

## Leg-Length Discrepancies: *Diagnosis and Treatment*



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*Numerous studies have been conducted. All agree on the data, but the actions required are unclear. Experts weigh in with research-supported opinions, but a universal protocol is not established. Although this may sound like a discussion of the Social Security system, these statements also apply to the clinical diagnosis and treatment of leg length discrepancies (LLDs).*

This is a diagnosis that appears deceptively simple. There is often more to the apparent difference in limb length than meets the eye. The symptoms can be diverse, confusing, and vague, such as complaints of lower-extremity pain or general backache. Studies have shown that true or **structural** LLD is less common than realized, and that most LLDs are **functional** in nature, i.e., they are the result of a compensation or restriction.

### Structural vs. Functional

**Structural** LLDs are the result of an anatomic short limb. These may occur due to congenital or developmental factors. Other conditions such as post-polio syndrome, certain post-op patient conditions, or trauma cases may lead to a LLD that needs to be actively managed.

More frequently, patients will display LLDs due to a **functional** difference in their biomechanics. For example, spinal problems, muscular weakness, ligamentous flexibility, and restricted ranges of motion at the ankle, knee, or hip can all lead to compensations that result in LLDs. Just because these LLDs are functional in nature doesn't mean they should be treated any differently.

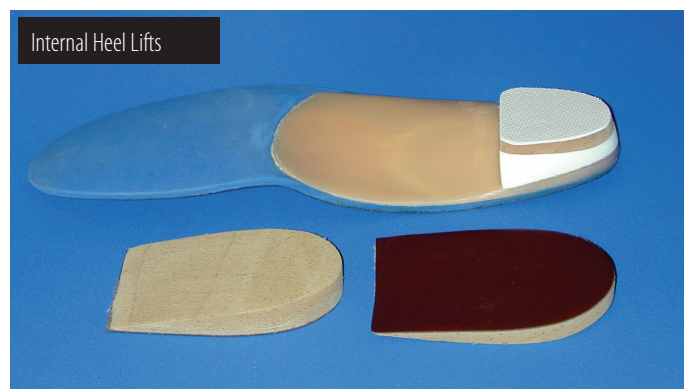
### Evaluating

Asymmetry is a clue that a LLD is present. The center of gravity will shift to the short limb side and patients will try to compensate, displaying indications such as pelvic tilt, lumbar scoliosis, knee flexion, or unilateral foot pronation. Asking simple questions such as, "Do you favor one leg over the other?" or, "Do you find it uncomfortable to stand?" may also provide some valuable information. Performing a gait analysis will yield some clues as to how the patient compensates during ambulation. Using plantar pressure plates can indicate load pressure differences between the feet. It is helpful if the gait analysis can be video-recorded and played back in slow motion to catch the subtle aspects of movement.

### Measuring

One of the golden rules in pedorthics is that you always measure a patient's two feet before fitting a pair of shoes. You never trust in the sizing that they tell you. Likewise, it is vital that

you measure the LLD, whether structural or functional, yourself. Measuring for a LLD is not an exact science; there is no clinical consensus as to which anatomical references should be used or how the patient should be positioned. In addition, direct measurement results with a tape can be difficult to reproduce across practitioners, and they will only indicate a structural LLD. It may be best to use several methods to develop a composite picture.



For a direct measurement, the method that I recommend is to measure from the anterior superior iliac spine to the medial malleolus. This measurement will give you the **actual** limb length difference. Other methods include palpation, frontal plane observation, X-rays, and use of a measurement screen. However, this is only a starting point for treatment. There is no agreement as to the amount of a measured difference that should trigger an intervention! Anecdotally, it appears that for LLDs greater than 1/4" some form of treatment be suggested to the patient, although many cases greater than this may be asymptomatic.

My preferred course is to proceed with an indirect measurement. I am not so much concerned with what the LLD is as I am concerned with what the patient can tolerate and what makes him or her comfortable. I prefer to measure the correction.

## Correcting

In order to measure for correction, use a series of blocks or sheets of firm material (cork or neoprene) of varying thickness, e.g., 1/8", 1/4", and 1/2". Place them under the short limb, either under the heel or the entire foot, depending on the pathology, until the patient feels most balanced.

Usually you will not be able to correct for the full amount of the imbalance at the outset. The longer a patient has had the LLD, the less likely he or she will be able to tolerate a full correction immediately. This is a process of incremental improvements. Bear in mind that the initial lift may need to be augmented as the patient's musculoskeletal system begins to adjust. It is often recommended that the initial buildup should be 50 percent of the total. After a suitable break-in period, one month say, another 25 percent can be added. If warranted, the final 25 percent can be added a month later.


Once you determine how much lift the patient can handle, you then need to decide how to best apply it. There are certain advantages and disadvantages to using either internal or external heel lifts.

**Internal heel lifts:** Putting a simple heel lift inside the shoe or onto a foot orthotic has the advantage of being transferable to many pairs of shoes. It is also aesthetically more pleasing as the lift remains hidden from view. However, there is a limit as to how high the lift can be before affecting shoe fit. Dress shoes will usually only accommodate small lifts (1/8"–1/4") before the heel starts to piston out of the shoe. Sneakers and workboots may allow higher lifts, e.g., up to 1/2", before heel slippage problems arise.

**External heel lifts:** If a lift of greater than 1/2" is required, you should consider adding to the outsole of the shoe. In this way, the shoe fit remains good. Although some patients may worry about the cosmetics of the shoe, it does ensure better overall function. Nowadays with the development of synthetic foams and



crepes, such lifts do not have to be as heavy as the cork buildups of the past. External buildups are not transferable and they will wear down over time, so the patient will need to be vigilant in having them repaired. On ladies' high-heel shoes, it may be possible to lower one heel and thereby correct the imbalance.

Compromise is always a worthy attribute, and personally I favor a blend of both internal and external lifts when more than 1/2" is necessary. This way, shoe fit is not too affected and yet changes to the overall look are minimized. A follow-up gait analysis should reveal a more symmetric gait, more even pressure distribution across both feet, and an absence of painful symptoms.  **QUICK FIND: EDS00805**

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