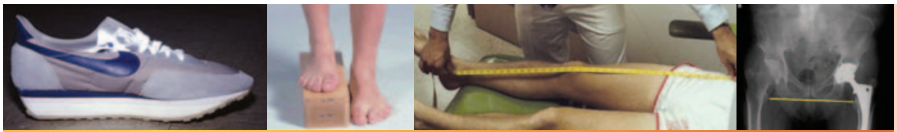

Evaluation and Management of Leg-length Discrepancy

Here's a comprehensive look at the diagnosis and treatment of this condition.

Goals and Objectives

After reading this article, the physician should be able to:

1) Understand the various etiologies of leg-length asymmetry

2) Recognize the presenting clinical symptoms that may be caused by a leg-length discrepancy

3) Differentiate between an anatomical and functional leg-length discrepancy

4) Determine the amount of leg-length difference present in a patient

5) Select an appropriate heel lift or shoe modification for the management of a leg-length problem

Welcome to Podiatry Management's *CME Instructional program. Our journal has been approved as a sponsor of Continuing Medical Education by the Council on Podiatric Medical Education.*

You may enroll: 1) on a per issue basis (at $20.00 per topic) or 2) per year, for the special introductory rate of $129 (you save $71). You may submit the answer sheet, along with the other information requested, via mail, fax, or phone. In the near future, you may be able to submit via the Internet.

If you correctly answer seventy (70%) of the questions correctly, you will receive a certificate attesting to your earned credits. You will also receive a record of any incorrectly answered questions. If you score less than 70%, you can retake the test at no additional cost. A list of states currently honoring CPME approved credits is listed on pg. 154. Other than those entities currently accepting CPME-approved credit, Podiatry Management *cannot guarantee that these CME credits will be acceptable by any state licensing agency, hospital, managed care organization or other entity. PM will, however, use its best efforts to ensure the widest acceptance of this program possible.*

This instructional CME program is designed to supplement, NOT replace, existing CME seminars. *The goal of this program is to advance the knowledge of practicing podiatrists. We will endeavor to publish high quality manuscripts by noted authors and researchers. If you have any questions or comments about this program, you can write or call us at:* ***Podiatry Management, P.O. Box 490, East Islip, NY 11730, (631) 563-1604 or e-mail us at bblock@podiatrym.com.***

*Following this article, an answer sheet and full set of instructions are provided (p. 154).—**Editor***

By Mark A. Caselli, DPM

Chronic overuse problems that persist despite appropriate care are the hallmarks of the presence of a leg-length difference. The symptoms associated with leg-length discrepancies are diverse and at times vague and confusing. The incidence of lower extremity asymmetry varies from 60 per cent to 95 percent in the general population. A high index of suspicion for the presence of leg-length asymmetry should always be considered in the athlete with back or lower extremity complaints.

With a leg-length discrepancy, the center of gravity changes as weight is transferred to one side of the body. One shoe heel will usually wear away more than the other. One foot, ankle, knee, and hip will be under more stress, and there will eventually be compensatory changes that take place above the pelvis as the balance of the spine is altered. Scoliosis can develop with premature joint degeneration on

Continued on page 148

Discrepancy...

one side of the spine.

Leg-length asymmetries appear to be the third most common cause of running injuries. For skating, it is a common cause of knee, hip, and foot pain. It is also a major contributor to a skater's loss of power, loss of balance, and loss of control. Minor asymmetry that is compensated for during normal ambulation.

When excessive load and stress, however, are placed on an asymmetrical lower extremity during many sports activities, symptoms may occur. The excessive overload that runners subject themselves to, for example, amplifies the stresses by a factor of three; lower extremity asymmetry as little as an eighth inch may become symptomatic.

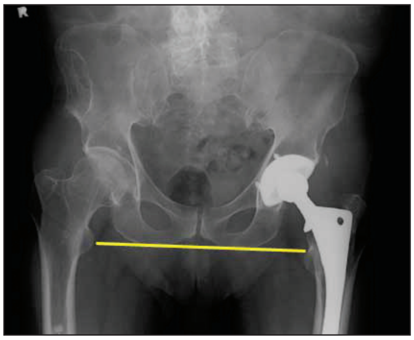

Figure 1: A hip replacement can result in a leg-length discrepancy

Etiology of Leg-Length Asymmetry

There are three categories in the classification of limb-length asymmetry. The two major categories are structural and functional. The one minor category is environmental. It is important to be able to differentiate between structural, functional, and environmental leg-length asymmetry because the treatment for each is different.

Figure 2: Direct clinical method for measuring leg-length

Structural discrepancies result from an actual anatomic shortening of one or more of the bones of the lower extremity. This can occur from a growth plate injury during childhood or adolescence, fractures, or genetic and acquired conditions that affect bone growth. Surgical procedures such as total hip and knee replacements can also lead to limb-length differences (Figure 1).

Structural leg-length differences can also result from spinal abnormalities such as scoliosis. Structural limb-length discrepancies appear to be present in about 6 to 12 per cent of the athletes presenting with apparent leg-length discrepancies. Functional leg-length differences are far more common than structural pathologies. They are present in three out of five athletes examined, and usually occur as a result of muscular weakness or inflexibility at the pelvis or foot and ankle complex.

Figure 3: Indirect method of determining leg-length discrepancy

Conditions that result in functional leg-length differences include pelvic obliquity, adduction or flexion contractures of the hip, genu varum, valgum or recurvatum, calcaneovalgus, equinovarus, and rearfoot pronation. Okun and associates, in a study of 100 students, found that a combined structural-functional deformity occurred 87.5 per cent of the time and both conditions must be addressed in a treatment plan.

Environmental factors such as drainage crowns built into roadways, banked running surfaces, and excessive wear of shoes can create a situation mimicking a leg-length difference. These environmental factors can also either accentuate or correct structural and functional length differences depending how the athlete is running on a given surface.

Anatomical Compensation

The spine, pelvis, and lower extremity are all involved in the compensation of leg-length asymmetry. Leg-length asymmetry causes the center of gravity to be shifted to the short leg side. Most commonly, the compensations associated with leg-length asymmetry include shoulder drop (to the long side), pelvic tilt (to the short side), lumbar scoliosis (convex to the short side), knee flexion (increased on the long side), genu recurvatum (on the short side), subtalar joint pronation (on the long side), and ankle plantar flexion and foot supination (on the short side).

The function of the compensation associated with leg-length asymmetry is to functionally shorten the long leg, functionally lengthen the short leg, level the sacral base, and thereby shift the center of gravity away from the short leg.

Symptoms Associated with Leg-length Discrepancies

The most common symptom associated with leg-length asymmetry is backache. Other symptoms affecting the lower extremity with a structural discrepancy usually appear first on the long leg side and include flank pain, arthritis of the knee, psoasitis, arthritis of the hip, patellar tendinitis, patellofemoral pain syndrome, plantar fasciitis, medial tibial stress syndrome, and metatarsalgia. Symptoms affecting the short extremity include iliotibial band syndrome with lateral knee pain, trochanteric bursitis,

Continued on page 149

sacroiliac discomfort, Achilles tendinitis, and cuboid syndrome.

If just a functional leg-length asymmetry is present, the symptoms will usually appear on the short side first and include plantar fasciitis, medial tibial stress syndrome, patellofemoral pain syndrome, illiotibial band syndrome, ipsilateral sacroiliac discomfort with contralateral low back pain, and secondary psoasitis.

Making the Diagnosis of Leg-length Discrepancy

When attempting to diagnose leg-length asymmetry in a patient, the examiner must determine three things. First, is there a leg-length asymmetry present, and on which side of the body is it located? Second, if a leg-length asymmetry is present, is it due to a functional or anatomic deformity? Finally, what is the amount of leg-length asymmetry?

Examination

The examination to rule out a limb-length inequality must be organized and systematic so that any clues that are suggestive and are consistent with a short leg will not be overlooked. The patient should be positioned in bare or stocking feet with the feet about 7 to 8 inches apart. S/he should be instructed to stand in a normal, relaxed position, with knees extended. While the patient is standing, the iliac crests are palpated and assessed for asymmetry.

The presence of a pelvic side shift, lateral spine curvature (noting the convexity), fontal plane leg deviation (genu varum and valgum), sagittal plane leg deviation (knee flexion, hamstring and/or ankle equinus), transverse plane leg deviation (excessive femoral medial rotation, demonstrated by "squinting patella"), along with unilateral foot pronation should be determined and its body side recorded.

Gait Analysis

An analysis of the patient's gait should be performed to evaluate for asymmetries during ambulation. Dynamic gait findings should support static measurements. An evaluation should be made on the three cardinal body planes (frontal, sagittal, and transverse) while looking at each body segment. The head and neck should be analyzed for any tilt to one side or the other (most commonly tilts to the short side). The shoulders should be evaluated for any tilt that might be present (most commonly tilts to the long leg side for balance).

Arm swing should be noted for symmetry of motion. The spine can also be evaluated for any curvatures or deviations. The hips should be evaluated for any asymmetries in motion (hip will drop to the short side). The knees should be evaluated for any varum, valgum, flexion, or recurvatum. The position the heel makes to the ground at contact and midstance should be noted (there is usually an increase in heel eversion on the long side).

Chronic overuse problems that persist despite appropriate care are the hallmarks of the presence of a leg-length difference.

Because a limb-length discrepancy produces an asymmetry, the timing of the gait parameters will also be deviated. An early heel-off may be seen on the short side. The long side will have a shortened swing phase, while the short side will have a longer swing phase. The long side will have a longer stance phase, while the short side will have a shorter stance phase of gait.

Structural Vs. Functional Asymmetry

Once the identification of a limb-length asymmetry is made, the next step is to categorize the asymmetry as a structural or functional problem. A structural short leg manifests as a pelvic obliquity in which the iliac crest is low on the same side and becomes level with the use of a heel lift. A functional short leg secondary to foot pronation manifests as a pelvic obliquity in which the iliac crest is low on the same side and becomes level by placing the subtalar joint in neutral position.

Testing For Pronation

The effect of pronation in contributing to the leg-length asymmetry is determined by the pronation test. With the patient standing with the knees extended and the feet in the angle and base of stance, the subtalar joint is placed in the neutral position. The iliac crests are palpated and any discrepancies are recorded. The patient is then allowed to pronate and the iliac crests are reevaluated as to their position, and any changes are noted. The pronation test is used to determine whether orthoses or heel lifts are indicated in the treatment of the leg-length discrepancy.

By performing the pronation test, the examiner determines one of three things: (1) pronation has no effect on leg-length; (2) pronation is causing a functional short leg; or (3) pronation is compensating for the long leg. If subtalar joint pronation has no effect on leg-length, there will be no change between the iliac crests with neutral and pronated subtalar joint positions. If the iliac crest on the ipsilateral side is lower in pronation than in neutral subtalar joint position, then the subtalar joint pronation is causing a functional leg-length asymmetry.

In this situation, an orthosis with appropriate posting would be indicated to correct the leg-length asymmetry. If the iliac crest becomes more level when examined in the pronated position, then subtalar joint pronation is compensating for a structural leg-length asymmetry. The use of a heel lift on the opposite extremity is indicated in this instance to correct the anatomic asymmetry along with decreasing the amount of compensatory long leg subtalar joint pronation.

Determining the Amount of the Leg-length Discrepancy

Once the diagnosis and classification of leg-length asymmetry is made, the discrepancy can then be quantified by either a direct or indirect method of measurement. The

Continued on page 150

Discrepancy...

indirect method of evaluating leg-length is superior to the direct method. The direct method involves measuring the distance between two points, the anterior superior iliac spine and the medial malleolus (Figure 2). The direct method is difficult to reproduce and fails to take into account functional limb-length discrepancies.

The indirect method of limb-length evaluation involves reduction of the pelvic tilt and leveling of the sacral base by placing a material of a known thickness under the short leg while the patient is standing in subtalar joint neutral position (Figure 3).

Another method involves placing a carpenter's level across the patient's knees while he/she is in a sitting position. Both feet should be in subtalar neutral position (Figure 4). A lift can be placed under the short leg until the bubble in the level is centered. This method can be used when the limb-length difference is suspected to be below the knee. The indirect method is reproducible and accurate in quantifying the amount of leg-length discrepancy.

Figure 4: Using a carpenter's level to determine leg-length symmetry

Clinical Measurements

Clinical measurements are by nature grossly inaccurate when exact measurements of the femur or tibia are required. More thorough determinations of their lengths by use of radiographic methods are essential in the treatment of significant leg-length discrepancy. Although there are various radiographic methods used, the CT scan is the most accurate (Figure 5).

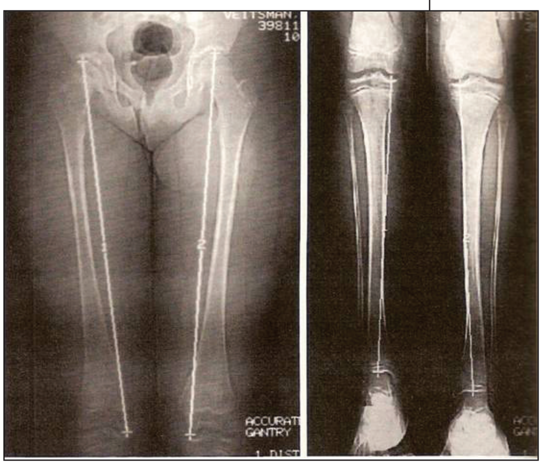

Figure 5: A CT scan is the most accurate method of determining anatomical leg-length

Treatment

The treatment for leg-length differences often depends on whether or not symptoms are present. If the body is compensating for a length difference without causing biomechanical stress in other areas, correcting the difference may alter the body mechanics in such a way as to cause an injury. If the discrepancy is causing symptoms, it needs to be addressed for full recovery to take place.

Treatment depends on the classification of the asymmetry. A functional asymmetry due to unilateral foot pronation is corrected with the use of properly posted foot orthoses. The environmental asymmetry secondary to improper foot gear or canted running surfaces is easily treated with the use of new or appropriate foot wear or a change in the running surface. The structural limb asymmetry is treated with a heel lift.

Figure 6: Cork heel lifts

Manual Muscle Testing

Manual muscle testing should be a routine procedure within the static examination. All muscles that are tight secondarily to a limb-length discrepancy must be stretched during the heel lift and orthotic therapy. Muscles commonly affected are those that abduct the thigh.

Selecting and Using Heel Lifts

The purpose of the heel lift is to level off the sacral base and correct the compensatory scoliosis caused by the short leg. It is likely that several different types of heel lifts would be used for different shoes and activities. No single heel lift works perfectly for every daily need, but the therapeutic effects of using heel lifts are most effective if they are used in all the patient's shoes. Temporary use may require varying the elevation over time. Long-term use requires foot comfort and minimum disturbance of shoe fit.

Lifts used for sports activities require firm support to retain control and prevent injuries. The amount of elevation can also affect the choice of heel lift or external shoe heel or sole additions. It is generally accepted that it is unwise and uncomfortable to add more than 12 mm. (1/2 inch) of heel elevation inside a shoe using inserts, and often one must use even less.

The maximum amount of elevation that will be comfortable in a shoe will depend on the individual and the style and size of shoe, with smaller feet generally able to accommodate less height, and lace-up shoes allowing more than slip-ons or loafers. The maximum height that can comfortably be used in a shoe will also be determined by the tightness of the shoe fit, and the amount of heel elevation already created by the heel of the shoes. Laced shoes with four or five eyelets can assist in accommodating a heel lift.

Type of Shoe Worn

The type of shoes that are to be

Continued on page 151

Discrepancy...

worn will also determine the type of lift that can be used. Closed-heel shoes are easier to adapt with a heel lift. Sandals or flip-flops may require an unobtrusive transparent heel lift for best appearance, or methods which a shoe-repair shop can provide, such as a wedge built into the sole. More than 12 mm. of elevation should be done at least partially with external modifications to the shoe. For stability and minimal disturbance to lower-body balance, external elevation should be placed under the entire foot, rather than just the heel.

Heel Lifts

A well-designed heel lift should be long enough to extend forward under the arch to avoid "bridging" between the heel and the ball of the foot. If the lift is too short along the length of the foot or has a "slope" that is too steep, it can cause the foot to slip forward in the shoe, especially when running. The longer the heel lift, the better it functions.

A shoe lift should add elevation with minimal compressibility to avoid creating vertical heel motion and rubbing in the shoe. Firm shoe lifts are mandatory for active sports to avoid loss of control though excess motion in the shoe which can result in injuries, most often ankle sprains.

Most heel lifts are made of cork, foam rubbers, or various plastics. Cork is a good material for many types of in-shoe lifts as it is inexpensive, light-weight, and minimally compressible. Cork lifts are available in a wide range of sizes and heights, and are usually covered with leather or vinyl to protect the cork from abrasion as well as to increase their life (Figure 6).

Figure 7: Rubber adjustable heel lifts with leather top covers

Cork Lifts

Cork lifts can be placed above or under the insole or heel pad of the shoe. Placing a firm lift under the insole results in the foot resting on the same amount of cushioning as in the unmodified shoe. With the firm lift placed under the insole, both shoes will feel alike. Cork lifts are also a good choice if the user does not wish to lift the insole of a shoe to place the lift beneath it because the slight resiliency of cork tends to be more comfortable directly under foot than harder materials.

Adjustable heel lifts are available which allow for the changing of the height of the lift by removing and replacing layers of materials.

Cork lifts are easily fit in most shoes since the shape of the material is easily modified and simple to fix permanently in place with contact adhesives or double-faced tape. The primary shortcoming of cork heel lifts is that they are not particularly durable.

Molded Plastic Lifts

Cast or molded plastic shoe lifts are often used for leg-length compensation since they are more durable than cork or foam rubber for extended heavy use. These lifts are available in a variety of sizes and heights, and in various firmnesses of plastic. The ideal firmness, or durometer, is 50-60, since softer plastics will result in loss of height and cause heel rubbing in the shoe. Solid plastic lifts are designed to be placed beneath the insole or heel pad of a shoe, the lift adding only height rather than compressibility.

Figure 8: Multi-layered transparent heel lift from Clearly Adjustable

Solid plastic lifts are available in several different widths and heights, commonly 3 mm., 5 mm., 7 mm., and 12 mm. Special double-faced tape is used to fix these lifts in place rather than glue. The main drawback to plastic lifts is that they are sometimes difficult to fit perfectly in all shoes due to the relative rigidity of these materials. A firm plastic lift is more difficult to adapt to different shoes than less rigid materials such as cork.

Foam Rubber Lifts

Foam rubber in-shoe lifts are widely available and are usually supplied with a leather, vinyl, or fabric top surface. These lifts can be placed directly under the foot or under an insole. They typically provide a maximum of 9 mm. (3/8 inch) of height. Caution must be used in selecting a foam rubber material that is not too spongy. Softer foam rubber heel lifts will crush permanently with use and lose their original height quickly. Materials that are too soft can also cause increased heel motion resulting in uncomfortable heel rubbing and calluses as well as instability when walking or running, leading to ankle sprains and falls.

Adjustable Heel Lifts

Adjustable heel lifts are available which allow for the changing of the

Continued on page 152

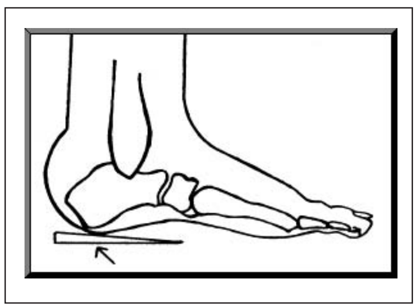

Figure 9: Height of lift should be measured at calcaneal contact point

Discrepancy...

height of the lift by removing and replacing layers of materials. Adjustable heel lifts are available in two varieties: those composed of three layers of rubber or plastic foam (Figure 7), and a multi-layered lift, which is made of many thin layers of firm plastic (Figure 8).

Figure 10: Athletic shoe modification for leg-length discrepancy

Three-layer lifts are made of three layers of 3mm foam rubber, cork, or soft plastic and have leather, vinyl, or fabric top covers. The layers can be removed or replaced to choose a height in 3 mm. increments. These lifts are intended for use directly underfoot, rather than beneath the insole. This makes them particularly desirable for sandals and shoes where the insole cannot easily be lifted.

The Clearly Adjustable lift is designed to be used under the insole or footbed. It is not compressible, so both shoes feel alike and no additional cushioning or heel rubbing is introduced in the shoe. This type of heel lift consists of fourteen 1 mm layers of firm plastic material which allow for peel-and-replace adjustment of the heel height in increments of 1 mm. to about 1/2 inch.

Amount of Heel Lift

The amount of heel lift needed is determined by the indirect method of evaluating a structural shortage. This is accomplished by having the patient stand with the subtalar joint in neutral. Then a material of known thickness is placed under the short limb until the iliac crests are level. The thickness of the heel lift under the short leg is the amount of limb-length inequality present. When using a heel lift, the heel lift height should be measured at the point where the calcaneus rests upon it, not at the back end of the lift (Figure 9).

The amount of heel lift that is used initially is about half of the anatomic discrepancy. This amount is used to realign the superstructure in a gradual manner. The clinician, with feedback from the patient, will determine the final amount of lift that will produce the best results for the underlying symptoms. Approximately a quarter to three-eighths inch heel lift can fit into the average adult shoe. If more correction is required, an addition may need to be added to the outside of the shoe (Figure 10).

Figure 11: Young patient with a 6cm leg-length difference, warranting surgical consideration for leg-lengthening surgical procedure

Surgical Management

Surgical management might be considered as an alternative for severe or significant deformities (Figure 11). Most orthopedic surgeons do not consider an operative procedure indicated for discrepancies less than approximately 2.5 cm. in an adult. Surgical procedures for the treatment of limb-length discrepancies include osseous epiphyseodosis, physeal stapling, bone-lengthening by distraction (Figure 12), distraction epiphyseolysis, and physeal stimulation. ■

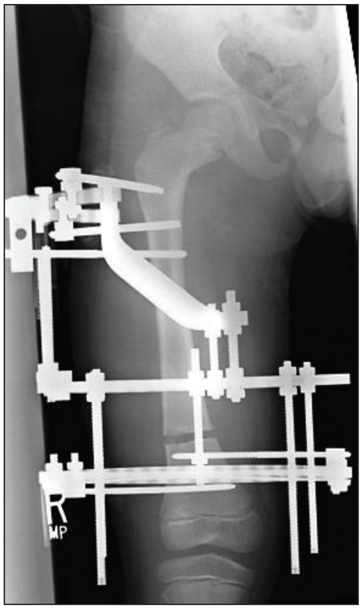

Figure 12: Bone lengthening distraction procedure for congenitally short femur

References

Batchelor D: Short-leg syndrome in runners. Dynamic Chiropractic 20(18), 2002.

Baylis WJ, Rzonca EC: Functional and structural limb-length discrepancies: evaluation and treatment. Clin Podiatr Med Surg 5(3), 1988.

Caborn DNM, Armsey TD II, Grollman L, et al: Running. In Fu FH, Stone DA (eds) Sports Injuries. Philadelphia, Lippincott Williams & Wilkins, 2001.

Cole L: Leg-length discrepancy. Skates.com http://www.skates.com/Articles.asp?ID=135

Fields KB, Craib M: Biomechanics of running and gait. In Sallis RE, Massimino F (eds) Essentials of Sports Medicine. St. Louis, Mosby, 1996.

Julien PH: Sure Footing. Atlanta Foot & Ankle Center, 1998.

Okun SJ, Morgan JW, et al: Limb-length discrepancy. A new method of measurement and its clinical significance. J Am Pod Assoc 72:595, 1982.

Schamberger W: The Malalignment Syndrome: Implications for Medicine and Sports. Edinburgh, Churchill Livingstone, 2002.

Tachdjian TO: Pediatric Orthopedics. Philadelphia, W.B. Saunders Company, 1990.

Zehr RW: Heel Lifts and Shoe Lifts - a Product Selection Guide ©2005 http://www.clearlyadjustable.com

Dr. Caselli is Staff Podiatrist at the VA Hudson Valley Health Care System in Montrose, NY and is Adjunct Professor in the Department of Orthopedic Sciences at the New York College of Podiatric Medicine. Dr. Caselli is a Fellow of the American College of Sports Medicine.

Continuing Medical Education

EXAMINATION

See answer sheet on page 155.

1) A high index of suspicion of the presence of a leg-length discrepancy should be considered when an athlete presents complaining of:
- A) Back pain
- B) Asymmetric shoe heel wear
- C) Unilateral arch pain
- D) All of the above

2) Which one of the following is not one of the categories in the classification of leg-length discrepancy?
- A) Structural
- B) Functional
- C) Habitual
- D) Environmental

3) Which one of the following conditions can result in a structural leg-length discrepancy?
- A) Growth plate injury
- B) Flexion contracture of hip
- C) Unilateral pronation
- D) Genu recurvatum

4) What is the incidence of functional limb-length discrepancy among athletes?
- A) 12 percent
- B) 30 percent
- C) 60 percent
- D) 87 percent

5) Which one of the following would be considered an environmental factor that could result in a leg-length discrepancy?
- A) Steep hills
- B) Drainage crown in roadway
- C) Platform shoes
- D) Sandy beach

6) Body compensations associated with a leg-length discrepancy include which one of the following?
- A) Shoulder drop on short side
- B) Pelvic tilt to short side
- C) Knee flexion on short side
- D) Foot pronation on short side

7) Which one of the following is not a function of the compensation associated with leg-length asymmetry?
- A) Functionally shorten the long leg
- B) Functionally lengthen the short leg
- C) Level the sacral base
- D) Shift center of gravity towards the short leg

8) Which one of the following is the most common symptom of leg-length asymmetry?
- A) Plantar fasciitis
- B) Shin splints
- C) Backache
- D) Calcaneal bursitis

9) Which one of the following is not consistent with the diagnosis of a structural leg-length discrepancy?
- A) Symptoms usually appear first on the short side
- B) Symptoms are more common during high levels of sports activities
- C) Conditions such as arthritis of the hip and knee can occur on the long side
- D) Iliotibial band syndrome and Achilles tendinitis are common on the short side

10) Which one of the following is not a common gait observation when evaluating a patient with leg-length asymmetry?
- A) Hip drop to the short side
- B) Early heel lift off on the long side
- C) Shorter stance phase on the short side
- D) Increased heel eversion on the long side

11) A leg-length asymmetry in which the obliquity of the iliac crest becomes level with the use of a heel lift alone would be categorized as:
- A) A structural leg-length discrepancy
- B) A functional leg-length discrepancy
- C) An environmental leg-length discrepancy
- D) None of the above

12) Which one of the following is not necessary in determining the amount of leg-length discrepancy by the indirect method?
- A) Patient must be standing
- B) Subtalar joints must be in neutral position
- C) Material of known thickness is placed under apparently short leg
- D) Patients must wear their normal shoes

13) The most accurate radiographic method of determining the true anatomical length of a limb is:
- A) Teleoroentgenography
- B) Slit scanography
- C) Orthoroentgenography
- D) CT scan

14) Under what condition should you consider not correcting a limb-length discrepancy?
- A) When symptoms occur only during rigorous activities
- B) When there are no symptoms
- C) When there is only unilateral pronation
- D) When the difference in limb-length is under 2.5 cm

Continued on page 154

Continuing Medical Education

EXAMINATION

(cont'd)

15) A functional leg-length discrepancy due to unilateral foot pronation is best treated by:
A) A change of running surface
B) A new pair of shoes
C) Properly posted foot orthoses
D) A heel lift

16) It is unwise to add an in-shoe heel lift of more than:
A) 1/8 to 1/4 inch
B) 3/8 to 1/2 inch
C) 3/4 to 1 inch
D) 1 to 1 1/2 inches

17) The type of shoe that can best accommodate a heel lift is:
A) Loafer
B) Flip-flop
C) Open heel (backless)
D) Laced

18) Which of the following is not a desirable characteristic of a heel lift?
A) Minimal compressibility
B) Extend to the medial tuberosity of the calcaneus
C) Made of cork, rubber, or plastic
D) Capable of being adjustable in height

19) Which one of the following is not a common practice in using a heel lift in the management of a leg-length discrepancy?
A) The initial height of the lift is about half of the anatomic discrepancy
B) It is most desirable to place a heel lift under the insole of the shoe
C) The height of the heel lift is determined with the patient standing in resting subtalar joint position
D) The heel lift height should be measured at the point where the calcaneus rests up on it

20) Operative procedures may be considered for a leg-length discrepancy greater than at least:
A) 1 cm
B) 2.5 cm
C) 4 cm
D) 6 cm

See answer sheet on page 155.

PM's CPME Program

Welcome to the innovative Continuing Education Program brought to you by *Podiatry Management Magazine*. Our journal has been approved as a sponsor of Continuing Medical Education by the Council on Podiatric Medical Education.

Now it's even easier and more convenient to enroll in PM's CE program!

You can now enroll at any time during the year and submit eligible exams at any time during your enrollment period.

PM enrollees are entitled to submit ten exams published during their consecutive, twelve–month enrollment period. Your enrollment period begins with the month payment is received. For example, if your payment is received on September 1, 2003, your enrollment is valid through August 31, 2004.

If you're not enrolled, you may also submit any exam(s) published in PM magazine within the past twelve months. **CME articles and examination questions from past issues of *Podiatry Management* can be found on the Internet at http://www.podiatrym.com/cme.** All lessons are approved for 1.5 hours of CE credit. Please read the testing, grading and payment instructions to decide which method of participation is best for you.

Please call (631) 563-1604 if you have any questions. A personal operator will be happy to assist you.

Each of the 10 lessons will count as 1.5 credits; thus a maximum of 15 CME credits may be earned during any 12-month period. You may select any 10 in a 24-month period.

The* Podiatry Management Magazine *CME program is approved by the Council on Podiatric Education in all states where credits in instructional media are accepted. This article is approved for 1.5 Continuing Education Contact Hours (or 0.15 CEU's) for each examination successfully completed.

Home Study CME credits now accepted in Pennsylvania

Enrollment/Testing Information and Answer Sheet

Continuing Medical Education

Note: If you are mailing your answer sheet, you must complete all info. on the front and back of this page and mail with your credit card information to: ***Podiatry Management*, P.O. Box 490, East Islip, NY 11730.**

TESTING, GRADING AND PAYMENT INSTRUCTIONS

(1) Each participant achieving a passing grade of 70% or higher on any examination will receive an official computer form stating the number of CE credits earned. This form should be safeguarded and may be used as documentation of credits earned.

(2) Participants receiving a failing grade on any exam will be notified and permitted to take one re-examination at no extra cost.

(3) All answers should be recorded on the answer form below. For each question, decide which choice is the best answer, and circle the letter representing your choice.

(4) Complete all other information on the front and back of this page.

(5) Choose one out of the 3 options for testgrading: mail-in, fax, or phone. To select the type of service that best suits your needs, please read the following section, "Test Grading Options".

TEST GRADING OPTIONS

Mail-In Grading

To receive your CME certificate, complete all information and mail with your credit card information to:

Podiatry Management
P.O. Box 490, East Islip, NY 11730

There is **no charge** for the mail-in service if you have already enrolled in the annual exam CPME program, and we receive this exam during your current enrollment period. If you are not enrolled, please send $20.00 per exam, or $129 to cover all 10 exams (thus saving $71* over the cost of 10 individual exam fees).

Facsimile Grading

To receive your CPME certificate, complete all information and fax 24 hours a day to 1-631-563-1907. Your CPME certificate will be dated and mailed within 48 hours. This service is available for $2.50 per exam if you are currently enrolled in the annual 10-exam CPME program (and this exam falls within your enrollment period), and can be charged to your Visa, MasterCard, or American Express.

If you are *not* enrolled in the annual 10-exam CPME program, the fee is $20 per exam.

Phone-In Grading

You may also complete your exam by using the toll-free service. Call 1-800-232-4422 from 10 a.m. to 5 p.m. EST, Monday through Friday. Your CPME certificate will be dated the same day you call and mailed within 48 hours. There is a $2.50 charge for this service if you are currently enrolled in the annual 10-exam CPME program (and this exam falls within your enrollment period), and this fee can be charged to your Visa, Mastercard, American Express, or Discover. If you are not currently enrolled, the fee is $20 per exam. When you call, please have ready:

1. Program number (Month and Year)
2. The answers to the test
3. Your social security number
4. Credit card information

In the event you require additional CPME information, please contact PMS, Inc., at **1-631-563-1604**.

ENROLLMENT FORM & ANSWER SHEET

Please print clearly...Certificate will be issued from information below.

Name ____ Soc. Sec. #______________________
Please Print: FIRST MI LAST

Address____

City________________________________State_______________Zip____________________

Charge to: _____Visa _____ MasterCard _____ American Express

Card #____________________________________Exp. Date______________

Note: Credit card is the only method of payment. Checks are no longer accepted.

Signature_______________________Soc. Sec.#_______________Daytime Phone__________________

State License(s)____________________Is this a new address? Yes_______ No_______

Check one: ______ I am currently enrolled. (If faxing or phoning in your answer form please note that $2.50 will be charged to your credit card.)

______ I am not enrolled. Enclosed is my credit card information. Please charge my credit card $20.00 for each exam submitted. (plus $2.50 for each exam if submitting by fax or phone).

______ I am not enrolled and I wish to enroll for 10 courses at $129.00 (thus saving me $71 over the cost of 10 individual exam fees). I understand there will be an additional fee of $2.50 for any exam I wish to submit via fax or phone.

Over, please

Continuing Medical Education

ENROLLMENT FORM & ANSWER SHEET (cont'd)

EXAM #7/06
Evaluation and Management of Leg-length Discrepancy (Caselli)

Circle:

1.	A	B	C	D	11.	A	B	C	D
2.	A	B	C	D	12.	A	B	C	D
3.	A	B	C	D	13.	A	B	C	D
4.	A	B	C	D	14.	A	B	C	D
5.	A	B	C	D	15.	A	B	C	D
6.	A	B	C	D	16.	A	B	C	D
7.	A	B	C	D	17.	A	B	C	D
8.	A	B	C	D	18.	A	B	C	D
9.	A	B	C	D	19.	A	B	C	D
10.	A	B	C	D	20.	A	B	C	D

LESSON EVALUATION

Please indicate the date you completed this exam

____

How much time did it take you to complete the lesson?

______ hours ______minutes

How well did this lesson achieve its educational objectives?

_______Very well _________Well

________Somewhat __________Not at all

What overall grade would you assign this lesson?

A B C D

Degree____________________________

Additional comments and suggestions for future exams:

____

____

____

____

____

____