## Overview

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The implantable nerve stimulator consists of:

External transmitter with a

#### IM-FES Defined<sup>2-3</sup>



A footswitch placed under the heel of the patient's foot inside the shoe activates and deactivates the stimulation.

The implantable nerve stimulator receives information carried by radiofrequency signals and converts them into the stimulation pulses of the desired amplitude and frequency.

## IM-FES Parameters & Muscles<sup>2,4</sup>



#### IM-FES Parameters (within comfort):

Amplitude: 4 - 20 mA

Pulse width: 1 - 150 µs

Frequency: 15 - 50 Hz

#### Muscles:

Tibialis anterior

Peroneus longus & brevis

Gastrocnemius, lateral head

Biceps femoris

#### Nerves

Superficial and Deep Peroneal



# Methods

The conducted literature search included:

CINAHL

PubMed

ProQuest Nursing and Allied Health

SAGE Journals

Cochrane Library

Two reviewers independently assessed each

### Search Terms



(implant\* FES OR neuroprosthetic OR neuroprosthesis OR implant\* stimulator) AND (lower leg OR lower extremity OR ankle) AND (gait OR ambulat\* OR walk\*) NOT microprocessor

#### Search limits

- Human subjects
- Peer-reviewed
- English language

Records identified through database searching (n = 355 in total) Additional records identified through other sources (n = 1)

Identification

## PRISMA

Screening

Records after duplicates removed (n = 325)



Records screened (n = 325) title/abstract



Full-text articles assessed for eligibility (n = 29)



Studies included in qualitative synthesis (n = 4)

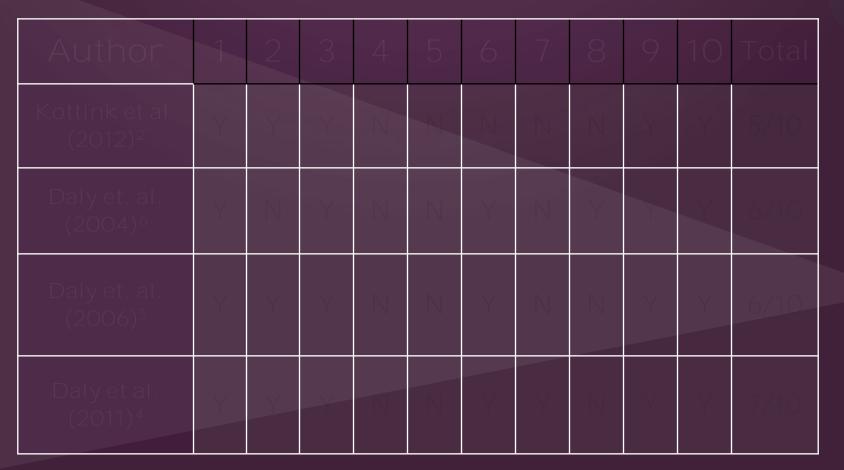
Records excluded, with reasons (n = 296)
Irrelevant - 136
Incorrect design - 12
Incorrect population - 100
Incorrect intervention - 38
Incorrect outcome - 10

Eligibility

Included

Full-text articles excluded, with reasons (n = 25)
Study design - 18
Intervention - 2
Population - 5
Abstract only - 0

#### PEDro Scale





# Results

### Results



Adverse effects of IM-FES included discomfort & erythema<sup>4-5</sup> No infections were reported

Outcomes were assessed pre- and post-treatment<sup>2,4-6</sup> 6 month follow-ups were used for 2 studies<sup>4,6</sup>

#### Results



Greater gains in self-reported functional mobility<sup>5</sup>

Retention of coordinated gait components occurred 6 months post-treatment and after IM-FES removal<sup>4</sup> Controls worsened significantly at follow-up<sup>4</sup>



## Conclusion

### Conclusion



There is moderate evidence to support IM-FES for improving gait in patients with chronic CVA vs BWSTT or gait training alone<sup>4-6</sup>

IM-FES resulted in normalized initial loading response in comparison to a conventional walking device<sup>2</sup>

One study showed retention in gait kinematics 6 months post-treatment following removal of IVI-FES<sup>4</sup>



Clinicians should consider using IM-FES to promote greater retention of gait improvements vs. gait training alone in adults with chronic CVAv s is s

IM-FES is a safe and feasible

## Limitations



Several articles were published by the same authors

Small sample size

Inability to blind

Invasive surgery

Adverse effects

Co-intervention

Varied outcome measures and protocols

Inability to generalize to other populations

#### Future Research



Future research should

- Compare IM-FES to transcutaneous FES with gait training
- Include larger sample sizes
- Include other populations

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