

Dr Kate Mulholland¹, Dr Conal Devlin¹
¹Mayo Mental Health Services

Background

Globally, 466 million people suffer with significant hearing loss and it is predicted that by 2050, this will increase to 900 million people. As of July 2022, the number of cochlear implant recipients worldwide was one million.¹ The number of cochlear implant (CI) candidates continues to grow due to expanding indications for cochlear implants and an aging population.² Cochlear implant users have higher rates of anxiety and affective disorders compared to the general population.³

The use of electroconvulsive therapy (ECT) is considered a lifesaving treatment for several mental health conditions, including depression, mania and psychosis. ECT is utilised particularly in the elderly with a recent consensus report finding the median age of patients receiving acute courses of ECT to be 62.1 years.⁴ A number of factors are associated with higher rates of ECT use in the geriatric population, including reduced tolerability of psychotropic medication, increased responsiveness to ECT in the elderly and lower risk of complications compared to psychotropic medication.⁵

No consensus statement exists regarding the safety of ECT in patients with cochlear implants. The Food and Drug Administration (FDA) and cochlear implant manufacturers advise against the use of ECT in patients with cochlear implants. The concerns with the use of ECT include potential thermal injury to surrounding tissue and damage to the implant.⁶

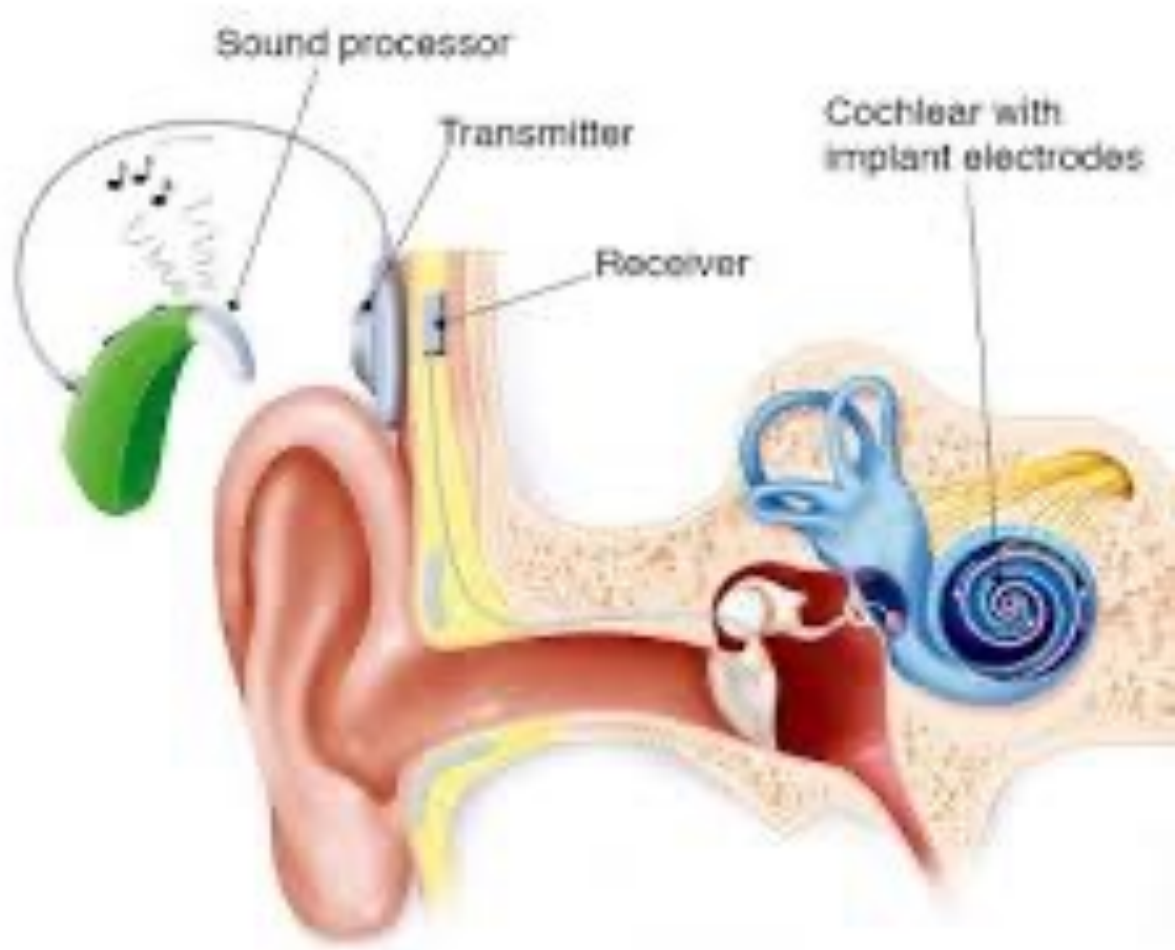


Figure 1: Illustration of cochlear implant

Aims and objectives

The primary objective of this review is to evaluate the current literature available on ECT in patients with cochlear implants.

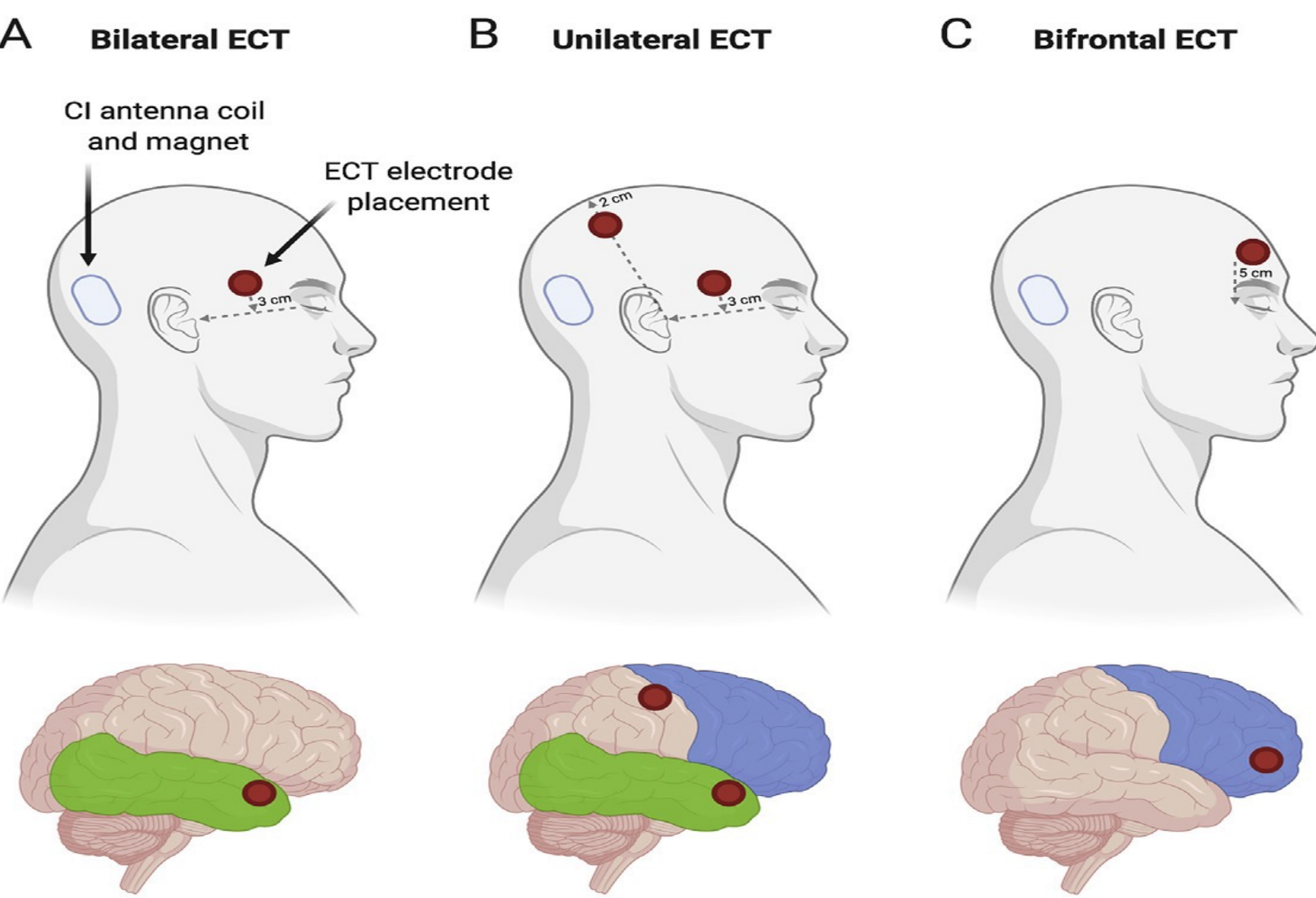


Figure 2: The proximity of ECT and CI device

Methods

A bibliographic search of five databases to extrapolate literature on the use of electroconvulsive therapy in cochlear implant patients including Google Scholar, Science Direct, Medline, EMBASE and Psych INFO. Search terms included ‘electroconvulsive, ECT, cochlear implant’.

Results

Author	Clinical details	ECT administration	Result
Labadie et al	17 year old male with cochlear device presenting with delirious mania	Two ECT treatments, unilateral and contralateral to implant. Charge 48 mC Energy 9.9 & 9.6 joule Current 800mA	Integrity testing of device normal. Resolution of symptoms.
Lauridsen JK	78 year old female with right sided cochlear implant presenting with severe depression episode	Nine inpatient ECT treatments, 4 outpatient ECT treatments, unilateral and contralateral to implant. Charge up to 1004mC.	No damage to device (audiology clinic) Resolution of symptoms.
Jiam et al	60 year old male with left sided CI presenting with BPAD I (severe depressive episode)	Nine ECT sessions, unilateral and contralateral to implant. Stimulus 10J for initial and 60J for subsequent treatments.	No subjective change of hearing. CI impedance testing in normal limits. Resolution of symptoms.
Veigne et al	67 year old male with right ear titanium CI presenting with severe depressive episode with psychotic features	Eleven sessions of right unilateral ECT. No further details given regarding ECT.	No information given on integrity of CI. Resolution of symptoms.
Mulholland et al	72 year old male with bilateral cochlear implants presenting with severe depressive episode with psychotic symptoms	Nine sessions of bilateral ECT. Charge 100mC for initial session titrated to 650mC for subsequent sessions.	No information given on integrity of CI. Resolution of symptoms.
McRackan et al	Ten functional cochlear implants were inserted into five cadaveric human heads.	Twelve consecutive unilateral ECT sessions over 30 minutes. ECT was contralateral for 5 CI and ipsilateral for the remaining 5 CI. Charge: 800mA	Impedance testing of CI normal. No difference between contralateral versus ipsilateral ECT.

Conclusion

This literature review revealed that there are currently five case reports of ECT in patients with cochlear implants, with resolution of symptoms of mental illness for all patients and preserved cochlear implant function post ECT in all cases. Of these five individuals, four received ECT contralaterally to the cochlear implant site and only one received ECT bilaterally and thus ipsilateral to the cochlear implant, with no difference in efficacy or tolerability noted between these different forms of ECT administration.

This literature review shows promising evidence for the use of ECT in patients with cochlear implants. While the findings suggest the safety and effective use of electroconvulsive therapy in this population, the paucity of literature highlights the need for a randomised control trial including broad populations and long-term follow up of clinical outcomes.

Limitations

- Limited research studies available on the topic of ECT in cochlear implant patients
- Significant clinical heterogeneity exists amongst existing case reports

PDF & Contact information

To access a PDF version of the poster, scan the QR code.
If you have experience of ECT in CI patients or would like to contact the presenter:
kate.mulholland@hse.ie



References

- D’Haese, PSC, Van Rompaey, V, De Bodt, M, Van de Heyning, P. **Severe hearing loss in the aging population poses a global public health challenge. how can we better realize the benefits of cochlear implantation to mitigate this crisis?** Frontiers in Public Health. 2019 Aug; 16:7:227. doi: 10.3389/fpubh.2019.00227
- National Institute for Health and Clinical Excellence (NICE). 2009. **Cochlear implants for children and adults with severe to profound deafness** (Report No. Technology appraisal guidance 166). Available at: <https://www.nice.org.uk/guidance/ta566/chapter/4-Evidence-and-interpretation> Accessed 3.12.2024
- Brüggemann, P, Szczepek, AJ, Klee, K, Gräbel, S, Mazurek, B, Olze, H, In patients undergoing cochlear implantation, psychological burden affects tinnitus and overall auditory rehabilitation, Frontiers in Human Neuroscience, 2017 May; 11:226. doi: 10.3389/fnhum.2017.00226
- ECTAS Dataset Report 1 January 2021- 31 December 2021, Electroconvulsive Therapy Accreditation Service. Available at: [https://www.rcpsych.ac.uk/docs/default-source/improving-care/ccai/quality-networks/electro-convulsive-therapy-clinics-\(ectas\)](https://www.rcpsych.ac.uk/docs/default-source/improving-care/ccai/quality-networks/electro-convulsive-therapy-clinics-(ectas)) Accessed 3.12.2024
- Kerner, K, Prudic, J, **Current electroconvulsive therapy practice and research in the geriatric population**, Neuropsychiatry, 2014 Feb; 4(1):33-54 doi: 10.2217/npj.14.3
- Najib, U, Horvath, JC, **Transcranial magnetic stimulation (TMS) safety considerations and recommendations**, Neuromethods, 2014 ; 89:15-30 Available at: https://link.springer.com/protocol/10.1007/978-1-4939-0879-0_2. Accessed 3.12.2024
- Illustration of cochlear implant Available at: <https://cochlearimplant.lab.uconn.edu/cochlear-implant-information/resources-for-people-with-cochlear-implants/> Accessed 3.12.2024
- The proximity of ECT and CI device: Jensen KHR, Navntoft, Sindahl, CH, Caye-Thomasen, P, Jorgensen, MB, **Cochlear Implant should not be absolute contraindication for electroconvulsive therapy and transcranial magnetic stimulation**, 2020 Sept-Oct; 13(5):1464-1466. doi: 10.1016/j.brs.2020.08.007
- Labadie, RF, Clark, NK, Cobb, CM, Benningfield, MM., Fuchs, DF., **Electroconvulsive Therapy in a Cochlear Implant Patient**, Otology & Neurotology, 2010 Jan; 31:64-66. doi: 10.1097/MAO.0b013e3181c0e7d1
- Lauridsen, JK. **Electroconvulsive Therapy for a Patient With a Cochlear Implant**, Ugeskrift for Laeger, 2019 May; 6:181(19):V01190063
- Jiam, NT, Li, D, Kramer, K, Limb, CJ, **Preserved Cochlear Implant Function After Multiple Electroconvulsive Therapy Treatments**, The Laryngoscope, 2020 Nov; 131 (5), doi: 10.1002/lary.29292
- Veigne, S, Ahmad, A, **Electroconvulsive Treatment (ECT) in the Presence of Titanium Cochlear Implant: A Case Report**, The American Journal of Geriatric Psychiatry, 2021 April p91. doi: 10.1016/j.jagp.2021.01.086
- Mulholland, K, Devlin, C, **Electroconvulsive Therapy in a Geriatric Patient with Bilateral Cochlear Implants**- awaiting publication.
- McRackan, TR, Rivas, A, Hedley-Williams, A, Raj, V, Dietrich, MS, Clark, NK, Labadie, RF, **Impedance Testing on Cochlear Implants After Electroconvulsive Therapy**, Journal of ECT, 2014 Dec; 30(4):303-8. doi: 10.1097/YCT.0000000000000124.