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Title: New paediatric spirometry reference values from the LUNOKID study: Comparison to Zapletal's and Quanjer's data

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Body: Background: Spirometry reference values developed by Zapletal et al. (Zapletal A. et al., Basel: Karger 1987), although still clinically used, may no longer be appropriate. The Global Lung Initiative (GLI) (Quanjer P. et al. Eur Respir J 2012; 40; 1324-1343) developed new multi-ethnic reference values. The aim of the present analysis was to assess whether the GLI data are representative for our German population and the bias introduced if old reference equations continue to be used. Material and Methods: In our LUNOKID study, we examined 4- to 18-year-old children/adolescents in 3 German communities under field conditions. For analysis, we used the regression model LMS introduced by Quanjer et al. in the context of spirometry. Results: Of 3133 recruited healthy children 1943 had a lung function visual acceptable as well as meeting ATS/ERS criteria. Lung function did not only depend on the child's height as supposed by Zapletal et al., but also in a non-linear way on age. Compared with the GLI data, we found that the variation coefficient in our LMS model did not depend on age. Furthermore, a significantly smaller percentage (0.9 to 1.8% depending on age) of children than the expected 5% had a FEV₁ below the lower limit of normal (LLN) predicted by Quanjer et al. Conclusions: To avoid diagnostic misconceptions, the conventional reference values according to Zapletal et al. should no longer be used. The non-linear dependence of lung function on age corresponds to the results recently published by Quanjer et al. Using the LLN as defined by the GLI data potentially leads to an underdiagnosis in a proportion of German children and adolescents.