

## Researchers find genetic link to PTSD

May 15 2012, by Bob Yirka

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(Medical Xpress) -- A team of Swiss and German researchers has found that a certain gene allele can be linked to increased emotional memory retention and because of that appears to be a factor in people who suffer from post traumatic stress disorder (PTSD). The team, as they describe in their paper published in the *Proceedings of the National Academy of Sciences*, conducted emotional memory tests on a large random group of people and then again on a sample of people in a Rwandan refugee camp who had survived atrocities committed during the genocide that occurred there in 1994, and found a common genetic link between emotional memory retention and the likelihood of developing PTSD after experiencing a traumatic event.

Suspecting that people who carried a variant of the PRKCA gene, called the A allele, which has been associated with memory retention, might experience better [memory retention](#) regarding [emotional experiences](#), the team enlisted 700 volunteers to undergo testing. Participants first submitted samples for DNA screening, then were shown pictures of [emotional events](#) and were asked several minutes later to provide details of what they'd seen. The group that had two copies of the A allele variant were able to recall more details about what they'd seen. Another group that had a pair of so-called G alleles fared the worst, while those that had just one of each wound up somewhere in-between.

To get a more accurate picture of what was going on, the team next enlisted a group of 394 volunteers to undergo the same test, only this time, each did so while laying in an fMRI machine as researchers watched to see which parts of their brains were getting busy. Not

surprisingly, they found that those areas of the brain associated with memory were activated in all the participants. Those with the A allele pairs, however, showed the most activity while those with G alleles showed the least and those with one of each once again fell in-between. They also found that those with A alleles demonstrated more activity in parts of their brains that have previously been associated with storing emotional memories.

Having confirmed their suspicions, the team next tested 347 volunteers that had survived the Rwandan genocide campaign and who were now living in a Ugandan refugee camp. They found that the vast majority of those still suffering from PTSD had pairs of A alleles and that as a group were twice as likely to suffer from PTSD as those with either one or no A alleles.

These results, the team concludes, demonstrate a clear link between A alleles and [emotional memory](#) retention and a higher propensity for developing PTSD after experiencing a traumatic event.

**More information:** PKC $\alpha$  is genetically linked to memory capacity in healthy subjects and to risk for posttraumatic stress disorder in genocide survivors, *PNAS*, Published online before print May 14, 2012, [doi: 10.1073/pnas.1200857109](https://doi.org/10.1073/pnas.1200857109)

### **Abstract**

Strong memory of a traumatic event is thought to contribute to the development and symptoms of posttraumatic stress disorder (PTSD). Therefore, a genetic predisposition to build strong memories could lead to increased risk for PTSD after a traumatic event. Here we show that genetic variability of the gene encoding PKC $\alpha$  (PRKCA) was associated with memory capacity—including aversive memory—in nontraumatized subjects of European descent. This finding was replicated in an independent sample of nontraumatized subjects, who additionally

underwent functional magnetic resonance imaging (fMRI). fMRI analysis revealed PRKCA genotype-dependent brain activation differences during successful encoding of aversive information. Further, the identified genetic variant was also related to traumatic memory and to the risk for PTSD in heavily traumatized survivors of the Rwandan genocide. Our results indicate a role for PKC $\alpha$  in memory and suggest a genetic link between memory and the risk for PTSD.

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