

# Pilot licence and substance abuse: hair analysis or confession?

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**DRUID project:** how often are psychoactive substances found in drivers seriously injured or killed in road traffic accidents?

Range (seriously injured)

Range (killed)

**Alcohol**

14.1-30.2 %

15.6-38.9 %

Highest percentage of seriously injured:

Belgium

Highest percentage of killed:

Portugal

70 % BAC of > 1.2 g/L



**DRUID project:** who is the 'average person' found driving after taking psychoactive substances?

## **General driving**

Male drivers over 35

BAC values relatively low

Positive tests on weekday nights or weekends

## **Drivers involved in accidents**

Younger male drivers (25-34 years)

BAC level high



## How to assess the driver's fitness to hold a licence?

- Council Directive 91/439/EEC of 29 July 1991 on driving licences
- Implemented in Belgium in the Royal Decree 23 March 1998 concerning the driving licence

*'Driving licences shall not be issued to or renewed for applicants or drivers who are dependent on psychotropic substances or who are not dependent on such substances but regularly abuse them'.*



# Drivers license versus pilot license

- Theoretical examination
  - Practical examination
  - Verklaring op eer/  
déclaration sur l'honneur  
medical
- Theoretical examination
  - Practical examination
  - Periodically medical  
examination
  - Periodically practical  
evaluation

Security measure by  
prosecutor or judge

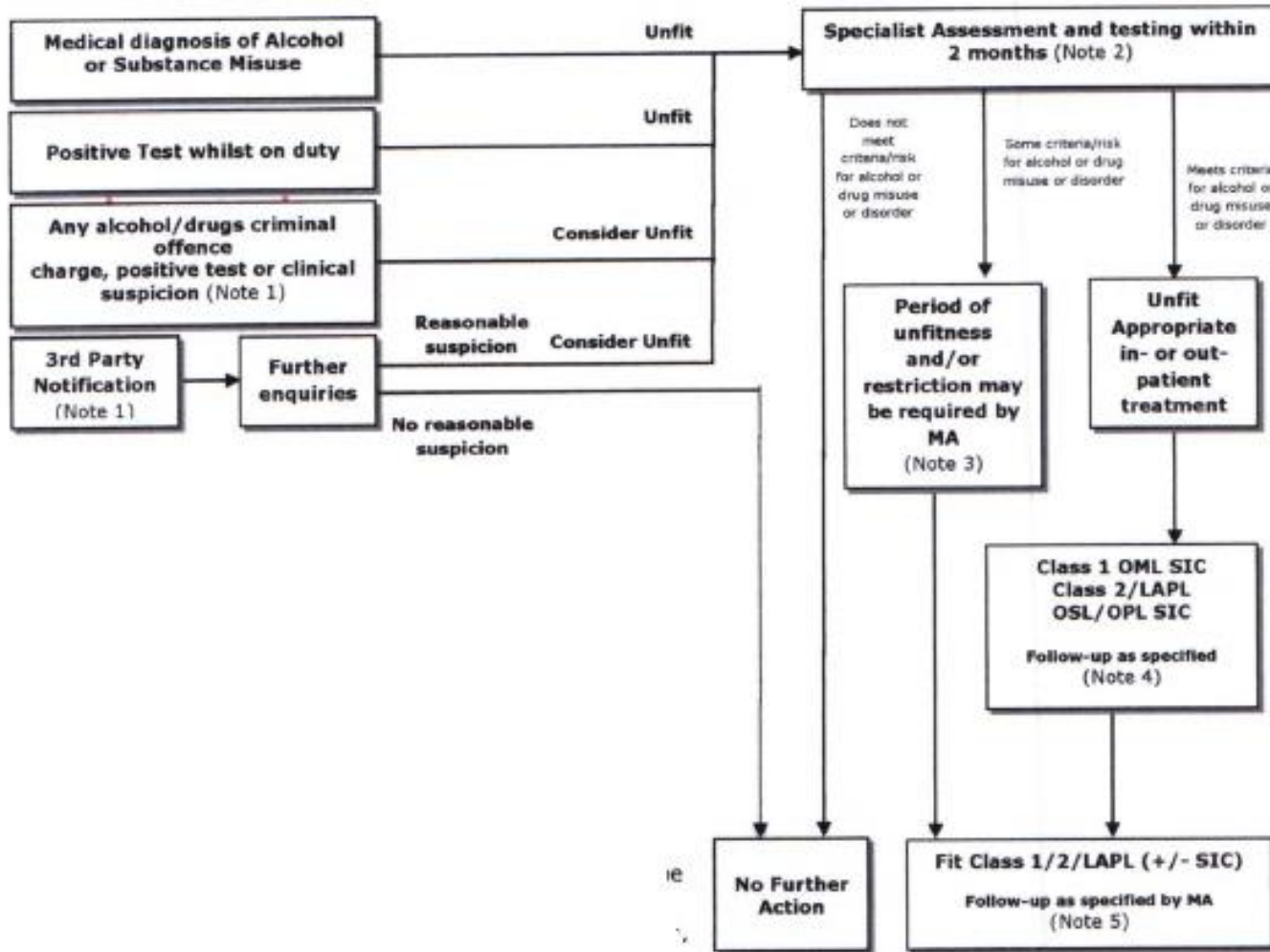


Voor het behalen van een rijbewijs type B of het aanvragen van een voorlopig rijbewijs dient een persoon overeenkomstig artikel 41, § 1, van het koninklijk besluit van 23 maart 1998 betreffende het rijbewijs een verklaring te ondertekenen waarin hij **op zijn woord van eer** bevestigt bij zijn weten niet te lijden aan een van de in bijlage 6, voorgeschreven voor de groep 1, genoemde lichaamsgebreken of aandoeningen. Deze verklaring omvat een gedeelte betreffende de algemene lichamelijke en psychische geschiktheid en een gedeelte betreffende het gezichtsvermogen.

L'article 41, § 1er, de l'arrêté royal du 23 mars 1998 relatif au permis de conduire dispose que « le candidat au permis de conduire valable pour la catégorie B signe sur la demande de permis de conduire, (ou sur la demande de permis de conduire provisoire), une **déclaration sur l'honneur** aux termes de laquelle il atteste qu'à sa connaissance, il n'est pas atteint d'un des défauts physiques ou d'une des affections mentionnés dans l'annexe 6, prévus pour le groupe 1. Cette déclaration comporte une partie relative à l'aptitude physique et psychique générale et une partie relative à la capacité visuelle



# Flowchart Dutch CAA PILOTS



## Easy Access Rules for Medical Requirements

### **MED.B.055 Mental Health**

(...)

(b) Drugs and alcohol screening shall form part of the initial class 1 aero-medical examination

(c) Applicants with a mental or behavioural disorder due to the misuse of alcohol or other psychoactive substances shall be assessed as unfit pending recovery and freedom from psychoactive substance use or misuse and subject to satisfactory psychiatric evaluation after successful treatment





# How to assess the driver's fitness to hold a licence?

Royal Decree 23 March 1998 concerning the driving licence

*'Applicants who were dependent on alcohol or drugs of abuse are fit to drive after a proved (complete) abstinence of at least six months'.*



## Easy Access Rules for Medical Requirements

### **AMC1 MED.B.055 Mental health**

(...)

(d) Psychoactive substance testing

(1) Drug tests should screen for opioids, cannabinoids, amphetamines, cocaine, hallucinogens and sedative hypnotics. Following a risk assessment performed by the competent authority on the target population, screening tests may include additional drugs.



## Easy Access Rules for Medical Requirements

### **AMC1 MED.B.055 Mental health**

(...)

(d) Psychoactive substance testing

(...)

(2) For renewal/revalidation, random psychoactive substance screening test may be performed based on the risk assessment by the competent authority on the target population. If random psychoactive substance screening test is considered, it should be performed and reported in accordance with the procedures developed by the competent authority.



# Sampling



How to monitor (or to prove) the abstinence (of at least 6 months) of suspected drinking drivers/pilots?

Clinical forensic medicine

- Annex 6 of the Royal Decree 23 March 1998 concerning the driving licence: **medical doctor** (not chosen by the applicant) **advises** after using following **tools**:
  - In-depth questioning (annex 6)
  - Full review of the (medical en criminal) records (medication)
  - Physical examination
  - Blood examination
  - Other toxicologic examinations (urine, nails, hair,..)



# ICADTS class medication

Description of category	Interpretation and practical use
<p><b>Category I:</b></p> <p><b>Presumed to be safe or unlikely to produce an effect</b></p>	<p>In various experimental circumstances negligible or no impairment of driving performance or performance related to driving is repeatedly demonstrated. Also for medicinal drugs that are presumed not to be dangerous based on their pharmacological profile, even though there are no experimental studies that support this presumption.</p> <p>For the most frequently used drugs in this category the effect has been assessed in over-the-road driving tests as equivalent to blood alcohol concentrations &lt; 0.5 g/l (&lt;0.05%).</p> <p><u>Advice for the patient:</u> Be careful not to drive before having read the warnings in the package insert.</p>
<p><b>Category II:</b></p> <p><b>Likely to produce minor or moderate adverse effects</b></p>	<p>Some impairment of driving performance or performance related to driving is seen in various experimental laboratory circumstances.</p> <p>Also for drugs that will not produce severely adverse effects, but because of a lack of sufficient experimental studies it can not be established if the effect is moderate, light or absent.</p> <p>For the most frequently used drugs in this category the effect has been assessed in over-the-road driving tests as equivalent to blood alcohol concentrations 0.5- 0.8 g/l (0.05-0.08%).</p> <p><u>Advice for the patient:</u> Do not drive without consulting a healthcare professional about the possible impairing effects.</p>
<p><b>Category III:</b></p> <p><b>Likely to produce severe effects or presumed to be potentially dangerous</b></p>	<p>In various experimental circumstances gross impairment of driving performance, or performance related to driving, is repeatedly seen.</p> <p>Also for drugs presumed to be potentially dangerous based upon their pharmacological profile, but there are not sufficient experimental studies to support this presumption.</p> <p>For the most frequently used drugs in this category the effect has been assessed in over-the-road driving tests as equivalent to blood alcohol concentrations &gt; 0.8 g/l (&gt;0.08%).</p> <p><u>Advice for the patient:</u> Do not drive when this drug is taken and consult a healthcare professional when to start driving again after evaluation of the treatment outcomes.</p>



## Monitoring by detection of parent drug or metabolites:

- Drugs of abuse: look for the parent product and his **metabolites**
- Alcohol: more complex: alcohol is not forbidden, deeper investigation, more important the range



# SUMMARY ETHANOL and DRUGS OF ABUSE





## Biomarkers ethanol

- **Indirect:** enzymes or proteins
  - Liver: release of enzymes out of hepatocytes due to toxic effect ethanol
  - Consequence of alcohol and other pathologies: secondary effects
  - No correlation with intake/amount of ethanol, duration, ...
- **Direct:** ethanol or metabolites
  - Ethanol itself in one or another way



- Blood – Biochemical markers cover only a limited period of time
- Gamma GT (gamma-glutamyl-transferase)
  - Hepatic enzyme
  - Aberrant results after some **weeks** excessive use of alcohol
  - In the Western world middle-aged men 75 % ethanol etiology
  - Half life time 2-3w → normalisation after five weeks
    - !! Liver disease can give false-positive results
  - No controle of abstinence, identification of high risk alcoholism
  - Low sensitivity (50 %) 1 on 2 has no positive test after drinking
  - 30 % of the people in abstinence still high values



- Blood – Biochemical markers cover only a limited period of time
  - MCV (mean corpuscular volume) 80-100 fL:  $10^{-15}$ 
    - Aberrant after some **months**, not sensitive (aspecific my clients 1 à 2 %)
  - ALT (alanin-aminotransferase)
    - Aberrant when damage of liver cells
    - 80 to 90 % of chronic alcoholics don't have increased aminotransferases
    - Many drugs cause increases in ALT/SGPT
    - Half-life 16 days!
    - Sensitivity: 23-50 %
    - Obesity: 22 % of abnormal values



- Blood – Biochemical markers cover only a limited period of time
  - AST (aspartat-aminotransferase) SGOT
    - Aberrant when damage of liver cells
    - 80 to 90 % of chronic alcoholics don't have increased aminotransferases
    - Many drugs cause increases in AST/SGOT
    - Obesity!





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## Review

# Analytical and diagnostic aspects of carbohydrate deficient transferrin (CDT): A critical review over years 2007–2017

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## ABSTRACT

The need for investigating alcohol abuse by means of objective tools is worldwide accepted. Among the currently available biomarkers of chronic alcohol abuse, carbohydrate-deficient transferrin (CDT) is one of the most used indicator, mainly because of its high specificity. However, some CDT analytical and interpretation aspects are still under discussion, as witnessed by numerous research papers and reviews. The present article presents a critical review of the literature on CDT appeared in the period from 2007 to 2017 (included). The article is organized in the following sections: (1) introduction, (2) pre-analytical aspects (3) analytical aspects (4) diagnostic aspects (5) concluding remarks. As many as 139 papers appeared in the international literature and retrieved by the search engines PubMed, Web of Science and Scopus are quoted.

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- Blood – Biochemical markers
  - CDT (carbohydrate-deficient transferrin)
    - Introduced in Belgium in **2008**
    - Cut-off:  $> 1,6 \%$   $\rightarrow$  alcohol abuse (or 1.8 or 2.2 % discussion!)
    - Aberrant if for more than **2 weeks  $> 60\text{g}$  ethanol daily**
      - (bottle of wine 75 gram, beer 33 cl 13 gram)
    - Half life time 14-17 days  $\rightarrow$  normalisation in 4 to 6 weeks



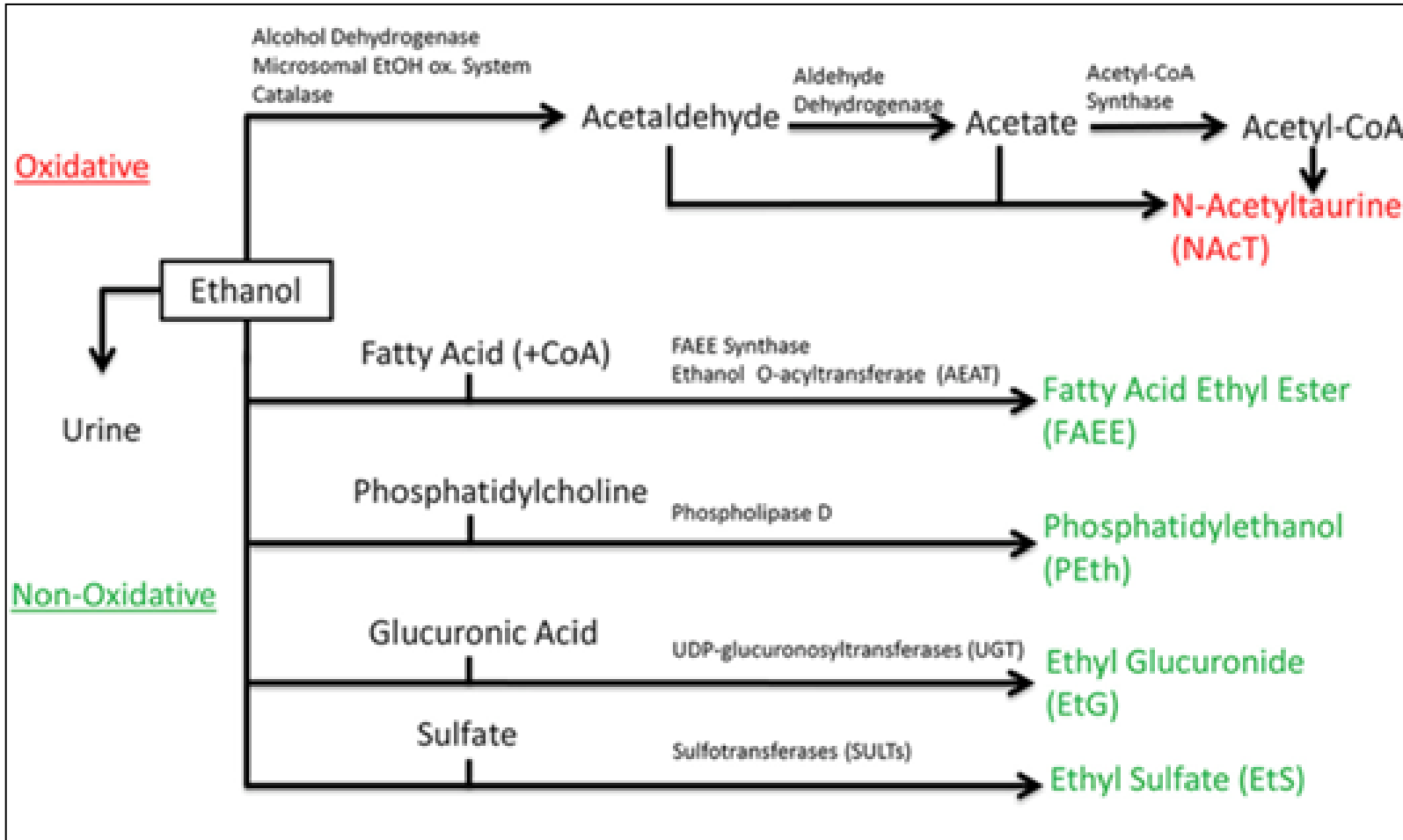
- Blood – Biochemical markers
  - CDT (carbohydrate-deficient transferrin)
    - Low sensitivity (test positive when drinking alcohol)
    - High specificity
    - Low cost
    - Normalisation in 2 tot 3 weeks



- **Urine** – Biochemical markers cover only a limited period of time
  - Ethanol
    - Good correlation with blood
    - Mean peak after 1.5 hour of the start of drinking
    - Detectable 6.5 hours after the consumption of alcohol

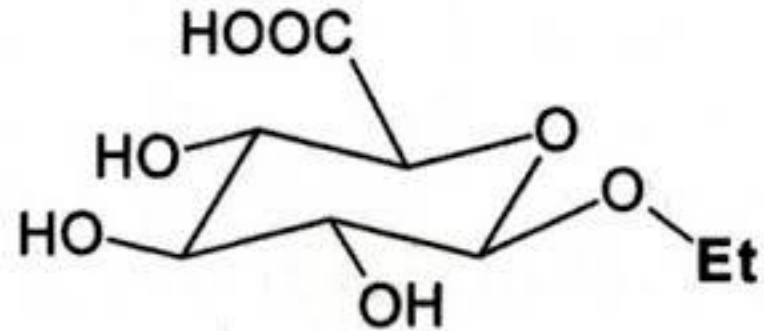




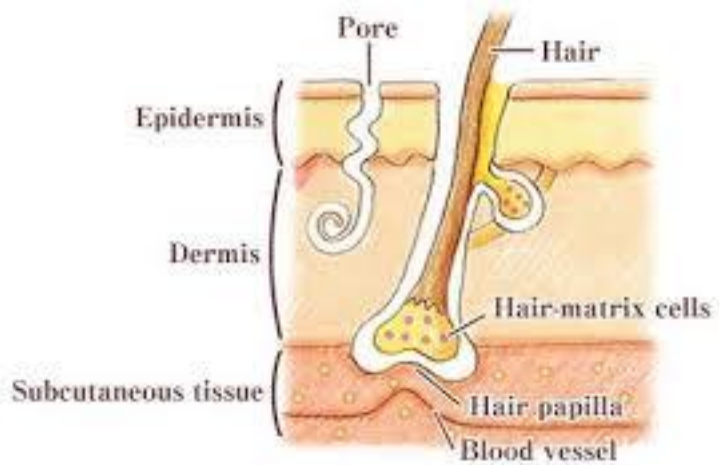
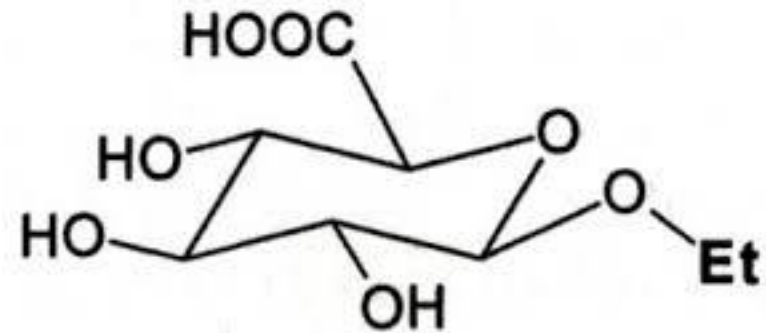


# Ethylglucuronide (EtG)

- Conjugation of ethanol and glucuronic acid
- Not useful on itself
- Production in the body



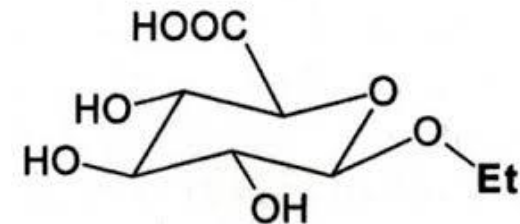
# Ethylglucuronide (EtG)



- Hair:

- EtG (ethyl glucuronide)

- Direct alcohol marker: 0,02-0,06% of ethyl alcohol is metabolised to EtG (in the liver)
- Produced (almost) only after drinking
- Long detection window: scalp hair grows at an average rate of 1 cm/month
- It will not show a solitary episode of modest alcohol consumption
- Negative EtG findings are not proof of abstinence
- Positive results can be taken as confirmation of alcohol consumption
- Hair:
  - Scalp hair
  - Chest hair (accumulation)
  - Arms and legs
  - Pubis
  - Armpit

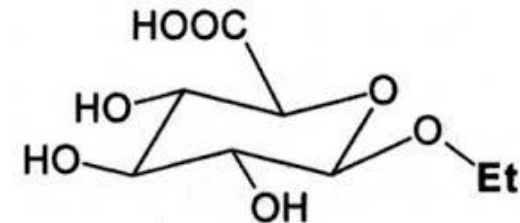




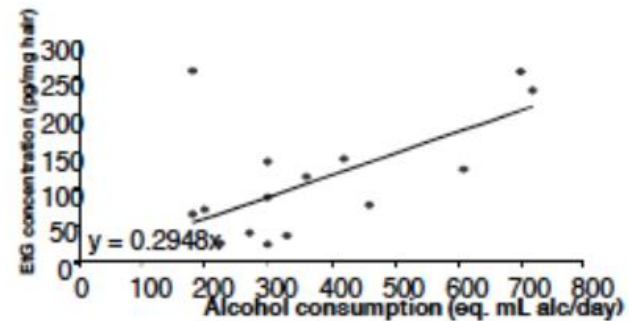
- Hair:

- EtG (ethyl glucuronide)

- Segment of 3 cm
- Cut-offs (Society of Hair Testing, [www.soht.org](http://www.soht.org))
  - <5-7 pg/mg: no regular consumption of alcohol, abstinence cannot be disproved, occasional alcohol consumption is possible.
  - 7-30 pg/mg: “social drinking” (20-40g alcohol/day); abstinence is clearly disproved.
  - > 30 pg/mg hair: excessive and/or regular alcohol consumption/abuse (> 60g alcohol/day); abstinence is clearly disproved.



## Correlation of amount of alcohol intake vs HETG



Patients In alcohol withdrawal programme (n = 15)

Significant linear correlation between HETG In hair and amount of alcohol intake

*Appenzeller et al, Forensic Sci Int (2007)*



- Hair:
  - EtG (ethylglucuronide)

**False positive?**

~~External ethanol?~~

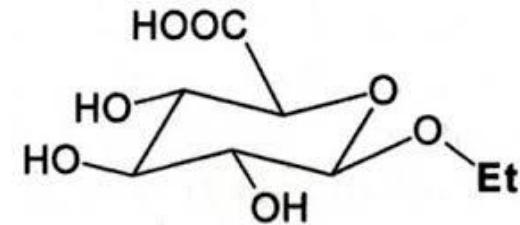
~~Hair lotion?~~

**False negative?**

Bleaching

Swimming

UV







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## Forensic Science International

journal homepage: [www.elsevier.com/locate/forsciint](http://www.elsevier.com/locate/forsciint)



# The influence of ethanol containing cosmetics on ethyl glucuronide concentration in hair<sup>☆</sup>

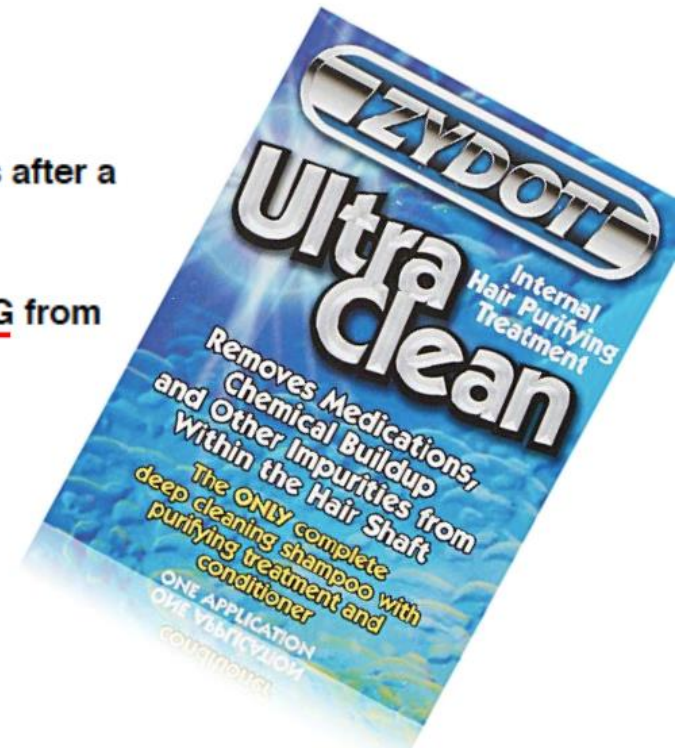
Liliane Martins Ferreira, Tina Binz, Michel Yegles<sup>\*</sup>

*Laboratoire National de Santé – Toxicologie, Université du Luxembourg, Campus Limpertsberg, 162a, Av. De la Faïencerie, L-1511 Luxembourg, Luxembourg*



## Effect of cleansing shampoo on EtG content in hair

- 25 real case hair samples were analyzed
- 4 cleansing shampoos were tested
- EtG concentrations in hair did not show any significant differences after a single application of the various cleansing shampoos.
- These results demonstrate that these shampoos do not remove EtG from hair after a single application.



*Binz TM, Baumgartner MR, Kraemer T, Forensic Sci Int. 2014;244:20-4*



- Hair:

- EtG (ethylglucuronide)

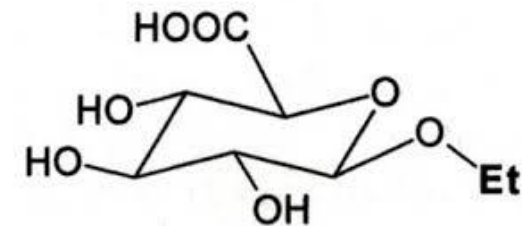
- African curly hair:

- Not a lot of hair
- Slow growing

- No hair: *Syndrome of the white brain skull*

- Nails

- Finger: 3 mm a month
- Toe: 1 mm a month: thus more accumulation



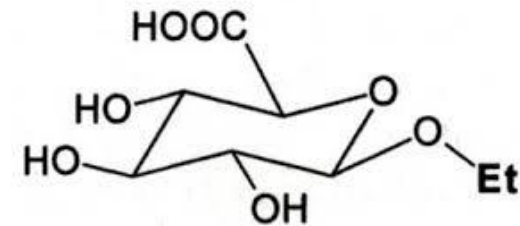
**B. Liniger** et al., “Abstinence monitoring of suspected drinking drivers: ethyl glucuronide in hair versus CDT”, *Traffic Injury Prevention* **2010**,11:123-126.

- EtG is a selective marker with a higher sensitivity than CDT in the evaluation of chronic alcohol abuse
- EtG in hair vs. CDT for the evaluation of fitness to drive:
  - EtG in 55% of all hair samples
  - Normal CDT value → **82%** positive EtG in hair
  - Elevated CDT → 39 % negative ETG in hair.
  - EtG analysis in hair is an useful test : monitoring during several months
  - EtG analysis should be added as a routine examination



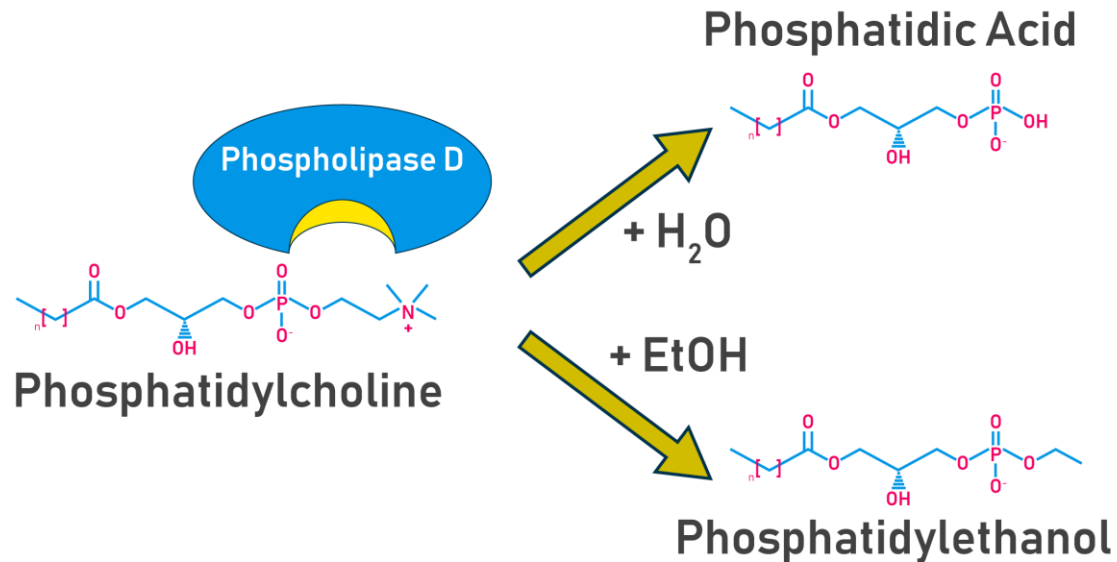
# Steps of hair analysis and air traffic medicine

- Assignment of investigation
  - Case history, purpose
- Sampling (documentation)
- Segmentation
- Decontamination by washing with water and acetone
- Cutting to small piece or grinding
- Extraction of hair matrix
- Clean-up of hair extract
- Qualitative and quantitative analysis
  - GS-MS/MS: gas chromatography- tandem mass spectrometry
  - Limit of quantification: 0.2 pg/mg hair
- Interpretation of results (also used candidates of liver transplantation)



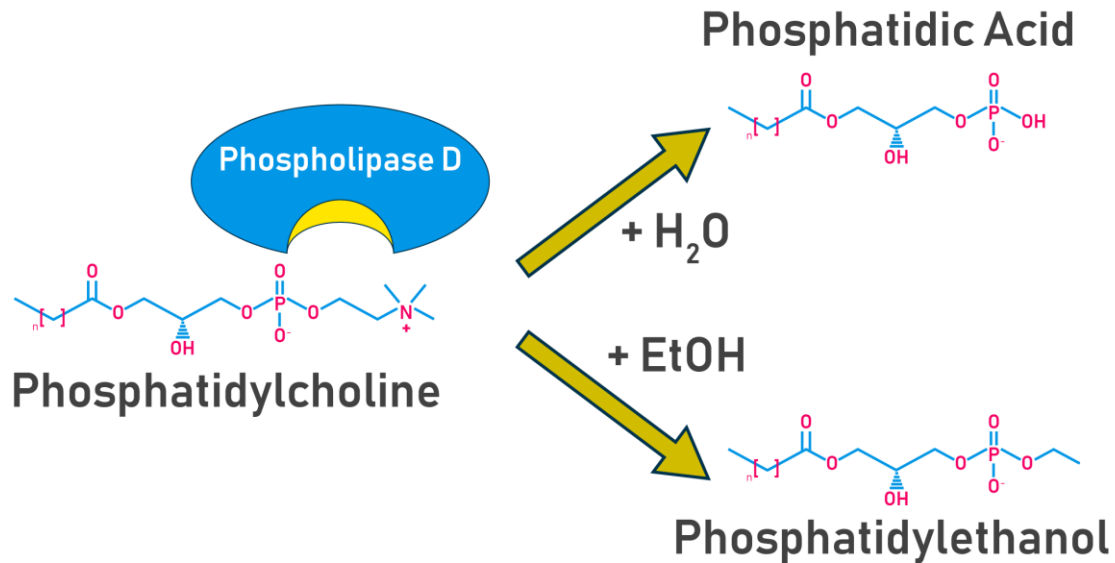
# Phosphatidylethanol (PEth)

- Hepatic enzyme working on lecithine (phosphatidylcholine) whereby in phosphatidylcholine aminochole is replaced by ethanol

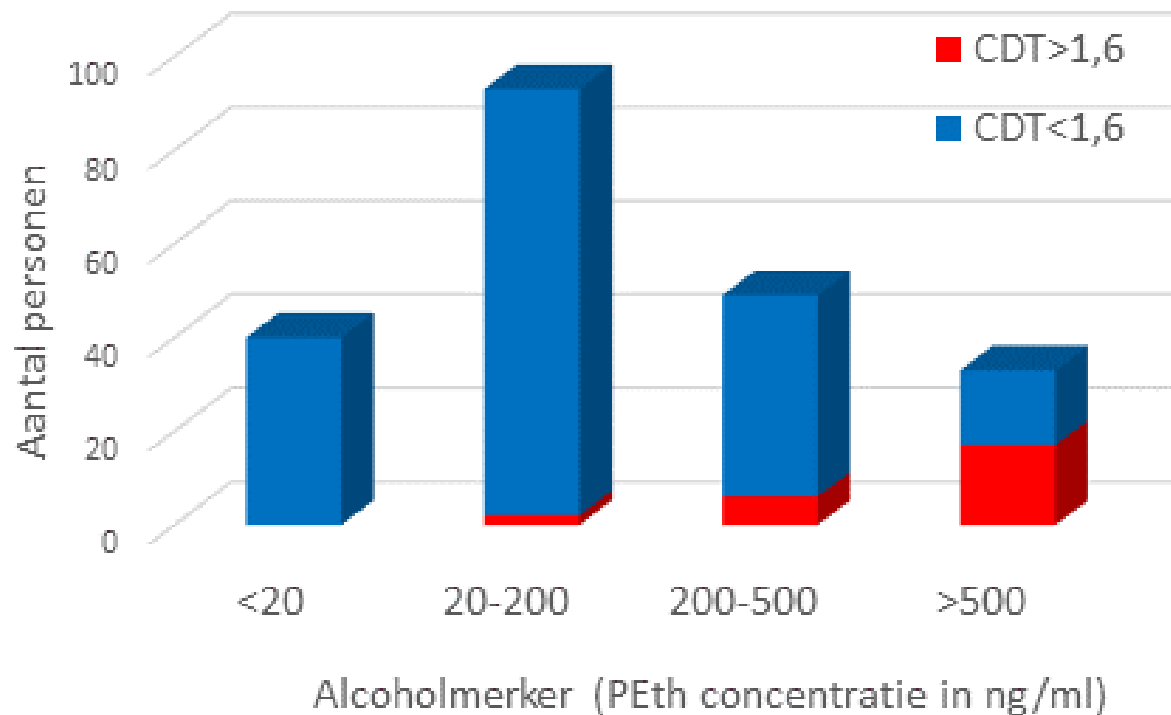


# Phosphatidylethanol (PEth)

- Whole blood or dry blood spot (DBS)?

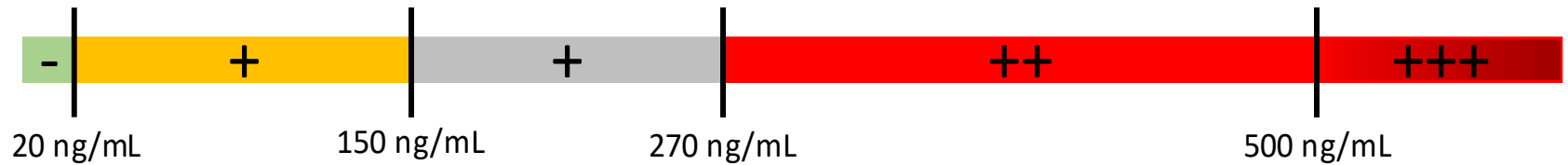


## Vergelijking huidige merker (CDT) vs alcoholmerker PEth ihkv teruggave rijbewijs





# From teetotaller to chronic abuse of ethanol



< LLoQ (10 ng/mL)	compatibel met geheelonthouding	150 - 270 ng/mL	sociale drinker, belangrijker alcohol gebruik
10 - 20 ng/mL	compatibel met geheelonthouding of beperkt alcoholgebruik	270 - 500 ng/mL	suggestief voor overmatig alcoholgebruik
20 - 150 ng/mL	sociale drinker	> 500 ng/mL	overmatig alcoholgebruik



- Slow metabolism (3 tot 4 days)
- > 200 ng/mL misuse
- Window: 4 to 6 weeks (TYTGAT 2 to 3 weeks in chronic drinkers)
- Sensitivity 86 %
- Specificity 100 % (no false positive results!)

Natalie Kummer  
2016






*Alternative sampling strategies to monitor alcohol consumption in case of driver's licence regranting*

Natalie Kummer 2016



# Blood Phosphatidylethanol (PEth) Concentrations following Intensive Use of an Alcohol-based Hand Sanitizer

Gary M. Reisfield <sup>1,\*</sup>, Scott A. Teitelbaum<sup>2</sup>, Joseph T. Jones <sup>3</sup>, Dana Mason<sup>2</sup>, Max Bleiweis<sup>2</sup> and Ben Lewis <sup>2</sup>

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- 296 ng/mL
- gestegen gamma-GT

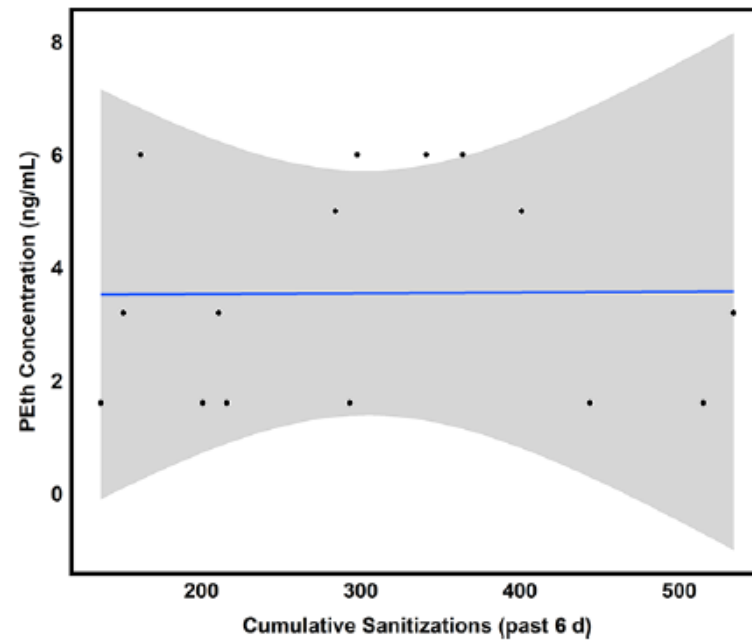
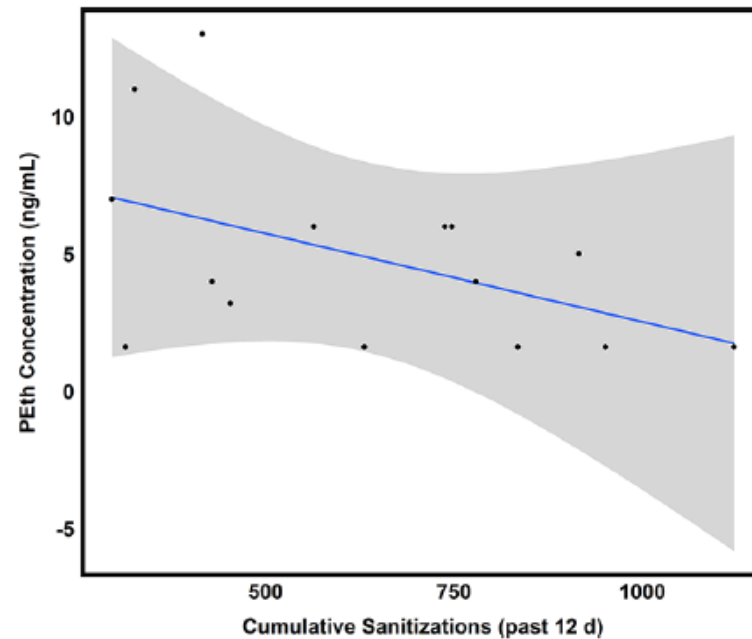


Figure 3. PEth Concentrations by (6 day) Cumulative Sanitizations.



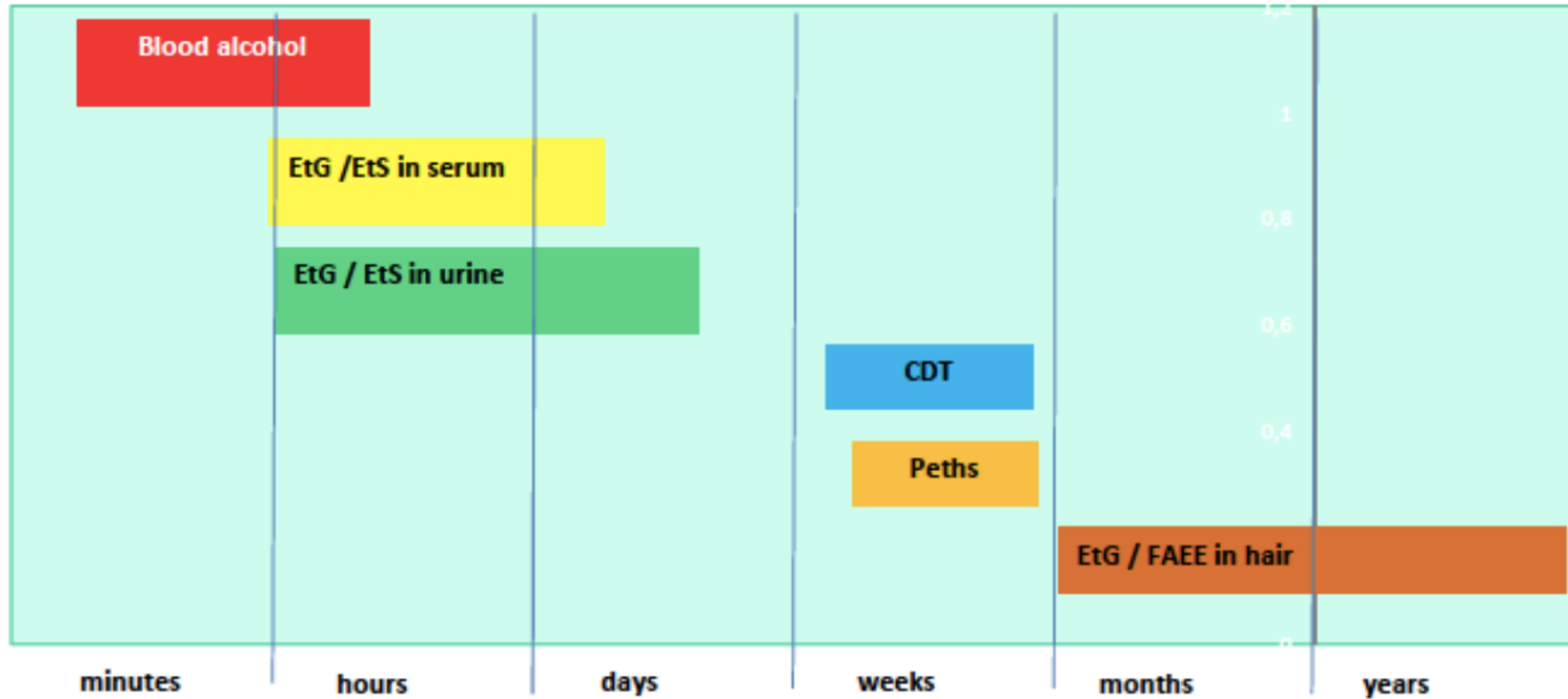
TABEL 1

*Kenmerken van de meest courant gebruikte biomerkers voor het opsporen van (chronisch) overmatig alcoholgebruik (3, 5, 15, 21, 22).*

Merker	Matrix	Tijdsvenster	Sensitiviteit	Specificiteit
ASAT	serum	3-4 weken	25-68%	47-80%
ALAT	serum	3-4 weken	15-40%	50-92%
GGT	serum	3-4 weken	37-95%	18-93%
MCV	serum	3-5 maanden	48-50%	52-90%
CDT	serum	2-3 weken	26-90%	70-92%
EtG	haar	3-6 maanden	92-96%	87-99%
EtG	nagels	min. 3 maanden*	33-100%	64-100%



# DETECTION WINDOW



**Comparison of different toxicological matrices (urine, blood, hair) to  
determine fitness to drive.**

Dr. D'HONDT Diona

Promotor: prof. Dr. JACOBS W.

Copromotoren: prof. NEELS H. en dr. WOSTYN L.

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**Academiejaar 2017-2018**



# Results – Toxicologic matrices

- Blood

	reference	normal range %	elevated %
<b>MCV (n=73)</b>	82,4 – 97,3	96	4
<b>ASAT (n=88)</b>	15-59 U/l	86.4	13.6
<b>ALAT (n=88)</b>	<49 U/l	77.3	22.7
<b>γGT (n=89)</b>	12-58 U/l	66.3	47.4
<b>CDT (n=89)</b>	<1,6	61	35.3





# Results – Self-reporting

- Self-reporting (n=181)
  - Alcohol
    - Not to drink at all or sporadic 26,7 %
    - social drinker 58 %
    - heavy drinker ( $\geq 60$  gram/day) 16 %



# Results – Toxicologic matrices

- Hair (n=181):

9 (10.6 %) not enough hair

**<7 pg/mg % (n)    7-30 pg/mg % (n)    >30 pg/mg % (n)**

**12.9 (11)**

**16.6 (8)**

**67.1 (57)**



# Fitness to drive/fly?

- Alcohol (self-reporting data) 83.5 %
- Urine ethanol (normal) 81.3 %
- CDT 35.3 %
- EtG analysis in hair > 30 pg/mg 53.8 %

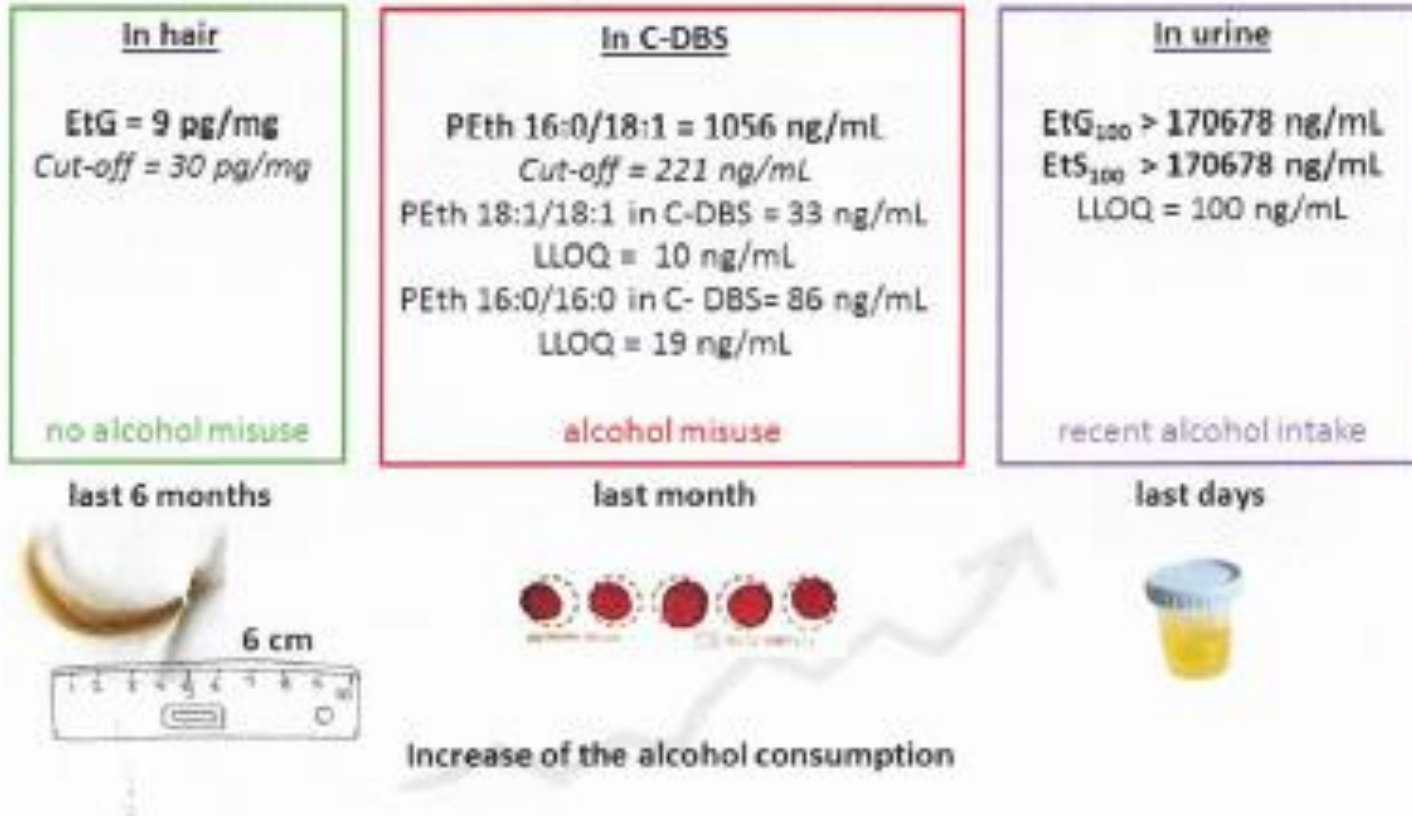


# Conclusion Clinical forensic medicine

- More 64 % should declared fit to drive with only CDT testing, only 47 % with hair analysis

Analysis of hair (EtG as biomarker which provides objective measures of abstinence) does have an added value to evaluate the fitness to drive





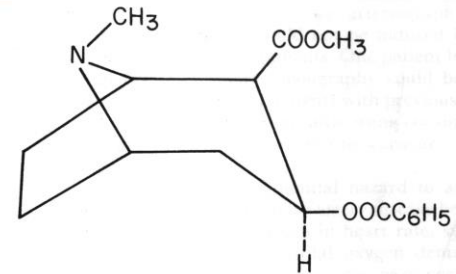
© 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100



# DRUGS OF ABUSE



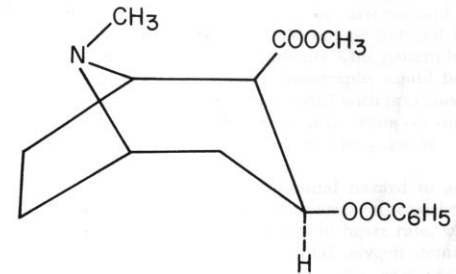
# cocaïne



- 500 Peru-indianen (Inca)
- 1884 Sigmund FREUD
- 1885 Robert L. STEVENSON *Dr. Jekyll and Mr. HYDE*
- 1886 John Styth PEMBERTON elixir Coca-Cola
- 1887 Sir Conan DOYLE *Sherlock HOLMES*
- HALSTED locoregional anesthesia



# Cocaine: acuut coronair syndroom



- behandeling van cocaine geassocieerde myocardische
- n **GEEN  $\beta$ -blokkers**
- n **Potential of cocaine induced coronary vasoconstriction by  $\beta$  adrenergic blockade. Lange et al., *Ann Int Med* 1990;112:897-903.**



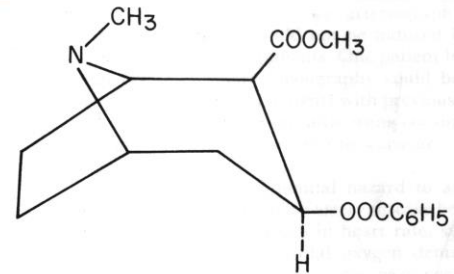


# cocaïne

- cardiovasculaire complicaties

- thoracale pijn op de spoedopname in de USA:

- 1/5 te wijten aan cocaïne
- 8% AMI
- 48% tussen 30-40j (gemiddelde leeftijd 34j)
- geen verschil tussen 'first-time users' en habituele gebruikers.
- niet dosis gebonden
- niet afhankelijk van de route van opname



Mephedrone (4-MMC of 4-methylmethcathinone)

De toxiciteit van 4-MMC (nieuwe psycho-actieve stof) uit zich vooral in sympathicomimetische effecten, zoals versnelde hartslag, hypertensie en stuipen.

Bij zeer hoge doses

kunnen agressiviteit, hallucinaties en psychose optreden.

Personen met hartproblemen en/of psychiatrische -of neurologische klachten kunnen er gevoeliger voor zijn.



# GHB liquid XTC

- gamma-hydroxy-butyraat (gamma-OH)
- metabolite of GABA (CZS): endogenous production (detection!)
- *liquid X(TC), easy lay & date rape drug*
- transparant liquid or white powder
  - ('hotel shampoo bottles')
- neurotransmitter
  - CNS: basal ganglia
- regulator of the energy metabolism bodybuilders



# XTC

methyleendioxyamfetamine

methyleendioxymethylamfetamine

methyleendioxyethylamfetamine

methoxymethyleendioxyamfetamine

paramethoxymethamfetamine

paramethoxyamfetamine

MDA

MDMA (Adam)

MDEA (Eva)

MMDA

PMMA

PMA



- Grote dosis (200 mg)
  - verhoogde polsfrequentie, hyperthermie
  - visuele hallucinaties
  - verhoogde bloeddruk
  - wijde pupillen
  - tandenknarsen
  - profuus zweten
  - eetlustverlies
  - **acuut coronair syndroom**
  - **psychotische episode**



# XTC: acute bijwerkingen

- ritmestoornissen
- VF
  - plotse dood
- myocardinfarct
- hyperthermie
- dehydratatie
- rhabdomyolyse, acuut nierfalen, leverfalen
- psychische uitputting
- hallucinaties, “flash back”
- (sub)acuut leverfalen
- acute dystonische reacties
  - trismus
  - opisthotonus
- DIC
- cerebrale bloeding





# cannabis

Cannabis Sativa Indica

India, Marokko

$\Delta^9$ -Tetrahydrocannabinol: actief bestanddeel (THC)

Hasj (6 tot 10 %)

- harsextract

Marihuana (1 tot 5 %)

- kruid (joint)

Flying impairment by urine screening?

Analysis!





- euphoric
- 2 to 4 hours
- boulimie
- loss of concentration
- damage short memory
- *amotivational syndrome*
- **psychotic episodes**



# Cannabis en CBD-olie: legale cannabis?

<https://www.health.belgium.be/fr/news/le-cbd-comme-aliment-interdit-en-europe>

- CBD is een "nieuw voedingsmiddel" dat nog niet is toegelaten. Het gebruik ervan in menselijke voeding is daarom nog steeds verboden.
- Le CBD est un 'nouvel aliment' (dénommé en anglais 'novel food') qui n'a jusqu'à présent pas été autorisé. Son utilisation dans l'alimentation humaine reste donc interdite.



# Cannabis en CBD-olie: legale cannabis?

<https://www.health.belgium.be/fr/news/le-cbd-comme-aliment-interdit-en-europe>

- Het in de handel brengen van producten die CBD bevatten en bestemd zijn voor inname (ongeacht of dit gebruik al dan niet duidelijk op de verpakking is vermeld), is derhalve illegaal.
- La mise sur le marché de produits contenant du CBD destinés à être ingérés (que cet usage soit clairement mentionné ou non sur l'emballage) est donc illégale.



## Does CBD affect driving performance and can it counteract the effects of THC?

A recent on-road driving study showed CBD-dominant cannabis did not produce any driving impairment compared to placebo,<sup>13</sup> although at least one study suggested CBD might be associated with impairment.<sup>14</sup> Further, it seems that when consumed with alcohol, CBD can increase impairment and more research on this topic is needed. Cannabis containing mainly THC or a combination of THC and CBD, did cause driving impairment for up to four hours after inhalation. From this and another study,<sup>15</sup> it can be concluded that CBD *when consumed alone*, does not impair driving performance nor does CBD reduce the impairing effects of THC.



## Do novel synthetic cannabinoids (SCs) pose a risk to traffic safety?

*Yes, novel SCs potentially pose a serious traffic safety risk.*

While some medical cannabinoids have been synthetically manufactured for decades, novel SCs represent a large group of new psychoactive substances with 209 identified in the European Union (EU) over the 13 years between 1 January 2008 and 31 December 2020, including 11 identified for the first time in 2020.<sup>16</sup> SCs are often sold as herbal smoking blends with names such as Spice, K2 and Kronic. SCs bind to the same receptors as tetrahydrocannabinol (THC) but often have far higher potency and efficacy.<sup>17</sup> Controlled administration laboratory studies using low doses of one of the earliest SCs (JWH-018) demonstrated acute impairment of motor coordination, attention, response speed, and memory.<sup>18,19</sup> It is expected that effects on psychomotor performance in consumers who use large amounts or overdose on SCs pose an even greater road safety risk than demonstrated in these studies.



# MULTI-DRUG SCREEN Multi 10E NAL von minden in de urine

Door middel van een Drug-Screen-Multi Dip Test 10 E NAL von minden wordt onmiddellijk overgegaan tot het opsporen in de urine van stoffen bedoeld door de wetgeving op de verdovende middelen zoals cannabis, opiumhoudende stoffen en morfinomimetische derivaten, cocaïne, psychostimulerende en/of anorexigene amines.

Au moyen d'un Drug-Screen-Multi Dip Test 10 E NAL von minden, nous procédons immédiatement à la détection dans l'urine des substances visées par la législation sur les stupéfiants telles que le cannabis, les substances contenant de l'opium et les dérivés morphinomimétiques, la cocaïne, les psychostimulants et/ ou des amines anorexigènes.



# MULTI-DRUG SCREEN Multi 10E NAL von minden in de urine

De Drug-Screen-Multi Dip Test 10 E NAL von minden is een oriënterende immunochemische test voor de kwalitatieve detectie en opsporing van 10 verdovende middelen: amfetamines, barbituraten, benzodiazepines, cocaïne, MDMA/XTC, metamfetamine, morfine/opiaten, methadone, tricyclische antidepressiva en tetrahydrocannabinol.

Le Drug-Screen-Multi Dip Test 10 E NAL von minden est un test immunochimique exploratoire pour la détection qualitative et la détection de 10 stupéfiants : amphétamines, barbituriques, benzodiazépines, cocaïne, MDMA/XTC, méthamphétamine, morphine/opiacés, méthadone, antidépresseurs tricycliques et le tétrahydrocannabinol.



# Urine-screen: immunochemical: confirmation!!

- Amfetamines 1000 ng/mL
- Barbituraten 300 ng/mL
- Benzodiazepines 300 ng/mL
- Cocaine 300 ng/mL
- MDMA/XTC 500 ng/mL
- Metamfetamine 1000 ng/mL
- Morfine/opiaten 300 ng/mL
- Methadone 300 ng/mL
- Tricyclischeantidepressiva 1000 ng/mL
- Tetrahydrocannabinol 50 ng/mL





# Drugs of abuse in urine

**TABLE 2.** Typical and Maximal Detection Times of Drugs of Abuse in Urine

Drug	Dose (mg Unless Noted Otherwise)/Route	Analyte	Cutoff (ng/mL)	Detection Time (hours)	Reference	Maximal Detection Time (days)
Amphetamine						9
Methamphetamine	10/PO	Methamphetamine	2.5	87 ± 51	14	6
MDMA	100/PO	MDMA	20	48	16	
Cannabis	1.75%	THCCOOH	15	34	23	95
	3.50%/SM	THCCOOH	15	87		
Cocaine	100/IN	Benzoylcegonine	1000	48-72	34	22
LSD	0.28/PO	LSD	0.2	36	42	4
		2-Oxo-3OH-LSD	0.2	96		
Heroin	10-15 IV/SM	Morphine		11-54	47	11.3
GHB	100 mg/kg PO	GHB	10000	12	53	

PO, oral; SM, smoked; IN, intranasal; IV, intravenous.



# Urine-screen: immunochemisch: confirmation!

- De urinelozing gebeurt onder toezicht in een door ons overhandigd recipiënt, in een toilet met de deur half-open. Het spoelwater in het toilet is van een kleur voorzien.
- De gecollecteerde urine had de lichaamstemperatuur.
- De urine was macroscopisch niet verdund.
- Creatinine-test (stick NAL von minden) met teststrookje moet minimum 100 mg/dl bedragen, wat wijst op (niet intentionele) niet gedilueerde urine.
- La miction a lieu sous surveillance dans un récipient remis par nos soins, dans des toilettes dont la porte est entrouverte.
- L'eau de chasse dans les toilettes est colorée. L'urine recueillie avait la température du corps.
- L'urine n'était macroscopiquement pas diluée.
- Le test de créatinine (stick NAL von minden) avec bandelette de test doit être d'au moins 100 mg/dl, indiquant une urine non diluée (non intentionnelle).



Het haaronderzoek wordt uitgevoerd met ultrahogedruk vloeistofchromatografie, gekoppeld aan hoge-resolutiemassaspectrometrie (UHPLC-HR-MS). Het haar wordt gewassen met methanol, verpulverd met een kogeltrilmolen en 10 mg wordt, na toevoeging van gedeutereerde interne standaarden, overnacht geïncubeerd met een mengsel van methanol, acetonitril en ammonium formaat buffer, waarna het na centrifugatie ingespoten wordt in de UHPLC-HR-MS.

L'examen des cheveux est réalisé par chromatographie liquide ultra-haute performance couplée à la spectrométrie de masse haute résolution (UHPLC-HR-MS). Les cheveux sont lavés avec du méthanol, pulvérisés avec un broyeur à billes vibrant et 10 mg, après addition d'étalons internes deutérés, sont incubés pendant une nuit avec un mélange de méthanol, d'acétonitrile et de formiate d'ammonium, après quoi ils sont injectés dans l'UHPLC-HR- SM après centrifugation. .



## BEPROEVINGSVERSLAG

### 1. Analysestaal

Haar aanwezig in een dichtgevouwen stuk aluminiumfolie, verpakt in een gesloten gripzakje.

Naam donor: \*]

Kleur: bruin

Lengte: 1 cm

### 2. Bepaling van verdovende middelen en psychotrope stoffen door middel van vloeistofchromatografie met massaspectrometer

De analyse werd uitgevoerd door

De analyse werd uitgevoerd op 1 segment (0-1 cm)

### 3. Resultaat

Doelverbinding	Resultaat (ng/mg)	Kwantisatielimiet (LOQ; ng/mg)	Cut-off* (ng/mg)
<b>cocaïne groep</b>			
anhydroecgonine methylester	niet gedetecteerd	0,05	
benzoyllecgonine	niet gedetecteerd	0,05	
cocaethyleen	niet gedetecteerd	0,05	
cocaïne <sup>(1)</sup>	niet gedetecteerd	0,05	0,50
norcocaïne	niet gedetecteerd	0,005	



Doelverbinding	Resultaat (ng/mg)	Kwantisatielimiet (LOQ; ng/mg)	Cut-off* (ng/mg)
<b>amfetamine groep</b>			
amfetamine	niet gedetecteerd	0,05	0,20
MBDB	niet gedetecteerd	0,05	0,20
MDA	niet gedetecteerd	0,05	0,20
MDEA	niet gedetecteerd	0,05	0,20
MDMA	niet gedetecteerd	0,05	0,20
metamfetamine	niet gedetecteerd	0,05	0,20
<b>cannabinoïden</b>			
cannabidiol (CBD)	niet gedetecteerd	0,05	0,05
cannabinol (CBN)	niet gedetecteerd	0,05	
Tetrahydrocannabinol (THC) <sup>(2)</sup>	niet gedetecteerd	0,05	0,05
THC-COOH	0,0006	0,0005	0,0002
<b>opiaten groep</b>			
6-monoacetylmorfine	niet gedetecteerd	0,05	0,20
codeïne	niet gedetecteerd	0,05	0,20
dihydrocodeïne	niet gedetecteerd	0,05	0,20
heroïne	niet gedetecteerd	0,05	0,20
morfine	niet gedetecteerd	0,05	0,20
oxycodone	niet gedetecteerd	0,05	0,20



TAKE HOME MESSAGE: CDT, Peth and HAIR!

# Any questions?

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Indirizzo (comune, provincia, via e numero) _____ Stato _____ N. Tel. o E-mail _____ Patente N. _____ Categ. (A, B, ...) _____ valida fino al _____	<p style="text-align: center;">← indicare il numero di caselle barrate con una croce →</p> <p style="font-size: small;">Il presente documento non costituisce un'ammissione di responsabilità bensì una mera rilevazione dell'identità delle persone e dei fatti, per una rapida definizione.</p> <p style="text-align: center;"><b>13. grafico dell'incidente al momento dell'urto</b></p> <p style="font-size: x-small;">Indicare: 1) il tracciato delle strade; 2) la direzione di marcia di A e B; 3) la loro posizione al momento dell'urto; 4) i segnali stradali; 5) i nomi delle strade</p> <div style="text-align: center;"> </div>	<p style="text-align: right;"><b>WWW.COSMONEON.IT</b></p> Stato _____ N. Tel. o E-mail _____ Patente N. _____ Categ. (A, B, ...) _____ valida fino al _____
<p><b>10. indicare con una freccia (→) il punto d'urto iniziale del veicolo A</b></p> <div style="text-align: center;"> </div> <p><b>11. danni visibili al veicolo A</b></p>	<p><b>15. firma dei conducenti</b></p> <p>A _____ B _____</p>	<p><b>10. indicare il punto del veicolo</b></p> <p><b>14. osservazioni</b></p>
<p><small>* In caso di lesioni o di danni materiali a cose diverse dai veicoli A e B indicare, sulla denuncia a tergo, l'identità e l'indirizzo del denunciante.</small></p> <p><small>La denuncia non deve essere modificata dopo la firma e la separazione degli esemplari.</small></p> <p style="text-align: right;"><small>Vedere osservazioni della</small></p>		



# FLAKKA

- Euforie
- Hallucinaties
- Agitatie
- Tremor/stuipen
- Hypertensie
- Tachycardie
- Mydriase
- Zweeten





According to the federal police:

- Increased reports of Flakka
- Uncertain if alpha-PVP, alpha-PHP or alpha-PHiP (samples to be analysed)
- Also goes by the name 'gravel'
- Price increased from € 2-3/g to € 14-15/g

- Associated with polydrug use and experienced users
- Thus far no confirmed involvement in fatal intoxications

