

*Drug Testing  
is the  
Technology of Recovery*



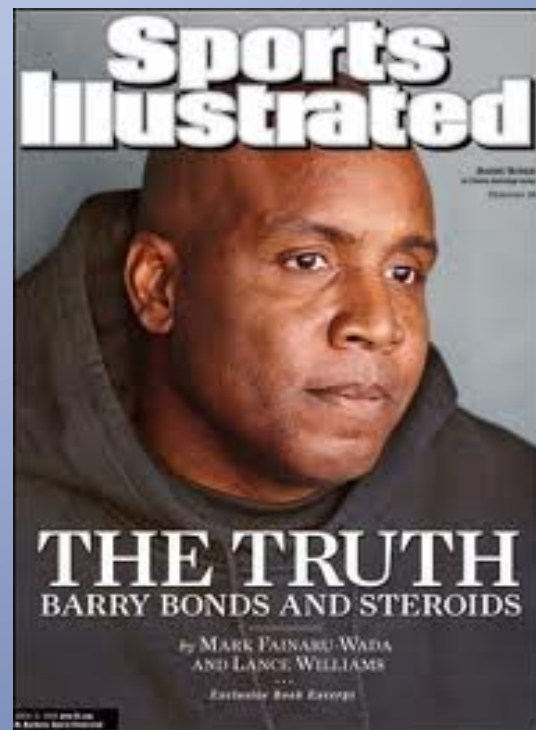
National Council of State Boards of Nursing  
June 14, 2017

# EDUCATIONAL OBJECTIVES

## DRUG TESTING: THE TECHNOLOGY OF RECOVERY

- History of Drug Testing in the Last 25 years
- Workplace vs PHM Drug Tests: Importance of Policy
- Specimen Validity Testing, Cutoffs
- Modern Technologies and Sample of Drug Testing
- Urine, Hair, Nails, Blood Spot, Saliva, Breath
- New Alcohol Testing Rule of Three
- Case Studies and Question and Answers

# NEVER TESTED POSITIVE FOR DRUGS



# PROFESSIONAL HEALTH MONITORING (PHM) DRUG TESTING

- Test with the right technologies
- On the right samples
- With the right laboratory



# HEALTH PROFESSIONAL EASY ACCESS



**TO A WIDE VARIETY OF DRUGS?**

# NEW EPIDEMIC OF DRUG ABUSE



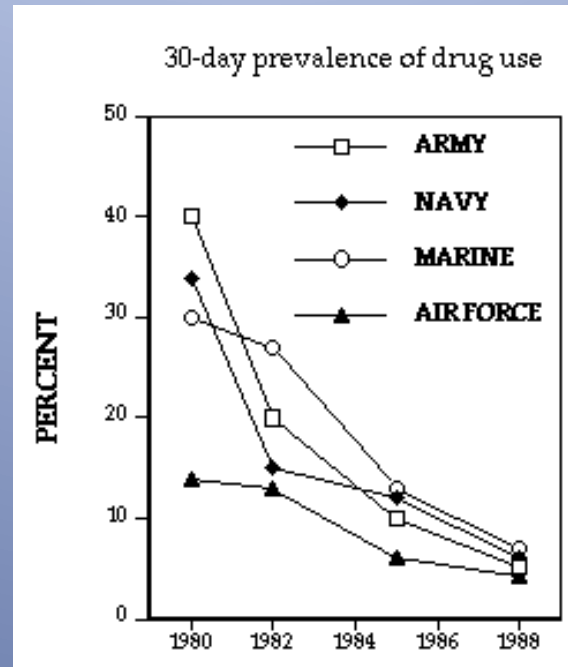
- Pain Clinics=Opioids
- Medical Marijuana
- Internet Pharmacies
- Synthetic THC
- Designer Drugs

An advertisement for buying Tramadol online. The ad features a red seal that says "BEST PRICE" and a gold seal that says "100%". The text "BUY TRAMADOL" is prominently displayed. Below this, it says "Never wait in line again" and "SHOPPING CART is empty". A large blue button says "ENTER HERE". The ad also lists "PAYMENT METHODS" including VISA, MasterCard, Discover, American Express, and ACH. At the bottom, there are logos for American Red Cross, VERIFIED by VISA, CIPA, and BBBOnline.

# DRUG FREE FEDERAL WORKPLACE



1981



1984



1986

# “CRISIS IN DRUG TESTING:

## RESULTS OF A CENTER FOR DISEASE CONTROL BLIND STUDY”

Hugh J. Hansen, PhD; Samuel P. Caudill, PhD; D. Joe Boone, PhD

Journal of the American Medical Association, **1985**, 253:282

<u>DRUGS</u>	<u>FALSE NEGATIVE</u>	<u>FALSE POSITIVE</u>
BARBITURATES	11 - 94 %	0 - 6 %
AMPHETAMINES	19 - 100 %	0 - 37 %
METHADONE	0 - 33 %	0 - 66 %
COCAINE	0 - 100 %	0 - 6 %
CODEINE	0 - 100 %	0 - 7 %
MORPHINE	5 - 100 %	0 - 10 %





# "NIDA 5" DRUG PANEL 1990

<b>DRUG</b>	<b><u>CUT-OFFS</u></b>	
	<b>Screen</b>	<b>Confirm</b>
<b>AMPHETAMINES</b>	<b>1000</b>	<b>500</b>
<b>COCAINE</b>	<b>300</b>	<b>150</b>
<b>MARIJUANA</b>	<b>100</b>	<b>15</b>
<b>PCP</b>	<b>25</b>	<b>25</b>
<b>OPIATES</b> <b>(morphine, codeine)</b>	<b>2000</b>	<b>150</b>

# DHHS 5 DRUG PANEL 2016

DRUG	CUTOFFS (ng/ml)	
	SCREEN	CONFIRM
MARIJUANA	50	15
COCAINE	150	100
PCP	25	25
CODEINE/MORPHINE	2000	2000
6-ACETYLMORPHINE	10	10
AMPHETAMINES	500	250
MDE	500	250
MDMA	500	250
MDA	500	250

# PHM DRUG TESTING 2017

- **Amphetamines**

- Amphetamine
- Methamphetamine
- MDA
- MDMA
- MDEA

- **Cocaine**

- **Marijuana**

- **PCP**

- **ETG**
- **ETOH**
- **PEth**

**Zolpidem**

**Soma**

**Meprobamate**

**Ketamine**

- **Opiates**

- **Morphine**
- **Codeine**
- **6-MAM**
  
- **Hydrocodone**
- **Hydromorphone**
- **Oxymorphone**
- **Oxycodone**
- **Buprenorphine**
- **Methadone**
- **Meperidine**
- **Propoxyphene**
- **Tramadol**
- **Fentanyl**

- **Benzodiazepines**

- Oxazepam
- Nordiazepam
- Temazepam
- Lorazepam
- Flurazepam
- Nitrazepam
- Triazolam
- Alprazolam
- Flunitrazepam
- Midazolam
- Clonazepam

- **Barbiturates**

- Butabital
- Amobarb
- Pentobarbital
- Secobarb
- Phenobarbital

# DRUG TESTING POLICY

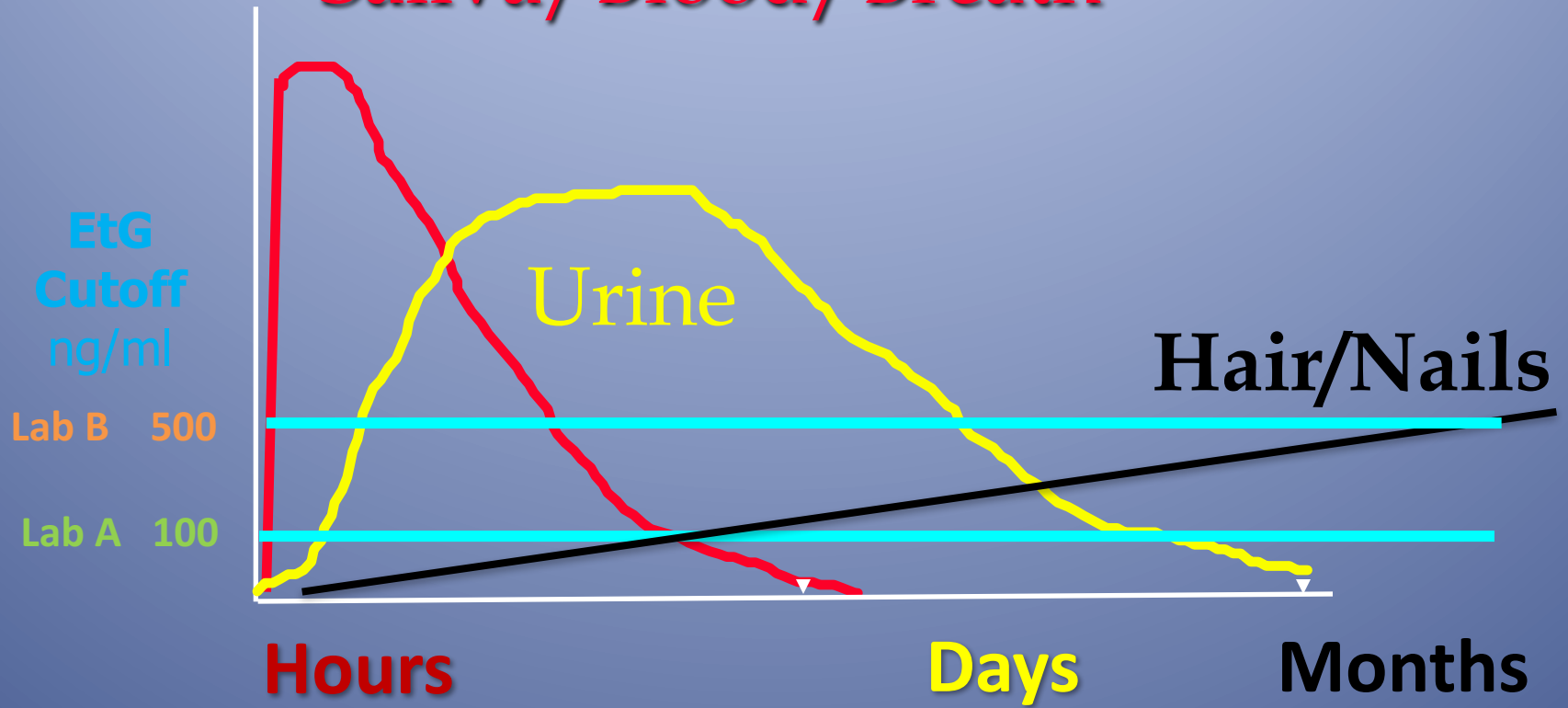
- Written Policy outlining the Drug Testing Program
- Supervisory Training
- Drugs Tested vs Zero Tolerance
- Third Party Administrator
- Participant Education on Program Entry
- Confidential Medical Review of Positives
- Consequences of a Positive Test
- Annual Review and Update

# DRUG TESTING POLICY

- Random Testing Mechanics
- Consequences of Non-Compliance
- Reasonable Suspicion Testing
- Post Incident Testing
- Periodic Testing
- Adulteration, Substitution and Dilution
- Dilute Negatives

# DRUG METABOLISM

Saliva/Blood/Breath



# HOW DRUG TESTS ARE COMPROMISED

- **Adulteration** of Urine with Products
- **Substitution** with a Clean Urine
- **Dilution** with Water

# ANTI-DRUG TESTING PRODUCTS



**NEED TO PASS  
A DRUG TEST?**

**Choose the Brand  
Trusted by Fortune  
500 Executives**

**TestClear.com**



**Overnight Shipping  
with  
\$135**

**ORDER**



**BUY 2 GET  
1 FREE**

**PASS A DRUG TEST  
FREE**

Without purchasing  
expensive speciality  
products!



**CONTAINS 5 OUNCES  
OF URINE**

- Premium Toxic-Free Synthetic Urine
- State of the Art Heating System
- Discreet, Clean & Easy to Use
- Adjustable Comfort Waistband
- Male & Female Compatible
- 2 Year Shelf Life

**THE ONLY TRUE 2-USE KIT AVAILABLE**

toll free telephone support available inside





# ADULTERATION

- Intentional Addition of Substances
- Mask Drug Use or Compromise Testing
- Initial Screening Test Immunoassay
- pH Shift e.g. Vinegar, Bleach, Drano
- Chemistry Shift e.g. Detergent, Methanol
- High Tech Adulterants
- Detected by Specimen Validity Tests

# SUBSTITUTION

- Substitution of Donor with Drug-Free Specimen
- Biological Substitution
- Non-Biological Substitution
- Detected Specimen Validity Testing

# DILUTION

- Most Common Form of Tampering
- Pre-Testing high volume of fluids
- Use of Products e.g. Absolute Detox
- Dilution of Collected Urine
- Detected by Specimen Validity Testing
- Consult with your TPA and MRO
- Establish a Policy

# SPECIMEN VALIDITY TESTING

- Creatinine
- Specific Gravity
- pH
- Temperature
- Nitrates
- Glutaraldehyde
- Pyridine
- Chromium

# CREATININE

- Product of muscle metabolism
- Produced at a constant rate daily
- Unique to Biological Specimens
- Super Hydration Reduces Creatinine
- Rare Medical Disorders Low Creatinine
- $< 20$  mg/dl are Dilute

# CREATININE

- Dilute Positives are Positive
- Establish a Policy for Dilute Negatives
- Low Creatinines 10 Times Higher in Randoms
- Normal urine creatinine: 2005 study “Urinary Creatinine Concentrations in the U.S. Population” determine was 130 mg/dl
- Less than 1% below 20 mg/dl
- Less than 1% greater than 400 mg/dl

# SPECIFIC GRAVITY

- Density of Liquid vs Water
- Normal Urine Values 1.0020-1.0200
- Combined with Creatinine provides **Dilute** or **Substituted** Reports

# pH

- Acidity or Alkalinity of Specimen
- Normal Range 4.5-8.9
- New cutoffs raised from <3 to <4
- pH <4.0 or >11.0 reported as **Adulterated**



# DILUTE or SUBSTITUTED URINE CRITERIA

- Samples with a Creatinine  $>2.0$  and  $<20$  mg/dl
- and
- a Specific Gravity  $>1.0010$  and  $<1.0030$  are reported as **Dilute**
  
- Samples with a Creatinine  $<2.0$
- and
- a  $< 1.0010$  or  $>$  or equal to  $1.0200$  considered to be **Substituted**
  
- 65 FR 79526, Dec. 19, 2000, as amended at 69 FR 64867, Nov.9, 2004

# DILUTE, ADULTERATED OR SUBSTITUED URINE POLICY

- Follow Established DOT/DHHS and Your Policy
- Positive Dilutes, treated as Positives
- MRO Interviews Donor and Physician for Medical Explanation Dilute Negatives, Adulterated or Substituted Urines
- MRO directs recollection under direct observation if creatinine is equal to or  $>2\text{mg/dl}$ , but less than or equal to  $5\text{ mg/dl}$
- 68 FR 31626, May 28, 2003; 69 FR 64867, Nov.9, 2004; 73 FR 35974, June 25, 2008

# INVALID SPECIMEN

An invalid drug test is the outcome of a drug test for a urine sample that contains an endogenous substance at abnormal concentrations, has abnormal physical characteristics, contains an unknown interfering substance, or an unknown contaminant that prevents the laboratory from obtaining a suitable valid result on the test.

- Creatinine  $<2.0$  mg/dl, Specific Gravity  $>1.0010$  or  $<1.0200$  or Temperature
- Unidentified Substance in Confirmation
- Screening Test Technically Failed
- Sample Physically Not Acceptable
- MRO Questions Donor

# LC-MS/MS



- mg/ml    Thousand     $10^{-3}$
- ug/ml    Million     $10^{-6}$
- ng/ml    Billion     $10^{-9}$
- pg/ml    Trillion     $10^{-12}$
- fg/ml    Quadrillion     $10^{-15}$

# DIFFERENT DRUG TESTING CUTOFFS

## EtG ng/ml

Screening

Confirmation

<b>Lab A</b>	<b>100</b>	<b>100</b>
<b>Lab B</b>	<b>500</b>	<b>125</b>

## Fentanyl ng/ml

Screening

Confirmation

<b>Lab A</b>	<b>0.2</b>	<b>0.1</b>
<b>Lab B</b>	<b>10</b>	<b>10</b>

# LAB SPLIT SAMPLE STUDY

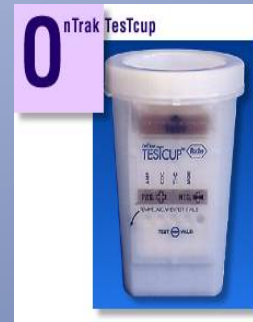
<u>Sample ID</u>	<u>Lab A</u> <u>Low cutoff</u>	<u>Lab B</u> <u>Higher cutoff</u>	<u>Reason</u>
1	EtG+	Neg	Cutoff
2	EtG+	Neg	Cutoff
3	EtG+	EtG+	>500
4	Tramadol+	Neg	Cutoff
5	Morphine+ Oxazepam+	Morphine Only	Cutoff
6	Fentanyl+	Pos	>10
7	Fentanyl+	Neg	Cutoff
8	Fentanyl+	Neg	Cutoff
9	Fentanyl+	Neg	Cutoff

# LAB EXPANSION & CONTRACTION

	<u>1990</u>	<u>2000</u>	<u>2010</u>	<u>2017</u>
<b>NIDA</b>	<b>10</b>	<b>238</b>	<b>95</b>	<b>35</b>
<b>PHM</b>	<b>0</b>	<b>10</b>	<b>500</b>	<b>&gt;1000</b>

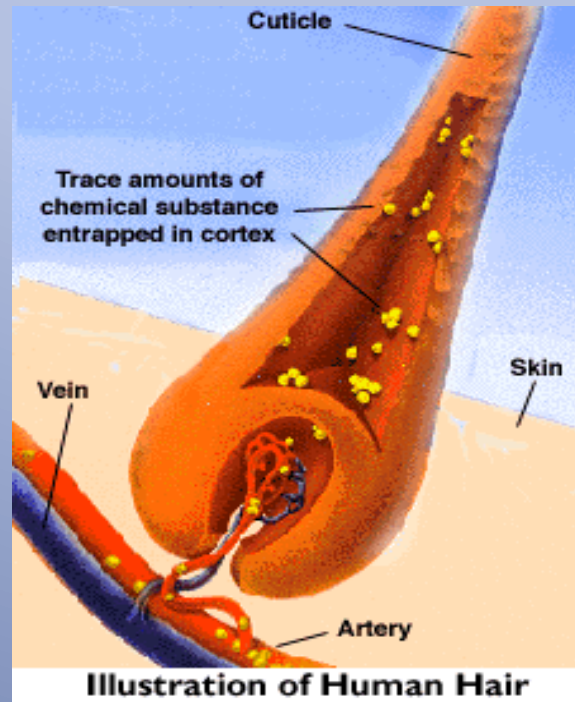
# INSTANT URINE DRUG TEST FRAUD

- > 70 KITS ON MARKET
- Not all have similar cutoffs
- Manufacturing
- Performance
- Validity tests
- >False negatives





# HAIR DRUG TESTING



- 7-10 days after drug use hair is positive
- 90 day window of detection
- 10-17 drugs routinely tested
- Direct observed collection

# HAIR COLOR AFFECTS TESTING

## Codeine Concentrations

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**Black**  
**1134.0**



**Brown**  
**250.8**



**Blonde**  
**119.6**



**Red**  
**66.6**

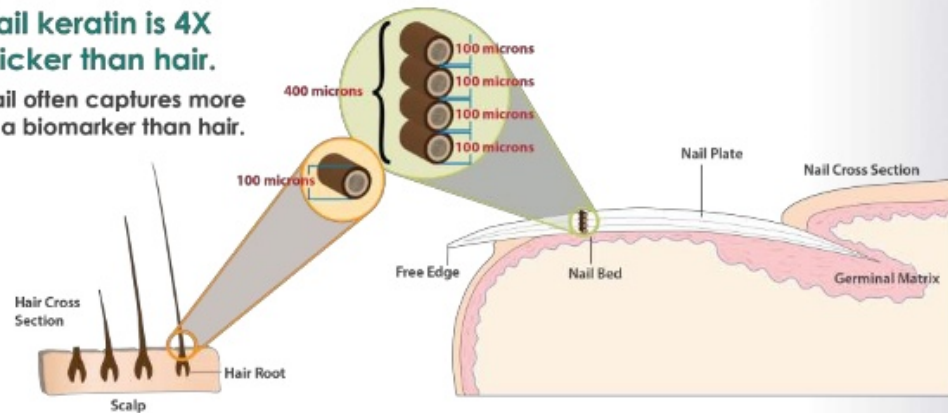


**(pg/mg hair)**

## Fingernail Testing vs. Hair Testing

**Nail keratin is 4X thicker than hair.**

**Nail often captures more of a biomarker than hair.**

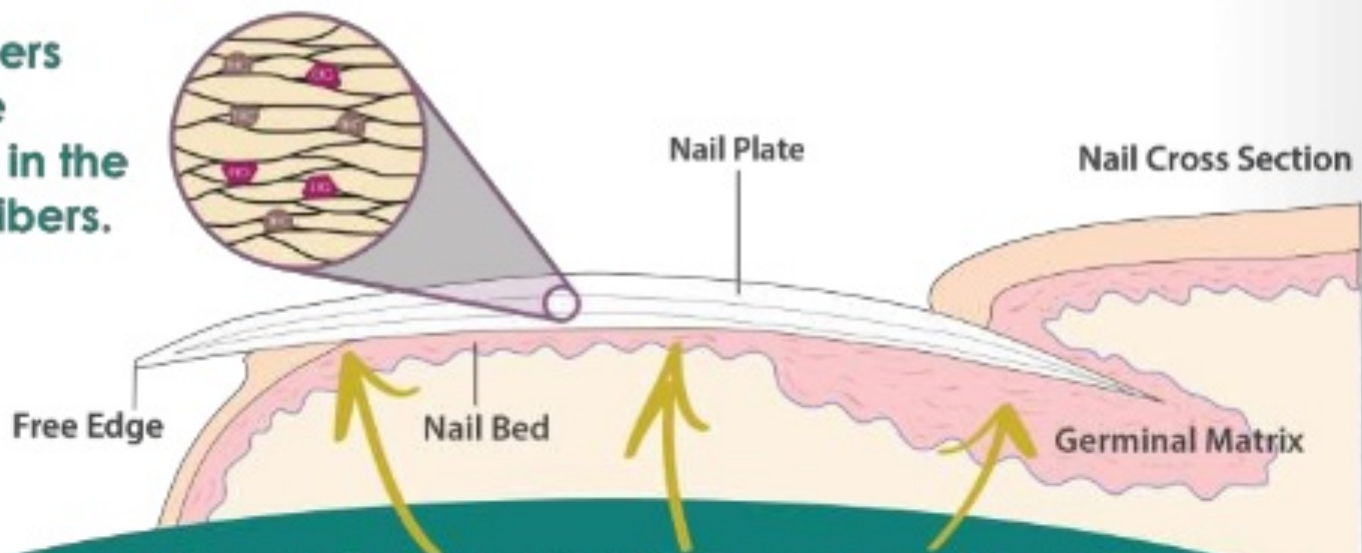


- Additionally, hair growth is relatively slow compared to fingernails, which can be grown in as little as 1-2 weeks. Some notice may be needed for the donor to refrain from clipping their nails in preparation for a test.

- 7-10 days after drug use nails are positive
- 180 day window of detection
- No melanin in nails vs hair
- 10-14 drugs routinely tested
- Direct observed collection

# Incorporation of Alcohol & SOA

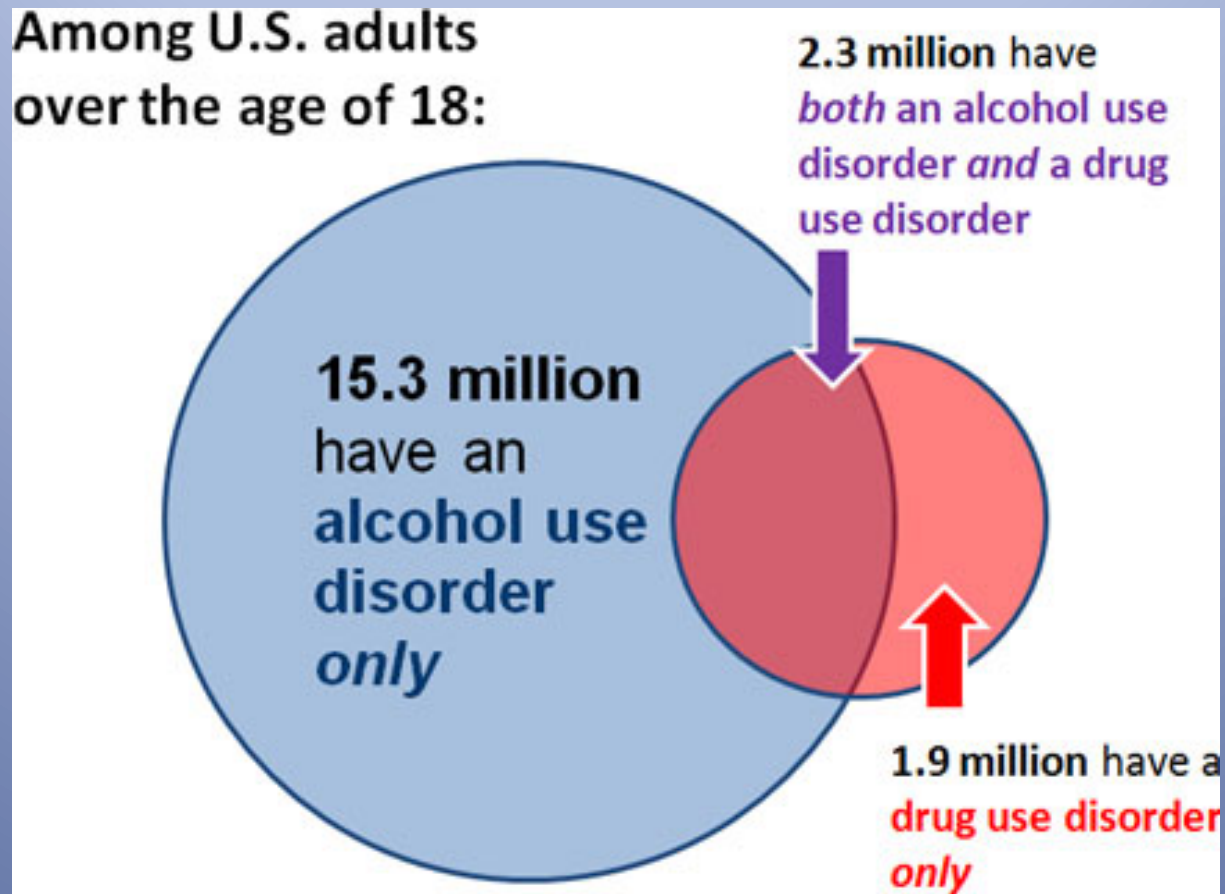
Biomarkers become trapped in the keratin fibers.



As the nail grows in thickness and length, biomarkers from alcohol and other substances of abuse build up in the nail at the germinal matrix and along the nail bed.

Biomarker: a measurable substance whose presence is indicative of ingestion or exposure to substances of abuse (SOA).

# ALCOHOL KEY TO THE DRUG PROBLEM

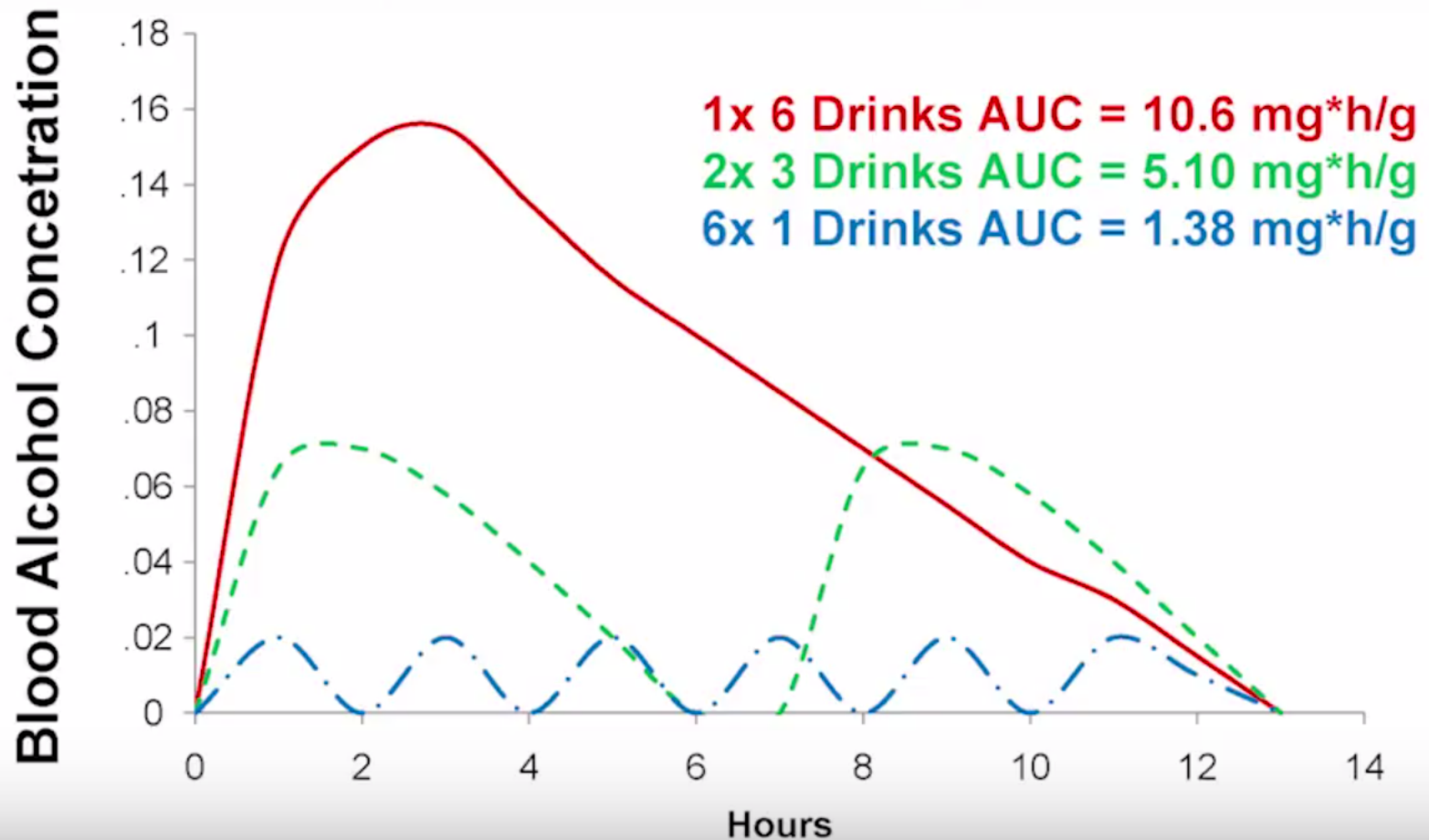


IF YOU WANT TO CONTROL THE DRUG PROBLEM

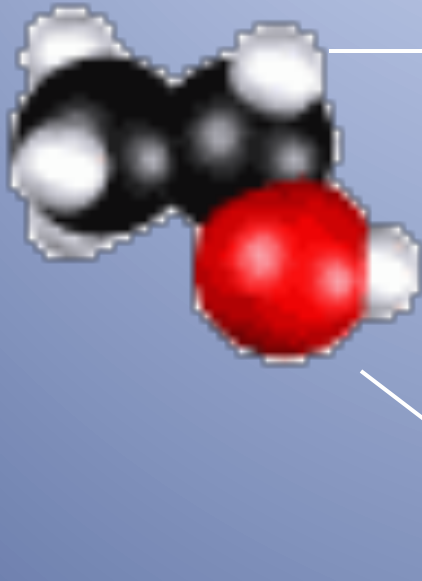
CONTROL THE ALCOHOL PROBLEM FIRST

# DRINKING BEHAVIORS AFFECTS DETECTION

## Area Under the Blood Alcohol Curve for 3 Different Drinking Behaviors



# ALCOHOL TESTING



## Standard Technology

- Breathalyzer – Hours/Drink
- Saliva - Hours/Drink
- Blood – Hours/Drink
- Urine – Hours/Drink

## Technology of Recovery Tests

- 1) Urine Ethyl Glucuronide(EtG) - **3 Days after** drinking
- 2) Phosphatidylethanol(Peth)- **3 weeks binge** drinking
- 3) Hair/Nails EtG – **3 months binge** drinking

# EtG in URINE

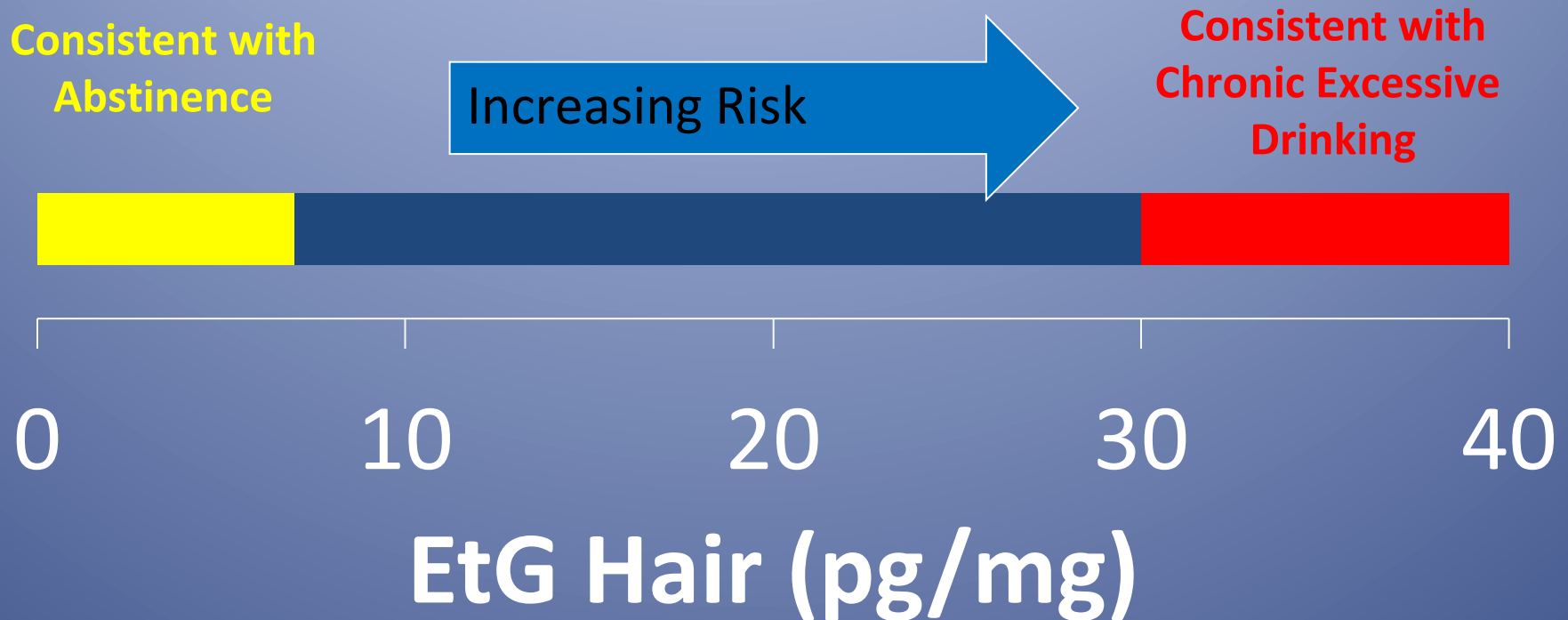
Ethyl glucuronide, metabolite of Alcohol

- In standard use since 2000
- Cutoff for recovery 100 ng/ml
- Not fermentation affected
- Abstinence monitoring
- Detection 2-3 days 1 drink

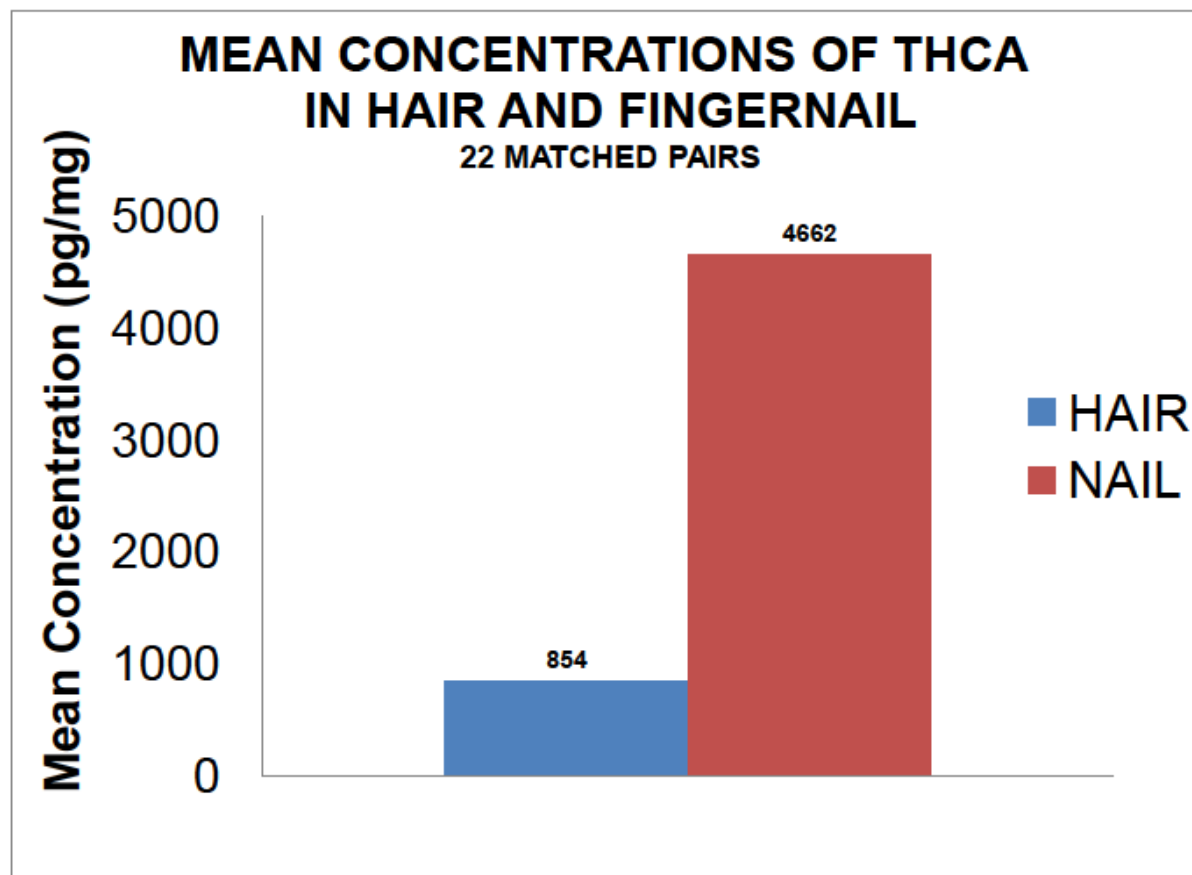


# EtG in HAIR

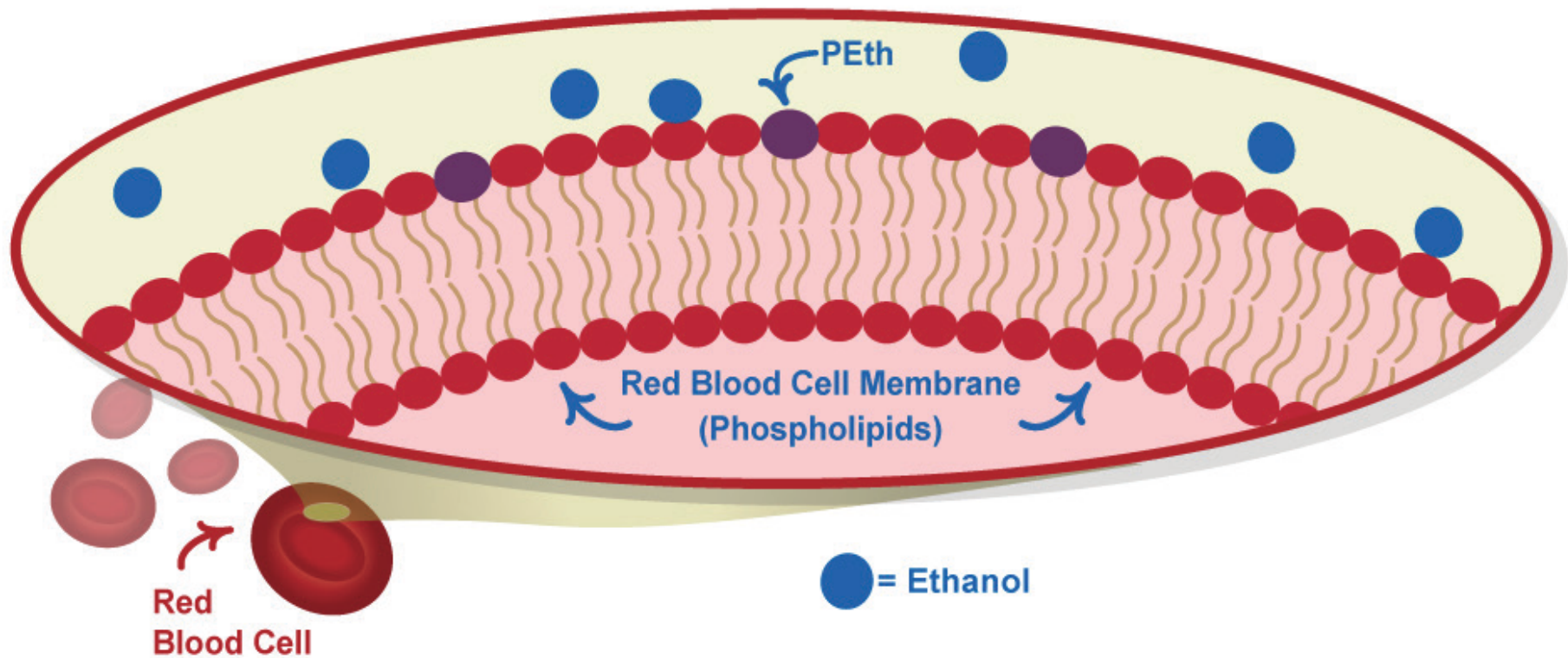
Society of Hair Testing Suggestions



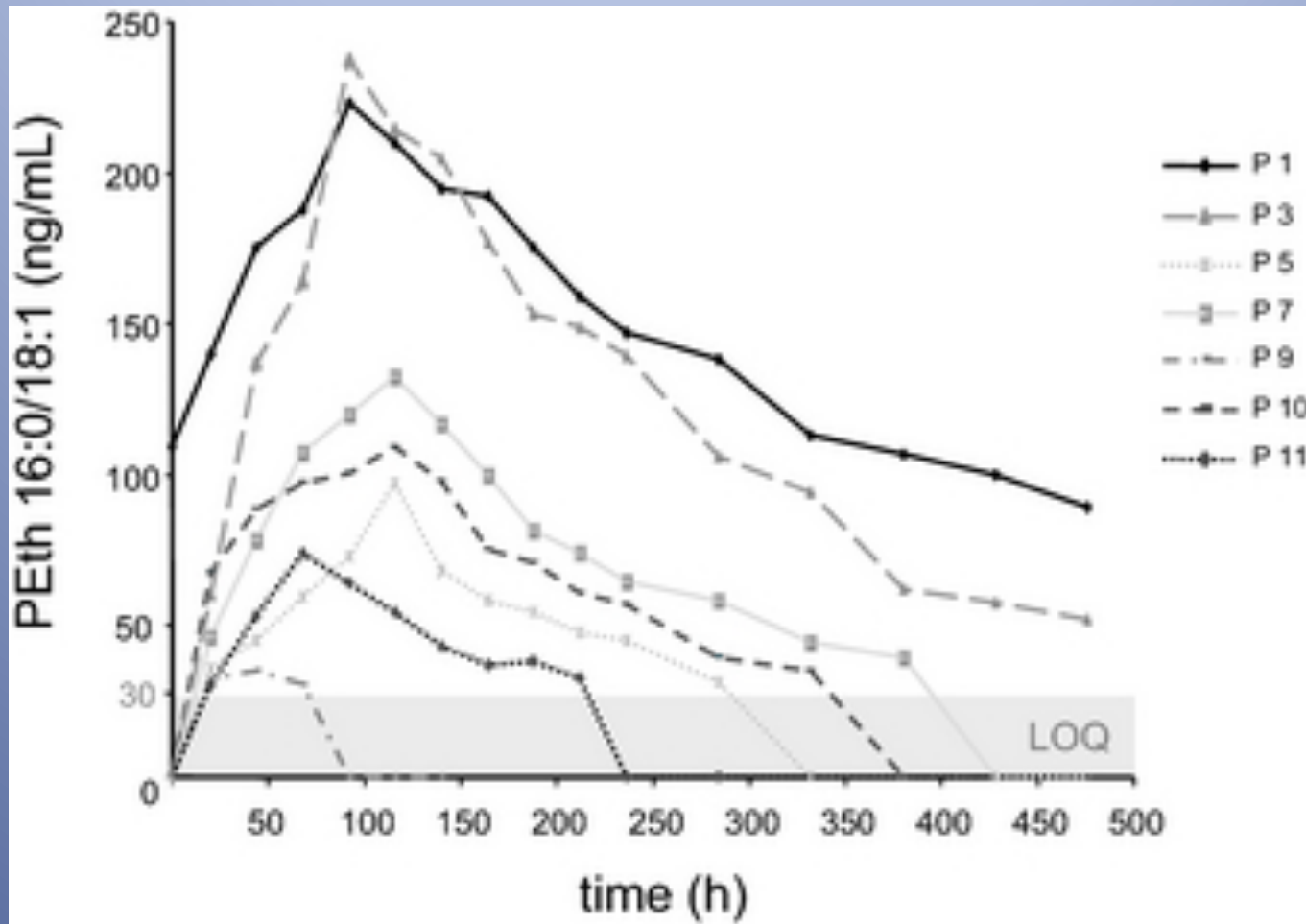
# FIVE TIMES MORE THC IN NAILS



# PHOSPHATIDYLETHANOL (PEth)



# Formation of PEth and Its Elimination During Extensive Drinking Over 5 Days



# Alcohol Testing Rule of 3

- 3 Hours Breath
- 3 Days ETG urine
- 3 Weeks PEth
- 3 Months ETG hair/nails

# PHM Monitoring Program

- Intelligent Science Based Population
- Target Drug (s) of Choice
- Vary Matrix eg Hair, Nails, Urine, Blood Spots
- Vary Panels, small to large, cost savings
- Insure SVT are Included and Policy in Place
- Reach Out with Questions to your TPA and Lab
- Monitor and Treat the Patient, not the Drug Test

# Question and Answer Time



# CASE STUDY #1

- 2 Social Drinkers, 10<sup>th</sup> Day Drug Tested
- Male ~ 2 drinks/day, Female 1 drink/day



URINE ETG= **POSITIVE**  
Hair and Nail ETG= **NEGATIVE**  
Peth= **NEGATIVE**



# CASE STUDY #2



Male heavy social drinker 195 lbs

- 5-night cruise-2 binges per day
- Stopped drinking, tested Day 1

URINE ETG= **POSITIVE**

Hair and Nail ETG= **NEGATIVE**

Peth= **POSITIVE 181 ng/ml**

# CASE STUDY #2 Continued



Male heavy social drinker 195 lbs.

- 5-night cruise-2 binges per day
- Stopped drinking, tested Day 10

URINE ETG= **NEGATIVE**

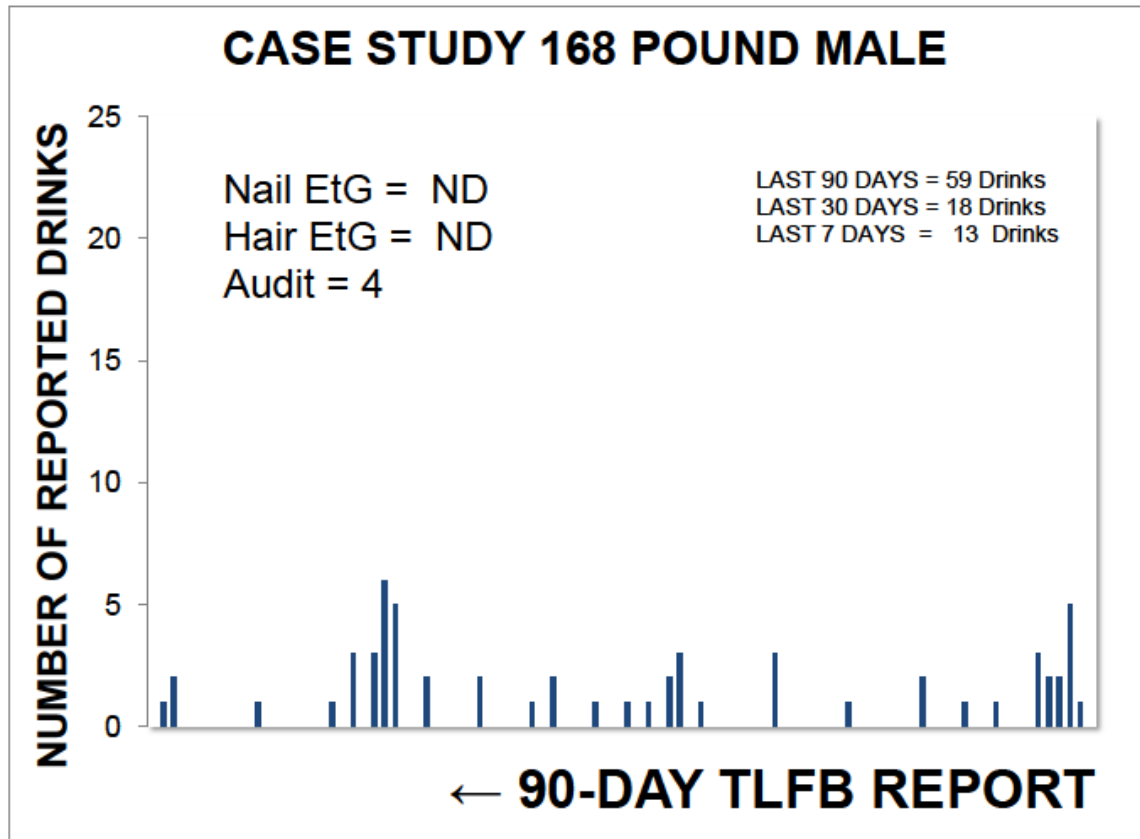
Hair and Nail ETG= **NEGATIVE**

Peth= **POSITIVE 93 ng/ml**

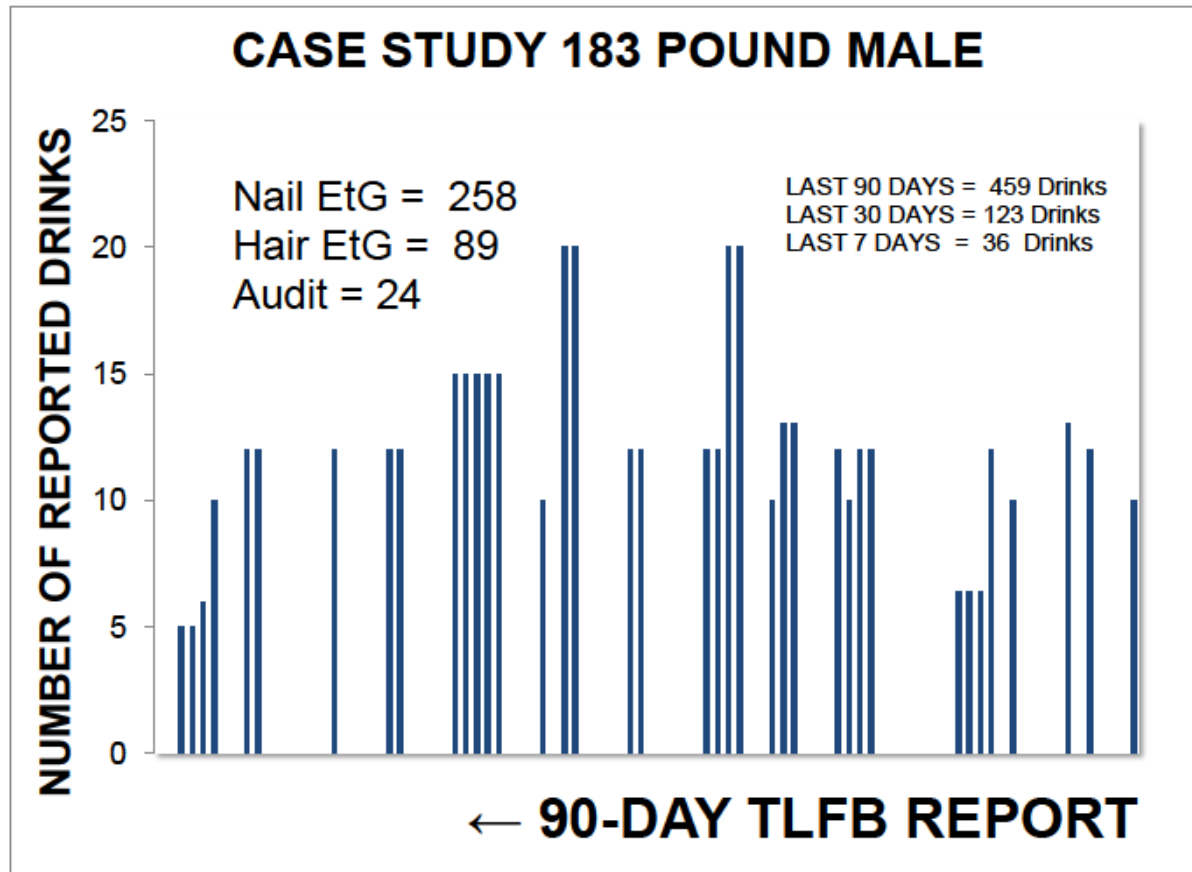
# ETG and AUDIT SCORES

- Alcohol Use Disorders Test
- 10 item screening test
- World Health Organization
- Clinician Administered version
- Self-Report Version
- **Score of >8** indicated harmful alcohol use
- <https://pubs.niaaa.nih.gov/publications/Audit.pdf>

# CASE STUDY #5

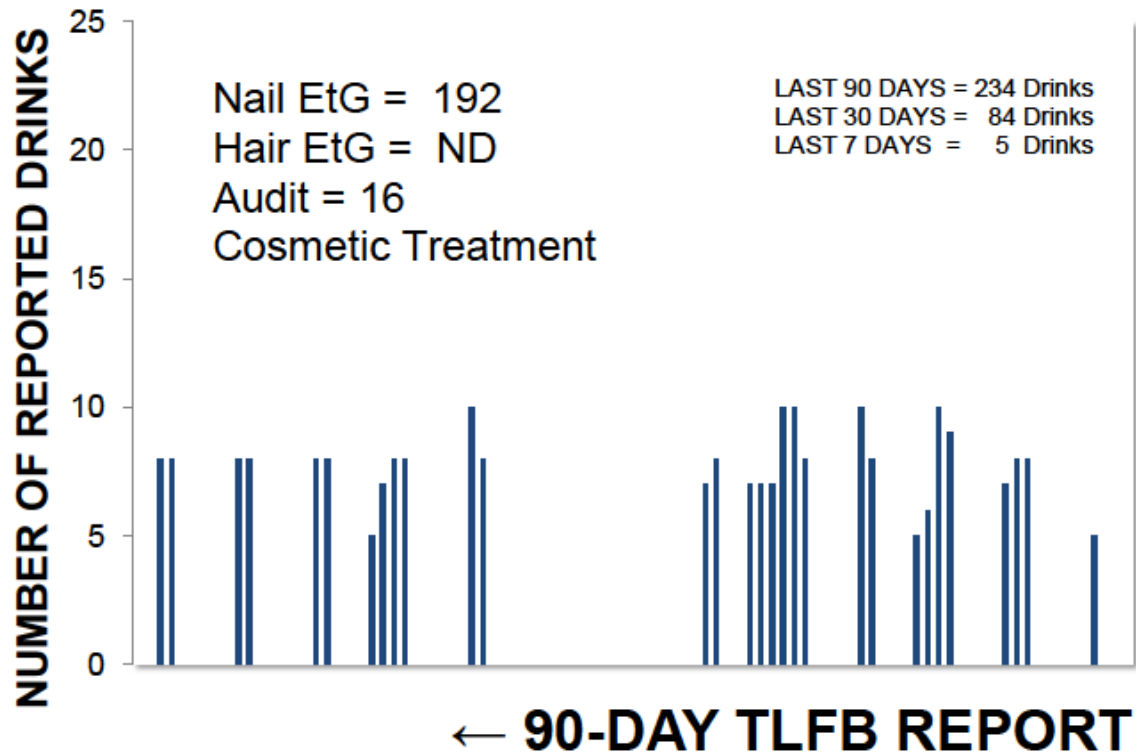


# CASE STUDY #4



# CASE STUDY #3

## CASE STUDY 132 POUND FEMALE



# CASE STUDY #6

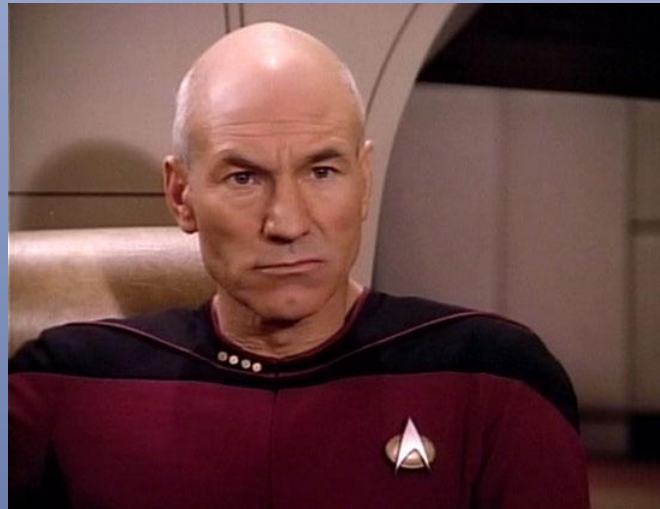
- 38 YEAR OLD FEMALE NURSE RECOVERING ALCOHOLIC
- NALTREXONE COMPLIANCE QUESTIONED
- URINE NALTREXONE NEGATIVE
- HAIR NALTREXONE NEGATIVE



- FINGER NAIL POSITIVE FOR NALTREXONE

# CASE STUDY #7

- 48 year old male air force nurse reported to State Board
- Urine test was negative
- Hair test ordered



- Body was clean shaven , not sufficient nails for testing
- Toe nail tested and positive for cocaine



# CASE STUDY #8

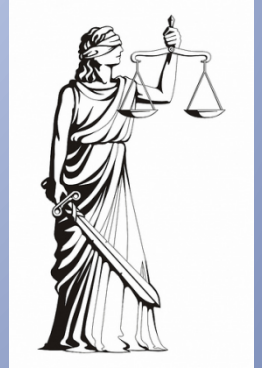
- Nurse with history of opioid abuse
- Positive for hair and fingernails oxycodone



- Toe nail test was negative

# CASE STUDY #9

- Contentious Legal Custody Case
- Husband alcoholic Sober-Link 0.025
- Court ordered PETH= 37 ng/ml
- Lawyers argued two 8oz of cough syrup
- Court ordered additional PEth, 42 ng/ml
- Nurse obtained custody of her children



# DRUG TESTING IS THE TECHNOLOGY of RECOVERY

- 5 years of Random Drug Testing > 70% recovery
- Daily call 800 Random Drug Test Line



- If selected must report for testing
- Panels and samples may vary
- Entire industry of specialized labs and TPAs

# CONCLUSIONS

- Know your laboratory, technology and cutoffs
- “What are the screening and confirmation technologies and cutoffs, how long have you been in business?”
- Vary testing panels, urine, saliva, hair, blood
- Custom design testing programs individual addiction

“Treat the patient, not the drug test”



# Presenter Contact Information and Coupon for Free Consultation

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