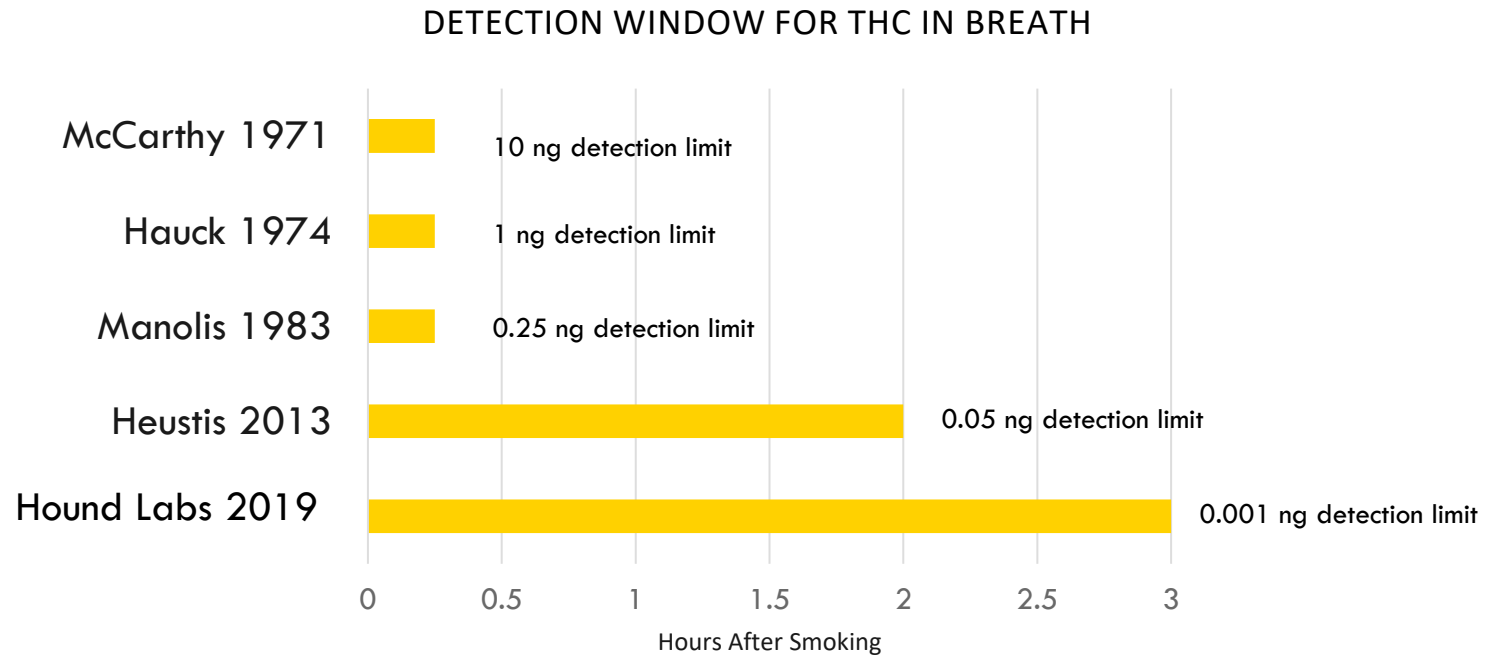


“Our findings validate existing research and provide additional evidence for using exhaled breath testing as an effective means of THC impairment and field sobriety detection.³”

^{1,2} <https://houndlabs.com/2018/09/06/how-long-can-marijuana-be-detected-in-drug-tests/>

³ *Cannabis and Cannabinoid Research* 5:1, 99–104, DOI: 10.1089/can.2018.0070. (Mar 2020)

THC DEGRADES QUICKLY IN BREATH



PROBLEMS TO OVERCOME

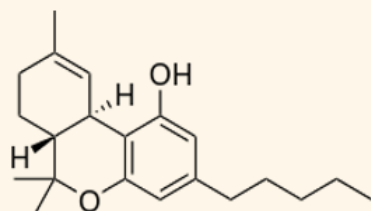
- Detection limit
- Consistent sample
- Environmental contamination
- Saliva contamination

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A. Verstraete, "Perspectives for the detection of cannabis in breath," in Proceedings of the 15th International Conference on Alcohol, Drugs and Traffic Safety (CD-rom), Stockholm, 2000.

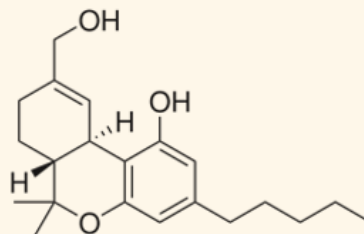
UNIQUELY SPECIFIC TECHNOLOGY

THC



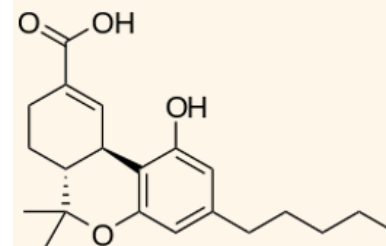
✓ Breath

11-OH-THC



✗ Breath

THC-COOH



✗ Breath

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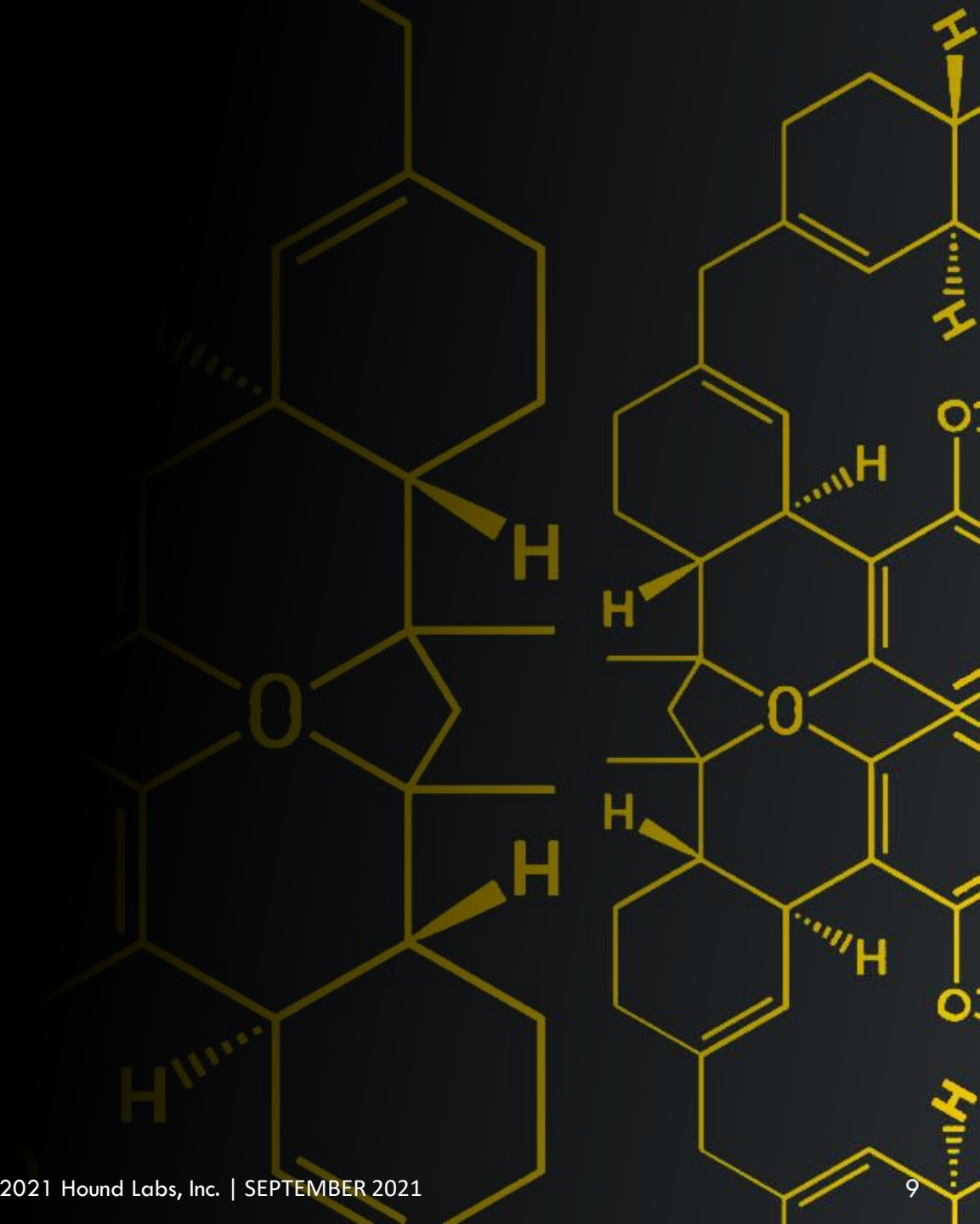
THC is easily distinguished from other cannabinoids in breath (CBD, CBN).

Himes, S. et al. "Cannabinoids in Exhaled Breath following Controlled Administration of Smoked Cannabis," *Clinical Chemistry* 59:12 1780–1789 (2013).

Lynch, K. et al. "Correlation of Breath and Blood Δ^9 -Tetrahydrocannabinol Concentrations and Release Kinetics Following Controlled Administration of Smoked Cannabis," *Clinical Chemistry Papers in Press*. Published July 11, 2019 as doi:10.1373/clinchem.2019.304501.

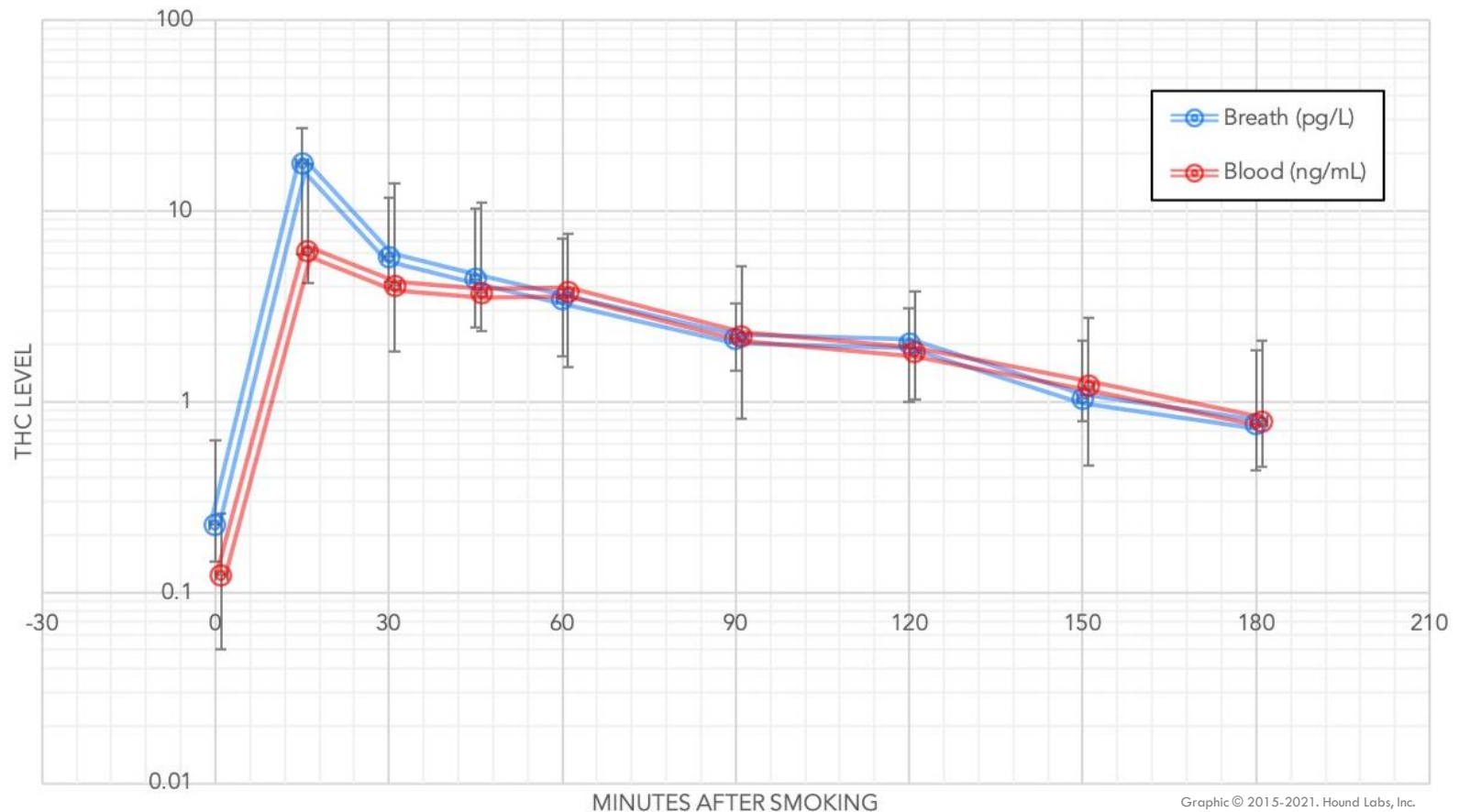
RESEARCH

What Have We Learned?



THC IN BLOOD + BREATH

University of California – San Francisco (UCSF) Clinical Trial:
Duration and Concentration of THC in Breath and Blood Over Time



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THC IN BREATH

- ✔ THC can be measured consistently
- ✔ Frequent smokers do not have residual THC in breath
- ✔ 2nd hand THC smoke disappears after a person is no longer exposed
- ✔ THC has a brief detection window



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SAFETY + FAIRNESS™

NEW CANNABIS SOLUTION NEEDED

ERA OF LEGALIZATION

Breathalyzer positive only within the impairment window



BREATH

- ✓ Positive results only after recent use
- ✓ Correlates THC in breath with impairment window
- ✓ Drivers can legally use, but cannot be impaired

PRE-LEGALIZATION

Non-breath drug tests support zero-tolerance



URINE



SALIVA



HAIR



BLOOD

- ✗ Positive THC results days or months after use
- ✗ Results do not correlate with impairment
- ✗ Unfair consequences for legal choices

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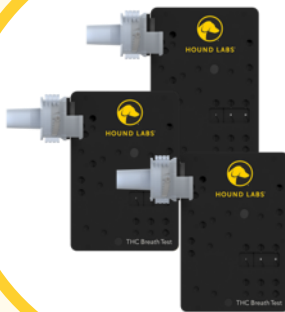
SIMPLE STEPS TO FAIR RESULTS

1-2-3

ATTACH

BREATHE

PROCESS



Easy to use



Simple to conduct



Roadside results



DISCLAIMER

The HOUND[®] MARIJUANA BREATHALYZER is intended to detect recent cannabis use. It does not measure whether, or how much, a person is impaired. It is intended solely for use in law enforcement, employment, and insurance settings. It should not be used for any medical or therapeutic purposes, or for any Federal drug testing programs, such as programs run by the Substance Abuse and Mental Health Services Administration (SAMHSA), the Department of Transportation (DOT), and the U.S. military.