Taking the Pain Out of Pain Management Testing

October 5, 2010

Welcome

Your Host: Karen Riba

- Handout available by clicking on handout icon, in upper right hand corner of your screen
- For technical difficulties please e-mail kriba@paml.com
- For questions you have during the presentation use the “Q & A” link at the top of your screen
- Questions will be answered at the end of the presentation.

Speaker Information

David Michaelsen, MS, RP
General Manager of Toxicology

Manages both clinical and forensic toxicology. He has a bachelor’s degree in chemistry from Eastern Washington University, a criminal justice degree from Washington State University and a master’s degree in forensic chemistry from Northeastern University. He is the RP for this SAMHSA-certified laboratory.

Learning Objectives

- Discuss the importance of monitoring patients on pain medications through laboratory testing
- Identify and explore different treatments of pain
- Describe various medication’s affects on pain
- Explore why specificity and sensitivity are important for pain management testing
- Interpret pain management test results in order to determine abuse and/or compliance.
9 out of 10 Americans aged 18 or older suffer pain at least once a month, and 42% experience it every day. Pain is one of the most common reasons for patients to seek medical attention.

Pain Management

Assessing Pain

Affecting Sleep?
Unable to walk?
Enjoyment of life?
Unable to Work?

Freedom From Cancer Pain

Adverse Effects

Flector® Patch

Pulse Stimulation
Korean Hand Therapy

Acupuncture

Altering Pain with Medications

Receptor Functionality

Opioids

Chronic Pain

Most Challenging Condition to Manage

- Tolerance
- Physical Dependence
- Patient Divergence
- Drug Side Effect
- Lack of Long Term Relief

- Abuse Potential
- Behavioral Changes
- Addiction

- Morphine (MScotin)
- Codeine
- Hydrocodone
- Hydromorphone
- Oxycodone(OxyCotin)
- Oxymorphone

Mu
- Located: Brain, Spinal Cord, Intestinal Tract
- Supraspinal analgesia
- Physical dependence
- Respiratory depression
- Euphoria

Delta
- Located: Brain
- Analgesia – less than mu
- Physical dependence
- Antidepressant effects

Kappa
- Located: Brain, Spinal Cord, Pain Neurons
- Sedation
- Dysphoria
- Spinal analgesia

Approx 90% of PM is treated with Opioids

Taking the Pain Out of Pain Management Testing
Taking the Pain Out of Pain Management Testing

**Opioids**

The Power of Opiates

- Morphine
- Di-Acetyl-Morphine

Strength in Metabolism

- Codeine → Morphine

**Buprenorphine**

Mu – partial agonist
Delta – competitive antagonist
Kappa – competitive antagonist

Suboxone – naloxone HCL
Subutex
Buprenex (Injection)

**Opioids**

- Codeine
- Heroin
- Morphine
- 6-Monoacetylmorphine

**Buprenorphine**

- Morphine

- Hydrocodone
- Oxycodone

- Hydromorphone
**Tramadol**

Weak Mu Agonist

Like Codeine metabolizing to Morphine, Tramadol is converted to O-desmethytramadol

**Methadone**

Mu Agonist

- Long Half-Life 15-60 hrs
- Analgesic Activity shorter than half-life
- Approx 82% of deaths due to Methadone are listed as accidental

**Marijuana**

THC - interferes with the brain's ability to absorb Anandamide

Anandamide is believed to play a role in pain sensation, memory and sleep.

- Receptors: CB1, CB2
- Partial Agonist

THC attaches to receptors in the hippocampus and weakens short-term memory
Taking the Pain Out of Pain Management Testing

Urine Drug Testing

Abuse prevalence from pain management has been reported as high as 41%.*
• Assist w/ therapeutic decisions
• Identify recent use of prescribed drugs
• Identify illicit drug use.


Abuse Testing

- Amphetamine
- Methamphetamine
- Barbiturates
- Benzodiazepines
- THC
- Cocaine
- PCP
- MDMA
- MDA
- Tramadol
- Propoxyphene
- Fentanyl
- Methadone
- Morphine
- Codeine
- Hydrocodone
- Hydromorphone
- Oxycodone
- Oxymorphone
- Heroin
- Carisoprodol
- Meprobamate

Compliance

Opiates
- Propoxyphene
- MS Contin
- Oxy Contin
- Oxymorphone
- Hydrocodone
- Tramadol
- Methadone
- Meperidine
- Fentanyl
- Buprenorphine

Cytochrome P450

Diverse group of enzymes which main function is to catalyze the oxidation of organic substances like hormones and drugs. More than 11,500 distinct CYP proteins known.
Taking the Pain Out of Pain Management Testing

### Cytochrome P450

**Cytochrome P450 2D6 Allele**

<table>
<thead>
<tr>
<th></th>
<th>Caucasians</th>
<th>Asians</th>
<th>African-American</th>
</tr>
</thead>
<tbody>
<tr>
<td>UM (ultrarapid metabolizers)</td>
<td>7% poor metabolizers</td>
<td>1-2% poor metabolizers</td>
<td>2-4% poor metabolizers</td>
</tr>
<tr>
<td>EM (extensive metabolizers)</td>
<td>4.1%</td>
<td>4.1%</td>
<td>4.1%</td>
</tr>
<tr>
<td>IM (intermediate metabolizer)</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
</tr>
<tr>
<td>PM (poor metabolizer)</td>
<td>3.3%</td>
<td>3.3%</td>
<td>3.3%</td>
</tr>
</tbody>
</table>

**Potential for toxicity or lack of efficacy**

Codeine, Hydrocodone, Oxycodone, Methadone

**Disclaimer:**

There are currently no guidelines regarding how testing for CYP450 polymorphisms, and the knowledge such testing yields about predicted phenotypes, can be incorporated into clinical practice, and little information about whether such testing produces any real benefits at all.
Taking the Pain Out of Pain Management Testing

3 Patients prescribed Avinza, Urine testing Performed

- Patient #1 - Morphine-19000, Hydromorphone 70 ng/ml.
- Patient #2 - Morphine 6000, Hydromorphone 450, Hydrocodone 600 ng/ml
- Patient #3 - Morphine 25000 ng/ml.

Who is compliant?
- 1. Patient #3 Only
- 2. Patient #1 and #3
- 3. None are compliant.

A patient is tested to verify morphine use. A workplace drug test is ordered with the following result:

- Screen negative for drugs of abuse.
- Creatinine level is 18 mg/dl, specific gravity is 1.0028, pH is 6.8.
- No adulterants were found
- Should this patient be eliminated from the program?

Complexities

- Oxycodone → Oxymorphone
- Hydrocodone → Hydromorphone
- Codeine → Morphine
- Heroin → 6-monooacetylmorphine → Morphine
- Carisoprodol → Meprobamate
- Benzodiazepines → Oxazepam or Nordiazepam
Taking the Pain Out of Pain Management Testing

Smith, Lori – F137xxxx
Collected 03/05/2010 11:25am

Medications listed

**Oxycontin CR 60mg TID**

- Last Dose 3/4/10 11pm
- **Fentanyl 100 mcg Patch**
  - 3/5/10

<table>
<thead>
<tr>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative – Not Consistent</td>
</tr>
</tbody>
</table>

- Fentanyl – > 250 ng/mL – Consistent
- Norfentanyl – > 500 ng/mL – Consistent
- Hydrocodone – 2080 ng/mL – Not Consistent
- Hydromorphone – 129 ng/mL – Not Consistent

Jones, Sara – W147xxxx

Collected 03/05/2010 11:25am

Medications listed

**Oxycodone 80mg 2 x day**

- **Methadone 80 mg AM**
  - 40 mg afternoon
  - 20 mg PM
- **Endocet PRN – 5 daily**
- **SOMA 350 mg 4 x day**

<table>
<thead>
<tr>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative – Not Consistent</td>
</tr>
</tbody>
</table>

- Methadone Metab - 17,100 ng/mL-Consistent
- THC – 344 ng/mL – Not Consistent

Hurley, Clare – T158xxxx

Collected 03/09/2010 14:00

Medications listed

**Hydrocodone Last Dose 3/5/10**

- Xanax 1 mg
  - Last Dose 3/4/10 2pm

<table>
<thead>
<tr>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative – Consistent</td>
</tr>
</tbody>
</table>

- Alprazolam – 741 ng/mL – Consistent

Resources

- David Michaelsen  dmichael@paml.com

Thank-you for Attending

- P.A.C.E. credit may be obtained by submitting your completed evaluation form. You will find the form by clicking on the “handouts” icon in the upper right hand corner of your screen
- CE credit may be obtained by downloading the “Certificate of Completion” under the “handouts” icon
- PAML employees will be able to receive one hour of continuing education credit by submitting your attendance through CE Manager.

Thank-you for Attending

- This webinar has been recorded and will be available October 7th on www.paml.com, under the Hospital Tab/Hospital Portal/Webinars heading
- Look for upcoming webinar information on our website www.paml.com.