

TREATMENT METHOD

TheraSuit™

Soft Dynamic Proprioceptive Orthotic

(United States)

Izabela Koscielny

Many of our friends would say that our daughter Kaya is lucky. She was born at 28 weeks to a family where both parents are physical therapists. We have started the earliest therapeutic intervention you can ever imagine. As soon as Kaya became medically stable we have initiated different therapeutic techniques.

We continued our intensive approach of her treatment for the next years to come. We started with the Vojta Method, Bobath, Doman-Delacato, PNF, Conductive Education as well as aquatic therapy, Hippotherapy, and daily massage. At age 6 Kaya was in a wheelchair and would use her K-walker for short distances. Nothing seemed to be bringing Kaya closer to independence.

Then one day, we traveled to Europe to try therapy that utilized an older version of the “space suit”. At the end of the first session, Kaya took her first steps. That was a turning point in our life. Since the old space suit was not available for sale and it was extremely cumbersome to use we decided to work on our own improved and modified version. That was the missing puzzle in our therapy.

In 2001, we designed and patented the TheraSuit. It is the first suit in United States used to rehabilitate neurological and sensory disorders. TheraSuit is a soft dynamic proprioceptive orthotic. It is FDA registered and currently utilized in over 32 different clinics and hospitals in the United States (including the Easter Seals and children’s hospitals). Therasuit is used to treat patients diagnosed with cerebral palsy, hemiplegia, stroke, developmental delays, ataxia, athetosis, traumatic brain injuries and many other neurological disorders. It is a tremendously help to patients suffering from sensory disintegration problems and autism.

Through the system of elastic rubber bands, a patient’s body is aligned to as close to normal as possible. This restoration of the posture and proper function of postural muscles allows the patients to learn (or relearn) proper patterns of movement. The patient’s body is loaded with very specific and unique pressure that restores deep proprioception from joints, ligaments and muscles. The TheraSuit provides external stabilization to the trunk and therefore allows more fluent and coordinated movement for both upper and lower extremities.



Izabela Koscielny with patient

Fine and gross motor skills improve in 94% of patients. Speech productivity and fluency is noted in 64%. But the major improvement occurs in the vestibular system.

The vestibular system, through the position of the body, records space and analyzes the muscle tone necessary to execute the movement. Since patients with neurological disorders display tremendous disbalance between the front and back of the trunk muscles, compensatory processes take place. But this means that additional muscles would be used that normally would not be active in the particular movement or position. It is very common to observe CP children relaxed when lying down but when put upright everything from toe to head tenses in order to maintain the upright position. The upper extremity attains a typical but pathological position. As a consequence, the weak trunk follows into an extension pattern. This is a chain reaction were lower extremity would usually compensate with a plantarflexion fixed position.

Standing on the toes does not allow for proper weight bearing on the heels. In addition, it would increase the muscle tone in the calf muscles. Also, when standing on the toes with the upper extremities abducted, flexed and extended, the entire body tilts forward thus displacing the center of gravity forward. This is the reason why it would be so difficult to maintain adequate balance and weight shifting.

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If you would try to attain this typical position, please, pay attention to the following muscle groups:

1. Trunk muscles (usually elongated, overstretched abdominal muscles, extremely tight trunk extensors)
2. Gluteal muscles (almost completely inactive, overstretched and weak)
3. Quadriceps muscle (in young children very straight knees, tight quadriceps; in older children overstretched, weakened with additional knee crouch and flexion)
4. Calf muscles (very tight, heel off the floor)

Not only it is extremely difficult to be upright in this pathological position but it also requires tremendous energy. Study shows that CP person would use 3 times more energy performing the same activity as the healthy peer. (1) Therefore fatigue and lack of endurance is very common.

When the TheraSuit is applied, very specific and precise placement of the elastic bands moves the entire body back on the heels and into more vertical position. Center of gravity moves back in between the feet. Very noticeable changes in muscle tone take place. More relaxed and upright posture with corrected alignment of lower and upper extremities is noted immediately. This is how TheraSuit normalizes muscle tone through the postural changes. Patients with ataxia and athetosis benefit from the use of the TheraSuit through the stabilizing effect to the trunk. They require more hours of use but benefit from it the most.

TheraSuit applies very specific pressure to the body. As Desmond Morris stresses in his book. The nervous system is exposed to pressure from the second week of gestation (2). This unique pressure allows the nervous system to develop properly. Premature and neurologically damaged babies are drastically deprived of that crucial input. When a healthy baby is born and starts crying we swaddle the baby in the blanket. Because of medical reasons, we cannot restore and provide pressure and touch to the premature or brain injured babies for weeks and sometimes months. As it is proven through endless research, touch and pressure are vital for survival. Ben E. Benjamin and Ruth Werner in their article entitled "The Primacy Of Human Touch" describe the necessity of those two elements in our life (3). TheraSuit restores nervous system function by providing both tactile stimulation and pressure all over the body. This is also why it helps so drastically with sensory integration problems.

What makes the TheraSuit unique is the ability to provide the dynamic correction. What this means is that it allows the error to occur but the same time, facilitates the correct position or movement. We can learn based only on our own experience. You will not be able to learn how to roller blade from the written description of the movement. You have to put the roller blades and fall several times before you will learn how to stand up in them. The same would apply to a hot stove. Your own mother would tell you not to touch it, but unless you experience and learn what hot stove means you will not avoid touching it. With any neurological disorder, lack of mobility will lead to limited personal experience and learning as well as delayed or disturbed sensory integration.

TheraSuit™ Applications:

- Cerebral Palsy
- Developmental delays
- Traumatic Brain Injury
- Post stroke (CVA)
- Ataxia
- Athetosis
- Spasticity (increased muscle tone)
- Hypotonia (low muscle tone)



Kaya Koscielny on the bike wearing TheraSuit

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Improvements in posture and body alignment during session with the TheraSuit

TheraSuit is not performing the movement instead for the wearer. It only guides and assists them. Meanwhile, all the above mentioned benefits would take place.

TheraSuit™ Benefits:

- Re-trains central nervous system
- Restores ontogenic development
- Provides external stabilization
- Normalizes muscle tone
- Aligns the body to as close to normal as possible
- Provides dynamic correction
- Normalizes (corrects) gait pattern
- Provides tactile stimulation
- Influences the vestibular system
- Improves balance
- Improves coordination
- Decreases uncontrolled movements in ataxia and athetosis
- Improves body and spatial awareness
- Supports weak muscles
- Provides resistance to strong muscles to further enhance strengthening
- Improves speech production and its fluency through head control and trunk support
- Promotes development of both fine and gross motor skills
- Improves bone density
- Helps to decrease contractures
- Helps improve hip alignment through vertical loading over the hip joint

Usually at the beginning the TheraSuit is used as a support system for the weak muscles. But, as the patient progresses, the bands are tightened up and would provide resistance, which leads to strength gains (4).

Through the loading effects of the elastic bands the skeletal system is loaded with mechanical force. It is very well documented that the proper ossification, calcification and strength of the bone is possible only through the mechanical forces acting up on the bones. Since mobility is so drastically limited, early weight bearing and therefore strengthening of the bones is impaired. Bone demineralization (including hip, calcaneus bone and spine) is very common (5, 6, 7).

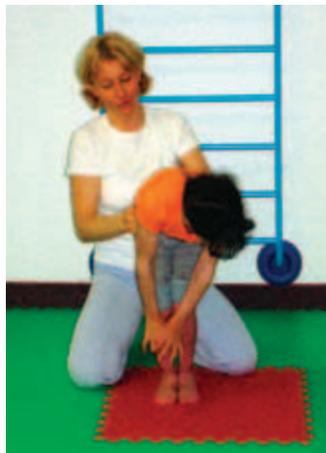
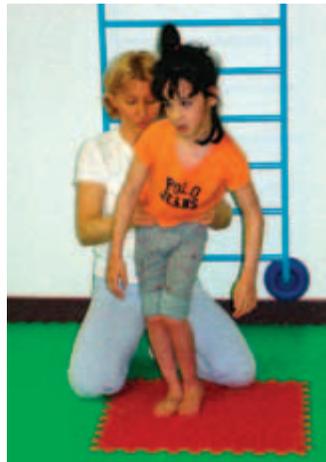
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Case studies show that use of the TheraSuit improves the density (strength) of the bone as well as helping to diminish the subluxation in the hip joint.

TheraSuit is a part of the TheraSuit Method, an intensive physical training (therapy). When comparison was made between two groups, one participating in the TheraSuit Method with the use of the TheraSuit and the other group, participating only in the TheraSuit Method, without the use of the TheraSuit, it was observed that children using TheraSuit achieved faster and higher functional gains. In plain English, the TheraSuit accelerated functional progress. Children undergoing intensive therapy with the use of the TheraSuit achieved better results in a shorter amount of time.

TheraSuit's effectiveness is proven through dramatic progress of hundreds of children and adults. Several clinics using TheraSuit serve as ongoing research centers to evaluate and document the benefits of the TheraSuit. The TheraSuit and the TheraSuit Method have become standard methods of treatment for neurological and sensory disorders.

Training and certification in the TheraSuit and the TheraSuit Method is available for physical therapists, occupational therapists, speech and language pathologists, and nurses at the Michigan treatment/education center as well as on site. Parents can obtain training through the facilities certified in the TheraSuit Method as well as the Michigan Model Center.



Improvements in posture and body alignment during session with the TheraSuit (cont.)

References:

1. Linda W. LeMura, Serge P. Von Dulliard, *Clinical Exercise Physiology-Application and Physiological Principles*, Lippincott Williams & Wilkins, 2004
2. Desmond Morris, *Intimate Behaviour*, 1997
3. Ben E. Benjamin and Roth Werner, "The Primacy of Human Touch Massage" *Therapy Journal by American Massage Therapy Association*, Fall 2003
4. Richard Koscielny, "Strength Training and CP" *Cerebral Palsy Magazine*, Vol 2, No 1, 2004, page 12-14
5. Thomas R. Baechle, Roger W. Earle, *Essentials of Strength Training and Conditioning*, Human Kinetics 2000
6. Jack Wilmore, David L. Costill, "Physiology of Sport and Exercises", *Human Kinetics*, 1999
7. *American College of Sports Medicine Resource Manual for Guidelines for Exercise Testing and Prescription*, Third edition, Williams & Wilkins, 1998

Therasuit LLC offers:

1. TheraSuit training for parents.
2. TheraSuit Method training for therapists.
3. Training and consultations on site.
4. Equipment imported from Europe (TheraSuit, Universal Exercise Unit, splints, crutches).
5. TheraSuit Method program for children with CP (3 weeks intensive exercise program).

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**EFFECTIVENESS OF THERASUIT METHOD™ AND THE THERASUIT™
PILOT STUDY****RESULTS OF INTENSIVE EXERCISE PROGRAM IN
THE PEDIATRIC CEREBRAL PALSY POPULATION**

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Objectives:

This study is part of a multi-site ongoing study and was designed to evaluate the effectiveness of an intensive exercise program (TheraSuit Method™) using a Soft Dynamic Proprioceptive Orthotic (TheraSuit™) on children with cerebral palsy by measuring changes which occurred after participating in a treatment session at the Pediatric Fitness Center, Keego Harbor, Michigan. The primary goal of the outcome study was the assessment of functional skills which have the most influence on the quality of life.

Design: Ongoing study using a group pre-test/post-test design. A four-level diagnostic algorithm has been designed for the complex evaluation of all participants. It includes the preliminary selection, obtaining the initial data necessary to develop the individual exercise program, collection of changes during and after the program and preparation of the individual home exercise program.

Setting: Intensive exercise program at the Pediatric Fitness Center, Keego Harbor, MI.

Length of the study: The results of this study were obtained during treatment sessions from July 2003 – May 2004.

Patients: 20 children (12 females and 8 males) with a mean age 6.3 (range of 2.5 to 13) and with a primary diagnosis of cerebral palsy.

Materials/Methods: During this study we used the TheraSuit Method™ and the TheraSuit™ (Soft Proprioceptive Orthotic-protected by a patent as a “Neurological Motor Therapy Suit”). All participants underwent evaluation pre- and post- exercise session. All data was recorded using the Gross Motor Functional Measurement form. Additionally, all participants were video taped before and after treatment.

Interventions: An intensive exercise program (consisting of 3 hours of exercises, 5 times a week for 3 weeks) was provided for the qualified participants. Treatment was administered by therapists/trainers trained in the Therasuit Method™. The intense program protocol included individually-designed exercise programs for all participants including exercise with and without the TheraSuit™.

Measurements and Main Results: All results were statistically evaluated. The results obtained from the study are presented in Fig.1 and Fig.2. In this publication we included only part of the collected outcomes. The study reveals functional improvements in 92% of the participants. Additional progress was made in coordination by 56%, strength by 100%, range of motion by 100%, balance by 62% and movement control by 64%.

We noticed a significant improvement in the level of new functional skills learned by our participants during the exercise sessions. In the study group, 90% learned to roll independently, 75% learned to sit without assistance, 49% learned to crawl, 39% gained the ability to stand independently, 33% learned to walk with assistive devices and 21% gained the ability to walk independently.

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Conclusions: The results of our study confirm the high level of effectiveness of the intensive exercise method (TheraSuit Method™) in conjunction with the Soft Dynamic Proprioceptive Orthotic (TheraSuit™).

In the future, Therasuit LLC will continue to collect, analyze and compare data obtained from other facilities using the TheraSuit™ and TheraSuit Method™ according to the standards and quality established in the industry. We will update this study as soon as the results from other facilities are analyzed and published.

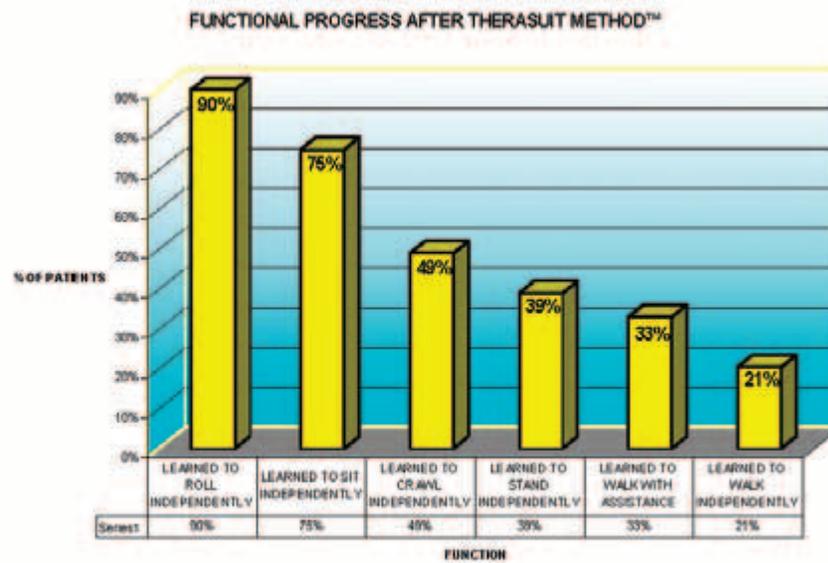


Fig. 1 FUNCTIONAL PROGRESS AFTER THERASUIT METHOD™

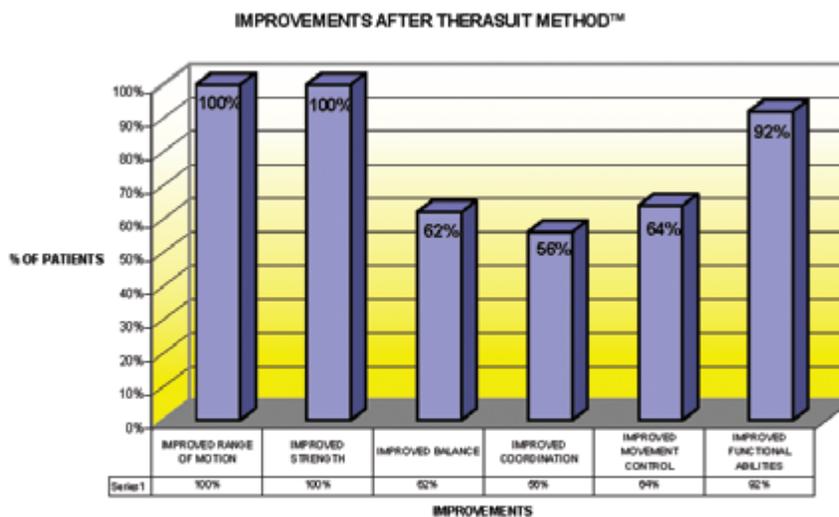


Fig. 2 IMPROVEMENTS AFTER THERASUIT METHOD™