Functional MRI Could Become Lie Detector

BY KATE JOHNSON
Montreal Bureau

CHICAGO — Functional magnetic resonance imaging can identify activation in specific regions of the brain when people lie and one day could be used to augment or replace polygraph testing, Scott H. Faro, M.D., said at the annual meeting of the Radiological Society of North America.

"We have just begun to understand the potential of fMRI [functional magnetic resonance imaging] in studying deceptive behavior," said Dr. Faro, professor and vice chair of radiology and director of the functional brain imaging center and clinical MRI at Temple University, Philadelphia.

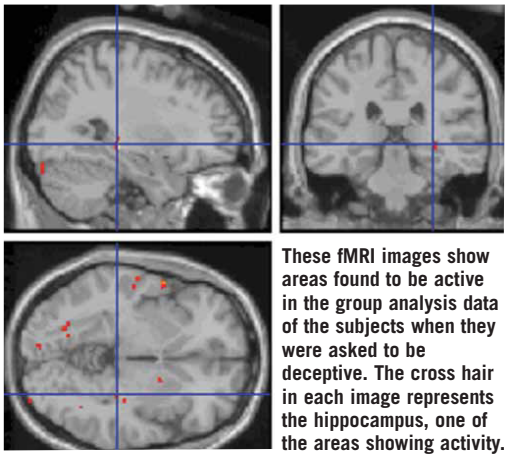
"We plan to investigate the potential of fMRI both as a standalone test and as a supplement to polygraph, with the goal of creating the most accurate test for deception," he said.

His research involved the examination of 11 volunteers with simultaneous fMRI and polygraph testing. Six of the subjects had been asked to shoot a toy gun and then lie about their participation, whereas the nonshooters were asked to tell the truth. In addition to being asked about the shooting, all subjects were asked unrelated control questions.

In all cases, fMRI and polygraph accurately identified the deceptive responses.

The fMRI showed activation in different areas of the brain, depending on whether a subject was being deceptive or truthful. The use of a real-life stimulus was a very important part of this study because this scenario can elicit strong activation of emotional and cognitive centers in the brain, which can be seen with fMRI, Dr. Faro said.

The investigators found that, during deception, activation was seen in the left medial, left inferior, and right precentral regions of the frontal lobe; the right hippocampus and right middle regions of the temporal lobe; and the anterior and posterior cingulate regions of the limbic lobe.



COURTESY FEROZE B. MOHAMED, PH.D.

These fMRI images show areas found to be active in the group analysis data of the subjects when they were asked to be deceptive. The cross hair in each image represents the hippocampus, one of the areas showing activity.

During truthful responses, activated areas included the left inferior and right medial regions of the frontal lobe, the left inferior region of the temporal lobe, and the posterior cingulate gyrus in the limbic lobe.

Some areas of the brain were activated during both lying and truth-telling, but there were five activated areas unique to lying: two in the frontal lobe (the right precentral gyrus and the left medial frontal gyrus), two in the temporal lobe (the right hippocampus and the right middle temporal lobe), and the anterior cingulate of the limbic lobe.

Investigation into other means of lie detection is important because polygraph testing is considered only 90% accurate, he said.

The polygraph test only measures peripheral physiologic responses, including galvanic skin conductance, which increases during perspiration, blood pressure, and respiration. These physiologic responses can vary among individuals, however, and can be self-regulated. "The deception response begins in the brain and controls all aspects of behavior. That is why the brain is the focus of our research," Dr. Faro said.

It is too early to tell whether fMRI results can be self-regulated, but the results suggest that the consistencies in brain activation patterns seen on fMRI may be beyond conscious control.

Dr. Faro's research is the first to use polygraph correlation and a modified version of control questioning techniques with fMRI. In addition, his research is the first to use a real-life stimulus, which is critical if the technique is to be developed into a practical test, he said. ■

Early Intensive Glucose Control Cut Neuropathy Risk in Type 1 Diabetes

BY MIRIAM E. TUCKER
Senior Writer

ORLANDO, FLA. — Early implementation of intensive blood glucose control reduces the risk for neuropathy in patients with type 1 diabetes, even if their control worsens down the line, Catherine L. Martin reported at the annual scientific sessions of the American Diabetes Association.

"Intensive therapy should be implemented as early as possible so as to obtain maximal long-term benefit," said Ms. Martin of the University of Michigan, Ann Arbor.

The finding is the latest to come from the Epidemiology of Diabetes Interventions and Complications (EDIC) study, a long-term follow-up of 96% of the original 1,441 participants in the landmark Diabetes Control and Complications Trial (DCCT), which confirmed the link between intensive glucose control and a reduced risk of microvascular complications in patients with type 1 diabetes (N. Engl. J. Med. 1993;329:977-86).

On the MNSI foot exam, 33% of those patients in the study's conventional group scored 2.5 or greater, vs. 23% of the intensive group.

In the DCCT, patients who practiced intensive blood glucose control and achieved an average hemoglobin A_{1c} level of 7.2% had a 64% lower risk for developing clinical neuropathy at an average follow-up of 5 years, compared with the conventionally treated group whose HbA_{1c} levels averaged 9%.

After the trial ended in 1993, the subjects in the conventionally treated group were instructed in intensive glucose management techniques, and all subjects were referred back to their personal physicians while continuing to be monitored annually in EDIC from 1994 onward, said Ms. Martin, the study coordinator for DCCT/EDIC at the University of Michigan.

By year 8 of EDIC, glucose control had improved in the DCCT conventionally treated patients to a mean HbA_{1c} level of 8.2%, while at the same time it had worsened in the former intensive treatment group to a mean of 8%.

But despite the convergence, 9.4% of the DCCT conventional group scored 7 or greater on the 15-item Michigan Neuropathy Screening Instrument (MNSI) symptom questionnaire at year 8, compared with 5% of the DCCT intensive group. On the five-component MNSI foot exam (appearance, ulceration, vibration, ankle reflex, and response to the 10-g monofilament), 33% of the DCCT conventional group scored 2.5 or greater vs. 23% of the intensive group.

Differences between the two groups on both neuropathy measures had reached significance by year 1 and remained so for each of the 8 years. Overall, the relative risk for neuropathy in the DCCT intensive group was reduced by 36% for the MNSI exam and by 50% for the MNSI questionnaire.

Similar findings of a persistent, beneficial effect of a prior period of glycemic control on the subsequent development of retinopathy and nephropathy at 8 years were reported at last year's ADA meeting by another EDIC investigator.

And in a published report, the progression of intima-media thickness, a measure of atherosclerosis, was also significantly lower 6 years later in the DCCT intensive group (N. Engl. J. Med. 2003;348:2294-303). ■

Diagnosis and Treatment of Restless Legs Found Lacking

SAN FRANCISCO — Roughly 3% of all visits to primary care physicians involve patients who are experiencing at least twice-weekly symptoms of restless legs syndrome, which are having an appreciably negative effect on their quality of life, according to the findings of a large international survey.

But their restless legs syndrome (RLS) typically remains undiagnosed or misdiagnosed, Wayne Hening, M.D., reported at the annual meeting of the American Academy of Neurology. "Awareness of the condition and accurate diagnosis by primary care physicians appear to be low," observed Dr. Hening of Robert Wood Johnson Medical School, New Brunswick, N.J.

He called for a new continuing medical education emphasis on consideration of RLS in the differential diagnosis of patients with sleep disorders involving difficulty in falling asleep and frequent awakening.

Dr. Hening presented data from the RLS Epidemiology, Symptoms, and Treatment (REST) Primary Care Study, in which more than 23,000 patients who visited participating primary care physicians in the United States, United Kingdom, Spain, Germany, and France during a 2-week period filled out an RLS screening questionnaire.

Patients in the Glaxo-SmithKline-sponsored study who were flagged as having at least weekly symptoms suggestive of RLS were asked to complete a more detailed follow-up questionnaire, and their primary care physicians were asked to complete a questionnaire about the patient's medical history.

Roughly 3% of the patients were deemed by investigators to have RLS symptoms likely to warrant treatment on the basis of self-report of at least twice-weekly frequency of symptoms and "some" or "high" negative impact upon quality of life. This cohort had a mean age of 56.6 years, with symptom onset at 45.8 years; 68% were women.

Overall, 88% of the patients reported having at least one sleep-related problem; 43% characterized sleep disturbance as their most troublesome RLS symptom. Also, 27% rated uncomfortable feelings in their legs as their most troublesome symptom, while 21% listed pain as their top symptom.

—Bruce Jancin