



## FES CYCLING AND SPINAL CORD INJURY FACT SHEET

### WHAT IS FES CYCLING?

Functional Electrical Stimulation (FES) Cycling is a therapeutic exercise where small electrical pulses are applied to peripheral nerves through adhesive electrodes in order to produce strong muscle contractions in weakened or paralyzed muscles. These muscle contractions are then utilized to facilitate cycling exercise with a motor, providing assistance and/or resistance to pedaling.

### HOW CAN FES CYCLING HELP ME?

Below are some summaries of studies from the four decades' worth of clinical research on lower extremity FES Cycling in individuals with SCI– highlighting the potential benefits. We

start with systematic reviews (comprehensive reviews and evaluation of the research on a certain topic) followed by additional individual studies.

Published	Systematic Review Topic/Summary	What does this mean?
2021 <sup>1</sup>	FES cycling can improve <b>lower extremity power output, aerobic fitness and muscle health</b>	<ul style="list-style-type: none"> <li>• Can <b>counteract the significant muscle loss</b> seen after SCI</li> <li>• Muscle can be influenced to become <b>more resistant to fatigue</b></li> <li>• <b>Reduced risk</b> of cardiovascular/ cerebrovascular events after SCI</li> </ul>

Published	Systematic Review Topic/Summary	What does this mean?
2021 <sup>3</sup> and 2022 <sup>2</sup> (two separate reviews)	FES cycling can <b>reduce spasticity</b>	<ul style="list-style-type: none"> <li>• Decreasing spasticity in the legs may:</li> <li>• improve transfer ability</li> <li>• improve sleep</li> <li>• decrease pain associated with spasms</li> <li>• reduce risk for contractures</li> </ul>
2013 <sup>4</sup>	FES (combined with appropriate medications) may <b>improve bone density</b>	<ul style="list-style-type: none"> <li>• In newly injured patients, FES can <b>reduce how much bone is lost</b></li> <li>• In patients with long-standing injuries, FES can <b>increase bone density</b> upwards of 10% after 12 months</li> <li>• Improved bone density reduces risk of fractures!</li> <li>• However: the frequency of FES training needs to be 5x/week to see meaningful improvement and continuous training is required to maintain gains</li> </ul>

## INDIVIDUAL STUDIES ON FES CYCLING:

Published	Article Topic/Summary	What does this mean?
2013 <sup>5</sup>	FES cycling 3x/week at home improves quality of life	<ul style="list-style-type: none"> <li>• Scores improved significantly in areas including: pain, energy/fatigue, physical health, sleep, work capacity, mobility</li> </ul>
2013 <sup>6</sup>	FES cycling promotes physical and functional recovery in chronic SCI: compared participants who FES cycled to those who received range of motion and stretching only	<ul style="list-style-type: none"> <li>• FES patients gained meaningful <b>improvements in sensation and motor scores</b></li> <li>• On average, FES cyclists showed 36% greater quadriceps <b>muscle mass</b>, 44% <b>less fat mass</b> in legs, 30 and 35% <b>greater strength</b> in hamstrings and quadriceps, respectively</li> </ul>
2014 <sup>7</sup>	4 weeks of FES cycling combined with PT/OT may reduce spasticity, increase muscle mass, and improve walking ability (cohort study)	<ul style="list-style-type: none"> <li>• Significant <b>reduction in spasticity</b> across multiple muscle groups</li> <li>• Quadriceps <b>muscle mass increased</b> 15-25%</li> <li>• <b>Walking ability</b> improved in participants who had some degree of walking ability at the start of the study</li> </ul>

## REFERENCES

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