

## Optimal Biological Variation database specifications

How good can you get? The Biologic Variation database, compiled by the Spanish CC society and Dr. Carmen Ricos, not only includes desirable specifications for imprecision, bias and total error, but also optimal specifications. For labs in search of "stretch" goals, here's the place to start. 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.]

## Optimal 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<sub>i</sub>** = within-subject biologic variation

**CV<sub>e</sub>** = between-subject biologic variation

**I** = minimum specification for imprecision

**B** = minimum specification for inaccuracy

**TE** = minimum specification for allowable total error

	Analyte	Biologic Variation		Optimal Specification		
		CV <sub>I</sub>	CV <sub>G</sub>	CV(%)	Bias (%)	TE <sub>a</sub>
S-	$\alpha$ -Amylase	8.7	28.3	2.2	3.7	7.3
U-	$\alpha$ -Amylase	94.0	46.0	23.5	13.1	51.9
U-	$\alpha$ -Amylase pancreatic	69.5	105.0	17.4	15.7	44.4
S-	$\alpha$ 1-Acid Glycoprotein	11.3	24.9	2.8	3.4	8.1
S-	$\alpha$ -Fetoprotein	12.2	45.6	3.1	5.9	10.9
S-	Alanine aminotransferase (ALT)	19.4	41.6	4.9	5.7	13.7
S-	Aspartate aminotransferase(AST)	12.3	23.1	3.1	3.3	8.3
U-	Albumin	35.0	35.0	9.9	7.0	23.3
U-	Aldosterone	32.6	39.0	8.2	6.4	19.8
S-	Bilirubin	21.8	28.4	5.5	4.5	13.5
S-	Bilirubin, conjugated	36.8	43.2	9.2	7.1	22.3
S-	C4 Complement	8.9	33.4	2.2	4.3	8.0
S-	CA 125 Antigen	24.7	54.6	6.2	7.5	17.7
S-	CA 15.3 Antigen	6.1	62.9	1.5	7.9	10.4
S-	CA 19.9 Antigen	15.95	130.5	4.0	16.4	23.0
U-	Calcium, output	26.2	27.0	6.6	4.7	15.5
S-	Carcinoembryonic Antigen (CEA)	12.7	55.6	3.2	7.1	12.4
S-	Cholesterol	5.95	15.3	1.5	2.1	4.5
S-	Cortisol	15.2	38.1	3.8	5.1	11.4
S-	C peptide	16.6	23.2	4.2	3.6	10.4
S-	C reactive protein	42.2	76.3	10.6	10.9	28.3
S-	Creatine kinase	22.8	40.0	5.7	5.8	15.2
S-	Creatinine kinase MB, %	6.9	42.8	1.7	5.4	8.3
S-	Creatinine kinase MB, mass	18.4	56.6	4.6	7.4	15.0
S-	Creatinine	11.0	23.0	2.8	3.2	7.7
S-	Cyfra 21.1 Antigen	22.2	31.1	5.6	4.8	13.9
S-	Estradiol	22.5	24.4	5.6	4.1	13.4
S-	Ferritin	14.2	15.0	3.6	2.6	8.4
S-	Folate	24.0	73.0	6.0	9.6	19.5
S-	Follicle Stimulating Hormone (FSH)	11.0	47.2	2.8	6.1	10.6
S-	$\gamma$ -Glutamyltransferase	13.4	42.15	3.4	5.5	11.1
S-	Haptoglobin	20.4	36.4	5.1	5.2	13.6
S-	Immunoglobulin A	5.4	35.9	1.4	4.5	6.8
S-	Immunoglobulin M	5.9	47.3	1.5	6.0	8.4
S-	Iron	26.5	23.2	6.6	4.4	15.3
B-	Lactate	27.2	16.7	6.8	4.0	15.2

S-	Lactate dehydrogenase	8.6	14.7	2.2	2.1	5.7
S-	Luteinizing Hormone (LH)	23.0	27.4	5.8	4.5	14.0
S-	Myoglobin	17.6	46.3	4.4	6.2	13.5
U-	Osmolality	28.3	57.9	7.1	8.1	19.7
B-	pH	3.5	2.0	0.9	0.5	1.9
S-	Parathyroid hormone (PTH)	25.9	23.8	6.5	4.4	15.1
S-	Phosphate	8.15	10.8	2.0	1.7	5.1
U-	Phosphate, output	18.0	22.6	4.5	3.6	11.0
U-	Potassium, output	24.4	22.2	6.1	4.1	14.2
S-	Prolactin	23.0	34.95	5.8	5.2	14.7
S-	Prostatic specific antigen (PSA)	18.1	72.4	4.5	9.3	16.8
U-	Protein, output	35.5	23.7	8.9	5.3	20.0
U-	Sodium, output	28.7	16.7	7.2	4.2	16.0
S-	Triglyceride	19.9	32.7	5.0	4.8	13.0
S-	Thyroid Stimulating Hormone (TSH)	19.3	24.6	4.8	3.9	11.9
S-	Thyroglobulin	14.0	39.0	3.5	5.2	11.0
S-	Urate	8.6	17.5	2.2	2.4	6.0
U-	Urate	16.8	14.4	4.2	2.8	9.7
S-	Urea	12.1	18.7	3.0	2.8	7.8
U-	Urea	17.4	25.4	4.4	3.8	11.0