Response to Letters Regarding Article, "Lower Mortality from Coronary Heart Disease and Stroke at Higher Altitudes in Switzerland"

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We thank the authors of the two letters for their interest and their comments. Dr Sullivan et al refer to the erythropoietic adaptations and changes in iron metabolism that occur when subjects are exposed to high altitudes (up to over 4500 m above sea level) and thus to extreme conditions. However, the population included in our study lived at altitudes below 2000 m, and more than 98% lived below 1200 m. On the basis of the available literature, it appears unlikely that the adaptations described occur at such relatively low altitudes. Accordingly, it cannot be expected that the effects described substantially contribute to lower cardiovascular mortality at higher altitudes in Switzerland.

We do not know whether the risk of diabetes mellitus decreases with increasing altitude because there are no nationwide data on the incidence or prevalence of type 2 diabetes mellitus in Switzerland. However, the data from the Swiss Health Survey 2002 used for our article also provide self-reported information on the diabetes mellitus status of participants. We calculated the prevalence of self-reported diabetes mellitus and found no significant differences between the altitudinal belts. The prevalence of self-reported diabetes mellitus was at altitudes <300 m, 5.8% (95% Confidence interval [CI]: 4.6 to 7.0); 300 to 600 m, 3.8% (CI: 3.4 to 4.2); 600 to 900 m, 3.4% (CI: 2.6 to 4.3); 900 to 1200 m, 4.0% (CI: 1.8 to 6.2); 1200 to 1500 m, 4.3% (CI: 0.1 to 8.5); >1500 m, 5.1% (CI: 0.7 to 9.5). The high prevalence at <300 m could be explained by the fact that most inhabitants at that altitude live in the city of Basel, which has the highest density of practitioners in Switzerland. It can thus be speculated that a higher proportion of patients with type 2 diabetes mellitus is being detected than at altitudes with a less urban population. Although self-reported health survey data have limited validity, we would not expect that, in Switzerland, altitudinal differences in the prevalence of diabetes mellitus are large enough to influence variations in cardiovascular mortality. As shown in the online supplement to our article, there was no significant difference between altitudes in potential risk factors for diabetes mellitus (obesity, cigarette smoking, physical inactivity, infrequent fruit consumption). By contrast, in Tyrol, the prevalence of obesity and physical inactivity was lower than in the rest of the country, which is in accordance with variations in the incidence of diabetes mellitus in Austria. As already stated in our article, we have no reason to believe that highlanders constitute a genetically different population, inasmuch as more than half of them are recent immigrants from lower regions. We cannot imagine other independent mechanisms related to altitude that could be responsible for differences in the prevalence of diabetes mellitus. Unfortunately, the study by Wimmer et al neither discloses whether diabetes mellitus prevalence differed by altitude within Tyrol or other Austrian mountainous states (Salzburg, Styria, Carinthia) nor proposes hypotheses for a causal pathway dependent on altitude. However, the lack of data stresses the need for a valid assessment of geographical variation in diabetes mellitus in Switzerland and elsewhere.

Disclosures
None.

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References