Morphine

General:

Morphine, alkaloid derivative of opium, is found highly concentrated in Papaver somniferum and has a considerably stronger effect than morphium itself. It is considered to be the main cause in opiate intoxication. Coma, narrow pupils (mostly without reaction), breathing depression, areflexia, paleness, cyanosis and hypotonia appear at overdosage.

Morphine can be taken orally, rectally, subcutaneously, intravenously, or epidurally. For medicinal purposes, intravenous injection is the most common method of administration. Morphine is subject to extensive firstpass metabolism, so if taken orally, only 40-50% of the dose reaches the central nervous system. Resultant plasma levels after subcutaneous, intramuscular, and IV injection are all comparable. After IM or SC injections, morphine plasma levels peak in approximately 20 minutes, and after oral administration levels peak in approximately 30 minutes.

Morphine is metabolized primarily in the liver and approximately 87% of a dose of morphine is excreted in the urine within 72 hours of administration. Morphine is primarily metabolized into morphine-3-glucuronide (M3G) and morphine-6-glucuronide (M6G) via glucuronidation by phase II metabolism enzyme UDP-glucuronosyl transferase. About 60% of morphine is converted to M3G, and 6–10% is converted to M6G. The cytochrome P450 (CYP) family of enzymes involved in phase I metabolism plays a lesser role. Not only does the metabolism occur in the liver but it may also take place in the brain and the kidneys. M3G does not undergo opioid receptor binding and has no analgesic effect. M6G binds to mu-receptors and is a more potent analgesic than morphine. Morphine may also be metabolized into small amounts of normorphine, codeine, and hydromorphone. Metabolism rate is determined by gender, age, diet, genetic makeup, disease state (if any) and use of other medications.

The elimination half-life of morphine is approximately 120 minutes, though there may be slight differences between men and women. Morphine can be stored in fat, and thus can be detectable even after death. Morphine is able to cross the blood-brain barrier but because of poor lipid solubility, protein binding, rapid conjugation with glucuronic acid and ionization, it does not cross easily. Diamorphine, which is derived from morphine, crosses the blood-brain barrier more easily, making it more potent.

The following tests are available:

- **Morphine in serum**

Indication: suspicion of abuse (hours before)
Material: 1 ml serum
TAT: 7-10 days*
Method: GCMS
Units: µg/l
Ref.- range: <10.0

- **Morphine in urine, qualitative**

Indication: suspicion of abuse (2-3 days ago)
Material: spontaneous urine
TAT: same day,FML
Method: IA
Units: qualitative
Ref.- range: negative

- **Morphine in urine, quantitative**

Indication: suspicion of abuse (2-3 days ago)
Material: spontaneous urine
TAT: 7-10 days*
Method: HPLC
Units: µg/l
Ref.- range: <300

- **Monoacetyl morphine in urine**

Material: 2 ml urine
TAT: 7-10 days*
Method: GCMS
Units: µg/l
Ref.- range: <10

- **Morphine/heroin confirmatory test**

Material: 10 ml urine
TAT: 7-10 days*
Method: GCMS

Units: µg/l
Ref.- range: up to 25

- **Morphine in urine, qualitative**

General:

Detection of 6-monoacetyl morphine in hair.

Material: 300 mg hair (2-3 cm long, about 1 cm in diameter hair)
Preanalytics: Human hair grows an average of 1.0 cm/month. Testing laboratories generally require between 2.0 and 3.0 cm length for testing, the tuft should be 1.0 cm in diameter. This represents approximately 30 to 90 days of drug use. In the absence of the required amount of hair on the scalp, body hair can be used as an acceptable alternative (face, chest, arm pit, and leg hair).
TAT: 7-12 days*
Method: GCMS
Units: ng/mg
Ref.- range: <0.2

For complete list of laboratory test offered at Freiburg Medical Laboratory, please visit http://www.fml-dubai.com/parameter-listings/