Drug Testing in the Workplace

Dräger, Technology for Life*

www.draeger.com



Breath Alcohol and Drug Testing Devices





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Intro



- Worldwide issue
- Drug and alcohol consumption is established in our cultural life and is part of all our societies.
- Trend to more potent drugs, but also to legalization
- Working population is mirror of society; working people all over the world use alcohol and drugs



















There aren't always clear Indications





Fotos: www.weltderwunder.de

Cannabis - Consumption

- Smoking
- Eating



Marihuana cigarette, joint, reefer



Cakes, Cookies







Cannabis pipe



Vaporizer



An individual is in a physical, mental and emotional state that enables them to perform the essential tasks of their work assignment in a manner which does not threaten the safety or health of oneself, co-workers, property or the public.



Adulteration/Substitution

Google "beat a drug test" 2003: 153,000⁺ hits 2006: 11,000,000⁺ hits 2013: 53,000,000⁺ hits 2018: 83,300,000⁺ hits

Witnessed Collection Difficult Sample Substitution































Cannabis - Pharmacology Cannabinoids

CH₃

0

> 500 chemicals & 109 Cannabinoids, like:



Cannabigerol, CBG

THC-cannabivarin, THCV

Cannabidiol, CBD

Tetra Hydro Cannabinol, △9-THC

OH

Cannabinol, CBN

Cannabis - Pharmacology Main Metabolism Route





Cannabis - Pharmacology Effects

Acute Subjective Behavioral Effects:

- Euphoria / Relaxation
- Altered perception of time
- Lack of concentration
- Impairment of learning / memory
- Executive function
- Divided attention
- Mood changes, like panic reaction, paranoia



Acute Physiological Effects:

- Tachycardia
- Dry mouth
- Increased appetite
- Vaso- / Bronchodilation





Cannabis - Pharmacology



the <u>active</u> THC... (The psycho-active part of the drug that causes impairment)

- ... passes the blood-brain barrier and binds to cannabinoid (CB1) receptors
- → modulates endogenous cannabinoid & other neurotransmitter system intensivation of feelings

Important neurobiological functions, like:

- Cognition: divided attention, short term memory, Learning
- Psychomotor control, coordination
- Hunger
- Body temperature control
- Brain reward system



Cannabis - Pharmacology Main Metabolism Route





Dräger DrugTest 5000 Detection times of various drugs in blood, oral fluid, urine



Detection Times of Drugs of Abuse in Blood, Urine, and Saliva. Alain Verstraete, Ther Drug Monit., Vol 26, April 2004

AMP	Blood Saliva I Urine					
MAMP						
MDMA			_			
ТНС						
THC- COOH						
COC						
BE				_		
OPI						
Consumption 24h 2d 3d 4d				4d	5d	





Analysis Material and Detection Window

Specimen Types



Selection depends on the intent/purpose of the test



Detection Window





Blood



is very well suited to testing for drugs and medication







- Contains the drug immediately, transports it to places where the substance takes effect (brain)
- \rightarrow indication of recent use
- Cannot be tampered with
- Homogeneous composition
- \rightarrow Blood found entry in most DUID legislations



- Taking of a blood sample is highly invasive
- Needs a physician resp. facility
- No on-site test available







- Historic timeframe available; helps identify long term abuse
- No onsite test available

- Hair growth: approx. 1 cm/month (.4 inches)
- Takes 5-7 days to emerge above the scalp

Urine





 Produced in the kidney as place of detoxification; Elimination of drugs, medicines etc., after they have been transformed into

inactive metabolites in the liver)

Urine





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- Approx. 100 fold higher substance concentration in urine than in blood
- Industry Standard with good scientific support
- Internationally available guidelines



- No quantitative result over time possible,
 (bladder is collection container):
 Cannot measure frequency of illicit drug use
- Mainly (inactive) metabolites, like carboxy-THC: does not indicate severity of impairment
- Facilities needed
- Some find urine testing intrusive
- High Risk of Adulteration



- Target analyte in saliva: mainly parent drugs
- Substances with high plasma protein binding hardly detectable (like THC)

Oral Contamination





For reproducible testing, important to collect as much liquid (the saliva portion) as possible



Why Oral Fluid?

Advantages of Oral Fluid



Less Invasive No Dignity or Gender Issues Easy to Administer / Collect Sample Results within 10 minutes



Cost Benefits

Reduce Downtime: Time, Logistics & People Reduce Administration & Testing Costs **Overview: Benefits of Oral Fluid Testing**



- Rapid, easy, and non-invasive specimen collection, eliminates the need of a collection facility
- ✓ Less invasive: no dignity or gender issues
- ✓ Reduced risk of sample adulteration and dilution







- Rapid, easy, and non-invasive specimen collection, eliminates the need of a collection facility
- ✓ Less invasive: no dignity or gender issues
- ✓ Reduced risk of sample adulteration and dilution
- ✓ Better detection of recent drug use = Risk of being impaired

YES,

Oral Fluid Drug Testing is an option for the Workplace

Onsite vs. Lab-based





On-site Oral Fluid Screening Devices

Lab-based Oral Fluid Analysis



Onsite vs. Lab-based



Quantitative results for a wide range of drugs

Turnaround time: hours, if not days

Costly

No target-oriented analysis, only in case of suspicion

Lab-based Oral Fluid Analysis



Saliva Components



- water
- electrolytes,
- mucus, with glycoproteins like mucins
- enzymes,
- antibacterial compounds (such as secretory IgA and lysozyme)



Saliva (secreted by glands)

→ more than 2000 components are identified in saliva

Formation approx. 0,5 - 1,5 liter/day

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Onsite vs. Lab-based



Quick results (after minutes) on the spot; immediate action

Other price models

Indicator for following lab analysis

→ valuable and decision-supporting tool on-site!



The DrugTest 5000



Immunoassay Technology Diager Antigen = drug Antibody Antigen bound to Antibody Image: Comparison of the structure of

This method detects a substance by using **antibodies**.

Antibodies are proteins; they are responsible for immune reactions in the immune system of vertebrate animals - usually against pathogens.

Their special ability is to be highly selective to only molecules of a specific substance - this substance is the matching antigen for the designed antibody.



Dräger DrugTest[®] 5000





5 ng/ml THC (Δ^9 -tetrahydrocannabinol) Immunoassay (Competitive Inhibition) Electro-Optical Reader Clear Results / No Interpretation Integrated Data Management

First oral fluid screening device approved in Canada by the DOJ for roadside testing

Inside the Test Cassette





Oral Fluid when NO Drug is present





Oral Fluid when NO Drug is present

Oral Fluid when a DRUG is present

Validation and Evaluation

As the analyser determines a positive or negative sample based on the intensity of the line, **line intensity is the key**.

Its precise and reproducible occurrence is based on many factors, like the quality of the antibody, but also on the quality of marking reagents.

A faint signal may be negative or positive depending on intensity compared to calibration values stored in the barcode.

This technique makes the DrugTest[®] 5000 system more reliable than visually read tests.

Plus: Temperature control

Key Elements

Teamwork

Expertise

Sales & Service Concept

Company

Match needs/wants of the customers

Quick and comfortable

Printing option

Product Clear results without interpretation

Easy and safe operation

Reliable analytical performance

How can this be proven??

Scientific evaluations

User studies

References

Country approvals

Selection of published Studies

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Oral Fluid Drug Testing

Implementation as part of a comprehensive fit-for-duty strategy

Not impairment testing, but for

Risk Identification & Risk Management

dignified

fast results all locations accurate

To improve Safety!

Conclusions for the Workplace

Completes the Drug Detection Window

Standard Drug Testing Protocol

Legal Due Diligence

Occupational, Health & Safety Human Rights Privacy

Corporate Drug & Alcohol Policy

Well Documented Well Communicated Consistently Applied **Contact Info**

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Thank you for your attention

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