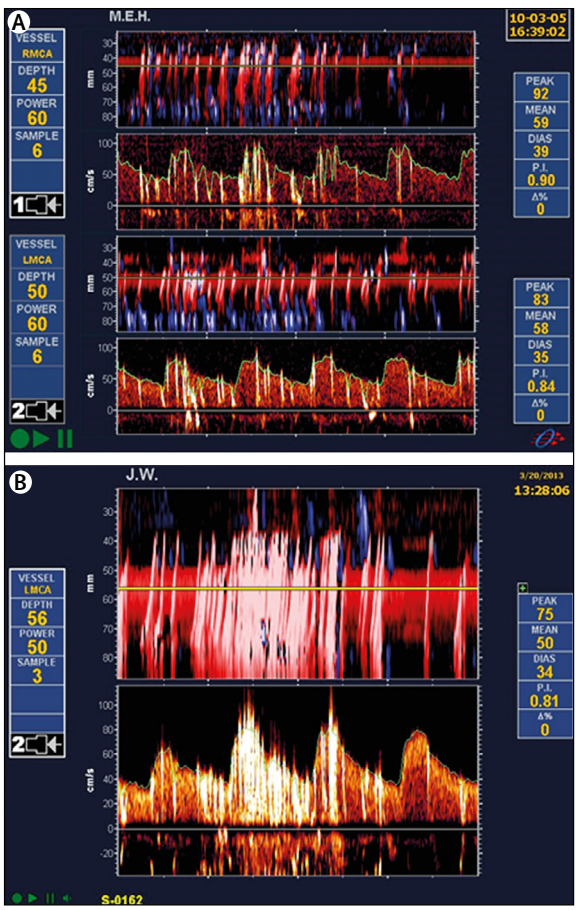

Figure: **Microemboli during carotid stenting**
Showers of microemboli occur commonly during carotid stenting. (A) Microemboli in both middle cerebral arteries while crossing the aortic arch during stenting of a carotid artery. (B) Microemboli in the ipsilateral middle cerebral artery during stenting of the stenosis. Reproduced from Bogiatzi C and Spence JD,[7] by permission of Springer Nature.

CAS, so CAS should be reserved for selected patients. Factors that would favour CAS could include younger age, specific anatomical features (such as a stenosis that is in the very distal internal carotid artery), lack of tortuosity of the arteries leading to the stenosis, absence of or only minimal plaque calcification,[11] presence of local tissue scarring due to previous surgery or radiation, and conditions conferring a high medical risk for surgery (such as congestive heart failure, myocardial ischaemia, or severe pulmonary disease). Patients receiving anticoagulation for indications such as atrial fibrillation might also be more suitable for CAS because the time when the patient is not taking anticoagulants would be shorter. Patients are likely to prefer a less invasive procedure, so they should be informed that outcomes with CEA are generally better than with CAS.

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An unparalleled assessment of the global burden of epilepsy

The risk of mortality is known to be higher in people with epilepsy than in the general population. Epilepsy is also responsible for considerable disability. In *The Lancet Neurology*, the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2016 Epilepsy Collaborators provide an unparalleled global assessment of the mortality and morbidity in people with epilepsy of unknown cause.[1]

The modelling procedures used by the GBD Collaborators enable estimates for prevalence, mortality, and

disability-adjusted life years (DALYs) associated with epilepsy of unknown cause, even for countries for which no data exist. Comorbidity adjustments were made with US hospital claims data. A positive point is that the International Classification of Diseases (ICD) ninth Clinical Modification was used in the USA for most of the period of the study; thus, no adjustment was needed for a new coding system (ICD-10). Unfortunately, mandated coding changes for seizures and epilepsy occurred in the USA over this time, the most important of which was shifting the classification of patients with a code of 780·39 (seizures) to a code of 345·9 (epilepsy) in 2005. This change resulted in a threefold increase in reported hospital stays for epilepsy after 2005 when compared with earlier years. The greatest increase (up to fourfold) was in people aged 50 years or older. However, there was no evidence for a true increase in the prevalence or incidence of epilepsy.[2] The accuracy of adjustments for variation in comorbidities, given such substantial changes in discharges attributable to epilepsy, might therefore be questioned. Another methodological point to consider is that weighting for disability might have been arbitrary and variable across studies, thus precluding comparisons. However, as long as weighting was consistent across time within the study, it should not have affected the results of the comparisons being made.[3,4]

The restriction of this GBD analysis to individuals with epilepsy of unknown cause was reasonable. The consequences of epilepsy following other neurological insults were appropriately assigned to the antecedent cause. However, use of the term idiopathic for the population studied might not have been the best choice given ongoing controversy over the term.[5] Furthermore, idiopathic, as used in the current study, includes both idiopathic generalised epilepsies (and genetic generalised epilepsies) and cryptogenic epilepsies—groups that were clearly distinguished in the early classifications.[6] These two groups differ by age and, importantly for this study, by mortality and prognosis for seizure remission. Thus, despite few data, calculation of DALYs separately for idiopathic generalised epilepsies and cryptogenic epilepsies would be useful.

Future plans for GBD studies include obtaining data from geographical areas with few data available thus far, allowing refinement of estimates. Although this approach might be useful, the current analysis includes papers published over the past 25 years, with data collection for some studies starting in the 1980s. Without a special emphasis on and support for epilepsy data collection in regions with limited research infrastructure, it seems unlikely that substantial new data will be acquired in the near future.

There are several additional strategies for future research that would be useful and that the GBD team could facilitate in the meantime. First, the primary audience for this study would seem to be health-care planners and policy makers, not neurologists. The presentation of mortality and prevalence rates in table 1 would be more meaningful to the clinician for making comparisons among geographical areas, as opposed to the numbers of deaths and numbers of prevalent cases as currently presented. Second, the data presented in the GBD analysis provide testable hypotheses. There are few preventive measures likely to alter incidence in people with epilepsy of unknown cause, although DALYs have been significantly reduced (19·4% [95% uncertainty interval 9·0 to 27·6]) over the study period. This reduction occurred despite little change in the number of cases. Investigation of the reasons for these trends would be appropriate. Third, for health-care administrators in countries with time trends opposite to general trends for decreasing mortality and total burden as measured by DALYs (Iceland, Germany, and Denmark), an assessment of the reasons for these differences could be valuable. These three countries have substantial epidemiological data available. It is not clear how many studies from these countries were included in the current study, but validation of the trends should be possible given that the research infrastructure is already in place.

Finally, substantially higher age-standardised DALY morbidity exists in low compared with high Socio-demographic Index (SDI) quintile countries, largely because of increased severity of epilepsy in low SDI regions. This finding suggests that interventions such as improved treatment of epilepsy could reduce burden in low SDI regions. The concept is not new, and intervention programmes in rural China, for example, have proved beneficial, leading to government-mandated changes in epilepsy care.[7,8] Potential candidate sites could be identified from this study where government agencies, administrators, and available infrastructure will enable additional intervention studies. Funds might be used to implement interventions in addition to or instead of collecting additional data. The findings reported

in this Article support the need for intervention, and the prevalence-based assessment used by the GBD Collaborators will provide a timely and useful metric to evaluate change.

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Global consequences of malignant CNS tumours: a call to action

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Tumours of the CNS are among the most feared cancers because they affect the very organ that defines personality and assures physical and cognitive independence. CNS tumours can cause severe disability, including seizures, poor memory or speech problems, and physical dysfunction. These effects can make caring for someone diagnosed with a CNS tumour challenging and often necessitate full-time assistance once the disease has progressed into its later stages.[1] CNS tumours can affect the brain or spinal cord and occasionally can disseminate within the CSF. They might occur in individuals at any age and from any background. No environmental exposure, other than previous ionising radiation, or behavioural or lifestyle choices are known to increase the risk of developing these tumours.[2] Atopic conditions might protect against the development of a malignant brain tumour, but the biological basis for this association in unknown.[3]

In *The Lancet Neurology*, the Global Burden of Diseases, Injuries, and Risk Factors (GBD) Study 2016[4] reports a 4·63 per 100 000 person-years global incidence of malignant CNS tumours, which represents a 17·3% increase from 1990 to 2016. Despite this increase over time, the GBD incidence is lower than the 5·57 per 100 000 person-years incidence reported[5] for 2003–07, which uses data from international cancer registries. The difference is likely due to variations in recording information in different cancer registries, but the relative distribution of cases throughout the world was similar to the GBD report. Additionally, the GBD study[4] notes an accompanying stable mortality rate, suggesting improvements in treatments over time.

The global incidence encompasses wide variation in estimates around the world, possibly attributed to different environmental exposures or variable genetic influences within a population. Incidence is also dependent upon ascertainment, and accurate diagnosis of a CNS tumour requires access to modern neuroimaging and neurosurgery. Thus, it is unsurprising that incidence is lowest in resource-limited environments, such as sub-Saharan Africa and Central America, and the highest incidence is observed in the highest quintile of the Socio-demographic Index (SDI). However, these differences cannot be attributed to health-care access alone, and there might well be important causal indicators within this regional and racial or ethnic variability. For example, the highest incidences are seen in the Nordic countries, with a substantially lower incidence evident in their surrounding countries. In the USA, the incidence of most malignant CNS tumours among the African American population is much lower than in the white population, which reflects what is seen globally.[6] Genetic susceptibility loci have been identified for gliomas, but they have been examined only in populations of European ancestry;[7] studies of populations from different genetic backgrounds might provide