

Minimum Specifications from Biological Variation database

When the best isn't possible, How low can you go? The Biologic Variation database, compiled by the Spanish CC society and Dr. Carmen Ricos, not only includes desirable and optimal specifications for imprecision, bias and total error, but also *minimum* specifications. For labs unable to achieve the recommended level of quality, here at least is the floor on performance. Updated for 2014.

[Please note: by August or October of 2018, the EFLM and SEQC have requested that Westgard.com no longer display this data]

Minimum Specifications for Total Error, Imprecision, and Bias, derived from intra- and inter-individual biologic variation

This most recent and extensive listing of biologic goals has been provided by Ricos C, Alvarez V, Cava F, Garcia-Lario JV, Hernandez A, Jimenez CV, Minchinela J, Perich C, Simon M. "Current databases on biologic variation: pros, cons and progress." *Scand J Clin Lab Invest* 1999;59:491-500. *This database was most recently updated in 2014: see what was updated here.*

IMPORTANT UPDATE: "[T]he BV data on your website is provided by the Analytical Quality Commission of the SEQC....

"The Analytical Quality Commission and ourselves have discussed this and agree that the EFLM database probably will provide estimates of Total allowable error. Furthermore, once the EFLM database is available, the BV database provided by the SEQC should be removed from both your website and the SEQC website. We would therefore not agree to new data being added to the 2014 BV database update. The aim is for the EFLM website to be available within 4-6 months and we will contact you once it has been published. Thank you for your understanding.

Kind regards,

Aasne Krine Aarsand, Sverre Sandberg, Pilar Fernandez Calle, Carmen Perich & Carmen Ricos
On behalf of the Working Group on Biological Variation, EFLM and the Analytical Quality Commission, SEQC, April 26, 2018"

[See The Reference List](#)

[See The References](#)

[See The original Guest Essay](#)

Note on abbreviations:

CV_i = within-subject biologic variation

CV_g = between-subject biologic variation

I = minimum specification for imprecision

B = minimum specification for inaccuracy

TE = minimum specification for allowable total error

	Analyte	Biologic Variation		Minimum Specification		
		CV _I	CV _G	CV(%)	Bias (%)	TE _a
S-	α1-Antitrypsin	5.9	16.3	4.4	6.5	13.8
P-	α2-Antiplasmin	6.2	---	4.7	---	---
S-	α2-Macroglobulin	3.4	18.7	2.6	7.1	11.3
S-	α-Amylase	8.7	28.3	6.5	11.1	21.9
S-	α-Tocopherol	13.8	15.0	10.4	7.6	24.7
S-	Acid phosphatase tartrate-resistant	8.0	13.3	6.0	5.8	15.7
P-	Activate partial thromboplastin, time (APTT)	2.7	8.6	2.0	3.4	6.7
S-	Alanine aminopeptidase	4.1	---	3.1	---	---
S-	Albumin	3.	4.75	2.4	2.1	6.1
S-	Albumin, glycated	5.2	10.3	3.9	4.3	10.8
S-	Alkaline phosphatase, bone isoenzyme	6.2	37.4	4.7	14.2	21.9
P-	Antithrombin III	5.2	15.3	3.9	6.1	12.5
S-	Apolipoprotein B	6.9	22.8	5.2	8.9	17.5
S-	Apolipoprotein A1	6.5	13.4	4.9	5.6	13.6
S-	β2-Microglobulin	5.9	15.5	4.4	6.2	13.5
P-	C Protein	5.8	55.2	4.4	20.8	28.0
S-	Calcium	1.9	2.8	1.4	1.3	3.6
S-	Calcium, ionized	1.7	1.9	1.3	1.0	3.1
S-	Carbohydrate deficient transferrin	7.1	38.7	5.3	14.8	23.5
(B)Gas	Carbon dioxide	4.0	4.8	3.0	2.3	7.3
S-	Carnitine, free	8.05	16.65	6.0	6.9	16.9
S-	Ceruloplasmin (Ferroxidase)	5.8	11.1	4.4	4.7	11.9
S-	Chloride	1.2	1.5	0.9	0.7	2.2
S-	Cholinesterase, activity	6.1	18.2	4.6	7.2	14.7
S-	Cholinesterase, concentration	7.1	---	5.3	---	---
S-	Collagen type I C propeptide (PICP)	7.8	26.7	5.9	---	---
S-	Collagen type III N propeptide (PIIINP)	13.6	87.2	10.2	33.1	49.9
S-	Copper	4.7	13.6	3.5	5.4	11.2
P-	Cysteine	5.9	12.3	4.4	5.1	12.4
S-	Dehydroepiandrosterone sulfate (DHEA)	6.35	30.7	4.8	11.8	19.6

Analyte	Biologic Variation		Minimum Specification		
	CV _I	CV _G	CV(%)	Bias (%)	TE _a

B-	Erythrocytes, count	3.25	6.3	2.4	2.7	6.7
P-	Factor V coagulation	3.6	---	2.7	---	---
P-	Factor VII coagulation	6.8	19.4	5.1	7.7	16.1
P-	Factor VIII coagulation	4.8	19.1	3.6	7.4	13.3
P-	Factor X coagulation	5.9	---	4.4	---	---
S-	Fructosamine	3.4	5.9	2.6	2.6	6.8
S-	Globulins, total	5.5	12.9	4.1	5.3	12.1
B-	Glutathione Peroxidase	7.2	21.7	5.4	8.6	17.5
S-	HDL1 Cholesterol	5.5	27.2	4.1	10.4	17.2
S-	HDL3 Cholesterol	7.0	14.3	5.3	6.0	14.6
B-	Hematocrit	2.7	6.41	2.0	2.6	5.9
B-	Hemoglobin	2.85	6.8	2.1	2.8	6.3
B-	Hemoglobin A1C	1.85	5.7	1.4	2.2	4.5
P-	Homocysteine	9.0	40.3	6.8	15.5	26.6
S-	Immunoglobulins, k chain	4.8	15.3	3.6	6.0	12.0
S-	Immunoglobulins, l chain	4.8	18.0	3.6	7.0	12.9
S-	Lactate dehydrogenase, isoenzyme 1	2.3	8.3	1.7	3.2	6.1
S-	Lactate dehydrogenase, isoenzyme 2	3.3	2.4	2.5	1.5	5.6
S-	Lactate dehydrogenase, isoenzyme 3	2.8	3.8	2.1	1.8	5.2
S-	Lactate dehydrogenase, isoenzyme 4	5.9	5.3	4.4	3.0	10.3
S-	Lactate dehydrogenase, isoenzyme 5	8.0	9.6	6.0	4.7	14.6
S-	LDL Cholesterol	7.8	20.4	5.9	8.2	17.8
B-	Lymphocytes, CD4	25.0	---	18.8	---	---

	Analyte	Biologic Variation		Minimum Specification		
		CV _i	CV _G	CV(%)	Bias (%)	TE _a
(B)Eryth-	Magnesium	5.6	11.3	4.2	4.7	11.7
S-	Magnesium	3.6	6.4	2.7	2.8	7.2
(B)Eryth-	Mean corpuscular hemoglobin (MCH)	1.4	5.2	1.1	2.0	3.8
(B)Eryth-	Mean corpuscular hemoglobin concentration (MCHC)	1.06	1.2	0.8	0.6	1.9
(B)Eryth-	Mean corpuscular volume (MCV)	1.4	4.85	1.1	0.7	2.3
(B)Plat-	Mean platelet volume	4.3	8.1	3.2	3.4	8.8
S-	Osmolality	1.3	1.2	1.0	0.7	2.3

S-	Osteocalcin	6.35	30.9	4.8	11.8	19.7
P-	Plasminogen	7.7	---	5.8	---	---
B-	Platelet distribution wide	2.8	---	2.1	---	---
S-	Potassium	4.6	5.6	3.5	2.7	8.4
S-	Protein	2.75	4.7	2.1	2.0	5.4
S-	Protein, glyated	0.9	11.6	0.7	4.4	5.5
P-	Prothrombin, Time	4.0	6.8	3.0	3.0	7.9
Patient-	Reabsorption tubular phosphate	2.7	3.3	2.0	1.6	4.9
B-	Red cell distribution wide	3.5	5.7	2.6	2.5	6.8
P-	S Protein	5.8	63.4	4.4	23.9	31.1
(B)Eryth-	Sodium	1.8	12.4	1.4	4.7	6.9
S-	Sodium	0.6	0.7	0.5	0.3	1.1
S-	Thyroxine (T4)	4.9	10.6	3.7	4.4	10.4
S-	Thyroxine Binding Globulin (TBG)	0.09	0.06	0.1	0.0	0.2
S-	Transferrin	3.0	4.3	2.3	2.0	5.7
S-	Vascular cell adhesion molecule-1 (VCAM-1)	5.2	16.0	3.9	6.3	12.7
P-	Vascular endotelial growth factor	14.1	18.1	10.6	8.6	26.1
P-	Von Willebrand factor	2.5	27.3	1.9	10.3	13.4
S-	Water	3.1	0.1	2.3	1.2	5.0