

MIND

1960S DRUG THAT HELPS US REMEMBER THE GOOD TIMES

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Beyond extinction: erasing human fear responses and preventing the return of fear

Anyone who saw the 1997 blockbuster, *Men In Black*, will be aware that one day – thanks to a pen torch and some strategically-placed sunglasses – troubling memories will be a thing of the past. Well we may not be there yet, but if Merel Kindt and her colleagues are correct, we're not that far off. The results from their Amsterdam University labs showed that taking the old-fashioned blood pressure medicine, propranolol, can fully erase fear memories.

Sixty volunteers were trained to associate a spider picture with fear by giving them small electric shocks. These volunteers demonstrated that their brains had learned to make the association by showing an exaggerated **startle response** whenever they were subsequently shown a spider photo. However, Kindt showed that, when individuals took propranolol and were then shown the spider picture days later, their expression of fear was completely abolished – unlike those who did not receive the tablet, whose startle response remained unchanged.

This new memory-wiping technique is based on the principle of memory reconsolidation: when we remember something, the invoked memory is retrieved from its long-term storage location (in a part of the brain called the neocortex) – at which point it becomes vulnerable to disruption. (It's a bit like retrieving a file from a filing cabinet. Once the file is removed, the papers stored in the file could get jumbled up in a way that's not possible while the file is safely stored away.) The memory is then 'restabilized' by being stored back into the neocortex – where it becomes resistant to change once again. It is thought that this process may underlie our ability to strengthen and weaken individual memories based on new experiences.

In her experiment, Kindt managed to block restabilization of the fear memory, causing it to be lost forever: once retrieved from the 'filing cabinet' of our neocortex, the memory 'file' was basically shredded by the propranolol before it could be safely re-filed. Unfortunately for the sci-fi fans among us, taking propranolol did not cause individuals completely to forget the whole experience of being tested: they expected to receive a shock when presented with the picture of a spider, but didn't seem to care anymore. This highlights a limitation of the memory-wiping technique – the drug seemed only to target the fear-memory link, and nothing else.

While it may seem positively 'James Bond' that memories can be selectively erased, the idea of blocking restabilization is not a new one. Countless experiments carried out on animals have produced similar results. But Kindt's work is special because she has shown that taking a drug, which is already well established in the medical community, can selectively erase fear memories in humans. This could prove to be a landmark discovery in the treatment of psychological trauma (in particular, post-traumatic stress disorder) and could even be extended to therapies for drug addiction.

So what next? Well, as with all new treatments, rigorous testing will have to be carried out: history is littered with the empty packets of innovative new medicines, which never made it through clinical trials. Indeed, three years after the initial experiment, we are still waiting for any key developments. So, for now, psychologists and neuroscientists sit with crossed fingers – the hope being that the treatment of unpleasant memories will soon be readily achievable through a simple process of 'therapeutic forgetting'.

RIGHT:
An 80mg capsule of Propranolol

