

Provincial Laboratory Services



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Updates to Reference Intervals and Critical Values

October 7, 2021

This information applies to: Island Physicians, Nurse Practitioners and Nurse Managers

Reference intervals and interpretive comments are crucial aspects of a laboratory result that serve to orient the physician and aid in test interpretation. Reference intervals generally refer to a range of values that would be expected in a healthy population, and accurate reference intervals may require partitioning for age and sex. Furthermore, reference intervals may be informed by clinical practice guidelines and can serve as a clinical decision limit. The Clinical Chemistry Division periodically examines reference intervals to confirm their continued relevance for the patients we serve. To this end, we evaluated reference intervals for 32 of the most commonly performed tests using samples from healthy adult volunteers. Several updates were necessary and summarized in Table 1. Tests not listed in the table will not change. Pediatric reference intervals will not change. **Reference Interval changes are effective October 14th, 2021.**

A Critical value refers to a laboratory test result that is so abnormal it generally signifies a medical emergency requiring urgent intervention. Establishing critical values requires balancing the potential clinical sequelae against the burden and risk of false alarm due to a variety of patient factors such as age and treatment. Provincial Laboratory Services communicates critical results by telephone as soon as they are available, and the full policy is available on request. The Clinical Chemistry Division has thoroughly reviewed its critical values and made several changes. Decisions on critical values were made on the side of caution, with the intention of improving patient outcomes by alerting providers sooner of concerning laboratory findings. The updated Critical Values list is found in Table 2. **Critical value changes are effective October 19th, 2021.**

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Table 1 Clinical Chemistry assays with updated reference intervals and interpretive comments as of September 28, 2021

Blood Test	Updated Reference Interval
Albumin	QEHL only: 35-50 g/L All other sites: 35-52 g/L
Aspartate Transaminase (AST)	Males: <50 mU/mL Females: <35 mU/mL
Chloride	98-107 mmol/L
Cholesterol	<5.2 mmol/L
Creatinine	Males: 63-106 µmol/L Females: 49-90 µmol/L
Creatine Kinase	Males: 30-200 mU/mL Females: 29-168 mU/mL
C-reactive protein (CRP)	<8.0 mg/L New Comment: CRP elevations are non-specific and must be considered within the context of the patient. Levels >8.0 mg/L are consistent with acute inflammation.
Ferritin	Males: 30-380 µg/L Females: 20-300 µg/L New Comment: Ferritin levels should be interpreted within the context of the patient as inflammation can raise this analyte. Values less than 30-45 µg/L are associated with iron deficiency.
GGT	Males: <50 mU/mL Females: <40 mU/mL
Iron	Males: 9-31.3 µmol/L Females: 7-26 µmol/L
LDH	Males : 180-500 U/L Females : 150-400 U/L New Comment: LDH is only appropriate for monitoring of known hematological malignancies and to investigate possible hemolytic anemia.
Total Protein	64-83 g/L
Troponin T – hs	<14 ng/L Note: High sensitivity Troponin assays are reported relative to a 99 th percentile (above). The critical value has not changed although non-critical values greater than 14 ng/L will display red in powerchart.
Urate	Males: 180-500 µmol/L Females: 150-400 µmol/L New Comment: Urate levels are highly dependant on a number of patient factors such as age, diet, BMI, menopause and the use of population based reference intervals is debatable. Clinical gout may be evident within our reported intervals, and levels may be lower during acute attacks. A common treatment target is <360 nmol/L. Rasburicase treatment falsely lowers urate levels.
Urea	2.5-9.2 mmol/L

Table 2 List of critical values and call frequency for Clinical Chemistry tests. All values refer to analysis in blood unless otherwise specified.

Clinical Chemistry Test	CRITICAL VALUES	Call FREQUENCY
Acetaminophen	>600 umol/L	Once / 72 hrs
Ammonia	>100 umol/L	Once / 72 hrs
Bilirubin, total	>300 umol/L	Once / 72 hrs
Cord Gases Base Excess	≤ -16	Once
Cord Gases pH	≤7.00	Once
Calcium (Ionized)	<0.80 mmol/L / >1.6 mmol/L	Once / 72 hrs
Calcium (Total)	<1.7 mmol/L / >3.0 mmol/L	Once / 72 hrs
Carbamazepine	> 65 umol/L	Each Event
Carboxyhemoglobin	>20%	Once / 72 hrs
Creatinine	>400 umol/L	Once / 6 mos unless ≥25% change from previous critical between 0800 - 1700 Dialysis Unit Patients Excluded
CSF Glucose	<2.0 mmol/L	Once / 72 hrs
CSF Protein	>2.0 g/L	Once / 72 hrs
Digoxin	>3.0 nmol/L	Once / 72 hrs
Ethanol	>40 mmol/L	Once / 72 hrs
Gentamicin (Trough values)	1 mos – 18 yrs: >1.4 mg/L >18 yrs: >2 mg/L	Each Event
Glucose - High	<1mos: >20 mmol/L >1mos: >25 mmol/L	Once / 72 hrs
Glucose - Low	≤2.8 mmol/L	Each Event
Lactate	>4 mmol/L	Each Event for ED patients. Once / 72 hrs for Inpatients and others
Lithium	>1.5 mmol/L	Once / 72 hrs
Magnesium	<0.5 mmol/L / >2.0 mmol/L	Once / 72 hrs
Osmolality	<250 mOsm/kg / >325 mOsm/kg	Each Event. Acute Care Patients Only
pCO ₂	<20.00 mmHg / >60.00 mmHg	Each Event
pH	≤7.20 / >7.60	Each Event
Phenobarbital	>255 umol/L	Each Event
Phenytoin	>99 umol/L	Once / 72 hrs.
Phosphate	<0.4 mmol/L / >4 mmol/L	Once / 72 hrs. Excludes renal patients.
pO ₂ (Arterial Blood gas)	<40 mmHg	Each Event
Potassium	<2 mos: <2.9 mmol/L / >7.0 mmol/L >2 mos: <2.9 mmol/L / >6.5 mmol/L	Each Event
Salicylate	>2.2 mmol/L	Once / 72 hrs
Sodium	<120 mmol/L / >160 mmol/L	Once / 72 hrs
Theophylline	>110 umol/L	Once / 72 hrs
Tobramycin (Trough values)	1 mos – 18 yrs: >1.4 mg/L >18 yrs: >2 mg/L	Each Event
Total CO ₂	<15.0 mmol/L / >40.0mmol/L	Once / 72 hrs
Troponin I - hs	Males: >34.2 ng/L Female: >15.6 ng/L	First event
Troponin T - hs	≥50.0 ng/L	Each event
Troponin T	≥50.0 ng/L	Each Event
Urea (Infants)	<1mos only: >25 mmol/L	Once / 72 hrs
Uric Acid	>800 umol/L	Once / 72 hrs. Excludes renal patients.
Valproic Acid	>832 umol/L	Once / 72 hrs
Vancomycin (Trough values)	<16 yrs: >20 mg/L ≥16 years: >25 mg/L	Each Event