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ROUTINE BASELINE SPIROMETRY FOR EVERYONE?

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The paper recently published by Diao et al.[1] confirms on a large scale what was already known: that the change in spirometric equations can modify the diagnostic category or the severity of an individual's disease[2-4]. Race adjustment is no less than applying a different equation for the calculation of normal predicted values for the same subject. The well-conducted analysis states that using or not race adjustment can change disease classification, occupational eligibility, and disability compensation for millions of people. However, it sidesteps some important aspects related to several factors influencing spirometric outcomes.

Clinical diagnostic variables can be statistically described by means of a Gauss bell chart. Some variables have a high peak and a narrow base, while others have a low peak and a wide base. The former have a low coefficient of variability (CoV = standard deviation/mean) and are useful on their own for establishing a diagnosis. That is the case with disease-defining variables such as blood pH[5], where values farther than 0.8% from the normal average value are considered pathological (acidosis and alkalosis) and define therapeutic actions. The same applies for hematocrit, plasma glucose or most electrolytes (Fig. 1A).

On the other hand, there are variables with a large CoV, which is influenced by many factors, such as body weight, maximal respiratory pressures and six-minute walking distance (6MWD). The latter, with a CoV≈17%, is a good example. A distance of 400 meters walked in six minutes can be considered normal, as well as 706 meters, almost twice the distance for a 60 year-old male (170 cm, 70 kg)[6]. In this case, a normal expected value of 553 meters (and its calculated deviations) is not very informative of the actual health status of that patient (Fig. 1B). So, these variables are better suited for follow up of a single patient, where comparisons are useful against the previous value obtained in the same individual.

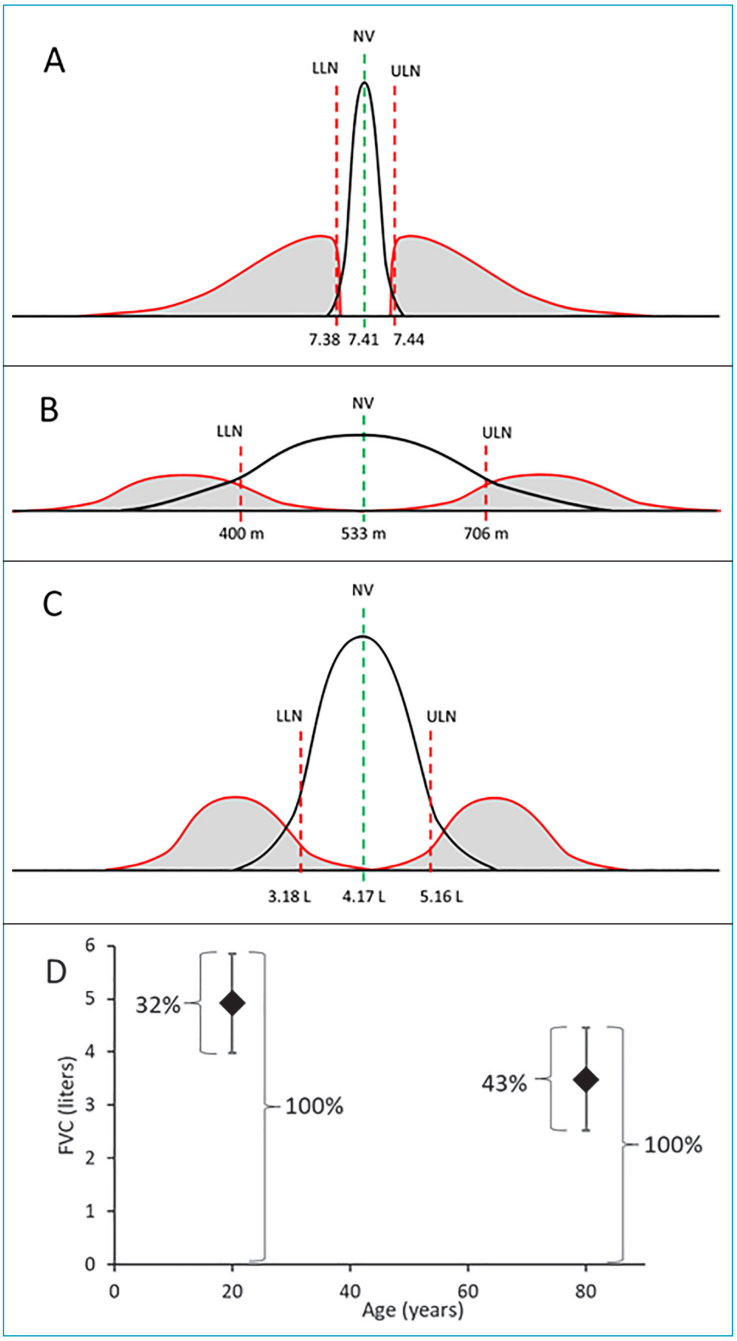
Spirometry variables (forced vital capacity – FVC; forced expiratory volume in the first second – FEV_1) behave in between these extremes (CoV≈12%), which is why we refer to their normal values as percent of predicted or z-score (Fig. 1C). However, this assessment often does not completely depict the clinical situation of the patient. For example, if we are dealing with a patient with a slowly progressive neuromuscular disease, finding a 40% predicted FVC is not informative. However, its comparison with former values revealing stability or impairment is clinically meaningful for understanding disease progression and make clinical decisions.

The reason is that spirometric normalcy is moderately wide, comprising about a third (≈32%) of total value for FVC and FEV_1 in a 20-year-old person, and almost half (≈45%) in an 80-year-old person (Fig. 1D)[7].

Adding to this is the issue of the comparator (AKA spirometric reference equation), which can display a wide range of values depending on its selection, and race adjustments. But above all, the calculated value derived by using these equations, whichever is chosen, depends strongly on anthropometric assessment and trial quality. Therefore, as expected, the values finally reported will depend on pre-analytical and analytical subtleties.

Assuming that the best effort has been achieved by the patient, the only reliable com-

Figure 1 | Gauss bell diagrams of 3 typical variables and relative range of normality for forced vital capacity. A: Blood pH; B: 6MWD for a 60 y.o. patient, 170 cm, 70 kg (reference values from Enright 1998[6]); C: FVC for a 60 y.o. patient, 170 cm, 70 kg (reference values from GLI 2012[8]). Gray-shaded areas show pathologic or abnormal conditions. D: Comparative range of normality compared to full range of FVC for the same subject in panel C, at 20 and 80 y.o.



6MWD: six-minute walk distance; FVC: forced vital capacity; LLN: lower limit of normality; NV: normal value; ULN: upper limit of normality

◆ = *predicted value, whiskers account for ULN and LLN*

parison is against the previously obtained value, when available. This should prompt the recommendation of spirometric measurement as a standard health assessment, not only in the presence of respiratory symptoms. Nowadays, it should not be difficult to achieve, as many more

complex and expensive determinations are routinely obtained several times across a lifespan "just for a health check"[8]. This could improve precision in respiratory decision-making, decrease legal claims and decide treatments on a more solid basis.

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