

GONGE

INSIGHTS

By physiotherapist Hannah Harboe

Hilltops and concentric and eccentric muscle work

In good quality movement, where the rhythm, flow, force, and strength of movement are adapted to the task in hand, the muscles on both sides of our joints work well together.

Concentric and eccentric muscle work constitute a cooperation. In concentric muscle work, the muscle on one side of the joint contracts, i.e., it shortens. Meanwhile, eccentric muscle work occurs on the other side of the joint where the muscle relaxes and elongates. When the work on both sides of the joint is smooth and simultaneous, the movement is even and of good quality.

To illustrate the difference between eccentric and concentric muscular work, think about walking up and down stairs: When we ascend stairs, most of the muscle work we employ is concentric: The muscle at front thigh contracts so that we can lift our body up onto the next step. We employ eccentric muscle work mostly when we descend stairs. The thigh muscle elongates and stretches until the opposite foot hits the next step down.

Eccentric work is hard work, and it requires strength. If the muscles are not strong enough to perform eccentric work, walking downstairs is noisy. If the muscle is weak and fails to restrain the movement, the foot more or less drops down onto the next step. To compensate for the lack of muscular force, the movement is rapid. This is often observed in children walking downstairs: Their movements are noisy, or they run down the stairs.

Adequate concentric and eccentric muscular work depends not only on force, but also on our proprioceptive registration.

Inside our joints and muscles, there are proprioceptive registration receptors that help us to sense our movement and the position of our joints without using our sense of sight.

Hilltops are available in three different heights. They help to train both concentric and eccentric muscular work. You can build a path so that the child climbs up Hilltops as if they were a staircase. The child moves from the lowest to the highest and back again. If you wish to give the child a more challenging exercise, you can alternate between Hilltops of different heights, so that, as the child moves from one Hilltop to the next, the child has to alternate between walking up and down. The slower you ask the child to walk, the more strength the child will need and the more demanding the concentric and eccentric work requires.



Case:

Jacob is 6 years old. He is a skinny little boy and small for his age. He is not a big eater. Jacob enjoys movement but finds it difficult to keep up with his friends when they run or play football. He soon becomes tired. He feels that he is not as strong as his friends.

During our first consultation, we talk about Jacob's desire to be stronger. A precondition for building muscle mass and gaining strength is that Jacob eats food that adds body weight. As he is so skinny, there is not much available to build muscle tissue. The muscles become bigger and stronger when, through exercise, body fat is converted into muscle mass.

Thanks to our chat, Jacob is motivated to eat a fattier diet and he is keen to do exercises that can make him stronger and faster. The first step is for him to put on weight. We make an appointment for the next consultation in a month's time. His parents receive guidance with regard to enriching Jacob's diet. Cocoa with whipped cream, crispbread with peanut butter and an extra spoonful of oil on his pasta: Jacob loves all of these.

By the end of the month, Jacob has gained 1½ kilos. He is proud of himself when he turns up for training. Training with weights is not advised for the growing child but it is possible to exercise and gain strength through play. Jacob works hard, pushing his Dad through the room, helping with the gardening and moving sand in the sandbox, and climbing stairs at home on a daily basis. He has to climb up and down stairs as fast and as slowly as he can. His times are written down and Jacob exercises frequently in an attempt to beat his own record.

At therapy sessions, we work on building Jacob's strength via concentric and eccentric work on Hilltops. Initially, Jacob finds it difficult to keep moving slowly when he is asked to walk from a high to a low Hilltop. He has insufficient strength to restrain the eccentric movement and he almost seems to fall down onto a lower Hilltop. We begin by walking up and down using Hilltops as stairs. Jacob soon realises that the object of this exercise is for him to become strong enough to walk up and down Hilltops at an even pace, his muscles restraining his movements. Jacob himself wants his legs to become strong enough to allow him to walk silently from the highest to the lowest Hilltop.

Jacob continues to exercise at home and comes for therapy sessions once a month. His weight continues to increase by just under 1 kg a month. After six months, Jacob's weight is about average for a child of his age. He can now navigate a Hilltops path, manages to pass from the lowest to the highest Hilltop and has full control over every step. Most important of all, Jacob is now less tired. He has sufficient energy and strength to play football right up until the final whistle.



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