Medical assessment in the blink of an eye

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Have you ever thought that you knew something about the world in the blink of an eye? This restaurant is not the right place for dinner. That person could be The One. It turns out that radiologists can do this with mammograms, the x-ray images used for breast cancer screening. Cytologists, who screen micrographic images of cervical cells to detect cervical cancer, have a similar ability. A new study, published in Springer's journal *Psychonomic Bulletin & Review*, takes a closer look at the skill these specialists have.

There are many routes to making snap judgments (not all of them particularly useful). One of these is our ability to get the "gist" of an entire image by analyzing the whole scene at once, based on interpretation of global properties and image statistics, not focusing on specific details.

That seems to be what medical experts can do. They are not perfect in a fraction of a second but they do far better than random guessing when classifying medical images as normal or abnormal even though, in that blink of an eye, they cannot tell you where the problem might be located.

Karla Evans and colleagues, from Harvard Medical School and Brigham and Women's Hospital in the US, assessed medical experts' ability to categorize a breast cancer or cervical screening image as either normal or abnormal in a single glance. A total of 55 radiologists and 38 cytologists were shown either mammograms or images of cervical cells. Half the images were normal and half showed cancerous abnormalities.

Participants were shown the medical images briefly i.e., for 250 to 2000 milliseconds. They were asked to rate the abnormality of the image and then attempt to localize that abnormality on a subsequent screen showing only the outline of the original image.

Both groups of experts were able to detect subtle abnormalities more often than if they had simply guessed the answer; in other words, they showed above chance performance. Control groups, composed of non-expert observers who had no medical training, did no better than if they had guessed the answers on either the breast or cervical cancer images. Interestingly, neither expert group could localize the anomalies reliably in the second part of the experiment. The global gist of pathology might be detected in a flash. Localizing the problem would require a longer period of close scrutiny.

The authors conclude: "Our results show that, with specific training, an expert radiologist or cytologist learns the statistical regularities that distinguish normal from abnormal in the images in the realm of their expertise. They have the ability to feel that something is amiss, yet not know immediately where to find it. If the signal that helps with this initial decision could be identified by a computer, it could be used as a novel form of computer-aided detection."

More information: Evans, K.K. et al (2013). The Gist of the Abnormal: Above Chance Medical Decision Making in the Blink of an Eye, *Psychonomic Bulletin & Review*. DOI 10.3758/s13423-013-0459-3

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