

Noninvasive Blood Flow Studies
A Discussion Session

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The round table discussion primarily focused on the state of the art in noninvasive cerebral blood flow studies as it relates to aphasia. The fact that an entire issue of Brain and Language was devoted to the topic testified to its interest and timeliness. In the introduction to the recent issue, Wood stated that validity of behavioral activation of regional cerebral blood flow (rCBF) had been demonstrated, although experimental and statistical control needed refinement. Various studies in the volume documented the role of specific language association areas as well as selective local activation. Differences in rCBF and other procedures were discussed, including the advantages of non-invasive, repeatable measures. rCBF was reported to be a compromise between more temporal (EEG) and more geographical (e.g. emission computed tomography) measurements in terms of resoluteness, lending itself well to the investigation of cognitive processes. General discussion of the procedure itself and examination of a computer printout on an aphasic patient were followed by responses and interactions to 6 questions.

1. What, if any, contributions, can speech pathologists make to the study of brain-behavior relations such as rCBF measurements?

The consensus was that Speech/language pathologists are at least as knowledgeable about speech and language processing and use as other specialists. Wood stated that the first phase in rCBF activation advancement had been to demonstrate a variety of global responses. The investigators attempting to control and specify behavioral variables would do well to enlist the assistance of speech/language pathologists, especially in selection of tasks for aphasic subjects.

2. Can aphasiologists utilize results of rCBF in differential diagnosis of aphasia?

Some of the studies reported have shown relationships between rCBF and clinical and psychometric data reflecting degree and localization of atrophy as well as local and general rCBF changes. Different rCBF abnormalities were reported, for example, from cerebrovascular patients than from patients with Peck's disease and Alzheimer's disease. The group considered the possibility that patterns of impairment on aphasia testing might be correlated with patterns of rCBF responses. Greater concern was expressed, however, that more differences among normals be identified. Also, the need for normal controls in activation studies and the need to accrue data on recovery over time with aphasic subjects was discussed. There was some question about stabilization of responses; the phenomenon of habituation was addressed in several studies in the volume.

3. Can we correlate prognoses for recovery from aphasia obtained from aphasia test results with rCBF results?

Again the need for rCBF measurements with aphasic patients over time was expressed. Some questions generated were: What happens when patients

recover? What constitutes good recovery? If the non-dominant hemisphere is assuming functions with recovery, could it have been supporting these functions pre-morbidly? Aphasiologists will be looking forward to more answers from rCBF activation studies in the future, such as the studies reported by Meyer and his associates, which help identify patients with good potential for recovery.

4. What are some considerations for selecting tasks for activation procedures in rCBF, i.e., to say activation made a significant regional change?

Some of the problems with tasks reported were habituation to a task, attention, mental set, and length of exposure time. It appeared that tasks at moderate or high difficulty levels produced greatest effects. Additionally, researchers are attempting to deconfound cognitive from sensory and motor aspects of tasks. The group considered that speech/language pathologists have the expertise to identify appropriate tasks for specific subjects. They are capable of submitting formal protocols to overcome some of the problems stated. Thus, activation procedures forcing subjects to a level of response activating a region, an important statistical consideration according to Wood, could be more efficiently accomplished.

5. What are some considerations for selecting and managing response modes?

Despite attempts to reduce effects of motor responses, they appeared to affect blood flow increase and thus complicate interpretation in studies reported. The face mask required for the procedure also limited choices available. The monitoring of a variety of responses to one task was suggested as a means of sorting out cognitive from motor responses. Selection and management of response modalities when paradigms require them was considered one of the most challenging to be met.

6. Will rCBF influence treatment of aphasia?

Regional cerebral blood flow has been considered to have potential to evaluate effectiveness of surgical treatments and diagnosis and prognosis in aphasia. The possibility of utilizing it to evaluate baseline treatment versus non-treatment was suggested. Perhaps the changes made from therapy will reflect physiological treatment in terms of blood flow. The rCBF measurements might be a way of testing methodology of treating the right hemisphere as well as other methodologies.

The group was enthusiastic about the opportunities to learn more of brain-behavior relationships from rCBF and expressed intents to seek out laboratories in their respective geographical areas.

REFERENCES

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