



# AOTA Evidence Briefs

## Cerebral Palsy

*\*A product of the American Occupational Therapy Association's Evidence-Based Literature Review Project*

### CP #5

## Therapeutic electrical stimulation may improve gross motor function in children with spastic cerebral palsy who have undergone posterior rhizotomy

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Steinbok, P., Reiner, A., & Kestle, J. R. W. (1997). Therapeutic electrical stimulation following selective posterior rhizotomy in children with spastic diplegic cerebral palsy: A randomized clinical trial. *Developmental Medicine and Child Neurology*, *39*, 515–520.

### Level IA1a

Randomized controlled trial, two groups, more than 20 participants per condition, high internal validity, high external validity

### Why research this topic?

Clinicians using therapeutic electrical stimulation have produced functional improvements in children with spastic cerebral palsy. However, there has been little scientific evaluation of the treatment's effectiveness. "Therapeutic electrical stimulation" is low-intensity stimulation of the muscles, delivered during sleep.

### What did the researchers do?

Steinbok and his colleagues (1997), variously of the University of British Columbia (Vancouver, B.C., Canada) and British Columbia's Children's Hospital (Vancouver), first conducted a pilot study on the feasibility and the effectiveness of therapeutic electrical stimulation, administering it to three small groups of children for 12 months. They obtained the most positive results with children with spastic diplegia who had had a "selective posterior lumbosacral rhizotomy" (cutting of the nerve roots on the back of the spine in the lower back) more than 2 years previously. Therefore, they chose this category of child for further study.

The participants were 44 children (gender not specified), presumably drawn from children referred to British Columbia's Children's Hospital. All had spastic cerebral palsy and had undergone posterior rhizotomy more than 1 year previously. They were randomly assigned to a treatment group (22 children) or a **control group** (see *Glossary*) (22 children). Two children in the former and one in the latter dropped out soon after assignment, so the final sample consisted of 41 children. The average age of the children in the treatment group was 7.2 years, of the children in the control group 7.3 years.

The treatment group received therapeutic electrical stimulation for 8–12 hours per night at least 6 nights a week for 1 year. Parents administered the stimulation at home to two muscle groups at a time. Across the 12 months, they moved it to different (increasingly distal) muscle groups at 3-month intervals.

The primary outcome area of interest was *gross motor function* (as measured by the Gross Motor Function Measure). Secondary outcome areas of interest included *seated postural control* (as measured by an instrument reported in the literature), *muscle strength* (as measured by a hand-held myometer (an instrument for measuring muscle strength)), *muscle tone* (as measured with a modified Ashworth scale), **range of motion** (see *Glossary*) (as measured by a **goniometer** [see *Glossary*]), and *physiological cost* (as measured by an index reported in the literature).

### **What did the researchers find?**

The treatment group improved in gross motor function **significantly** (see *Glossary*) more than the control group did. That is, the improvement was probably caused by some factor other than chance.

On all the other measures, the two groups showed **no significant** (see *Glossary*) differences.

### **What do the findings mean?**

- The findings suggest that therapeutic electrical stimulation improves gross motor function in children with spastic cerebral palsy who have undergone posterior lumbosacral rhizotomy at least 1 year previous to enrollment in the study.
- The findings should boost confidence in funding programs that use therapeutic electrical stimulation with this population. The findings also suggest a direction for research: replication of the study to confirm the results; investigation of the effects of therapeutic electrical stimulation with ambulatory versus nonambulatory children with spastic cerebral palsy; and investigation of the mechanism by which therapeutic electrical stimulation achieves the improvement.

### **What are the study's limitations?**

- Seemed well designed and carried out.
- Sampling from one metropolitan area.
- Study child and caregiver were not **blinded** (see *Glossary*) to procedure; could potentially have been a placebo effect. Assessor was blinded.
- Not generalizable to larger population of children with spastic cerebral palsy who have not undergone selective posterior rhizotomy.

## **GLOSSARY**

**blinding**—refers to the practice of keeping members of the research study unaware of which group a participant is assigned to (treatment or control) in the study. Single blinding usually refers to keeping study participants unaware of whether they are receiving the experimental or the sham treatment. Double blinding usually refers to keeping the participants and those who are administering the treatment unaware of who is receiving the experimental and who is receiving the sham treatments. In some cases, where it is impossible to blind those administering treatment, the individuals who are administering the outcome measures can be blinded to group status.

Studies in which blinding does not occur can have significant biases. When the participants know that they are receiving the experimental treatment, they often get better because they think they ought to (this is often referred to as the placebo effect). When researchers know that a participant is receiving the experimental treatment, they often subconsciously favor those participants when evaluating them on outcome measures. For instance, when timing a participant in the treatment group, researchers may unknowingly stop the watch a little faster or slower so the treatment participant seems to do better.

**control group**—A group that received special attention similar to that which the treatment group received, but did not receive the treatment.

**goniometer**—Instrument that measures angles.

**nonsignificant (or no significance)**—A statistical term that refers to study findings that are likely to be due to chance differences between the groups rather than to other factors (like the treatment of interest). A nonsignificant result is not generalizable outside the study. Like significance, a nonsignificant result does not indicate the clinical effect. Often studies will show nonsignificant results, yet the treatment group's mean will be better than the control group's. This is usually referred to as a trend in the right direction. Because significance is closely determined by sample size, nonsignificant results would often become significant if the sample size were increased.

**range of motion**—Arc of motion through which a joint passes.

**significance (or significant)**—A statistical term that refers to the probability that the results obtained in the study are not due to chance, but to some other factor (such as the treatment of interest). A significant result is one that is likely to be generalizable to populations outside the study.

Significance should not be confused with clinical effect. A study can be statistically significant without having a very large clinical effect on the sample. For example, a study that examines the effect of a treatment on a client's ability to walk, may report that the participants in the treatment group were able to walk significantly longer distances than the control. However, if you read the study you may find that the treatment group was able to walk, on average, 6 feet, while the control group was able to walk, on average, 5 feet. While the outcome may be statistically significant, a clinician may not feel that a 1-foot increase will make his or her client functional.

■ Terminology used in this document is based on two systems of classification current at the time the evidence-based literature reviews were completed: *Uniform Terminology for Occupational Therapy Practice—Third Edition* (AOTA, 1994) and *International Classification of Functioning, Disability and Health (ICIDH-2)* (World Health Organization [WHO], 1999). More recently, the *Uniform Terminology* document was replaced by *Occupational Therapy Practice Framework: Domain and Process* (AOTA, 2002), and modifications to *ICIDH-2* were finalized in the *International Classification of Functioning, Disability and Health* (WHO, 2001).

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