Reference values for vastus lateralis fiber type proportions and fiber size

Citation for published version (APA):

Document status and date:
Published: 01/09/2013

DOI:
10.1152/japplphysiol.00613.2013

Document Version:
Publisher's PDF, also known as Version of record

Document license:
Taverne

Please check the document version of this publication:
• A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher’s website.
• The final author version and the galley proof are versions of the publication after peer review.
• The final published version features the final layout of the paper including the volume, issue and page numbers.

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

• Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
• You may not further distribute the material or use it for any profit-making activity or commercial gain
• You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the “Taverne” license above, please follow below link for the End User Agreement:
www.umlib.nl/taverne-license

Take down policy
If you believe that this document breaches copyright please contact us at:
repository@maastrichtuniversity.nl
providing details and we will investigate your claim.

Download date: 17 Sep. 2023
Reference values for vastus lateralis fiber type proportions and fiber size

Harry R. Gosker and Annemie M. W. J. Schols

Department of Respiratory Medicine, NUTRIM School for Nutrition, Toxicology and Metabolism, Maastricht University
Medical Center+, Maastricht, The Netherlands

TO THE EDITOR: Recently Gouzi et al. (3) reported reference values and lower limits of normal (LLNs) for vastus lateralis fiber size and type in healthy subjects over 40 years old. LLNs are useful to distinguish pathology from physiological variation in high-risk patient groups such as chronic obstructive pulmonary disease (COPD). The authors report a LLN for fiber type I of 33% and claim this value is more valid than the one (27%) we reported previously (2) because the latter would not have resulted from a systematic review. We would like to rectify this statement because our reference value also resulted from a systematic review. Although we reported the same average fiber type I proportion (51%) in healthy subjects, the pooling of SDs was done using different approaches, which could have caused the differences in LLNs. Regardless, a substantial subgroup of COPD patients has a fiber type I proportion below either LLN, indicating that abnormally low fiber type I proportions indeed occur in this disease. Interestingly, this loss of type I fibers is frequently attributed to reduced physical activity, whereas this review clearly contradicts this assumption as physical activity was not a determinant of fiber type I proportion, which is in line with our recent findings (4).

Gouzi et al. also provide prediction formulas and LLN values for fiber size [expressed as cross-sectional area (CSA)], based on sex and fiber type I proportion. We appreciate that sex should be considered in any fiber CSA analysis as elegantly illustrated in the paper, but we seriously doubt the usefulness of the presented prediction formulas. We correlated the actual fiber CSAs with the proposed predicted normal values of 53 healthy controls (36 men and 17 women, average age 63 yr) derived from two previously published studies (Refs. 1, 4, and additional unpublished data). Albeit statistically significant, we found a rather weak correlation (r = 0.561, P < 0.001), with 68.5% unexplained variation. Furthermore, applying the LLN prediction formula to determine whether muscle fiber size is abnormally low in COPD appears impractical. Of 44 patients with COPD (1, 4) none had a fiber CSA below the calculated LLN, in contrast to consistently reported reduced values compared with healthy age- and sex-matched controls (1, 5). Moreover, for 10 of the 15 patients with advanced COPD (1), the LLN value was <338 µm² (being the smallest average LLN for fiber CSA regardless of fiber type or sex, as reported by Gouzi et al.), and for five the LLN even was <0 µm². The average LLN was 134 µm², which is unrealistically low. Even for patients with less advanced COPD (4) we calculated negative LLNs. The patients with LLNs close to or below zero are characterized by abnormally low fiber type I proportions, indicating that the prediction formulas do not apply in case of fiber type redistribution. The review by Gouzi et al. reveals two important insights. First, the traditionally presumed contribution of physical inactivity to the loss of type I fibers is likely overrated. Second, sex should be considered when analyzing fiber sizes. The presented formulas for normal and LLN CSA values however, are of limited utility, especially when applied in situations of changed fiber type distribution.

DISCLOSURES
No conflicts of interest, financial or otherwise, are declared by the author(s).

AUTHOR CONTRIBUTIONS
Author contributions: H.R.G. drafted manuscript; A.M.S. edited and revised manuscript; A.M.S. approved final version of manuscript.

REFERENCES

Address for reprint requests and other correspondence: H.R. Gosker, Dept. of Respiratory Medicine, NUTRIM School for Nutrition, Toxicology and Metabolism, Maastricht University Medical Center+, PO Box 616, 6200 MD, Maastricht, The Netherlands. e-mail: h.gosker@maastrichtuniversity.nl.