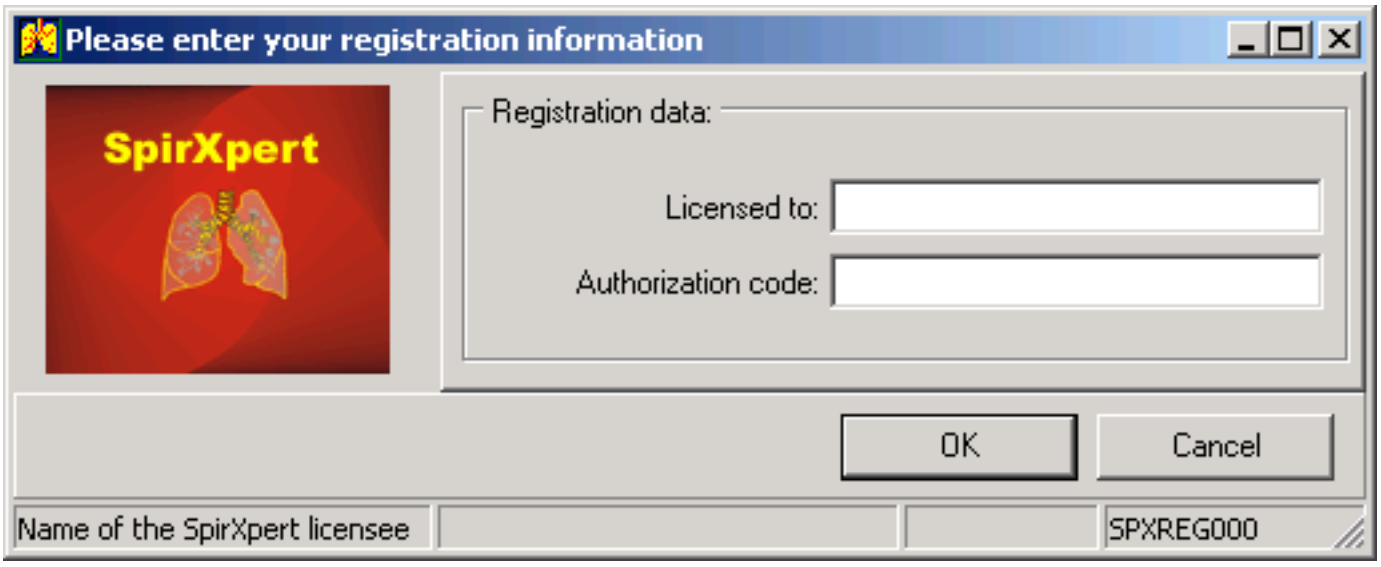
How to use SpirXP

Registration

Each user must identify himself with a user name and numeric code after first installation. This information is provided to you in a separate document. That information must be copied exactly, i.e. capital or lower case characters, spaces, brackets, etc.

If you received the software on trial, the default is:

Licensed to: 15 days trial version
Authorization code: 1894-0930-83



Please take note of the following

The software

The SpirXP software has been designed and tested with the greatest care. However, it is impossible to guarantee that it will work as intended under all circumstances and on any PC system.

Please send any comments you may have to pquanjer@spirxpert.com.

Quality of spirometric measurements

It is implicitly assumed that test results of FEV_1 and (F)VC entered for evaluation into SpirXP comply with recommendations issued by ECCS/ERS, ATS, ATS/ERS or NLHEP. This implies that at least two or three technically acceptable (F)VC maneuvers were obtained with reproducible FEV_1 and (F)VC. The values chosen should be the highest FEV_1 and the highest (F)VC of any of these maneuvers. Avoid 'garbage in - garbage out'.

Using the computer generated assessments

We cannot stress enough that even the best computer algorithms are tools that cannot replace a medical professional. Good professional judgement is based on a wide range of information, of which the results of a pulmonary function test at a particular moment in time forms only a part, albeit it often an important part. Whilst the assessments generated by the software reflect our best expertise, they were designed without a specific patient in mind, and are therefore provided on an 'as is' basis. Whatever use one makes of the computer generated assessments remains the sole responsibility of the user. The authors specifically disclaim all medical liability with respect to the use of the software product in patient care, and the possible consequences of its use. It is the medical professional who should decide whether the interpretation and any suggestions generated by the software are the most complete and appropriate for a particular patient. *Treat the patient, not the numbers.*
Carefully study the criteria underlying the software algorithms (www.spirxpert.com/pivotal4.htm) with respect to - Airway obstruction - Bronchodilator responsiveness - Reversibility of airway obstruction - VC too low - FEV_1 too low.

Complying with international standards

The algorithms used to evaluate spirometric data comply with the ATS/ERS 2005 recommendations. If you decide to use the software, first make sure that you are aware of the relevant texts, summarized on the website under 'pivotal points'.

About prediction equations

Some widely used prediction equations for children and adolescents do not include FEV_1%(F)VC, the starting point for assessing airway obstruction. Zapletal's prediction equations are widely used in Europe and hence apparently acceptable to the users. As a compromise that you should be fully aware of we have substituted Zapletal's predicted FEV_1%FVC, and its 'lower limit of normal' for predicted values from Hsu, Polgar, Roca and Salorinne.

'Lower limit of normal'

If a publication specified the lower 5^{th} percentile, the published procedure was used to compute the LLN. In other cases it is usual to subtract 1.645•RSD from the predicted value and regard that as the lower 5^{th} percentile. This is based on the assumption that the residuals (actual minus predicted values) are normally distributed in a population.

Selection of reference values

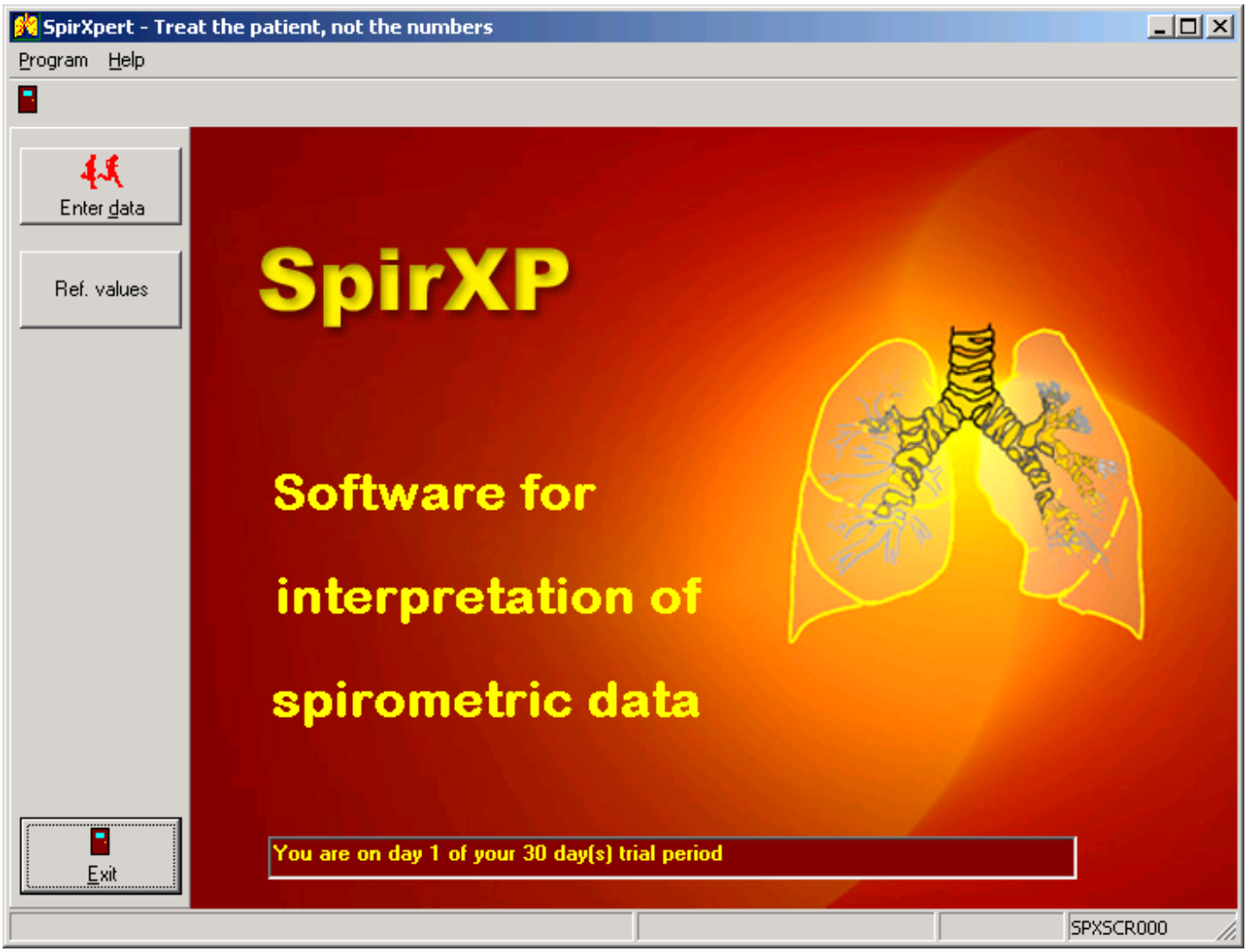
Any evaluation system relies on the assumption that the reference values used fit the population. It is the user's responsibility to select appropriate reference values.

Ethnic group

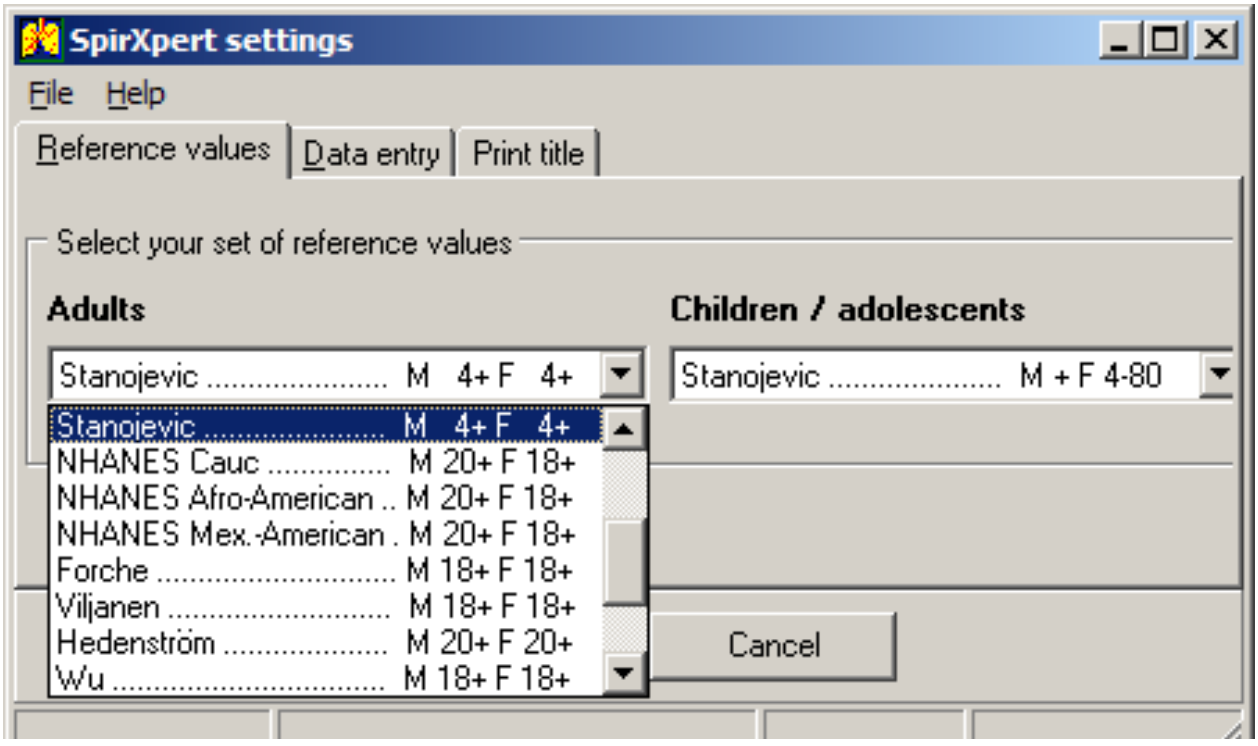
Some of the prediction equations are specific for ethnic groups, others are not. In accordance with the 1993 ECCS/ERS report on Standardized Lung Function Testing predicted values for Caucasians are adjusted as follows for some ethnic groups:

Negroïd, South India	0.87 (-13%)
North India, Pakistan, Polynesia	0.90 (-10%).

Default settings are accessible by clicking on 'Program' in the menu bar

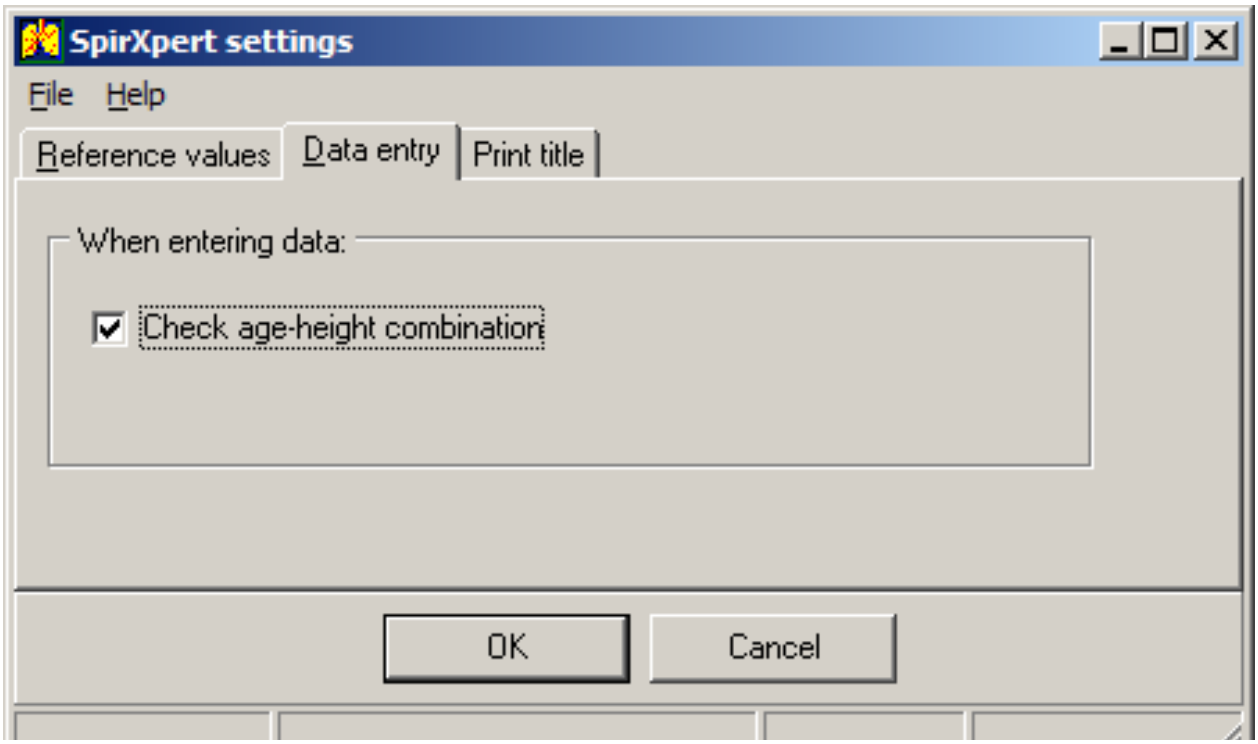


Select your **preferred language** and the **default reference values** for children and adolescents, and for adults, from the Program drop-down list. You can change these any time, and they can be overruled when you evaluate spirometric data.



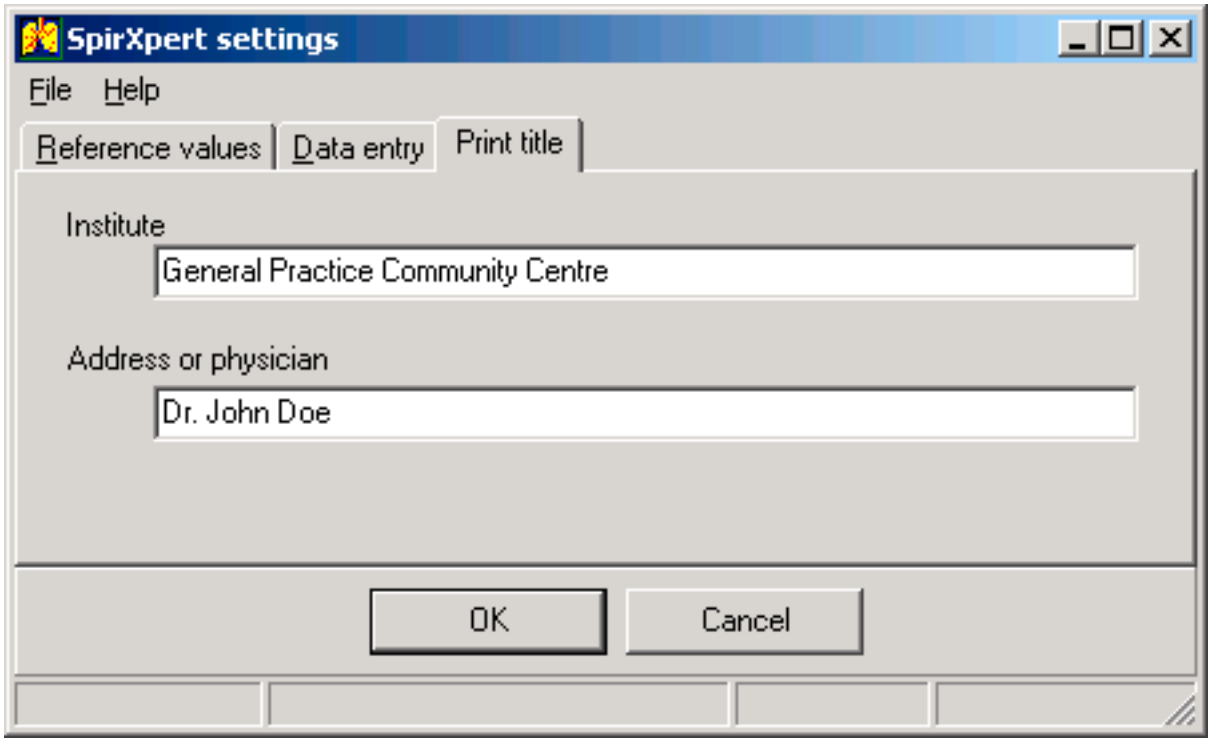
Check age-height combination

You may instruct the software to check the age-height combination that you have entered, just as a crude check on possibly erroneous entries. The check is effective in the pediatric age range only, and is based on the 1 and 99 percentiles for Dutch children between ages 6 and 18 yr. This feature can be turned off at any time.



Print title

If you wish to print a header in the printed output, you can enter two blocks of text that should fit on a single line in print.

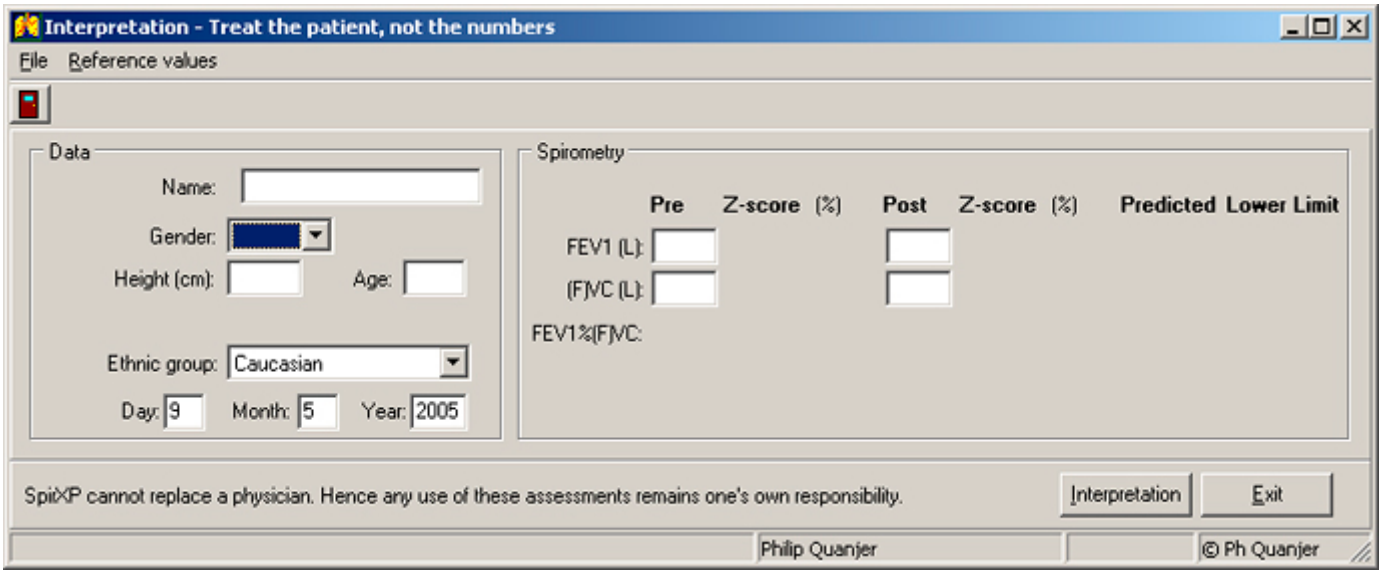


Entering data

Anthropometric data
gender,
standing height in cm (for armspan consult www.spirxpert.com/refvalues2.htm),
age in yr,
weight in kg (required for prediction equations due to Forche, Pereira and Roca only)

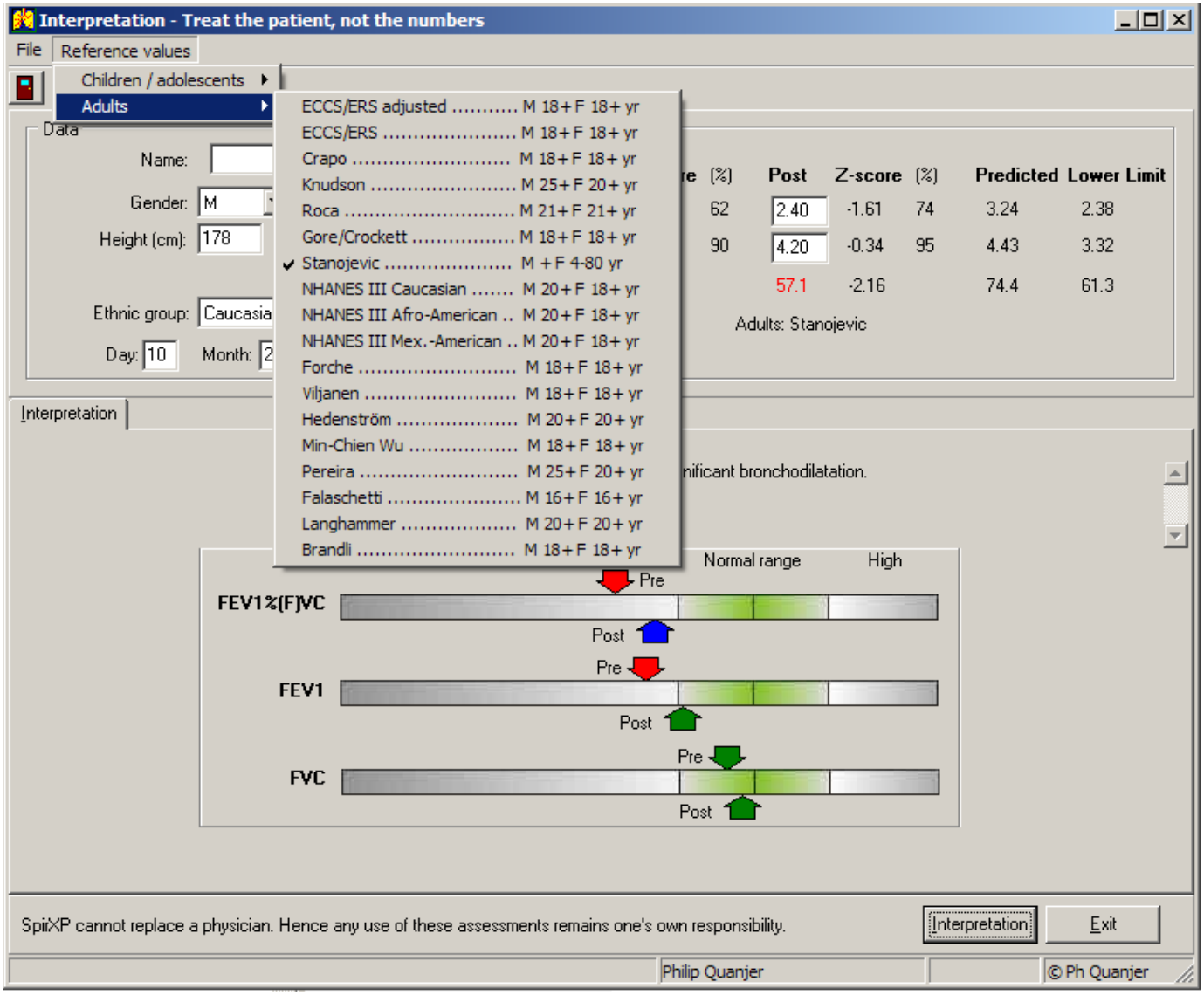
Spirometric data
FEV_1 and **FVC** prior to, post bronchodilator drug, or both. Volumes are in liter.

Upon completion of data entry, and after changing data, press the button 'Interpretation'.
Please remember to always hit the 'Return' key after entering data, and before pressing the button 'Interpretation'.



Changing reference values on the fly

While the interpretation of data is displayed, one can still decide to apply prediction equations other than the default for adults, or for children and adolescents. Some combinations of reference values imply that a certain age is not covered, and the age range that is excluded is displayed on the screen. Entering body weight is mandatory if you use reference values due to Forche, Pereira or Roca for children, and Roca for adult females.

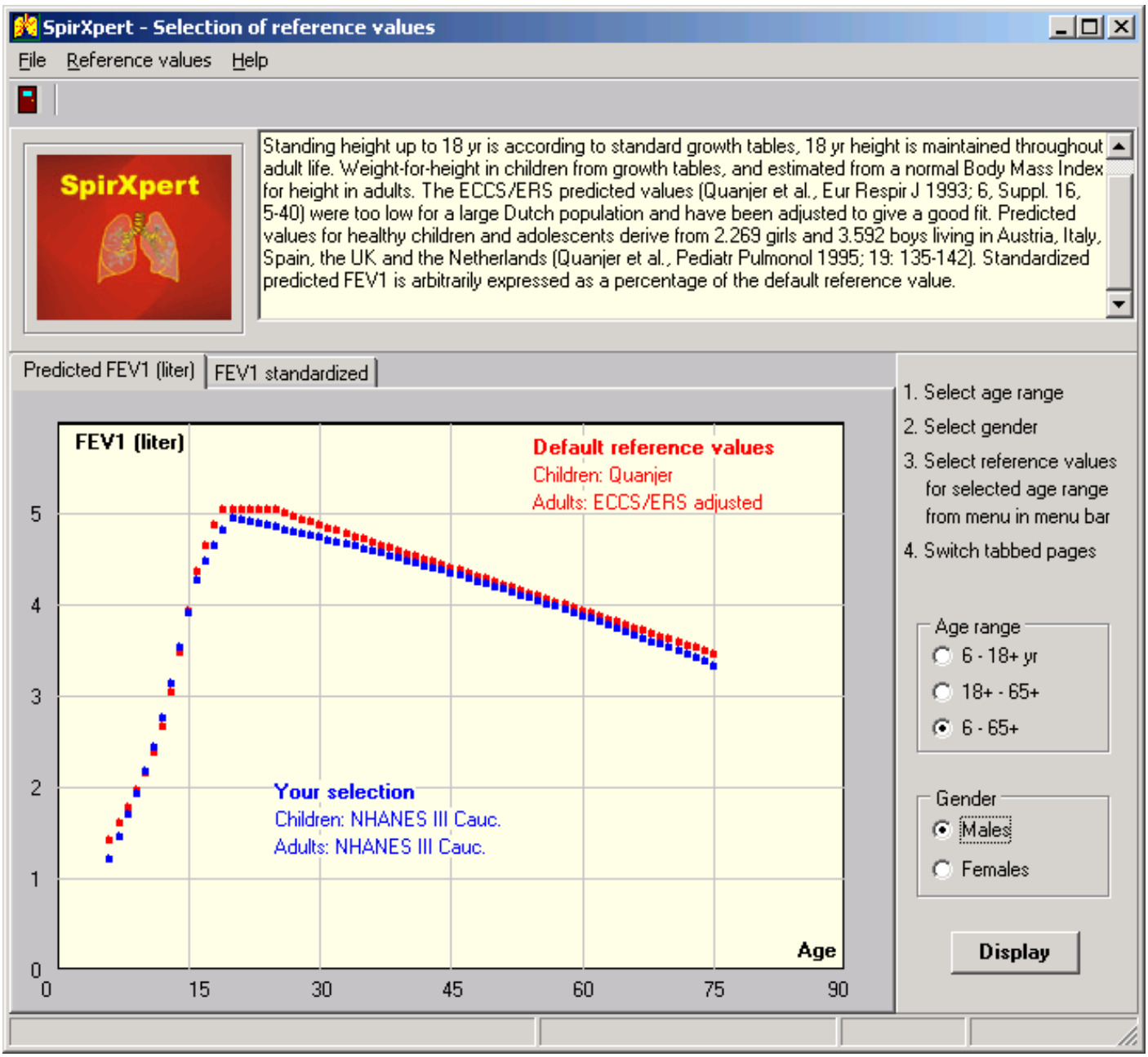


Comparing reference values - 1

The predicted FEV_1/(F)VC ratio varies little among different authors, and is for practical purposes independent of racial group. However, the level of the predicted FEV_1 tends to vary appreciably. The best way to assess which prediction equation best fits the population that you are going to work with is to investigate how well an equation fits a representative sample of a healthy, nonsmoking population in your area. However, this is usually a costly and large undertaking well beyond your means. It is then common practice to use regression equations derived from studies of large populations that resemble the population in your environment. Since the FEV_1/FVC ratio does not differ much among authors, it is probably sufficient to compare predicted FEV_1.

Incorporated into the SpirXP software is a considerable number of widely used regression equations. This allows the user to compare the predicted FEV_1 according to various authors. Arbitrarily they are compared to a set of default prediction equations for adults and for children/adolescents.

There are occasionally considerable differences in predicted FEV_1. The greatest discrepancies occur in children and adolescents. This is due to the fact that the simplest prediction models, which predict FEV_1 and FVC only as a function of standing height over a wide age range (such as $FEV_1 = a \cdot H^k$ or $FEV_1 = e^{H \cdot k}$) fail to take into account the change in body proportions that occur during growth from child to adult. This is best illustrated if one uses a relative rather than an absolute scale, as shown on the next page.



Comparing reference values - 2

On an absolute scale (liter) differences in predicted FEV_1 in particularly the 6-18 yr age range often appear to be small and therefore insignificant. However, when expressed on a relative scale such differences can be appreciable, and often exhibit a trend. The usual pattern is that the predicted FEV1 is too low in the youngest children and in the older adolescents, and too high at about age 10-11 yr. This implies that one may under estimate airway obstruction on the basis of FEV_1 in a 6-7 yr old child; since the natural growth of FEV1 is subsequently systematically less than the predicted one this will spuriously introduce a trend of 'deteriorating' lung function until the end of the growth spurt. After that actual growth in FEV1 is generally larger than the predicted one, spuriously introducing a trend towards 'improvement' in the level of FEV1. This trend is best circumvented by using age-specific regression equations, or those which in some form take age-height interaction into account [1-5].

1. Wang X, Dockery DW, Wypij D, Fay ME, Ferris BG. Pulmonary function between 6 and 18 years of age. Pediatr Pulmonol 1993 15: 75-88.
2. Forche G, Stadlober E, Harnoncourt K (1988): Neue spirometrische Bezugswerte für Kinder, Jugendliche und Erwachsene. Ost. Ärztezeitung 43, 15/16, 40-42
3. Knudson RJ, Lebowitz MD, Holberg CJ, Burrows B: Changes in the normal maximal expiratory flow-volume curve with growth and aging. Am Rev Respir Dis 1983; 127: 725-734.
4. Quanjer PhH, Borsboom GJJM, Brunekreef B, Zach M, Forche G, Cotes JE, Sanchis J, Paoletti P. Spirometric reference values for white European children and adolescents: Polgar revisited. Pediatr Pulmonol 1995; 19: 135-142.
5. Stanojevic S, Wade A, Stocks J, Hankinson J, Coates AL, Pan H, Rosenthal M, Corey M, Lebecque P, Cole TJ. Reference ranges for spirometry across all ages. A new approach. Am J Respir Crit Care Med 2008; 177: 253–260.