

Smart Notes

Hydrocodone is an antitussive and narcotic analgesic agent

Why test for Hydrocodone and Hydromorphone?

Hydrocodone is one of the most misused prescription drugs on the market, according to the Drug Enforcement Administration (1). It is a semi-synthetic opioid, most commonly known as Vicodin® and is prescribed as a cough suppressant and for the treatment of moderate to severe pain.

One of its metabolites, hydromorphone, is considered to be more potent than the parent drug, hydrocodone, and has the highest analgesic potency. Commonly prescribed under the brand name of Dilaudid®, hydromorphone is also used for the treatment of moderate to severe pain. (2)

Currently doctors face stiff penalties for over-prescribing hydrocodone to a patient. These same physicians are also coping with an addicted patient base, many of whom will lie about illnesses or “doctor shop” in order to gain access to additional prescriptions for the drug. As we move through the 21st century, hydrocodone addiction remains a growing problem in the community. (3)

Hydrocodone and Hydromorphone Facts

- Listed as Schedule II drugs: high potential for abuse (1, 2)
- Detection times depend upon dosage and metabolites excreted: (4)
 - Hydrocodone drug: up to 24 hours after use
 - Hydromorphone and its glucuronide metabolite: up to three days after use
- Opiate screens may give false negatives: limited detection sensitivity (5)
- Newly proposed SAMHSA Guidelines: now include testing for hydrocodone and hydromorphone (6)



Hydrocodone is metabolized by the liver into its major metabolite, hydromorphone; most of hydrocodone's effect is from hydromorphone.

More Facts About Hydrocodone and Hydromorphone

Licit Use

Hydrocodone

>136 million prescriptions in 2013
Most commonly prescribed as Vicodin® and Lortab®
More effective than codeine as a cough suppressant
Nearly as potent as morphine for pain relief (1)

Hydromorphone

Approximately 4 million prescriptions in 2012
Most commonly prescribed as Dilaudid®
Metabolite of hydrocodone
More potent than hydrocodone (2)
Prescribed for treatment of moderate to severe pain

Illicit Use

Euphoria effects: continued abuse can cause severe dependence
Can lead to heroin use: is cheaper than illegal pills (\$5 to \$50/tablet) and is abused by all ages and ethnic and economic groups (2)

Side Effects

Nausea, vomiting
Drowsiness, dizziness
Lightheadedness, fuzzy thinking
Anxiety, abnormally happy or sad mood
Rash, itching
Dry throat
Difficulty urinating

Overdose Symptoms

Slow, shallow or stopped breathing
Slowed or stopped heartbeat
Cold, Clammy or blue skin
Excessive sleepiness
Loss of consciousness
Seizures
Death

Metabolism and Detection in Urine

Hydrocodone is metabolized by the liver into its major metabolite, hydromorphone. Most of hydrocodone's effect is from hydromorphone. The active metabolite, hydromorphone, undergoes phase 2 metabolism to form hydromorphone-glucuronide. In a 48 hour urine, people who are rapid metabolizers secrete significantly more of a dose as conjugated hydromorphone (hydromorphone-glucuronide) than those who are poor metabolizers. (7) Hydromorphone and its glucuronide metabolite can be detected for longer periods in urine. (4, 8) Hydromorphone is also a prescription drug under the name of Dilaudid®.

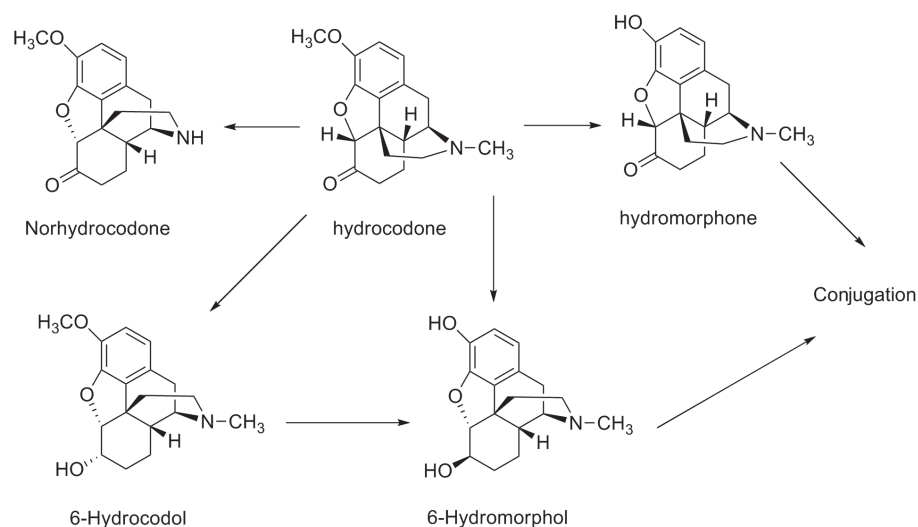


Figure 1: Metabolism of Hydrocodone

How is it tested?

Hydrocodone and hydromorphone concentrations are measured in blood, plasma, and urine mostly by mass spectrophotometric techniques. Until recently, no hydrocodone specific immunoassays existed on the market. Opiate immunoassays were used instead; however, they were developed to detect morphine and are most sensitive to morphine and codeine.

Although some opiate immunoassays also detect hydrocodone and/or hydromorphone, sensitivities for these metabolites are not high enough, increasing the possibility of negative screening results when the drug, or the metabolite, is present in the urine. (4, 5)



The new classification of hydrocodone and hydromorphone as schedule II drugs requires even more diligence by clinicians and proof of patient compliance. ⁽¹⁾

Screening for Hydrocodone and Hydromorphone

The newly proposed Substance Abuse and Mental Health Services Administration (SAMHSA) guidelines include hydrocodone and hydromorphone as additional analytes for workplace drug testing programs.

⁽⁶⁾ Other organizations, such as the Department of Transportation, tend to follow the guidelines set forth by this agency.

Since hydrocodone and hydromorphone are now under schedule II as set forth by the Controlled Substances Act (October 2014), each prescription must be handwritten while the patient is present; as such, prescriptions can no longer be called in or faxed to pharmacies. Prescriptions can only be written for a 30-day supply, with no refills. ⁽³⁾

Using an opiate immunoassay to screen for hydrocodone and hydromorphone may not be suitable to address the continuing rise in illicit use, meet the newly proposed SAMHSA guidelines (using a 300 ng/mL cut-off), and Schedule II regulations.

Given the wide-spread abuse of hydrocodone and hydromorphone, drug courts need to routinely screen for them as part of their drug treatment program.

The new classification of hydrocodone and hydromorphone as schedule II drugs requires even more diligence by clinicians and proof of patient compliance.

SAMHSA certified laboratories can no longer assume that opiate assays will provide the detection sensitivities.

Whether screening for misuse or abuse, prescription compliance, pre-employment or continuing employment, immunoassays developed specifically for the detection of hydrocodone or hydromorphone (as an initial screen) can be used to be in compliance with the new regulations and address community health concerns.

The Thermo Scientific Solution

We offer the Thermo Scientific™ DRI® Hydrocodone Assay with a cut-off of 300 ng/mL.

Below is an example of the assay's cross reactivity performance:

Cross Reactants	Concentration Tested (ng/mL)	% Cross-reactivity
Hydrocodone	300	100%
Hydromorphone	250	120%
Hydromorphone-glucuronide	250	120%



Hydrocodone is the most frequently prescribed opiate in the United States. There are several hundred brand names and generic combinations of hydrocodone products marketed. ⁽¹⁾

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