Beaumont HEALTH

Beaumont Laboratory	Effective Date:	10/31/2019
Clinical Pathology	Supersedes:	09/28/2015
Royal Oak	Related Documents:	

FORMULAS FOR MANUAL CALCULATIONS (LIS Downtime)

Anion Gap = Sodium – (Cl + CO2)

Globulin = Total Protein – Albumin

A/G Ratio = Albumin / (Total Protein – Albumin)

Chol/HDL Ratio = Chol/HDL

Non HDL Cholesterol = Chol – HDL = mg/dL

LDL Cholesterol = Total Chol – HDL – (Trig/5)
Note: Formula for calculation only if Trig<400 mg/dL

BUN/Creatinine Ratio = BUN/Creatinine

CKD-EPI Estimated GFR (mL/min/1.73 m^2) =
$141 \times \min(S_{cr}/\kappa, 1)^{\alpha} \times \max(S_{cr}/\kappa, 1)^{-1.209} \times 0.993^{Age} \times 1.018$ [if female] $\times 1.159$ [if black]

S_{cr} is serum creatinine in mg/dL,
κ is 0.7 for females and 0.9 for males,
α is -0.329 for females and -0.411 for males,
min indicates the minimum of S_{cr}/κ or 1, and
max indicates the maximum of S_{cr}/κ or 1.

Example for a female patient:
$141 \times \min(S_{Cr}/0.7,1)^{-0.329} \times \max(S_{Cr}/0.7,1)^{-1.209} \times 0.993^{Age} \times 1.018 \times 1.159$ [if black]

Example for a male patient:
$141 \times \min(S_{Cr}/0.9,1)^{-0.411} \times \max(S_{Cr}/0.9,1)^{-1.209} \times 0.993^{Age} \times 1.159$ [if black]

(Use www.kidney.org to calculate)

% Saturation = 100 x [serum Iron/ (Transferrin x 1.4)]

TIBC = Transferrin x 1.4

CK-MB Index = (CKMB / CK) x 100

Formulas for Manual Calculations (LIS Downtime)

Urine MicroAlbumin/Creatinine Ratio = (ualb mg/dL/Urine Creatinine mg/dL) x 1000

Urine Creatinine Clearance mL/min

$$\frac{\text{Raw Urine Creatinine mg/dL}}{\text{Serum Creat mg/dL}} \times \left(\frac{\text{TV ml}}{\text{Hrs collection}} \times \frac{1 \text{ Hr}}{60 \text{ min}} \right)$$

Urine Creatinine Clearance Pediatric mL/min CC Corrected =

$$\frac{\text{Raw Ur Creat mg/dL}}{\text{Serum Creat mg/dL}} \times \left(\frac{\text{TV mL}}{\text{Hrs collection}} \times \frac{1 \text{Hr}}{60 \text{min}} \right) \times \left(\frac{1.73 \text{ m}^2}{\text{surface area m}^2} \right)$$

NOTE: Surface area m² is determined from child's height and weight.

Urine Creatinine Timed or 24 Hour mg/Coll =

$$\text{Raw Urine Creatinine } \frac{\text{mg}}{\text{dL}} \text{ X dilution X} \left(\frac{\text{TV mL}}{\text{Coll.}} \text{ X } \frac{10 \text{dL}}{1000 \text{mL}} \right)$$

Urine Amylase Timed U/Hr =

$$\text{Raw Urine Amylase } \frac{\text{U}}{\text{L}} \text{ x dilution x } \frac{\text{TV ml}}{\text{Hrs of Coll.}} \text{ x } \frac{1 \text{L}}{1000 \text{mL}}$$

Urine Calcium Timed or 24 Hour, mg/Collection =

$$\text{Raw Urine Calcium } \frac{\text{mg}}{\text{dL}} \text{ x dilution x } \left(\frac{\text{TV mL}}{\text{Coll.}} \text{ x } \frac{10 \text{dL}}{1000 \text{mL}} \right)$$

Urine Glucose Timed and 24 Hour, g/Collection =

$$\text{Raw Urine Glucose } \frac{\text{mg}}{\text{dL}} \text{ x dilution x } \left(\frac{\text{TV mL}}{\text{Coll.}} \text{ x } \frac{10 \text{dl}}{1000 \text{mL}} \right) \text{ x } \frac{\text{g}}{1000 \text{mg}}$$

Urine Magnesium Timed or 24 Hour,   mg/Collection =

$$\text{Raw Magnesium } \frac{\text{mg}}{\text{dL}} \text{ x dilution x } \left(\frac{\text{TV mL}}{\text{Coll.}} \text{ x } \frac{10 \text{dL}}{1000 \text{mL}} \right)$$

Urine Phosphorous Times or 24 Hour, g/Collection =

$$\left(\text{Raw Urine Phos } \frac{\text{mg}}{\text{dL}} \text{ x } \frac{1 \text{g}}{1000 \text{mg}} \right) \text{ x dilution x } \left(\frac{\text{TV mL}}{\text{Coll.}} \text{ x } \frac{10 \text{dL}}{1000 \text{mL}} \right)$$

Formulas for Manual Calculations (LIS Downtime)

Urine Protein Timed or 24 Hour, mg/Collection =

$$\text{Raw Urine Protein } \frac{mg}{dL} \times \text{ dilution } \times \left(\frac{TV\ mL}{Coll.} \times \frac{10dL}{1000mL} \right)$$

Urine Urea Nitrogen Timed or 24 Hour, mg/Collection =

$$\text{Raw Urine Urea Nitrogen } \frac{mg}{dL} \times \text{ dilution } \times \left(\frac{TV\ mL}{Coll.} \times \frac{10dL}{1000mL} \right)$$

Urine Uric Acid Timed or 24 Hour, mg/Collection =

$$\text{Raw Urine Uric Acid } \frac{mg}{dL} \times \text{ dilution } \times \left(\frac{TV\ mL}{Coll.} \times \frac{10dL}{1000mL} \right)$$

Urine Sodium Timed or 24 Hour, mmol/Collection =

$$\text{Raw Urine Sodium } \frac{mmol}{L} \times \text{ dilution } \times \left(\frac{TV\ ml}{Coll.} \times \frac{1L}{1000mL} \right)$$

Urine Potassium Timed or 24 Hour, mmol/Collection =

$$\text{Raw Urine Potassium } \frac{mmol}{L} \times \text{ dilution } \times \left(\frac{TV\ mL}{Coll.} \times \frac{1L}{1000mL} \right)$$

Urine Chloride Timed or 24 Hour, mmol/Collection =

$$\text{Raw Urine Chloride } \frac{mmol}{L} \times \text{ dilution } \times \left(\frac{TV\ mL}{Coll.} \times \frac{1L}{1000mL} \right)$$

% Urine Amylase/Creatinine Clearance Ratio =

$$\frac{\text{Raw Urine Amylase U/L}}{\text{Serum Amylase U/L}} \times \frac{\text{Serum Creatinine mg/dL}}{\text{Raw Urine Creatinine mg/dL}} \times 100$$

NOTE: reference range 1.3-4.3%

Urine Protein/ Creatinine Ratio =

$$\frac{\text{Raw Urine Protein mg/dL}}{\text{Raw Urine Creatinine mg/dL}}$$

NOTE: reference range 0.0-0.2

Formulas for Manual Calculations (LIS Downtime)

Urine Calcium/ Creatinine Ratio =

<u>Raw Urine Calcium mg/dL</u>
Raw Urine Creatinine mg/dL

NOTE: reference range 0.02-0.26

AAPO2, mmHg =
((713mmHg x FiO2 as decimal) – (PCO2 / 0.8)) - PO2

PF, no units =
PO2 / FiO2 (as a decimal value)

% Free PSA =
(Free PSA/PSA) X 100

Albumin gradient; Serum and Ascites fluid, g/dL =
Albumin (g/dL) – Albumin fluid (g/dL)
NOTE: >1.1 = Transudate
            0.2-1.0 = Exudate

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Authorized Reviewers: Section Medical or Technical Director

Formulas for Manual Calculations (LIS Downtime)

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Document History

Signature	Date			
Prepared by: M. Landskroener MT(ASCP)	12/05/2008			
Approved by:				

Reviewed by: (Signature)	Date	Revision	Modification	Related Documents Reviewed/Updated
Raymond E. Karcher, PhD	12/05/2008			
Raymond E. Karcher, PhD	12/04/2009			
Vivek Kumar, PhD	12/07/2010			
Vivek Kumar, PhD	02/14/2012	r01	Added the following equations: Non HDL Chol, %CPSA, % Free PSA, Albumin gradient: serum and ascites fluid. Changed microalbumin units to mg/dL,	
Kenneth Simkowski	11/19/2014			
Steven Truscott, PhD	09/28/2015	r02	Updated GFR equation to CKD-EPI (2009 version)	
Kenneth Simkowski, PhD	11/03/2017			
Elizabeth Sykes, MD	02/02/2018			
Peter Millward, MD	09/17/2018		New medical director	
Peter Millward, MD	11/19/2018			
Updated by: Robin Carey-Ballough MT(ASCP)	10/31/19	r03	Updated Calculations to Abbott methods. Removed calculations not in use	
Approved: Qian Sun PhD	11/1/2019			

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