

Does cannabidiol protect against the harmful effects of THC in cannabis?

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Cannabis has long been associated with poor memory, but new research suggests that the strain of cannabis makes all the difference¹. In a test of memory, only users of 'skunk'-type strains exhibited impaired recall when intoxicated, whereas people who smoked hashish or traditional herbal cannabis performed equally well whether they were stoned or sober. These findings suggest that an ingredient more plentiful in some types of cannabis than in others may help to reduce memory loss.



Cannabis contains around 70 ingredients that are unique to the plant. A key difference between the types of cannabis is the ratio of two of the principle ingredients. Delta-9 tetrahydrocannabinol (THC) is the primary active ingredient, and is responsible for the 'stoned' feelings that users want. The second ingredient, cannabidiol (CBD), has more calming effects, and brain-imaging studies have shown that it can block the psychosis-inducing effects of THC². Skunk-type strains of cannabis contain a little if any CBD whereas resin (hashish) or traditionally grown herbal types generally contain CBD.

Valerie Curran & Celia Morgan, from University College London, led the latest research, and argue that if people must consume cannabis, they should be encouraged to use strains with higher levels of CBD rather than using skunk. They also argue that studying CBD could provide insight into the mechanics of memory formation.

Cannabis use has increased in recent years — almost as many 16–24-year-olds in the United Kingdom have tried as haven't, according to the 2008 report [*Statistics on Drug Misuse*](#) by the National Health Service. Concerns have been raised that increased levels of THC in 'skunk' varieties owing to the way these are grown (under 24 hour lighting in hydroponic solutions). This form of growing also reduces levels of CBD in the plant. Curran & Morgan hypothesised that effects of the drug on mental health could be influenced by the ratio of THC to CBD in cannabis.

To test this hypothesis, the UCL researchers travelled to the homes of 134 volunteers on two separate days. On one day the individuals got high on their own supply of cannabis; on the other day, they were sober. On both days they completed a series of tests designed to assess memory, mood, drug salience and other functions. The researchers then took a portion of each individual's cannabis back to the laboratory to test how much THC and CBD it contained.

The participants were divided into groups of high (samples containing more than 0.75% CBD) and low (less than 0.14% CBD) exposure, and the data were filtered so that their THC levels were constant. Analysis showed that participants who had smoked cannabis low in CBD

were significantly worse at recalling text than they were when not intoxicated. Those who smoked cannabis high in CBD showed no such impairment.

The results suggest that CBD can mitigate THC's interference with memory formation. This is the first study to show such effects.

In a related study, Morgan & Curran⁴ found that those smoking low CBD strains acutely, paid more attention to cannabis-related cues (e.g. pictures of spliffs, varieties of cannabis) than those smoking higher CBD strains (Morgan et al, 2010b). This modulation of the salience of drug cues by CBD suggests this compound may have potential in the treatment of addiction. It also suggests that those smoking low CBD strains like skunk every day may be more at risk of addiction than those smoking herbal or resin forms. Other mental health consequences are likely to be more marked when individuals smoke low CBD strains, especially for those who have other vulnerability factors. In the US, several states allow the medical prescription of cannabis, especially for pain. Cannabis with higher levels of CBD would be preferable so users experience less memory impairment and less incentive salience of cannabis while under the influence of the drug.

1. Morgan, CJAM, Schafer G, Freeman TP & Curran (2010) Impact of cannabidiol on the acute memory and psychotomimetic effects of smoked cannabis: naturalistic study. *Br. J. Psychiat.* **197**, 285-290.
2. Bhattacharyya, S. *et al.* *Neuropsychopharmacology* **35**, 764-774 (2010).
3. Ilan, A. B. , Gevins, A. , Coleman, M. , ElSohly, M. A. & de Wit, H. *Behav. Pharmacol.* **16**, 487-496 (2005).
4. Morgan CJA, Freeman TP, Schafer G & Curran HV (2010) Cannabidiol attenuates the appetitive effects of Δ^9 -tetrahydrocannabinol in humans smoking their chosen cannabis. *Neuropsychopharmacology*, 35:1879-1885.