

Electroconvulsive therapy reboots certain brain networks to help depressed individuals

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Dr. Brian Levine, senior author on the paper and senior scientist at Baycrest's Rotman Research Institute (RRI). Credit: Provided by Baycrest

Electroconvulsive therapy (ECT) helps people with severe depression by "pushing the reset button" on brain networks involved in creating a mental picture, according to recent Baycrest findings.

People with depression commonly become focused on the negative aspects of an experience, which also blunts their memory ability. These individuals have difficulty reframing their thoughts towards healthier interpretations of past events. Electroconvulsive therapy appeared to fight depression by "rebooting" the visualization networks, according to findings published in the journal *NeuroImage: Clinical*.

"ECT has long been known to be an [effective treatment](#) for patients who don't respond to other therapies," says Dr. Brian Levine, senior author on the paper and senior scientist at Baycrest's Rotman Research Institute (RRI). "But we don't know precisely how ECT affects brain function. Our study shows how ECT alters brain networks involved in memory and thinking."

Since the late 1930s, psychiatrists have used ECT as part of an overall treatment plan to help people with depression who are not benefitting from antidepressants. With ECT, [electrical current](#) is applied to the forehead to intentionally cause brief seizures, while the person is under anesthesia. Following a course of ECT, individuals proceed with medication or talk therapy to maintain their improved condition.

"Since people with depression struggle to reframe an event, their ability to cope with adverse situations is affected," says Dr. Raluca Petrican, co-first author on the paper and RRI postdoctoral fellow. "Our study suggests that ECT reconfigures brain networks that promote flexibility in how people remember events, and this may help people cope better with daily challenges."

Researchers analyzed the [brain scans](#) of 25 adults between the ages of 25 to 60 years old. Among the participants, 15 individuals were severely depressed and referred for [electroconvulsive therapy](#) at psychiatric clinics across Toronto. All participants were asked to share some notable events with researchers at the beginning of the study. Participants were

cued to picture these events while they were inside the scanner. Individuals who were recommended for ECT did scans before and after all their sessions. These scans were analyzed and researchers found that before ECT, the brain networks linked to visualization appeared to function differently among individuals with depression, but after ECT, these [brain](#) networks looked similar to healthy individuals.

The results were validated in a publicly available database of more than 300 [individuals](#) who had their brains scanned as part of a separate study but did not have ECT.

Through these scans and access to the database, researchers were also able to link a person's [brain networks](#) to their resiliency or susceptibility to depression.

As next steps, the study is exploring one of the common side effects of ECT—the amount and types of memory loss experienced by patients who undergo this treatment.

More information: Raluca Petrican et al, Electroconvulsive therapy "corrects" the neural architecture of visuospatial memory: Implications for typical cognitive-affective functioning, *NeuroImage: Clinical* (2019). [DOI: 10.1016/j.nicl.2019.101816](https://doi.org/10.1016/j.nicl.2019.101816)

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