Neuromodulation and opioid use disorder: Ethical opportunities for Canada

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OBJECTIVE

To examine the state of the science for using neuromodulation to treat opioid use disorder (OUD), and associated ethics discourse surrounding clinical trials and implementation.

BACKGROUND

- Nineteen Canadians die everyday from opioid poisoning.
- Current approaches to the crisis involve harm reduction and educational initiatives (e.g. naloxone kits, needle exchanges, safe injection sites).
- Current treatment involve medication assisted therapies (MAT) (e.g. methadone) and counselling.
- Both invasive and non-invasive neuromodulatory interventions are being tested for OUD.

METHODS

Scoping review of the literature on neuromodulation to treat opioid use disorder in PubMed. Key papers and ethics considerations based on thematic relevance are summarized here.

KEY CASE REPORTS AND CLINICAL TRIALS

Author	Year	Country	Result
Zhou et al.	2011	China	DBS n=1 6.5 years sober post DBS
Kuhn et al.	2013	Germany	DBS and MAT n=2 Sobriety at 12-months (patient 1) and 24-months (patient 2)
Zhang et al.	2018	China	DBS n=1 Fatal overdose 3 months post-surgery
Chen et al.	2019	China	DBS n=8 5/8 sober at 3.5-year follow-up
Mahoney et al.	2021	USA	DBS n=1 Sobriety for 12-month follow-up period

KEY ETHICS CONSIDERATIONS

Recruitment	•Capacity, consent, and coercion; Representativeness; triage
Stigma	•Negative impact on community especially if already marginalized
Cultural meaningfulness	•Mismatch of biomedical intervention with traditional views on wellness
Cost	•For the procedure and additional supports
Changes to person	•Behavioural and psychological; agency and identity
Sociopolitical	•Stigma misinforming policy and law; political advocacy and dissent

DISCUSSION

Case reports:

- DBS, rTMS, tDCS reduce opioid craving and withdrawal scores.
- DBS is the most promising intervention given precision and long-lasting effects.

Ethics discourse:

- Supports throughout neuromodulatory intervention (e.g. MAT, counselling) are emphasized consistently.
- Given the still-evolving science, DBS should only be used as a last resort.
- More ethics discourse on and guidance is needed for recruitment, consent, impact on identity, and triage.

OPPORTUNITIES FOR ACTION

- **Engagement** of key stakeholders – opioid users, clinicians, ethicists, policy-makers – to inform future of neuromodulation
- **Integration** of Indigenous voices and knowledges to ensure culturally appropriate development and implementation.
- **Proactive neuroethics discourse and evidence-based policy** for equitable evolution of neuromodulation on a global scale.

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