

## **ANALYTICAL PROCEDURES**

The FTDTL uses Immunoassay and Gas Chromatography Mass Spectrometry as the primary drug testing methodology. Liquid Chromatography Mass Spectrometry is being developed by the PSA Forensic Research Department.

## **FTDTL INSTRUMENTATION**

The testing procedures are analyzed using:

Olympus AU2700  
Gas Chromatograph  
Gas Chromatograph Mass Spectrometer  
Liquid Chromatograph Mass Spectrometer  
UV Spectrophotometer

## **IMMUNOASSAY PROCEDURE**

Metabolism is the process by which the body chemically converts an ingested drug into water-soluble forms (metabolites), which can be eliminated in the urine. The immunoassay tests are designed to identify the principle metabolites that are produced following ingestion of drugs.

The Emit<sup>®</sup> II Plus assay is a homogeneous enzyme immunoassay technique used for the analysis of specific compounds in human urine. The assay is based on competition between drug in the sample and drug labeled with the enzyme glucose-6-phosphate dehydrogenase (G6PDH) for antibody binding sites. Enzyme activity decreases upon binding to the antibody, so the drug concentration in the sample can be measured in terms of enzyme activity. Active enzyme converts nicotinamide adenine dinucleotide (NAD) to NADH, resulting in an absorbance change that is measured spectrophotometrically. Endogenous serum G6PDH does not interfere because the coenzyme NAD functions only with the bacterial (*Leuconostoc mesenteroides*) enzyme employed in the assay.

## **GAS CHROMATOGRAPHY MASS SPECTROMETRY (GCMS)**

Gas Chromatography Mass Spectrometry (GCMS) is widely recognized in the scientific community as the most specific, sensitive technique that exists for determining the chemical structure of a compound. A GC/MS analysis of a drug metabolite is fingerprinting the chemical structure of that drug on a sub molecular basis. As each human being has his/her own unique fingerprint, so does each drug have its own unique fingerprint (known as a mass spectrum).