We thank Dr Athyros and colleagues for their interest in our study and comments comparing their study with ours. There are a few differences between the studies. Although Karagiannis et al reported a seasonal variation in stroke occurrence using hospital-based data,1 we focused on mortality from cardiovascular disease (CVD) using cohort-based data.2 However, it is certain that CVD occurrence and mortality are closely related because case fatality for CVD is relatively high.3 Therefore, we would like to discuss the effect of cold weather without being particular about whether it leads to the onset of or death from CVD.

There are several reports on seasonal variation in the occurrence of or death from CVD.4,4 As Athyros et al mentioned, the increase in CVD because of cold weather might be related to increased sympathetic tone, arterial hypertension, and high plasma fibrinogen levels. These risk factors have been reported to show seasonal variation.2,5,9 The main mechanism of the seasonal variation of these risk factors might be the effect of temperature. In other words, the effect of season could include the effect of temperature. Moreover, because a time-stratified case cross-over design is expected to control for seasonality as described in our paper, we believe that the results of our study indicated an independent effect of cold temperature on CVD.

It may be interesting to analyze the relationship between temperature and CVD for each season. Our study did not show a significant relationship between cold temperature and CVD mortality when we analyzed each season separately, probably because of the limitation of sample size. A more detailed and larger cohort of data would be required to reveal a relationship between temperature and CVD for each season. If we acquire such information about seasonal variation in the relationship between temperature and CVD, it would be more useful for educating susceptible people.

Additionally, Karagiannis et al classified stroke into ischemic stroke, intracerebral hemorrhage, subarachnoid hemorrhage, and transient ischemic attack.1 We could not obtain significant results when we divided stroke into subgroups. This result may again be related to the small sample size. Because the mechanisms of ischemic stroke and hemorrhagic stroke are different, we need to analyze ischemic stroke and hemorrhagic stroke separately with a larger cohort of data.

References


Akiko Atsumi, MD
Faculty of Medicine,
Graduate School of Comprehensive Human Sciences,
University of Tsukuba, Tsukuba, Japan

Kayo Ueda, MD
Environmental Epidemiology Section,
Center for Environmental Health Sciences,
National Institute for Environmental Studies, Tsukuba, Japan

(Released online August 30, 2013)