Matters arising

Telemetered EEG in schizophrenia

Sir: I should like to comment on Stevens et al’s two elegant investigations correlating abnormal behaviour and abnormal mental state in chronic schizophrenics with the computerised analysis of telemetered EEG signals. In the first of these reports Stevens et al recorded continuously the EEGs of 40 schizophrenics, most of whom were unmedicated, by radio-telemetry for periods ranging between 2 and 24 hours. The patients were compared to 12 normal, age-matched controls. It was found that the schizophrenics had more delta, and less alpha power than the controls. Further, during hallucinations, the patients showed a reduction in left temporal power, accompanied by an increase in right temporal slow activity. Both the schizophrenics and the controls desynchronised in the left hemisphere during verbal tasks, but the schizophrenics, unlike the normals, also showed left hemisphere activation during spatial tasks. In the patients there was no relationship between the presence of EEG abnormality and previous treatment with drugs or electroconvulsive therapy, nor with age, sex or the presence or absence of neurological findings. It is noteworthy that the five illustrative cases which Stevens and her colleagues detail all had clear, lateralised EEG abnormalities localised to the left temporal lobe. (In case No 2, where the EEG is not described in the clinical vignette, inspection of the EEG sample published, fig 2, shows a clear, localised irregular slow EEG activity from the left centro-parietal derivation.) In addition, the first case during episodes of agitation, develops “low voltage spike-wave activity from the left centro-parietal and temporal regions” and, during a period of dissociation, bizarre posture, waxy flexibility exhibited “remarkable high voltage, 2-5 Hz rhythmic slow wave activity over the left hemisphere” later leading to right hemisphere abnormality. The third case during episodes of speech arrest, psychomotor blocking and lip smacking exhibits “sharp or slow spike activity in the left temporal region” before these abnormal behavioural events. The power spectra of the fourth patient described revealed “during dissociated speech striking asymmetrical delta activity in the left temporal region”. In the fifth patient examined during continuous auditory hallucinations, there was a background of left temporal spikes and immediately “prior to the event marker, that is during the auditory hallucination, power was increased in all frequency bands and scalp derivations with the exception of alpha in the left temporal region”. Stevens and Livermore reported on telemetered EEG in a new sample of 18 schizophrenics, recorded on the average over a 20 hour interval, essentially unmedicated patients who were compared to nine healthy controls. Once again the schizophrenics had a preponderance of delta activity, and a reduction of alpha power, compared to normals. The “stigmata” spectral pattern, previously described and implying the presence of nonpropagated focal spike discharges in the depth of the temporal lobes were found in 45/120 average spectra in the schizophrenics, and in none of the controls. The trend was towards a right temporal localisation in catatonia, and a left hemisphere localisation in paranoid schizophrenia with auditory hallucinations. The patients also showed “a striking increase in left centro-parietal activity (slow)” during hallucinatory states. The pooled spectra from all the patients during all the abnormal (psychiatric) events compared to the pooled spectra, of these patients when not victim of the psychopathological intrusions “disclosed suppression of left temporal alpha during abnormal events”. During spatial cognitive activation the schizophrenics failed to show the relative right temporal power suppression found in normals although both schizophrenics and controls had the expected relative left temporal power suppression during verbal tasks. However, in the verbal task, unlike the normals, the schizophrenics did not suppress in the centro-parietal derivations.

The two investigations of schizophrenics observed by radio-telemetry and the correlation between abnormal mental event and EEG configurations in schizophrenia that Stevens and her collaborators were thus able to document, repeatedly implicated the left hemisphere, in individual patients at baseline, in the pooled spectral data and in the correlation between psychopathological intrusion and corresponding transient, EEG alteration. It is therefore curious to see that Stevens and Livermore conclude “although there were differences in lateralisation of power between patients and controls in this study, no evidence emerged for a specific left temporal abnormality in schizophrenia as proposed by Flor-Henry and Shaw et al.”

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References


Stevens replies:

We are grateful for Dr Flor-Henry’s careful analysis of our findings in the two studies of telemetered EEGs of schizophrenic patients. Although nothing would have been given more satisfaction than to find some consistent specific localisable derangement of cerebral electrical activity during abnormal behaviours of schizophrenia, our interpretation of the data did not allow us to specify which was the abnormal hemisphere for the few statistically significant changes emerging from our extensive studies of scalp EEG in schizophrenic patients.

In the first study, (Stevens et al, 1979) patients showed a decrease in left temporal power but an increase in right temporal slow activity during hallucinations. Was this evidence of faulty activation of the speech area on the left or abnormality from the homologous area on the right? True, schizophrenic patients in contrast to normals demonstrated inappropriate activation of the left hemisphere during spatial tasks—but was this due to failure of activation of an abnormal right hemisphere? True again, anecdotal information illustrated from five patients in the first study showed predominance of left temporal abnormality but in our second study (Stevens and Livermore, 1982) in which we attempt quantitative analysis of power spectra of the data of many of the same patients plus additional subjects, the complex mix of findings
appears to implicate both hemispheres in the unusual information processing suggested by the EEC data. Thus, as Flor-Henry notes, the catatonic schizophrenics had more right temporal slow activity and the paranoids more left; alpha-suppression in the left temporal lobe during abnormal behavioural or subjective events could as well represent inappropriate failure to suppress on the right, as was also seen in the failure of schizophrenic patients to suppress right temporal alpha during performance of spatial tasks.

Finally, carbamazepine, and also sodium valproate have both been shown to have important therapeutic and preventive effects in mania.\textsuperscript{1-3} We found that these anticonvulsant agents are not useful in and may even exacerbate schizophrenia, one of the few pharmacologic distinctions between these disorders, a clue worth pursuing in the investigation of underlying etiologies of the disease and mechanisms of drug actions.

\textbf{Janice R Stevens}

\textbf{References}

