



Urine Drug Testing

Presented by:

Elaine Swope MSN, RN-BC, CNP
Nurse Practitioner Pain Management
St. Charles Mercy Hospital, Oregon, Oh
ASPMN Urine Drug Testing Task Force

ASPMN UDT TASK FORCE

- Elaine Swope MSN, RN-BC, CNP- Chair
- Libby Amero, RN, BSN
- Tina Kujawski, RNC, MS, CANP
- Kathy Miller, MSN, RNC, CNS, CNA, BC, CPAN
- Barbara St. Marie, PhDc, RN, ANP, GNP

Objectives

- Describe 2 methodologies used for urine drug testing
- Discuss technical issues which may affect interpretation
- Discuss 2 alternatives to urine drug testing
- Explain ethical issues pertaining to urine drug testing

Why urine drug testing ?

- monitor pharmacotherapy compliance
- identify individuals who may be at high risk
- a means of providing documentation to an agreed treatment plan



Characteristics of urine

- temperature 90° F to 100 ° F
- pH 4.5 – 8
- creatinine concentration > 20 mg/dl
- specific gravity 1.003 – 1.030

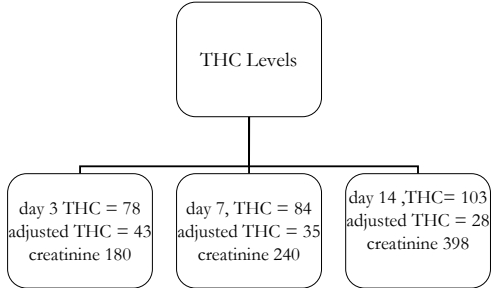


Creatinine adjusted drug levels

The measured drug level is adjusted to the level of creatinine detected and multiplied by 100 mg/dl
(patient's directly measured THC level
x average creatinine excreted ÷
patient's directly measured creatinine level = creatinine adjusted drug level)

Medical drug monitoring

example, measured THC level 62ng/ml
creatinine level = 86
 $62 \text{ ng/ml} \times 100 \text{ mg/dl} \div 86 \text{ mg/dl} = 72 \text{ ng/dl}$



Methods of urine drug testing

- Immunoassay drug tests
 - clarifies a substance as being present or absent
 - advantages:
 - rapid turn around time
 - inexpensive
 - high sensitivity
 - limitations
 - cross-reactivity

Point of Care Testing

- commercially available
- does not require instrumentation
- easy to use
- limited number of tests
- interpretation subjective
- limited or deficient quality control



POCT testing

- users of POCT devices should understand limitations
- used should be trained
- be aware of interferences from chemicals
- consider cutoff(s) in selection of device
- must use quality control material

National Academy of Clinical Biochemistry
(NACB)

Confirmatory testing

- gas chromatography/mass spectrometry (GC/MS)
 - the gold standard
 - highly specific and sensitive



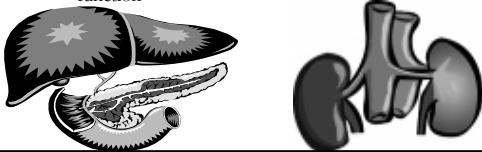
Adulterants

- dilution products
- cleansing products
- chemical adulterants
- prosthetic devices



Interpretation

- strong lines of communication between lab personnel or technical support
- detection time of drugs typically 1-3 days
- rate of excretion of drug varies
 - Dependent on differences in metabolism/ urinary function



drugs and their metabolites

Drug class	Drug	Drug and/or metabolite
opiate	hydrocodone	hydrocodone hydromorphone
benzodiazapine	alprazolam	alprazolam alpha-hydroxylalprazolam
cocaine	cocaine	benzoylecgonine

Data from Ameritox, Shurman & Backer, 2006

Interpreting urine drug levels

- urine drug levels don't indicate strength of drug being used
- urine drug levels don't indicate how frequently the drug is used
- blood alcohol as a model

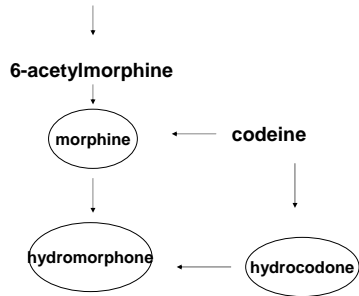


Urine drug test report

- Drug not detected may be due to the following
 - patient didn't take any of the medication
 - patient has not recently taken any of their medication
 - patient excretes medication and /or their metabolites at a different rate than normal
 - the test used was not sensitive enough
 - clerical error



Metabolism of Opioids heroin



Adapted from Gourley, Caplan & Heit, 2006

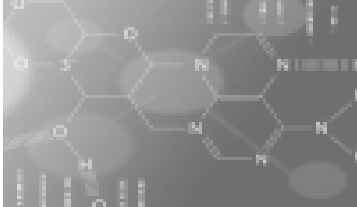
Alcohol

- breath alcohol test or a blood alcohol concentrate reflects current state
- metabolite of alcohol Ethyl glucuronide (Etg)
- OTC cough medications, mouthwashes can produce a positive result



Cross Reactivity

- substances with similar and sometimes dissimilar compounds, chemical composition
- may yield a false positive for the target drug



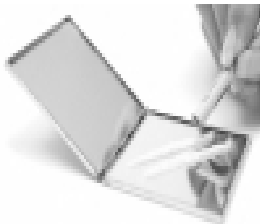
Amphetamines

- Includes:
 - diet agents
 - decongestants
 - medication for parkinsons



Cocaine

- Quinine can cross react with the following immunoassays : cocaine EIA but not cocaine FPJA



Marijuana

- Sustiva can cross react with THC EIA
- Immunoassays can't distinguish between smoked marijuana and Marinol



Opiates

- can cross react with antibiotics, levofloxacin and ofloxacin
- can yield false positive results for:
 - imipramine
 - papaverine
 - rifampin

Benzodiazepines

- can cross react with oxaprozin (daypro)
- can cross react with diphenhydramine
- can cross react with sertaline (zoloft)



False/positive results

Barbituates

- primidone (mysoline) metabolized in the liver to phenylethylmalonamide and phenobarbital which are excreted in the urine
- phenytoin can cross react

Detection times of drugs in urine

	Cutoff (ng/ml)	Days
Amphetamines	1000	≤ 5
Benzoylsergamine after street doses of cocaine	300	2-3
Cannabinoids moderate smoker	50	5
heavy smoker	50	10
chronic smoker	50	≤ 28
Opiate	2000	1-2

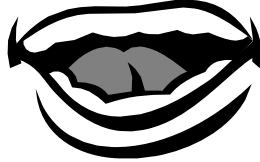
Alternatives to urine testing

- serum opioid measurements
 - costly and invasive
 - limited detection windows and low drug concentrations



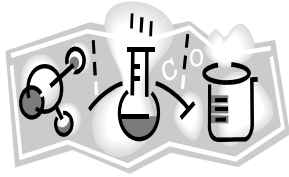
Oral fluid drug testing

- drugs transferred to oral fluid by passive diffusion from blood and by deposits from smoking & intranasal or oral administration
- drugs & metabolites in oral fluid proportionate to those in serum



Factors influencing drug deposition

- pH
- degree of protein binding
- lipophilicity of the drug



Crouch, 2005

Providing a specimen

- Refrain from eating and drinking and smoking 10-20 minutes prior to providing a specimen



Dolan, 2004

Ethical issues



Abandonment of Care

- unilateral termination by the health care practitioner of the patient- practitioner relationship without adequate notice
 - to obtain equally qualified replacement care
 - and at a time when medical care is needed

Clinician's obligations

- clinician obligations
 - to provide treatment or
 - arrange for treatment to be provided elsewhere
 - cannot neglect the patient



Avoiding claims of abandonment

- Steps to be taken
 - communicate early and document
 - Is referring clinician able to accept patient
 - Review any guidelines for terminating relationship



Case Study

- Mr. Smith- 40 y.o. male with hx of chronic back pain
- current RX- OxyContin, effexor, tizanidine and levaquin,
- urine drug testing results-Immunoassay
- - opiates - oxycodone + amphetamines

Take Home Messages

- confirm a positive urine screen by another method
- urine drug testing is only a part of the whole monitoring process
- urine drug testing should be used to improve the care of patients

