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NEWS

RSNA Press Release

Who's the Liar? Brain MRI Stands Up to Polygraph Test

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At A Glance

- Functional MRI shows unique areas of brain activation when someone tells a lie.
- With fMRI, twice the number of brain regions are activated during deception than during truth-telling.
- Because an individual cannot control brain activation, fMRI may prove a better lie detector than the polygraph test.

OAK BROOK, Ill.- Traditional polygraph tests to determine whether someone is lying may take a back seat to functional magnetic resonance imaging (fMRI), according to a study appearing in the February issue of Radiology. Researchers from Temple University Hospital in Philadelphia used fMRI to show how specific areas of the brain light up when a person tells a lie.

"We have detected areas of the brain activated by deception and truth-telling by using a method that is verifiable against the current gold standard method of lie detection-the conventional polygraph," said lead author Feroze B. Mohamed, Ph.D., Associate Professor of Radiology at Temple.

Dr. Mohamed explained how the standard polygraph test has failed to produce consistently reliable results, largely because it relies on outward manifestations of certain emotions that people feel when lying. These manifestations, including increased perspiration, changing body positions and subtle facial expressions, while natural, can be suppressed by a large enough number of people that the accuracy and consistency of the polygraph results are compromised.

"Since brain activation is arguably less susceptible to being controlled by an individual, our research will hopefully eliminate the shortcomings of the conventional polygraph test and produce a new method of objective lie detection that can be used reliably in a courtroom or other setting," Dr. Mohamed said.

Dr. Mohamed and colleagues recruited 11 healthy subjects for the study. A mock shooting was staged, in which blank bullets were fired in a testing room. Five volunteers were asked to tell the truth when asked a series of questions about their involvement, and six were asked to deliberately lie. Each volunteer was examined with fMRI to observe brain activation while they answered questions either truthfully or deceptively. They also underwent a conventional polygraph test, where respiration, cardiovascular activity and perspiration

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responses were monitored. The same questions were asked in both examinations, and results were compared among the groups.

"With fMRI, there were consistently unique areas of the brain, and more of them, that were activated during the deceptive process than during truth-telling," Dr. Mohamed said. In producing a deceptive response, a person must inhibit or conceal the truth, which activates parts of the brain that are not required for truth-telling. Thus, fewer areas of the brain are active when telling the truth.

Fourteen areas of the brain were active during the deceptive process. In contrast, only seven areas lit up when subjects answered truthfully. By studying the images, investigators were able to develop a better picture of the deception process in the brain. The increased activity in the frontal lobe, especially, indicated how the brain works to inhibit the truth and construct a lie.

Polygraph test results correlated well with actual events when subjects were asked to lie (92 percent accuracy); however, the results were not as conclusive when subjects were asked to tell the truth (70 percent accuracy).

The largest implications for a credible method of lie detection are in the field of crime investigation and prevention, and in the judicial determination of the guilt or innocence of accused individuals. Since the polygraph has not been embraced as a fully credible means of lie detection, the authors hope to provide a more accurate means of determining whether or not someone is telling the truth.

"A more consistent and verifiable method of lie detection could lead to changes in this particular realm of the legal system down the road," Dr. Mohamed said.

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"Brain Mapping of Deception and Truth Telling about an Ecologically Valid Situation: Functional MR Imaging and Polygraph Investigation-Initial Experience." Collaborating with Dr. Mohamed on this paper were Scott H. Faro, M.D., Nathan J. Gordon, M.A., Steven M. Platek, Ph.D., Harris Ahmad, M.D., and J. Michael Williams, Ph.D.

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