

Pseudohyperkalemia

By Drs. Cheryl Tomalty and Jan Palaty, Clinical Biochemists

Have you ever been called by LifeLabs with a patient's critical potassium that is normal following a repeat at a hospital?

This phenomenon, pseudohyperkalemia, is defined as a spuriously high potassium result in the absence of visible sample hemolysis or chronic kidney disease. It is typically due to the release of potassium from intracellular stores either during or following blood collection. The most common causes occur during the collection process e.g. mechanical trauma of red blood cells, fist clenching or prolonged standing of sample at room temperature. To illustrate the importance of collection, one urology clinic found its rate of unexplained hyperkalemia to decline from 16.0% to 3.8% with a revised protocol¹.

Potassium may also be misleadingly elevated in the presence of extreme thrombocytosis or leukocytosis though the underlying causes differ. Platelets inherently release their potassium during the clotting process, causing a potassium increase of about 0.15 mmol/L per $100 \times 10^9/L$ which is negligible in typical samples but will become significant when platelets exceed about $500 \times 10^9/L^2$. White cells, by contrast, may release potassium during centrifugation, a situation further aggravated in conditions such as CLL where very high WBC counts are combined with greater membrane fragility. This process of cell lysis

appears to be more limited in serum samples presumably due to entrapment of white cells within the fibrin clot. Consequently, evaluation of potassium results in the presence of thrombocytosis is best done with unclotted (i.e. plasma) samples, whereas serum is preferred for patients with very high WBC counts.

While potassium can also be increased by drugs, most notably beta blockers and drugs targeting the renin-angiotensin-aldosterone system, this is not pseudohyperkalemia. The same is true for hyperkalemia secondary to high osmolality (e.g. hyponatremia, hyperglycemia) or low insulin.

LifeLabs uses serum collection tubes for most biochemistry testing owing to decreased interferences and increased sample versatility. Hospitals, by contrast, use mainly plasma tubes in order to avoid the need for a lengthy clotting step. Consequently, it is not uncommon to observe differences in potassium of up to 2.0 mmol/L between LifeLabs and hospitals. If pseudohyperkalemia is suspected, we suggest ordering potassium in both plasma and serum samples, then continuing to monitor the patient with the more appropriate choice.

References:

1. *JClinNurs* 2015, Jul.16 (adv. pub).
2. *AmJKidneyDis* 1988,12(2) 116.

Do Bugs Need Drugs?

By Dr. Romina Reyes, Medical Microbiologist

The Do Bugs Need Drugs? program (www.dobugsneeddrugs.org), sponsored by the BC Ministry of Health, invites you to order free educational print material to use as tools for supplementing client care. The *Parent Guide to Wise Use of Antibiotics* may assist you when counseling clients who have been identified with respiratory tract infections and for whom development of resistance may cause significant morbidity and/or mortality. The *Parent Guide* is translated into 10 languages: Arabic, Simplified Chinese, Traditional Chinese, French, Persian, Punjabi, Spanish, Vietnamese



and Korean. Japanese, Italian and Thai. Please visit the website to obtain an electronic copy or place an order for print material.

Also note the 2012 *Bugs and Drugs* book for healthcare professionals, which provides guidance for appropriate antibiotic prescribing. If you've not yet received your complimentary hardcopy or iPhone app, you may place an order through the Fluid Survey: <http://fluidsurveys.com/s/BugsandDrugs>. Android versions are available for purchase through Google Play.

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Urine Drug Testing 101

By Dr. Jan Palaty, Clinical Biochemist

1. A standard MSP-reimbursed urine drug screen includes opiates, amphetamines, benzodiazepines, cocaine metabolite and methadone metabolite only.
2. Additional tests (e.g. fentanyl, oxycodone, zopiclone, buprenorphine) must be requested explicitly.
3. The LifeLabs fentanyl screen uses mass spectrometry for maximum specificity and low detection limits.
4. The opiate screen is most effective for morphine, codeine and heroin; its cross-reactivity against hydro-morphone and hydrocodone is modest and it does not detect oxycodone, fentanyl, tramadol, tapentadol and other synthetic opioids. Also note that codeine is metabolized extensively to morphine while hydro-morphone is a minor metabolite (~2%) of high-dose morphine.
5. Confirmation by mass spectrometry (GC/MS or LC/MS) is performed only when requested. When a positive screen result would significant medical consequences (as per MSP), we recommend writing "confirm ____ if positive" on requisition to minimize turnaround time.
6. We are frequently asked whether a positive drug screen result could have been caused by a patient's known medication. While some medications are known to give false-positive screen results, it is also true that the patient may have taken the illicit drug as well: a confirmatory test is needed.
7. MSP-reimbursed samples are not required to meet legal criteria for collection and analysis and so cannot be used in a court of law. Nevertheless, MSP samples are checked for temperature, total volume and appearance, with a suitable comment being attached if one or more parameters are abnormal. Note that a low sample volume (<45mL) increases the risk of the sample having been substituted (e.g. with normal drug-free urine) by the patient.
8. We routinely encounter samples which are either not urine or which have been adulterated with the drug whose presence is expected (e.g. Suboxone). These findings are noted in a comment below the individual tests, so always be sure to read the entire lab report!
9. The MSP-reimbursed urine alcohol screen is for very recent (e.g. <8 hrs) alcohol consumption only. This detection window can be extended to ~2 days with the urine ethyl glucuronide test: please refer to our website or contact Specialty Services (604-431-5005) for details.

We encourage health care practitioners to call and ask for a toxicologist with any questions related to analytical or interpretive issues.

High-volume Chemistry at Burnaby

LifeLabs is installing a state-of-the-art automated chemistry line at the Burnaby site, combining analyzers and sample handling modules.

As a result, specimens will be processed with less manual intervention, reducing the risk of error and improving turnaround time. The new chemistry line will go into production sometime next year.

