Letters to the Editor

Stroke welcomes Letters to the Editor and will publish them, if suitable, as space permits. They should not exceed 750 words (excluding references) and may be subject to editing or abridgment. Please submit letters in duplicate, typed double-spaced. Include a fax number for the corresponding author and a completed copyright transfer agreement form (published in every issue).

Meta-Analysis Reported Incompatible Statistics and Omitted Pertinent Studies

To the Editor:

The evidence that higher levels of physical activity and cardiorespiratory fitness confer protection against ischemic heart disease (IHD) is persuasive, particularly in middle-1 and older-aged2 men. With the most common type of stroke, ischemic stroke, and ischemic heart disease sharing similar pathophysiological traits, a sedentary existence has been advanced as a lifestyle risk factor for stroke.3 As the cohorts on which the observations of a physical activity–IHD association are based mature, a growing number of publications examining the link between physical exertion and stroke have appeared. The aggregation of results from these studies in the meta-analysis of Lee and others4 is therefore timely. However, in our view, the authors reported confusing statistics and omitted some relevant studies.

In Table 3 of their report,4 the relative risk (95% CI) of ischemic stroke in the moderate compared with the low active groups is 0.91 (0.80 to 1.05), but this seems incompatible with the reported probability value (P<0.001). Similar observations are made for the hemorrhagic stroke result (RRmoderate versus low active; 95 CE: 0.85; 0.64 to 1.13), which has a probability value of 0.001, and for total stroke in a pooling of findings from case-control studies (RRhigh versus low active: 0.36; 0.25 to 0.52), which has a probability value of 0.04.

Additionally, although the authors’ search strategy was clearly reported, it was not comprehensive. In addition to an electronic search of several medical databases (the authors searched only MEDLINE), scrutiny of the reference sections of relevant articles, contacting experts in the field, and reviewing one’s own files have all been recommended to bolster the number of identified studies.5 We are aware of 2 additional reports that appear to meet Lee and others’ inclusion criteria but were omitted from their meta-analysis.4 We are aware of 2 additional reports that appear to meet Lee and others’ inclusion criteria but were omitted from their meta-analysis.4

In these prospective cohort studies of European populations from the United Kingdom5 (362 stroke deaths in 12 552 London-based male civil servants) and Sweden6 (111 stroke deaths in 7142 Göteborg men), physical activity was essentially unrelated to total stroke risk at conventional levels of statistical significance.

In the former report from the Whitehall study6 we described the relation of physical activity to stroke risk based on a question administered to the first 12 552 study participants in the late 1960s about how much time, if any, they spent walking or cycling to work. Following modification of the study questionnaire during baseline data collection, different inquiries regarding leisure-time physical activity were made to the final 6702 men recruited into the cohort. Although we have previously reported on the relation of IHD and cancer subtypes to this index of physical exertion,6 we have yet to examine its predictive capacity for stroke. In new analyses presented here (Table), there were 216 deaths attributed to stroke during 25 years’ surveillance in these men. There was little evidence of an activity-stroke relation, however. We were unable to examine the relation of this index of physical exertion with stroke subtypes because the majority of stroke fatalities were ill-defined on death certificates,9 a problem across all UK cohort studies which hold outcome data on deaths.

The omission of these reports notwithstanding, given that inclusion of the total number of stroke deaths from them and the present analyses (n=689) increases the total number of incident stroke reported in Table 1 of the meta-analysis4 by around only 14%, the magnitude of the pooled effect estimate for cohort studies with its tight CIs (RRhigh versus low active: 95% CE: 0.75; 0.69 to 0.82) is unlikely to be markedly attenuated. Therefore, the conclusion of Lee and others4 that physical activity is inversely related to total stroke risk is likely to be unaffected.

G. David Batty, MSc, PhD
Department of Social Medicine
Panum Institute
University of Copenhagen
Copenhagen, Denmark

Martin J. Shipley, MSc
Department of Epidemiology and Public Health
University College London
London, UK

George Davey Smith, MD
Department of Social Medicine
University of Bristol
Bristol, UK


Response

We thank Dr Batty and colleagues for their careful review and comments on our meta-analysis of physical activity and...
stroke. Indeed, as they pointed out, we unfortunately transcribed 3 probability values incorrectly. The correct probability values for Table 3, testing the null hypothesis of $\ln(RR)=0$, are as follows: ischemic stroke $P_{low \text{ vs. } moderate}=0.09$; hemorrhagic stroke $P_{low \text{ vs. } moderate}=0.13$; and total stroke (case-control) $P_{low \text{ vs. } high}=0.001$. We regret our error but have verified that all other RRs and probability values presented in the article are correct.

Batty and colleagues also pointed out that we omitted 2 cohort studies (the Whitehall study 2 and the multifactor primary prevention study in Göteborg 3) from the analysis. In fact, we had identified but did not include the Whitehall study 2 because as we described in our Methods, we included only studies of leisure-time physical activity. The Whitehall study 2 assessed physical activity as the time spent commuting to work by bicycle or on foot, which we judged not to be leisure-time activity. We somehow did not find the Swedish men’s data 3 and when we added it to the meta-analysis, the results were identical to those in Table 3: $RR_{low \text{ vs. } high, \text{ cohort}}$ 95% CI: 0.75, 0.69, 0.82, $P<0.001$; and $RR_{low \text{ vs. } moderate, \text{ cohort}}$ 95% CI: 0.83, 0.76, 0.89, $P<0.001$.

The overall conclusion of our article was unchanged by correcting the 3 probability values. However, we must correct the conclusion about stroke subtypes to say that moderate levels of physical activity are not clearly associated with reduced risk of ischemic or hemorrhagic strokes, individually, even though high levels of physical activity are.

Chong Do Lee, EdD
Department of Sports and Exercise Sciences
West Texas A&M University
Canyon, Texas

Aaron R. Folsom, MD
Division of Epidemiology
School of Public Health
University of Minnesota
Minneapolis, Minnesota

Steven N. Blair, PED
The Cooper Institute
Dallas, Texas

Meta-Analysis Reported Incompatible Statistics and Omitted Pertinent Studies
G. David Batty, Martin J. Shipley and George Davey Smith

Stroke. 2004;35:e79-e80; originally published online March 4, 2004;
doi: 10.1161/01.STR.0000120959.76451.B1
Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2004 American Heart Association, Inc. All rights reserved.
Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the
World Wide Web at:
http://stroke.ahajournals.org/content/35/4/e79

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Stroke can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Stroke is online at:
http://stroke.ahajournals.org//subscriptions/