

# STERLING NEWS & NOTES

*A Report from Sterling Reference Laboratories*



**Third Quarter, 2007 – TECHNICAL CONTENT**

## Technical Information from STERLING Reference Laboratories

Great strides have been made in Drugs of Abuse (DOA) testing technologies in recent years. Specificity and reliability have improved to the point that testing for DOA is now possible on specimens other than urine or blood. Oral fluid, hair, and sweat testing technologies appear to be sufficiently reliable to be added to drug testing protocols, particularly for laboratory-based programs. There are advantages and disadvantages associated with each specimen types, but urine DOA testing is the most mature technology and remains the gold standard.

The major drawbacks to urine drug testing are well documented, and are primarily specimen collection issues – same sex collectors for observed collections, tampering, dilution, substitution, etc. Oral fluid (saliva) collections overcome most of these collection related problems, but there are unique issues to consider. Attempting to stimulate saliva flow may result in decreased drug levels due to changes in saliva pH resulting in false negatives. Stimulant abusers (amphetamine, methamphetamine, ecstasy) may not have adequate saliva production to obtain a valid specimen. It may also be difficult to obtain an adequate specimen for screening and confirmation tests for polyabusers.

### Summary of Advantages and Disadvantages of Urine, Oral Fluid, Hair, and Sweat

Specimen	Advantages	Disadvantages
Urine	<ul style="list-style-type: none"> <li>• Drugs and drug metabolites are highly concentrated</li> <li>• Extensive scientific basis for testing methodology</li> <li>• Performance testing is liberally practiced</li> <li>• Results are normally accepted in court</li> <li>• Uniform testing criteria (e.g., cutoffs) established</li> <li>• Easily tested by commercial screening methods</li> </ul>	<ul style="list-style-type: none"> <li>• Period of detection 2-3 days</li> <li>• No dose-concentration relationship</li> <li>• Drug concentration influenced by the amount of water intake</li> <li>• Susceptible to adulteration and substitution</li> <li>• Intrusion of privacy (observed collections)</li> </ul>
Oral Fluid	<ul style="list-style-type: none"> <li>• Useful in the detection of recent drug use</li> <li>• Results may be related to behavior/performance</li> <li>• Ready accessibility for collection</li> <li>• Observed collection</li> <li>• Detects parent drugs and metabolites</li> </ul>	<ul style="list-style-type: none"> <li>• More expensive than urine testing</li> <li>• Short window of detection</li> <li>• Collection volume or reliability is device dependent</li> <li>• Drug recovery, especially cocaine is pH dependent</li> <li>• Specimen recovery from stimulant abusers is difficult</li> <li>• Limited test menu and performance testing under development</li> </ul>
Hair	<ul style="list-style-type: none"> <li>• Provides a longer estimate of time of drug use</li> <li>• Detects parent drugs &amp; metabolites (e.g., 6-acetylmorphine)</li> <li>• Observed collection</li> <li>• Ease of obtaining, storing, and shipping specimens</li> <li>• Second specimen can be obtained from original source</li> </ul>	<ul style="list-style-type: none"> <li>• Inability to detect recent or occasional drug use</li> <li>• Potential hair color bias</li> <li>• Possible environmental contamination for some drug classes</li> <li>• Susceptible to adulteration by prior chemical treatment</li> <li>• Expensive and performance testing under development</li> </ul>
Sweat	<ul style="list-style-type: none"> <li>• Provides cumulative measure of drug exposure</li> <li>• Ability to monitor drug intake for a period of days to weeks</li> <li>• Detects parent drugs and metabolites (e.g., 6-acetylmorphine)</li> <li>• Noninvasive specimen collection</li> <li>• Collection device is relatively tamper-proof</li> </ul>	<ul style="list-style-type: none"> <li>• Large variation in sweat production</li> <li>• Limited collection devices / Specimen volume unknown</li> <li>• High inter-subject variability/Can't detect prior exposure</li> <li>• Application risk of contamination / Accidental removal</li> <li>• Performance testing under development</li> </ul>

### Recommended Use of Specimens

Specimen	Use
Urine or Oral Fluid	Pre-employment    Random    Reasonable suspicion/Cause    Post-accident    Return-to-duty / Follow-up
Hair	Pre-employment    Random
Sweat	Return-to-duty / Follow-up

**Change in pH Reporting Limits** - As we continue to move toward securing our SAMHSA certification we are implementing changes in the reporting limits and formats of our specimen validity tests (SVT). These test include creatinine, ph, nitrite, and specific gravity. Our most recent change has been the reporting limits for the pH test, which is monitored to detect substituted or tampered specimens. **Any pH result greater than 2.9 but less than 4.5 or equal to or greater than 9.0 but less than 11.0 is physiologically improbable** and is cause for concern. According to SAMHSA guidelines results within these limits are to be flagged as "Abnormal". **Any result less than 3.0 or greater than 11.0 is evidence of specimen tampering** and the specimen will be reported as adulterated. Unusually acidic specimens (lower than 4.5) are generally a result of specimen tampering or contamination. Unusually alkaline specimens are not as easy to characterize, as specimens, especially those containing any significant amount of bacteria, will become more alkaline over time. It is not unusual to encounter specimens with pH levels around 9.0 that are a result of storage artifact (or urinary tract infection). As the levels rise above 9.5 the probability of specimen tampering or contamination increases significantly. As always, if you have any questions on interpretation, a consulting scientist is available at (800) 442-0438, (253) 552-1551, or via e-mail at [certifying@regtox.com](mailto:certifying@regtox.com).