

# Reference Predicted Normals used in EasyOne and EasyWare

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This document describes in detail which predicted normals are implemented in the current version of EasyOne and the PC companion software EasyWare. The following table shows implementation details and the publications on which the reference values are based.

The first table has the following entries:

Reference:	Name of predicted normal reference used in EasyOne and EasyWare. The name is the study name, or the name of the authors of the publication.
Publ. Year:	Year when the study was published.
Abbrev.:	Abbreviation for the study. The abbreviation is used if parameters from other studies are copied. Example: For most studies 'Cherniak' (CH) values are used for the MVV parameter.
Age Range:	Age range of the study. If range was extended beyond the study range the extended range is shown in parenthesis.
Height Range:	Height range of the study. Extended range also listed in parenthesis, as in age range.
Weight Range:	Weight range of the study. In most studies weight is not used.
Built in:	The studies that are marked with an X are integrated into all EasyOne. Studies that are not marked can be loaded into EasyOne by ndd or a local dealer.
Ethnic:	Ethnic group that is supported by the study.
Parameter:	In the parameter list the following indicators are used: X                the parameter is available in the study X (green)     the parameter is available in the study <u>and</u> it is used in EasyOne X (orange)    the LLN of the parameter (see below) is computed according to the ATS recommendations: $LLN = Predicted - 1.645 * SEE$ (Standard Error of Estimate) FVC, IVC      the value of the parameter is copied from listed parameter of the same source FEV1/FVC     FEV1/FVC% is computed from the predicted of FEV1 and FVC of the same source
Lower Limit of Normal of Parameter:	This table lists which lower limits of normal (LLN) are provided by the study. If the study does not have a formula for LLN, the LLN is set to 80% of the predicted for normal parameters (FVC, FEV1 etc.) and 90% of predicted for relative parameters like FEV1/FVC%.
Additional remarks:	
Lung Age:	Lung Age is computed according to the following publication: Spirometric "Lung Age" Estimation for Motivating Smoking Cessation. J.F. Morris, W. Temple. Prev Med 14, 655-662 (1985).
Scandinavian References:	These predicted normals are always combined with the Zapletal references for children.



	Reference	Index	Publication
North America	NHANES III (Hankinson)	/REF_P01/	John L. Hankinson, John R. Odencrantz, and Kathleen B. Fedan. Spirometric Reference Values from a Sample of the General U.S. Population. Am J Respir Crit Care Med, Vol 159, p 179-187, 1999
	Knudson_83	/REF_P02/	Knudson, Ronald J, Michael Lebowitz, Holberg Catherine J., Benjamin Burrows. Changes in the Normal Maximal Expiratory Flow-Volume Curve with Aging. American Review of Respiratory Disease, Volume 127, p. 725-734, 1983.
	Knudson_76	/REF_P03/	Knudson, Ronald J, Ronald Slatin, Michael Lebowitz, Benjamin Burrows. The maximal Expiratory Flow-Volume Curve. American Review of Respiratory Disease, Volume 113, p. 587-600, 1976
	Crapo	/REF_P04/	Crapo RO, Morris AH, Gardner RM. Reference spirometric values using techniques and equipment that meets ATS recommendations. Am Rev Respir Dis Volume 123, p.659-664, 1981.
	Morris	/REF_P05/ /REF_P19/	Morris, James F., Koski, Arthur, Lavon Johnson. Spirometric Standards for Healthy Non-Smoking Adults. American Review of Respiratory Disease, Volume 10-3, p. 57-67, 1971 Morris, J.F. West J. Med (1976) 125:110-118
	Hsu	/REF_P06/	Hsu KHK, Bartholomew PH, Thompson V, Hsieh GSJ. Ventilatory Functions of Normal children and Young Adults- Mexican- American, White, Black. I. Spirometry. J Pediatr Volume 95, p. 14-23, 1979.
	Dockery (Harvard)	/REF_P07/	Dockery, D.W. et al., Distribution of Forced Vital Capacity and Forced Expiratory Volume in One Second in Children 6 to 11 Years of Age, American Rev. of Respiratory Disease. Volume 128, p. 405-412, 1983.
	Polgar	/REF_P20/	Polgar, Promadhat, Pulmonary Function Testing in Children: Techniques and Standards. W.B. Saunders Co., Philadelphia, 1971
	Cherniak	/REF_P08/	Cherniak, R.M., and Raber M.B. Normal Standards for Ventilatory Function using an Automated Wedge Spirometer. American Review of Respiratory Disease. Volume 106, p.38-46, 1972
Latin America	Pereira	/REF_P09/	Carlos Alberto de Castro Pereira, Sueli da Penha Barreto, João Geraldo Simões, Francisco W.L. Pereira, José Gerson Gerstler, Joge Nakatani. Valores de referência para a espirometria em uma amostra da população brasileira adulta, Jornal de Pneumologia 18(1):10-22, maio de 1992
Europe	ERS (ECCS, EGKS)	/REF_P10/	P.H. Quanjer. Lung Volumes and Forced Ventilatory Flows. Eur Respir J, Vol 6, Suppl 16, p. 5-40, 1993
	Zapletal	/REF_P11/	A. Zapletal, T. Paul, M. Samanek. Die Bedeutung heutiger Methoden der Lungenfunktionsdiagnostik zur Feststellung einer Obstruktion der Atemwege bei Kindern und Jugendlichen. Z. Erkrank. Atm.-Org., Volume 149, 343-371, 1977.
	Austria (Forche)	/REF_P12/	G. Forche, K. Harmoncourt, E. Stadlober. Neue spirometrische Bezugswerte für Kinder, Jugendliche und Erwachsene. Öst. Ärztztg. 43, 15-16, 1988.
	Sapaldia	/REF_P13/	SAPALDIA team, O Brändli, CH. Schindler, N. Künzli, R. Keller, A.P. Perruchoud. Lung function in healthy never smoking adults: reference values and lower limits of normal of a Swiss population. Thorax 1996; 51:277-283
	Spain (Roca)	/REF_P14/	J. Roca et al. spirometric reference values for a Mediterranean population. Bull Eur Physiopathol Respir, 18:101-102, 1982.
Scandinavia	Hedenström	/REF_P15/	H. Hedenström, P. Malmberg, K. Agarwal. Reference values for lung Function tests in females. Bull. Eur. Physiopathol. Respir. 21, p. 551-557, 1985. H. Hedenström, P. Malmberg, H.V. Fridriksson. Reference values for lung function tests in men. Upsala J. Med. Sci., 91:299-310, 1986
	Gulsvik	/REF_P16/	A. Gulsvik. Spirometri (Korrespondanser). Tidsskr Nor Loegeforen nr. 31, 105:2240-2, 1985.
	Berglund	/REF_P17/	E. Berglund, G. Birath, J. Bjure, G. Grimby, I. Kjellmer, L. Sandqvist, B. Söderholm. Spirometric Studies in Normal Subjects. Acta Medica Scandinavica, Vol. 173, fasc. 2, p. 185-206, 1963.
Australia Asia	Hibbert	/REF_P18/	Marianne E. Hibbert, M App Sci, Anna Lannigan, RN, Louis I. Landau, MD, Peter D. Phelan, MD. Lung Function Values From a Longitudinal Study of Healthy Children Adolescents, Pediatric Pulmonology 7:101-109 (1989)
	Gore, Crockett	/REF_P19/	C.J. Gore, A.J. Crockett, D.G. Pederson, M.L. Booth, A. Bauman, N. Owen. Spirometric standards for healthy adult lifetime nonsmokers in Australia. Eur Respir J., 1995, 8, 773-782
	JRS2001	/REF_P20/	日本人のスパイログラムと動脈血液ガス分圧基準値 日本呼吸器学会肺生理専門委員会 2001年4月