



## The Hip Bone is Connected to the Thigh Bone . . .

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The song we sang when we were kids about all the bones in the body being connected was really a very valuable lesson in human function. There are very few things that occur independently in the human body with effects that are restricted to only the structures they occur in. One of the key principles of human function is the nature of its interdependence. It is important to consider the importance of proper lower limb function to maintaining normal function throughout the entire body.

The feet are the most common contact point with the world for your body. This is especially true in most load bearing and high force production activities. If there is any lower limb dysfunction, it will manifest effects in all these activities. Even in standing, a foot problem or leg length discrepancy can produce dramatic changes over time in the pelvis and spine. An unstable ankle can severely limit the amount of force exerted in lifting through the hip because even though the force is developed in the hip, it is transmitted through the ankle and foot. The result of this limitation would be an increased likelihood of applying force through the torso to assist in making up some of the lost lower body force. This can lead to injuries around the tissues of the spine.

These physical processes can create effects throughout the body. Some of these effects are obvious like an injured right hand creating mechanical changes that place more emphasis on the immediately connected structures (elbow/forearm) and on the opposing hand. Others are less obvious. For instance it is possible for a difficulty with the foot involving how it handles impact forces to contribute to chronic headaches. An example in the upper body is the use of forearm supports in typing activities. On the surface it appears that the use of these supports will decrease static muscle loads in the neck and shoulders. Generally speaking this is true, but there are a lot of interdependent effects not considered. With the arm resting on the support, the portion of the body that is “upstream” from the forearm becomes functionally separated. The result of this intervention is increased load on the forearms and hands and decreased activity of the movers and stabilizers of the torso and shoulder girdle. The long term effect of this can be a wide variety of injury scenarios to both the extremities and central structures. Of course high static loads through the neck are not desirable either, but they are best mitigated through effective body control and not external support. While ergonomic devices, foot orthotics and other external devices can be very helpful, it is important that any evaluation of the issues is thorough and that the potential effects of any of these devices be thoroughly investigated and understood.



The body operates as a series of chains that transmit both forces that the body creates and those that it absorbs from the outside environment. Ineffective operation of any of these segments will distort the ability of the chain to either produce or manage forces. The ultimate result will either be sub-optimal performance or tissue damage. If, as the old song says, the knee bone wasn't connected to the thigh bone which is connected to the hip bone . . . etc., people would not be able to hit a tennis ball at 200 km/h or even walk down the street. The mechanical operation of the body is a complex and balanced system. Minor dysfunction in remote areas of the body can actually become amplified into significant and complex dysfunction in other areas.