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### Brain imaging could spot liars

[Mark Peplow](#)

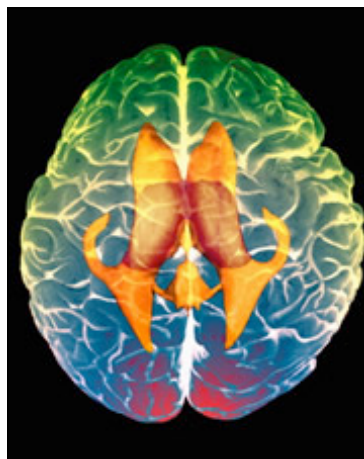
Tests reveals patches in the brain that light up during a lie.

Lying activates tell-tale areas of the brain that can be tracked using functional magnetic resonance imaging (fMRI), according to scientists who believe the technique could replace traditional lie detectors.

Conventional detectors, or polygraphs, are extremely controversial. Proponents of the polygraph argue that it measures the body's physiological responses to stress induced by lying. Trained operators can supposedly match spikes in respiration, blood pressure and sweating with false answers.

But although some US government agencies still use the tests, the US National Academy of Sciences published a damning report in 2003 concluding that the instrument was very unreliable<sup>1</sup>. With practice, subjects are able to moderate their physical response and conceal their deceit, the report said.

So scientists are looking for more reliable alternatives to the test, which was first conceived in 1915 by psychologist William Marston (see "[The truth about lying](#)").



MRI scanning can pick up activity in millimetre-sized parts of the brain.

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Functional MRI might be the key, says Scott Faro, a radiologist at the brain-imaging centre of Temple University in Philadelphia, Pennsylvania. Faro presented the new study on 29 November at the annual meeting of the Radiological Society of North America in Chicago. "I believe this is a vital approach to understanding this very complex type of cognitive behaviour," he says.

### Shoot for the truth

Faro and his colleagues asked six volunteers to fire a toy gun. The subjects then lay inside an fMRI scanner and lied about having fired the shot. They also received a polygraph test. Five more volunteers who did not shoot the gun were tested in the same ways to compare their responses.

Both tests caught out the liars and identified the truth-tellers in every case. The fMRI scan showed that specific areas of the brain were active during lying, including key parts of the frontal, temporal and limbic lobes. Overall, more areas of the subjects' brains were activated when they lied.

Functional MRI picks up magnetic signals from oxygen atoms stuck to iron in the subject's bloodstream. As brain activity increases, so too does blood flow, which carries more oxygen with it and boosts the signal strength. The technique, normally used for medical brain scans, can map activity in millimetre-sized parts of the brain.

### Beyond control

The technique could be most useful on subjects who have been trained to evade traditional polygraph tests, says Charles Honts, a psychologist from Boise State University, Idaho, who studies the polygraph's effectiveness. However he points out that the method will need to be made much cheaper before it could be used routinely. Efficient lie detectors are needed to beef up security in airports, he says, but million-dollar fMRI machines are simply not an affordable solution.

Daniel Langleben, a psychiatrist at the University of Pennsylvania, Philadelphia, has also used fMRI to identify the brain regions activated by lying. His test involves fibbing about the identity of a playing card<sup>2</sup> and also indicates that the method holds promise. However, Faro says that his experiment is the first to directly compare fMRI with polygraph tests.

It is too early to tell whether fMRI can be fooled in the same way as the polygraph, says Faro. However, he says that the results are promising because these characteristic brain patterns may be beyond conscious control, rendering it much more difficult to cheat.

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### References

1. National Research Council, The Polygraph and Lie Detection (National Academies Press, Washington DC, 2003).
2. Langleben D. D., *et al.* *NeuroImage*, **15**, 727 - 732 (2002). | [Article](#) | [PubMed](#) | [ISI](#) | [ChemPort](#) |

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