

Urinary Analytes for Patients Taking Opiate-Based Medications

Understanding Opiate Class Metabolism

Quantitative urine analysis by LC/MS/MS has the capability of detecting analytes of frequently prescribed opiate-based medications; codeine, morphine, hydrocodone, hydromorphone, oxycodone, and oxymorphone (see chart below).

DRUG	URINARY ANALYTES
Codeine	Codeine Morphine Hydrocodone
	◇ morphine is a metabolite of codeine ◇ hydrocodone is a minor metabolite of codeine
Morphine	Morphine Hydromorphone Codeine
	◇ hydromorphone is a minor metabolite of morphine ◇ codeine may be present as an impurity in commercially manufactured morphine
Hydrocodone	Hydrocodone Hydromorphone
	◇ hydromorphone is a metabolite of hydrocodone
Hydromorphone	Hydromorphone
Oxycodone	Oxycodone Oxymorphone Hydrocodone
	◇ oxymorphone is a metabolite of oxycodone ◇ hydrocodone may be present as an impurity in commercially manufactured oxycodone
Oxymorphone	Oxymorphone Oxycodone
	◇ oxycodone may be present as an impurity in commercially manufactured oxymorphone

Codeine

Approximately 5% to 15% of parent codeine is metabolized to morphine in most individuals, so both morphine and codeine can be found in the urine of patients taking codeine. It is significant to note that approximately 5-10% of Caucasians, 1% of East Asians, 1-2% of African Americans, 3% of Mexican Americans, and 2% of Middle Eastern and North Africans are poor metabolizers (PM) deficient in the cytochrome P450 2D6 enzyme required to convert codeine to morphine.^{1,2,9,10} In addition, hydrocodone is a minor metabolite of codeine, and may be excreted in urine at concentrations up to 11% of

parent codeine.^{1,4}

Morphine

The primary analyte detected in urine of patients administered morphine is morphine itself, but several studies have suggested that hydromorphone is a minor metabolite. Small amounts of hydromorphone have been detected in combination with high concentrations of morphine in urine samples of patients prescribed morphine only.^{6,8} Certain investigators have suggested that codeine is also a minor metabolite of morphine, but most agree that codeine arises as an impurity in commercially manufactured morphine.¹

Hydrocodone

Hydrocodone and hydromorphone are expected urinary analytes after hydrocodone consumption. Hydromorphone is a metabolite of hydrocodone. Rapid metabolizers excrete a significantly greater fraction of a dose as hydromorphone than do poor metabolizers (5.9% vs. 1.0% in 48 hour urine).^{1,9}

Hydromorphone

The analyte detected in urine of patients administered hydromorphone is hydromorphone itself.¹

Oxycodone

Analytes detected in urine after oxycodone administration include oxycodone and/or its metabolite oxymorphone.^{1,3, 5} Hydrocodone is a potential impurity in commercially manufactured oxycodone preparations; therefore, a small quantity of hydrocodone could be detected in the urine of patients prescribed oxycodone only.

Oxymorphone

The primary analyte excreted in urine after the administration of oxymorphone is oxymorphone itself.¹ Oxycodone is a potential impurity in the process of commercially manufactured oxymorphone; consequently, a small amount of oxycodone could be detected in the urine of patients prescribed oxymorphone only.^{2,7}

References:

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