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## TheraTogs Science Origin

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TheraTogs strapping strategies are founded in these principles:

- **Neuro-Developmental Treatment** – whereby proximal stability fosters improved distal mobility, and neuromotor problems are comprised of identifiable impairments.<sup>1</sup>
- **Muscle Balance Theory**<sup>2</sup> – whereby shortened muscles lead the clinician to address (raise awareness of, activate in shortened state) the less-used, long muscles in the force couple; and short muscles impose excessive motion demands on – and therefore threaten the integrity of – adjacent joints. Optimum biomechanical and kinesiological conditions foster optimum muscle recruitment and performance.
- **Cortical adaptability and motor learning** – studies indicate the necessity for extensive, purposeful, optimum practice.<sup>3 4 5 6</sup>
- **Physiologic adaptation** of muscle and soft tissues in response to a history of use.<sup>7</sup>
- **Skeletal modeling** during growth.<sup>8</sup>

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<sup>1</sup> Howle, JM. *Neuro-Developmental Treatment Approach: Theoretical Foundations and Principles of Clinical Practice*. 2002. [www.ndta.org](http://www.ndta.org).

<sup>2</sup> Sahrmann SA. *Diagnosis and Treatment of Movement Impairment Syndromes*. St. Louis, MO: Mosby. 2002.

<sup>3</sup> Karen Adolph, PhD – *Articles*: [www.psych.nyu.edu/adolph/publications1.php](http://www.psych.nyu.edu/adolph/publications1.php)

<sup>4</sup> Daly JJ, Ruff RL. *Construction of efficacious gait and upper limb functional interventions based on brain plasticity evidence and model-based measures for stroke patients*. *ScientificWorldJournal*. 2007; 7: 2031-45.

<sup>5</sup> van Mier H, Tempel LW, Perlmutter JS, Raichle ME, Petersen SE. *Changes in brain activity during motor learning measured with PET: effects of hand of performance and practice*. *J Neurophysiol*. 1998 Oct;80(4):2177-99.

<sup>6</sup> Petersen SE, van Mier H, Fiez JA, Raichle ME. *The effects of practice on the functional anatomy of task performance*. *Proc Natl Acad Sci U S A*. 1998 Feb 3;95(3):853-60. Review.

<sup>7</sup> Lieber RL. *Skeletal muscle adaptability. I: Review of basic properties*. *Dev Med Child Neurol*. 1986 Jun;28(3):390-7. Review.

<sup>8</sup> Jee WS, Tian XY. 2005. *The benefit of combining non-mechanical agents with mechanical loading: a perspective based on the Utah Paradigm of Skeletal Physiology*. *J Musculoskelet Neuronal Interact*. 5(2): 110-11

- **Reported calming effects** of applied compression on somatosensory processing, attention to task, and body **control** in cases of attention deficit and hyperactivity disorders.<sup>9 10</sup>

TheraTogs were developed as a logical sequel to the emergence of new strategies for raising sensory awareness and activation of targeted muscles, including orthopedic taping techniques<sup>11 12</sup>; Kinesio Taping<sup>13 14</sup>; elastic joint supports<sup>15</sup> and customized, full-body, Lycra garments.<sup>16 17</sup>

Changes in growing bone shape and joint alignment occur with the prevailing history of use while the bones are compliant. If the TheraTogs wearer is ambulatory and less than age 7 years, strapping systems that improve functioning joint alignment can influence the bone modeling process, preventing or reducing modeling errors by providing prolonged, gentle, and consistent, corrective forces. As the bones and joints mature and harden, the potential to effect healthy changes in bone and joint design wanes, and surgery becomes the only corrective option.

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<sup>9</sup> Grandin T. *Thinking in Pictures and Other Reports from My Life with Autism*. New York, NY: Vintage Press. 1995

<sup>10</sup> VandenBerg NL. *The use of a weighted vest to increase on-task behavior in children with attention difficulties*. Am J Occup Ther. 2001 Nov-Dec;55(6):621-8.

<sup>11</sup> Kilbreath SL, Perkins S, Crosbie J, McConnell J. *Gluteal taping improves hip extension during stance phase of walking following stroke*. Aust J Physiother. 2006;52(1):53-6.

<sup>12</sup> Baquie P. Lower limb taping. Aust Fam Physician. 2002 May;31(5):451-2.

<sup>13</sup> Słupik A, Dwornik M, Białoszewski D, Zych E. *Effect of Kinesio Taping on bioelectrical activity of vastus medialis muscle*. Preliminary report. *Ortop Traumatol Rehabil*. 2007; 9(6): 634-643.

<sup>14</sup> Kase K, Martin P, Yasukawa A: *Kinesio Taping® in Pediatrics: Fundamentals and Whole Body Taping*. Kinesio USA, LLC, Albuquerque, NM. 2006.  
www.kinesiotaping.com

<sup>15</sup> Hassan BS, Mockett S, Doherty M. Influence of elastic bandage on knee pain, proprioception, and postural sway in subjects with knee osteoarthritis. *Ann Rheum Dis*. 2002 Jan;61(1):24-8.

<sup>16</sup> Rennie DJ, Attfield SF, Morton RE, Polak FJ, Nicholson J. (2000) Related Articles, An evaluation of lycra garments in the lower limb using 3-D gait analysis and functional assessment (PEDI). *Gait Posture* 12(1):1-6.

<sup>17</sup> Blair E, Ballantyne J, Horsman S, Chauvel P. (1995) A study of a dynamic proximal stability splint in the management of children with cerebral palsy. *Dev Med Child Neurol* 37:544-554.

**The processes of physiologic adaptation** and cortical plasticity combine forces in TheraTogs systems that are used extensively for neuromotor re-education (i.e. lived in) for at least 8 hours/day between therapy sessions.

TheraTogs systems gently and comfortably offer these aids to sensorimotor training:

- Compression for postural support and increased body awareness
- A secure, non-slip, Velcro®-hook-sensitive field for applying postural and movement training straps
- Resistance to undesirable movement patterns
- Assisted experience and practice using desirable movement patterns
- Improved resting joint alignment from which to initiate movements
- Prolonged periods of improved joint positioning, with potential to promote normalizing changes in soft tissues through physiologic adaptation.