Recent advances in epilepsy

Epilepsy is the commonest serious neurological disorder in every country, affecting about 40 million people all over the world, yet nearly three quarters of them remain untreated (Anonymous, Lancet, 1997, 349, 1851). Epilepsy leads to extensive social and economic consequences. In order to focus attention on the diverse aspects of epilepsy and promote a positive approach to the disorder, in 1997, WHO, International League Against Epilepsy and International Bureau of Epilepsy has begun a campaign, called 'to bring epilepsy out of the shadows'. There had been many major advances in the understanding and treatment of epilepsy in the recent past. Indexed medical journals have published over 22,000 articles on epilepsy in the past one decade.

Although epilepsy is a universal disease, nearly 85% of all persons with epilepsy in the world live in developing countries, where they face several handicaps. However, only 15% of the total market for anti-epileptic drugs is contributed by developing countries. The vast majority of people with epilepsy living in developing countries are not receiving appropriate treatment. In certain areas the treatment gap (those with active epilepsy, but not receiving treatment) reaches as high as 80%. Socioeconomic backwardness, stigma to the disease and poor health care delivery system are some of the reasons for this treatment gap.

In this special section, attention is focused on certain selected areas of epileptology that has witnessed significant advances in the past ten years. Clinical epidemiological data from several developing countries have supplemented the global literature. Precise clinical epidemiological data are very important in understanding any disorder in its totality. Epilepsy has a fairly uniform prevalence across the world. However, etiological factors for symptomatic epilepsies vary from country to country and from region to region within one country. Sridharan has addressed these issues in his article (page 664).

Genetics of epilepsy is perhaps an area that has seen tremendous progress in the past decade, thanks to the application of molecular genetic techniques. Several specific mutations associated with generalized epilepsies were identified since the beginning of last decade. Recently several promising leads related to the genetic basis of localization-related epilepsies are also being unraveled. Tripathi and Jain have provided an update on the current understanding of the genetics of epilepsy (page 671).

Progress in prevention and treatment of epilepsy depends to a large extent on understanding the molecular mechanisms that contribute to occurrence of seizures and pathophysiology of epileptogenesis. There had been substantial progress in the understanding of molecular mechanisms involved in epileptogenesis. Acharya has summarized these developments in his article on recent advances on epileptogenesis (page 679).

Recent advances in imaging techniques have made substantial contributions to treatment of epilepsy, particularly, the surgical management of intractable epilepsy. Non-invasive diagnostic procedure has become a logical alternative to several invasive diagnostic procedures. Functional neuro-imaging methods such as SPECT, PET and fMRI have proved to be reliable methods to study the complex mechanism underlying cognition, and epileptogenesis. Thodore has provided a clear exposition of this important topic (page 689).

There had been an exodus of anti-epileptic drugs to the market in the past one decade after a relatively long lull period. Nearly 70% of epilepsy can be controlled with one of the anti-epileptic drugs. The newer anti-epileptic drugs have several advantages. Tomson has discussed the role of newer anti-epileptic drugs in the current management of epilepsy (page 698).

Epilepsy surgery has established itself as a treatment of choice in certain epileptic syndromes that proved intractable to medical management. Progress in imaging, electrophysiological studies, and knowledge of epileptic syndromes amenable to surgery has facilitated establishment of surgical centers in several parts of the world. Radhakrishnan and Menon have discussed the progress in this field in their article on surgery for epilepsy (page 707).

Reproductive functions in people with epilepsy have great impact on their quality of life. Better understanding of the complex interactions among epilepsy, AED, pregnancy and fetus has enabled us to develop suitable strategies to make pregnancy safer in epilepsy. In the article on epilepsy and pregnancy I have summarized the current knowledge in this field (page 720).

All the authors have extensive experience in their respective fields and had graciously accepted my request to contribute their articles well within time. I hope that this treatise will open a window into the exciting field of epileptology and facilitate further studies that would ultimately improve the quality of life of people with epilepsy.

Sanjeev V. Thomas

Measuring deformation associated with the Bhuj earthquake

Earthquakes are manifestation of release of elastic strain accumulated in the rock mass that often involves large-scale deformation of crust. Realizing this, many early studies on major earthquakes focused on the analyses of triangulation records to understand how the earth deforms in relation to the onset of an earthquake. New insights into these processes came from the conven-
ional geodetic studies of the large earthquakes. The classic elastic rebound theory, explaining the cycle of stress build-up and eventual release, continues to be the fundamental theory of earthquake science. Reid, who proposed the elastic rebound theory soon after the 1906 San Francisco earthquake, even thought that the earthquakes could be forecast by studying the triangulation records; an idea that is vigorously followed to this day, notwithstanding our increased understanding of the complexities at the earthquake source. The 1980s saw a major revolution in geodesy in that space-based techniques have come into vogue, and among them the GPS became a system of choice for most tectonic studies.

The GPS technique, which relies on tapping information on time and position transmitted from a constellation of satellites, has developed computing methods to measure the positions of geodetic monuments to millimeter-accuracy that would have been unimaginable in the days of conventional geodesy. Accuracy in measurement has now made it possible to bring out minute changes in the baseline lengths and calculate displacement rate between geodetic points. Using new techniques, scientists have been able to generate excellent data on the rates of motion within many plate boundary regions. They have also understood a lot more on how seismic (and as seismic) deformations vary in space and time within plate interfaces, which has implications for earthquake recurrence. Space-based geodetic study has found its applications also in measuring the mid-continent deformation that is not directly linked to plate boundary kinematics. Unlike the plate boundary regions, constraining deformation within the continent is a major challenge because of the low rate of strain buildup and rarity of earthquakes in such settings.

The 2001 Bhuj earthquake provides a rare opportunity to measure coseismic and post-seismic deformation field within an intraplate setting. A major problem here is that no GPS control points had been established in the Kutch region for tectonic studies prior to the earthquake, with the exception of a point at Jamnagar, quite outside the epicentral zone. A direct comparison between GTS (Great Trigonometrical Survey of India: 1858) and recently established GPS points is difficult because of the uncertainties in orientation and translation between the Everest spheroid and the GPS coordinate systems. Besides, the Kutch region had many earthquakes earlier, thus complicating the deformation field. Despite these limitations, and giving due recognition to each of these, Sridevi Jade et al. (page 748) make an effort to estimate coseismic and post-seismic displacement rates associated with the 2001 earthquake. Although preliminary in nature, this study marks the beginning of a worthwhile venture, which in the long run may provide insight into the postseismic deformation associated with a rare and an intriguing earthquake.

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