12

BACK

Strong and flexible back muscles are essential for maintaining good posture and an adequate range of motion, and can reduce the risk of injuries that may occur from everyday activities. Certain exercises are also beneficial in easing the backaches and pain that are often associated with a chronic "bad back." Many people with AK and BK amputation experience back pain. Although no proven scientific data can pinpoint the exact cause, it is believed that a discrepancy in leg length, poor gait habits, and improper alignment are contributing factors.

In a 1985 study at the Bioengineering Centre at the University College London, 80 percent of a study group of people with AK amputation reported that they had back pain. The group recorded a statistically greater level of leg length difference and scoliosis compared with a nonamputation control group. The results of the study suggest that there may be some relationship between the leg length difference recorded in the group with amputations and the degree of incapacity due to lower back pain.[1]

An earlier study conducted by the Veterans Administration included several categories affecting the veteran with a lower limb amputation. One category that was surveyed among a cross-section of veterans with amputations, both traumatic and dysvascular, was back pain. Fifty-four percent of the 81 veterans with amputation surveyed in this category complained of back pain.[2]

Exercises for the back usually concentrate on specific muscles in either the upper or lower back. Although the major muscles are located in the same region of the body, they are exercised with distinctly different body movements to isolate either the upper or lower back.

The major muscle groups of the upper back are teres major and minor, trapezius, and latissimus dorsi. The muscles emphasized in the exercises that follow are the trapezius muscles (commonly referred to as "traps") and the latissimus dorsi muscles (commonly referred to as "lats"). The main lower back muscle emphasized in the exercises is the erector spinae (sacrospinalis), a large and deep three-part muscle.

The correct techniques for lifting weights, or for lifting any heavy or bulky items encountered in a normal work day, are essential in protecting the back from injury. Some general rules are:

1. Whenever picking up a weight, the back should be straight and the head up. Bend by flexing the knees before beginning to lift. This permits you to lift the weight primarily with the legs and not the back.
2. Hold the weight or object close to your body for added support and balance. In this way, there is less risk of injury through losing your balance or dropping the object.
3. Get help or use a dolly to lift or move heavy objects.

[1]A. Middleditch and P. Jarman, *Assessment of the Spine in Above-Knee Amputees, Bioengineering Centre Report.* London: University College London, 1985, pp. 123-128.

[2]F.T. Hoaglund, *et al.,* "Elevation of Problems and Needs of Veteran Lower-Limb Amputees in the San Francisco Bay Area During the Period 1977-1980." *Journal of Rehabilitation Research and Development,* Vol. 20, No. 1, 1983, pp. 57-71.

UPPER-BACK EXERCISE ROUTINE

Muscle	Exercise	Title
Latissimus Dorsi	77	Bent-over Rowing
Latissimus Dorsi/Elbow Flexors	78	Seated Rowing
Latissimus Dorsi	79	Nautilus Lat Pull-down
Latissimus Dorsi	80	Wide-grip Lat Pull-down
Latissimus Dorsi	81	Wide-grip Front Chin-up
Latissimus Dorsi/Elbow Flexors	82	Reverse Close-grip Front Chin-up
Latissimus Dorsi/Biceps	83	Reverse Medium-grip Front Chin-up
Trapezius	84	Seated Shoulder Shrug
Trapezius	85	Standing Shoulder Shrug

LOWER-BACK EXERCISE ROUTINE

Muscle	Exercise	Title
Erector Spinae	86	Hyperextension
Abdominals/Hip Flexors	87	Reversed Hyperextension (Intermediate)
Erector Spinae/Abdominals	88	Reversed Hyperextension (Advanced)
Erector Spinae	89	Stiff-legged Barbell Dead Lift

INCREASING THE NUMBER OF REPETITIONS

Always do warm-up exercises before lifting weights.

Start with a minimum of 8 repetitions with a given weight. If a minimum of 8 repetitions cannot be completed, the weight is too heavy for you and the resistance should be lowered until 8 repetitions can be completed.

When 12 repetitions can be successfully completed, the weight should be increased by 5-10 pounds. When 12 repetitions can be completed with the increase in pounds, the weight may be increased again.

Work up to 15-20 repetitions per set for muscle maintenance, endurance, and tone.

When performing exercises with free weights, it is recommended that 2-6 sets for each particular muscle group be used.

CAUTION

Beginners are encouraged to use free weights with a spotter present. Certain exercises will require a spotter regardless of skill level (e.g., squats).

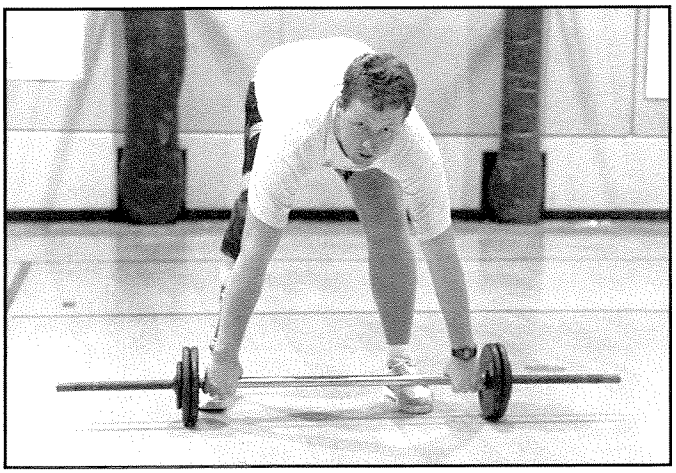
EXERCISE 77. BENT-OVER ROWING

PURPOSE
Develops the latissimus dorsi muscles.

PROCEDURE
- Roll the bar close to your toes.
- Keep your feet about shoulder-width apart.
- Bend over and take hold of the bar. It is best for beginners to use the grip width that is most comfortable and then vary it with practice.
- Keep your back straight and approximately parallel with the floor. With your knees bent slightly, inhale and lift the bar until it nearly touches the lower portion of your chest. This exercises all portions of the lat muscle.
- Keep your head up throughout and do not flex your wrists as you pull up the bar. Exhale as you lower the bar. Do not let the bar touch the floor during the repetitions of the exercise.

MODIFICATION
If balance is a problem, try Seated Rowing (Exercise 78).

SKILL LEVEL
Intermediate.



Richard Hughes wears an Endolite Multiflex Ankle, which allows the prosthetic foot to remain flat on the floor for better stability.

EXERCISE 78. SEATED ROWING (SEATED TWO-ARM LAT PULL-IN)

PURPOSE

Primarily strengthens latissimus dorsi and, to a lesser degree, the elbow flexor muscles.

PROCEDURE

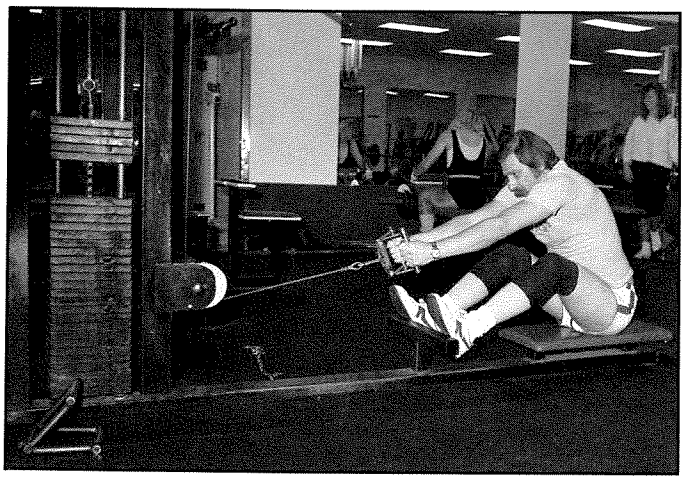
- Sit on the platform seat in front of the pulley.
- Bend your knees slightly, keeping your feet firmly against the foot plate.
- Grasp the pulley handles with both hands and remain in a bent-forward position.
- With arms outstretched, knees bent, and upper trunk bent forward, pull the cables in toward the chest just below the pectorals. Inhale as you pull. To keep strict form, keep torso erect or lean slightly forward. Lean back only on your last repetitions and only if you would not otherwise be able to complete them.
- Exhale as you slowly lower the weights back to the starting position.
- Minimize back movements.

VARIATION

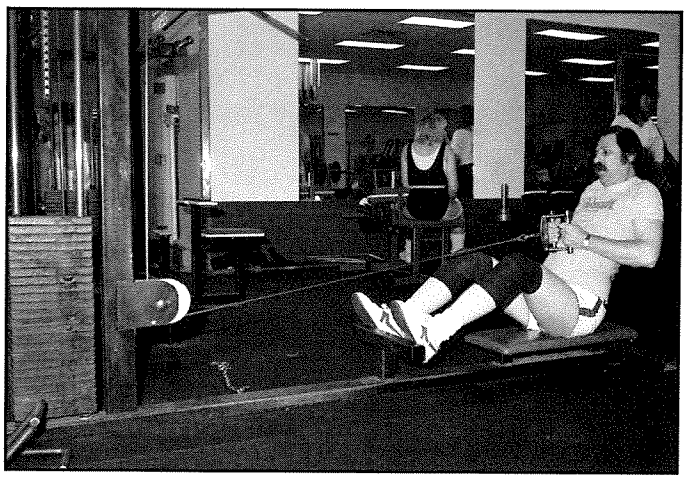
For greater muscle stretch, lean forward. This variation will also use the lower back muscles for stabilization when bringing the torso to an upright position.

SKILL LEVEL

Intermediate.



John Everett completes the final repetitions of a demanding set.

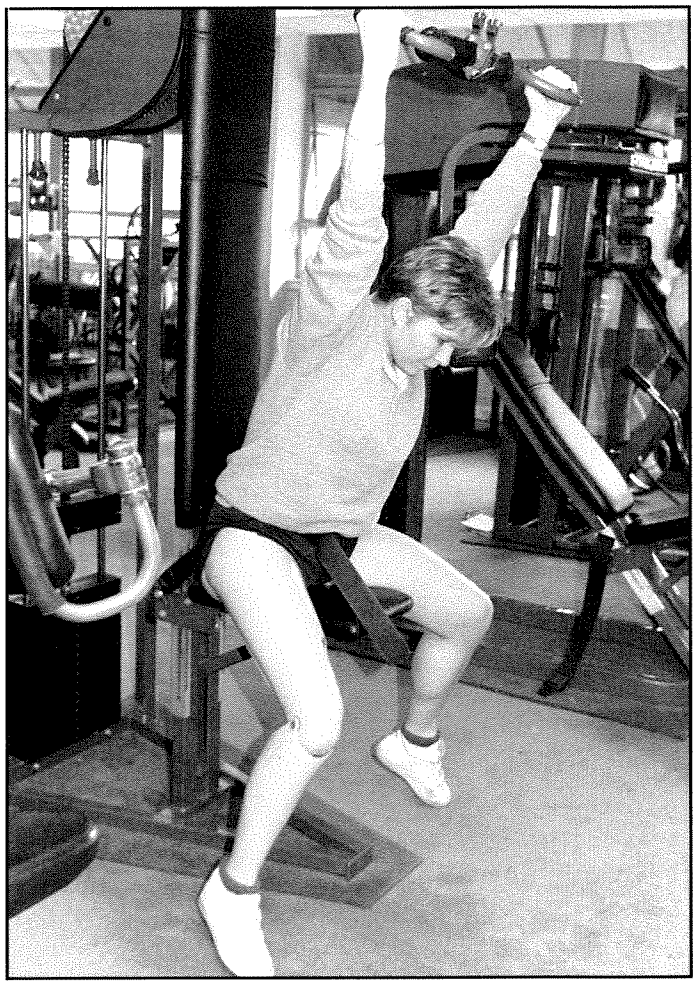


EXERCISE 79. NAUTILUS LAT PULL-DOWN

PURPOSE
Develops the latissimus dorsi muscles.

PROCEDURE
- Adjust the height of the seat so that the weights are slightly raised off the rack when your arms are fully extended overhead.
- Secure yourself with the seat belt. Lean forward and keep your feet on the ground for support.
- Take hold of the bar with both hands in a firm grip. Begin by pulling the bar down until it touches the back of your neck at a level slightly above the shoulders.
- Inhale while pulling the bar down to a count of two.
- Exhale as you slowly let the bar back up to a count of four.

SKILL LEVEL
Intermediate.



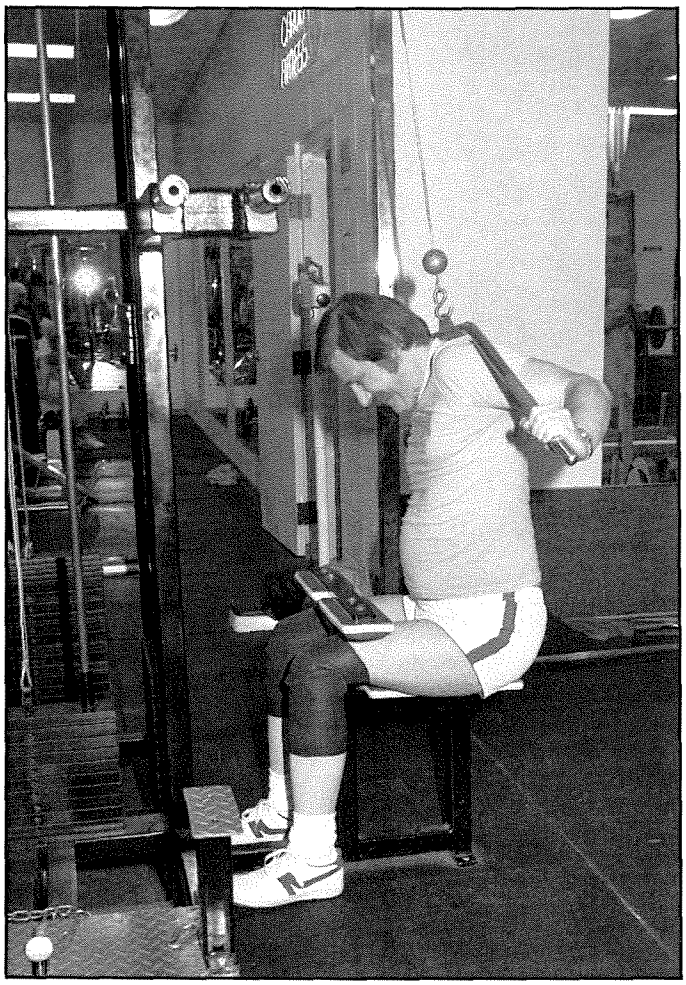
Linda Pedersen uses her feet for support as she begins to pull the bar down.

EXERCISE 80. WIDE-GRIP LAT PULL-DOWN

PURPOSE
Develops the latissimus dorsi muscles.

PROCEDURE
- Adjust the seat so that when your arms are fully extended above your head the weights are slightly raised off the rack. (The adjustable padded section positioned across the front of your thighs helps to hold you down when lifting heavy weights. In addition, a spotter can exert downward force on your shoulders to keep you from coming up off the seat.)
- Grasp the bar as near to its end as is comfortable.
- Pull the bar down behind your neck to a level just above your shoulders with a count of two.
- Inhale while pulling the bar down and exhale while letting the bar back up to the starting position with a count of four.

SKILL LEVEL
Intermediate.



NOTE

This is essentially the same as Exercise 79 but on a different apparatus.

Note the use of the padded section to help hold the legs down.

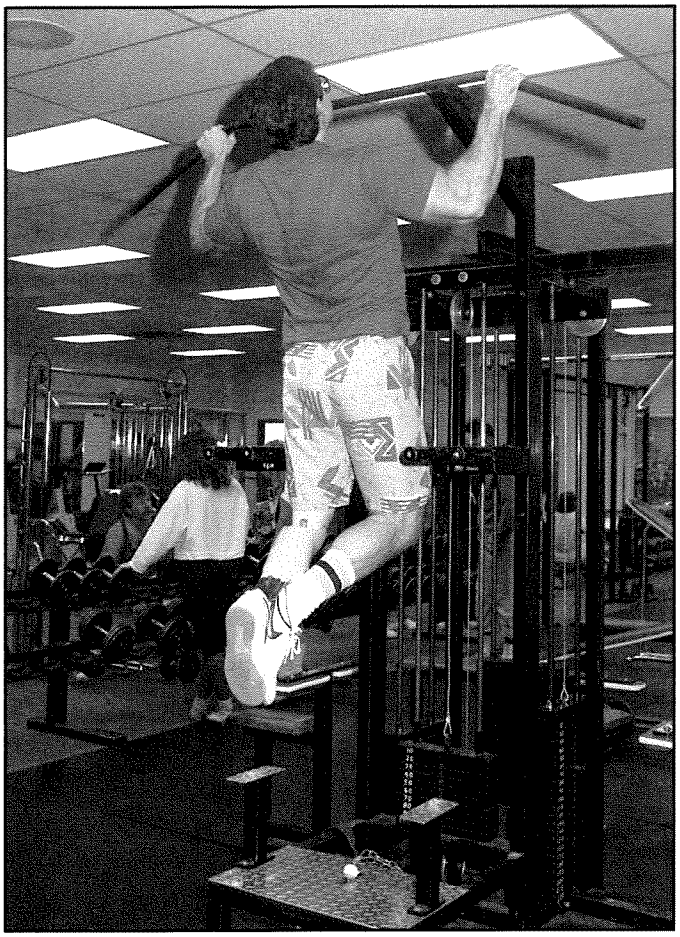
EXERCISE 81. WIDE-GRIP FRONT CHIN-UP

PURPOSE
Develops the latissimus dorsi muscles.

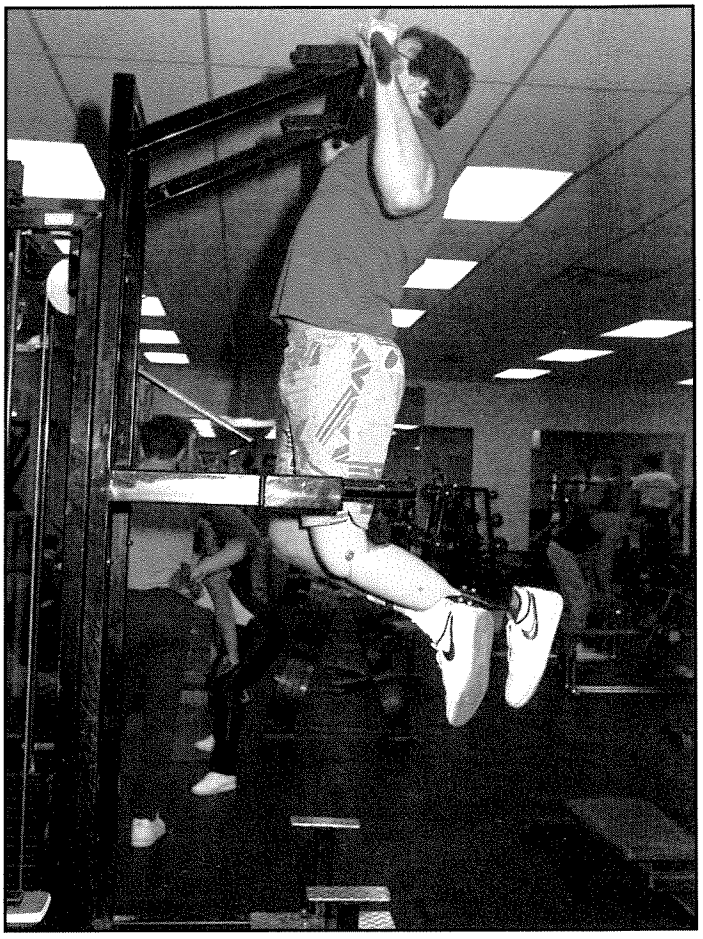
PROCEDURE
- The overhead bar should be at least 6 inches higher than you can reach from a standing position with your arms fully extended. Stand on a stool to reach the bar and take hold of it with your palms facing away from you. Use a wide grip outside the width of the shoulders.
- Hang with your arms extended at full length. Flex at the knees if necessary to keep your feet off the platform.
- Inhale as you pull yourself up to the bar, attempting to touch it with your chin. It is acceptable to have the back slightly hyperextended, but try to keep your body from swinging back and forth.
- Exhale as you lower yourself back down until your arms are fully extended.

SKILL LEVEL
Advanced.

NOTE
If this exercise is too difficult, the Reverse Close-Grip Front Chin-Up (Exercise 82) may be substituted.



The AK prosthesis can be supported by the sound leg in a flexed position, as shown by Mike Nitz.



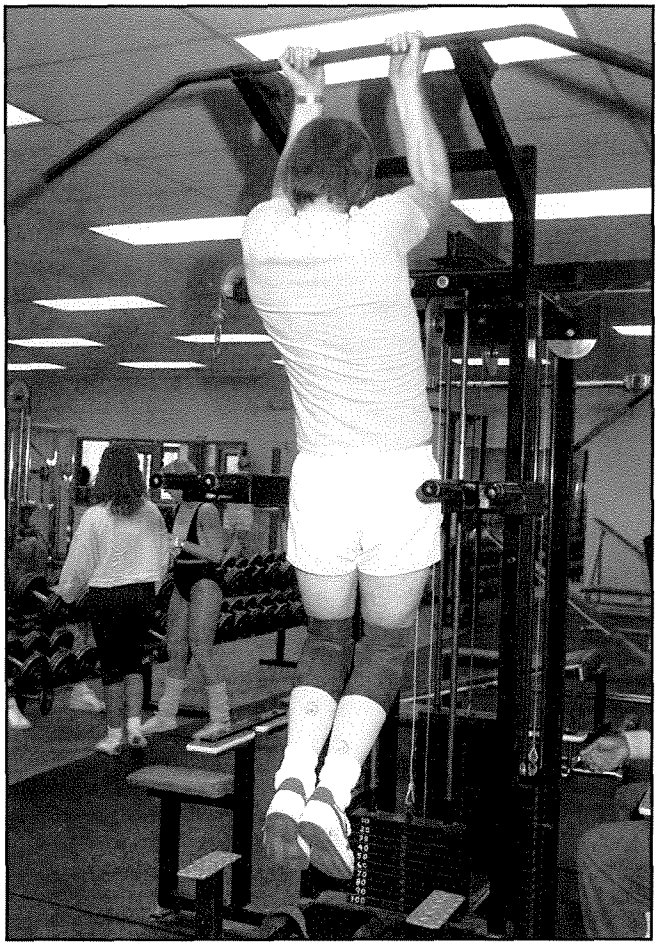
EXERCISE 82. REVERSE CLOSE-GRIP FRONT CHIN-UP

PURPOSE
Develops and strengthens the latissimus dorsi and, to a lesser degree, the elbow flexors.

PROCEDURE
- The overhead bar should be at least 6 inches higher than you can reach from a standing position with your arms fully extended. If this is not possible, keep your knees flexed while lifting your body to prevent your feet from touching the platform.
- Grasp the bar with your hands about 6 to 8 inches apart and palms facing you.
- Inhale as you pull yourself up, attempting to touch your chin to the bar. Do not swing or sway your body.
- Exhale as you lower yourself to the hanging position.

MODIFICATION
Use a step stool to reach the bar.

SKILL LEVEL
Advanced.



John Everett's knees are flexed to keep his feet from touching the platform.

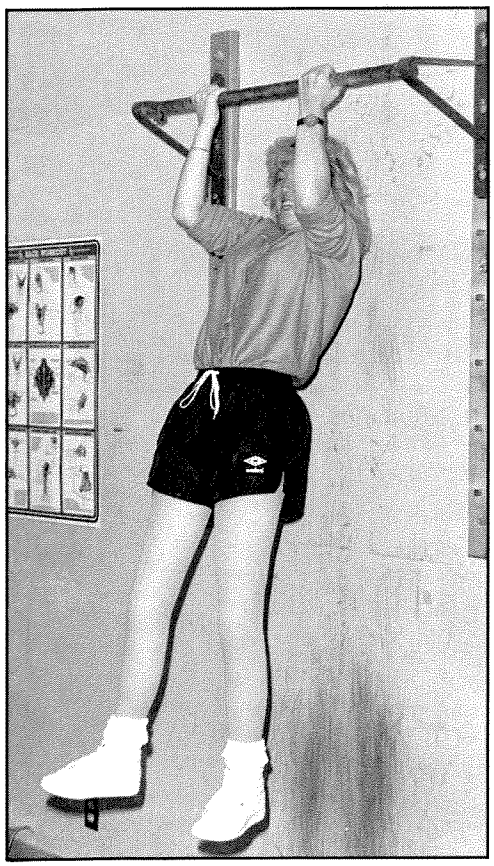
EXERCISE 83. REVERSE MEDIUM-GRIP FRONT CHIN-UP

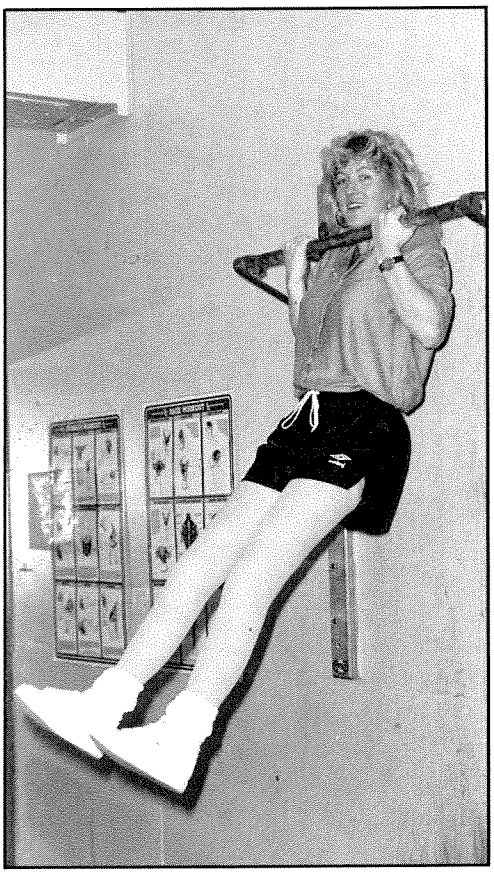
PURPOSE
Develops the latissimus dorsi muscles and, to a lesser degree, the biceps.

PROCEDURE
- Adjust the bar so that you must stretch to reach it. Your feet should not touch the floor when you hang with your arms fully extended.
- Grasp the bar; grip with palms facing you. (Your hands should be about 10-12 inches apart, not wider than your shoulders.) Raise up at least until your chin touches the bar.
- Flexing at the hips helps to maintain the body position.
- Pause momentarily in the top position and then lower yourself slowly to the floor. Inhale as you pull yourself up and exhale as you return to the starting position.

MODIFICATION
In order to reach the bar, some individuals may need to use a step stool or have a spotter help them.

SKILL LEVEL
Advanced.





Samantha Ellis flexes slightly at the hips as she rests momentarily at the top position.

EXERCISE 84. SEATED SHOULDER SHRUG

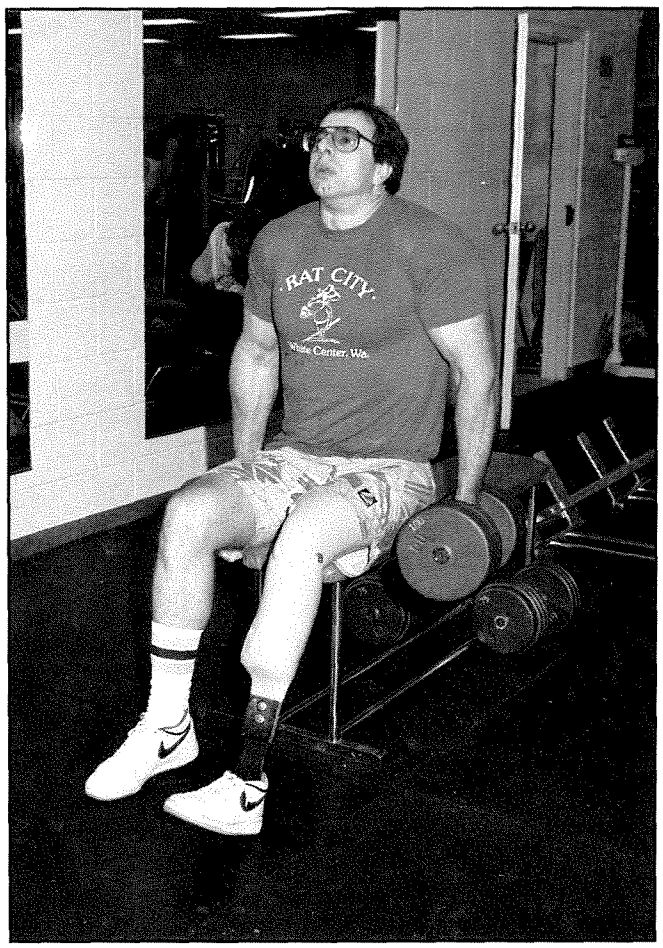
PURPOSE
Develops the trapezius muscles.

PROCEDURE
- Grasp the dumbbells in each hand with your palms facing your body, and take a seated position at the end of the bench.
- Keep your back straight, head up, feet approximately 8-10 inches apart, with your arms hanging at your sides. As you begin each repetition, allow your shoulders to drop as low as possible with the weight of the dumbbells.
- Inhale and raise your shoulders as high as you can; bring your shoulders up to your ears. Keep your arms fully extended and down at your sides.
- Exhale as you lower your shoulders and arms to the starting position.

VARIATION
Roll the shoulders in a circular motion front to back and then back to front.

MODIFICATION
Keep the prosthesis slightly forward with pressure on the heel to help you push against the floor and stabilize your balance when lifting weights from the seated position.

SKILL LEVEL
Intermediate.



Mike Nitz demonstrates a Seated Shoulder Shrug position with 100-pound dumbbells.

EXERCISE 85. STANDING SHOULDER SHRUG

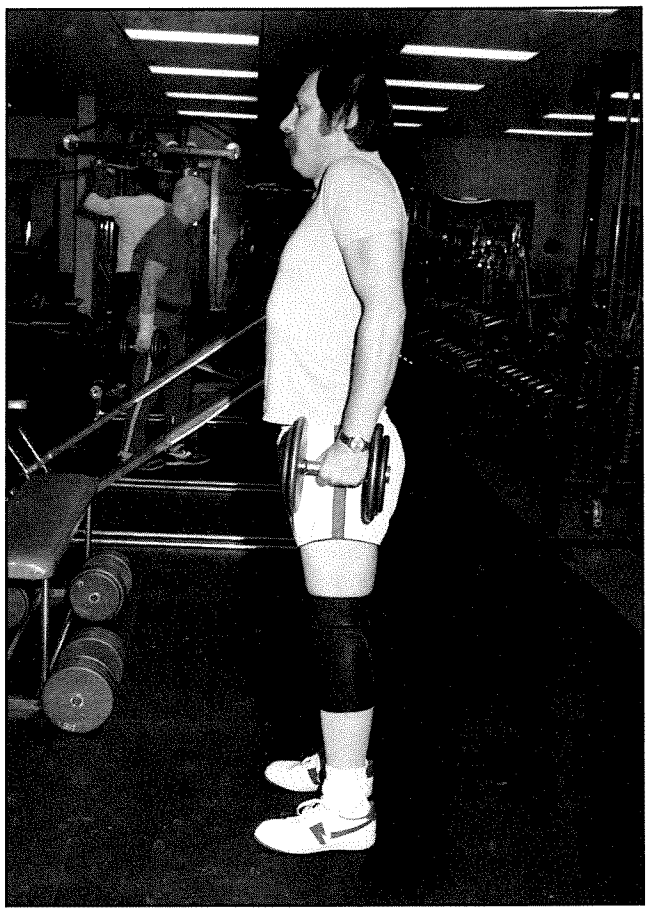
PURPOSE
Develops the trapezius muscles.

PROCEDURE
- Bend your knees and pick up the dumbbells from the floor, using your legs to lift the weight.
- Stand erect and hold the dumbbells by your sides with arms extended at full length, back straight, and feet about shoulder-width apart.
- Allow your shoulders to drop as low as possible with the weight of the dumbbells.
- Inhale as you raise your shoulders in an attempt to touch your ears. Do not bend the elbows.
- Exhale as you lower your shoulders to the starting position.
- When the desired number of exercise sets is completed, keep your head up, your back straight, and bend at the knees as you lower the weights to the floor.

VARIATION
Roll the shoulders in a circular motion front to back and then back to front.

MODIFICATION
If standing balance is a problem, choose the Seated Shoulder Shrug (Exercise 84).

SKILL LEVEL
Intermediate.



John Everett demonstrates the exercise.

EXERCISE 86. HYPEREXTENSION

PURPOSE

Develops lower back strength.

PROCEDURE

- Climb onto the hyperextension bench in a face-down position, with your lower abdomen and hips resting on the support above the hand bars. Grasp the hand bars for balance while getting into position.
- Your legs should be outstretched between the two leg support bars. To help maintain body position, the legs are held down by the upper padded bar.
- Lower your torso, let go of the hand bars, and fold your arms across your chest, as demonstrated by Linda Pedersen in the photo.
- Raise your trunk up until your body is about parallel with the floor. The arms may be folded across the chest, outstretched toward the feet, or out to the side.
- Arch your back and raise your body beyond the parallel position; then lower yourself down slowly as in the photo and repeat the sequence.
- As you advance in your physical conditioning, you may raise your back slightly beyond the parallel position, as shown in the photo.
- Inhale while raising your body and exhale while lowering it.

VARIATIONS

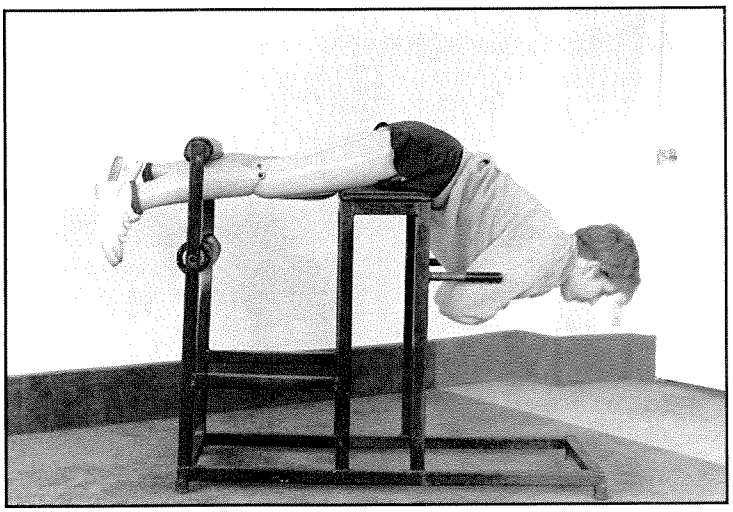
For an enhanced workout, perform one or more of the following steps: 1) hold the body in the up position for a few seconds, then lower yourself down slowly; 2) hold a weight behind the head or against the chest (whichever is more comfortable); 3) twist to each side (left, center, then right), alternating on each repetition; 4) hold the hands behind the head during the entire exercise. The hands may be held against the chest when starting and out to the sides as the exercise is completed (this may be easier for the beginner). The important thing is not to let the arms swing back and forth during the exercise.

SKILL LEVEL

Intermediate.

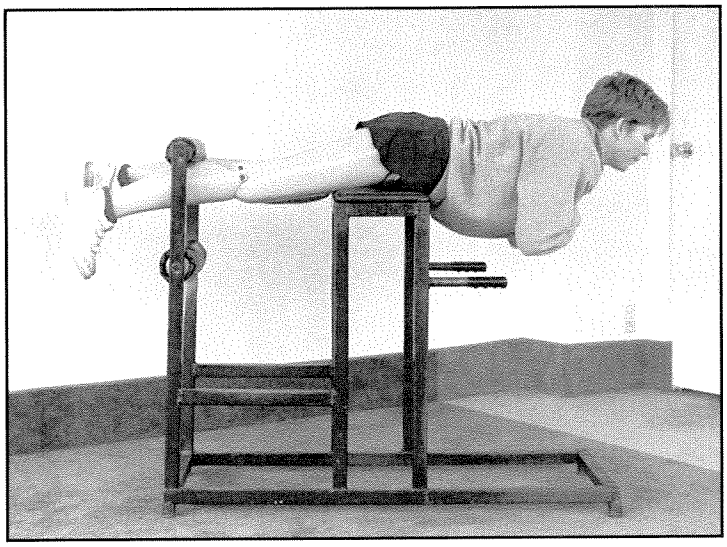
NOTE

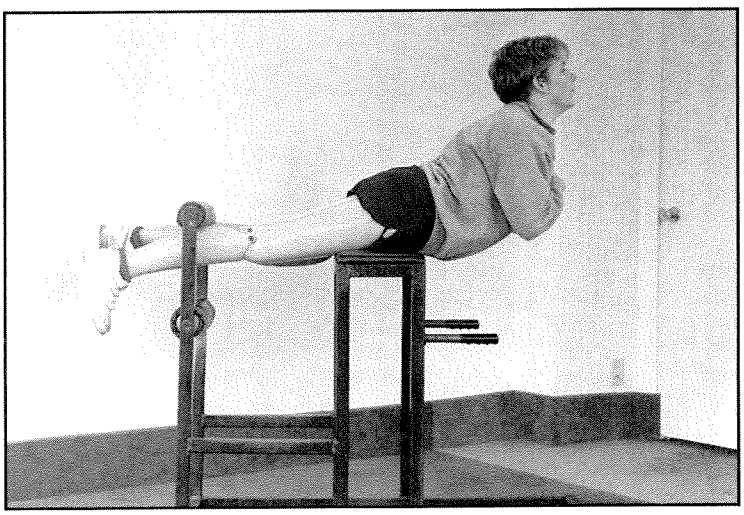
Beginners should be instructed on how to get into the proper position on the hyperextension bench without the danger of falling or straining. Start with the position demonstrated and work up to the position shown as the back muscles are strengthened. Assistance may be needed in positioning an AK or BK prosthesis between the support bars. To rest between sets, turn over and sit up on the bench, support your weight with your arms, or step completely out of the apparatus.



CAUTION

This exercise should be performed at each individual's tolerance level, starting with a limited range of motion. This exercise is not recommended for people with previous back injury.





Linda Pedersen demonstrates the Hyperextension Exercise.

EXERCISE 87. REVERSED HYPEREXTENSION (INTERMEDIATE)

PURPOSE
Strengthens and stretches the abdominal muscles and hip flexors.

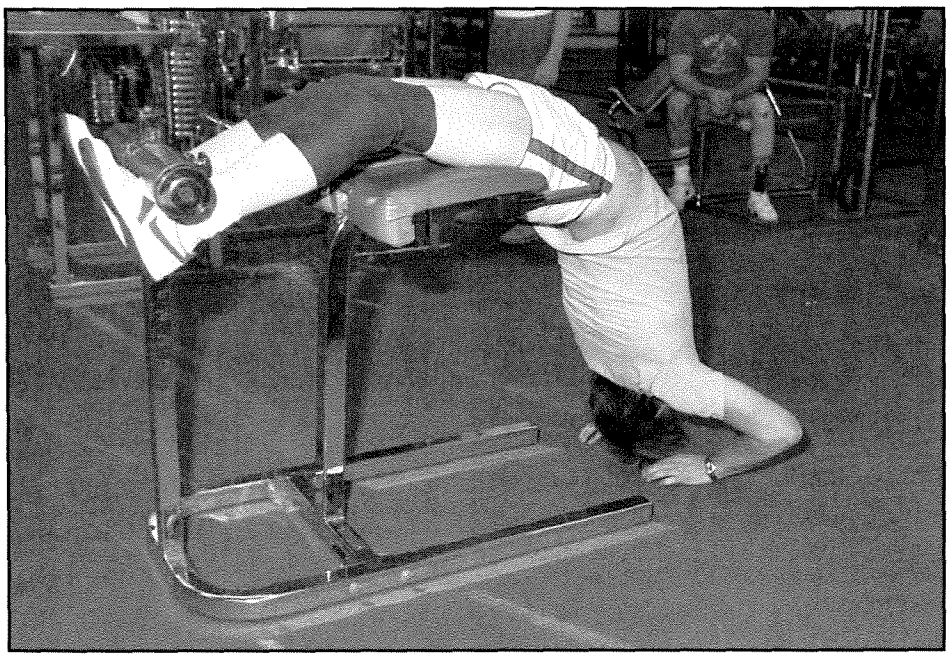
PROCEDURE
- Sit on top of the hyperextension bench and place your feet underneath the leg supports.
- Balance yourself by holding the side bars. Make sure your feet are securely positioned under the support bar.
- Slowly lower yourself backward and down until your hands reach the floor.
- Hold this position to stretch the abdominals. Bring yourself back to an upright position by doing a sit-up or by having a spotter help you.

MODIFICATION
Use auxiliary suspension such as a cuff strap with a waistbelt or a latex suspension sleeve to hold the prosthetic leg on.

SKILL LEVEL
Intermediate.

CAUTION

This exercise is not recommended for people with previous back injury. Beginners should have an assistant to help them lower and raise the torso until they can do it by themselves without risk.



John Everett demonstrates the reverse of the position shown in Exercise 86. He can stretch the low back and also perform sit-ups from this position. (You may not want to drop down this far in order to do sit-ups.)

EXERCISE 88. REVERSED HYPEREXTENSION (ADVANCED)

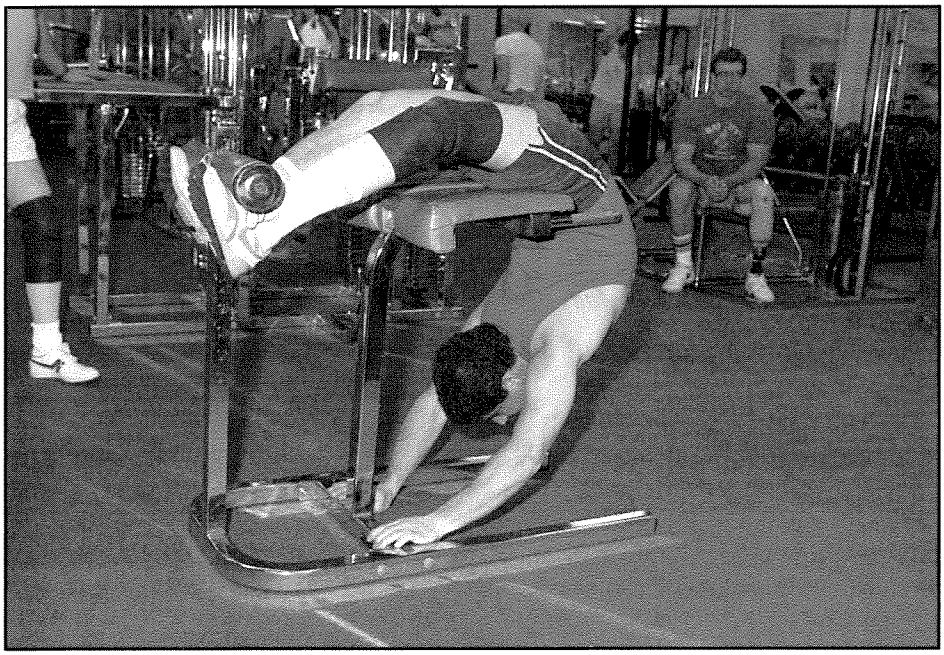
PURPOSE
Strengthens and stretches the lower back and, to a lesser degree, the abdominal muscles. **Attempt only after noting carefully the caution statement below.**

PROCEDURE
- Perform the first three steps from Exercise 87 (Intermediate Reversed Hyperextension). When your hands reach the floor, walk your fingers across the floor until you reach the center post (or as close as possible).
- For each 6-12 inches of finger-walking, hold the position 10-20 seconds. This slow development of the stretch will allow you to progress in a safe manner.
- Make sure to keep your head back. Make sure you have positioned yourself so that the coccyx or lumbosacral spine are not impinged by the bench. Breathe naturally while extending.

MODIFICATION
Use auxiliary suspension if necessary to hold the prosthetic leg on.

SKILL LEVEL
Advanced.

CAUTION
This exercise is not recommended for people with previous back injury. It is recommended only for those who have had previous conditioning in lower back exercises.



Albert Rappoport demonstrates the advanced position. He uses the ActivSleeve Suspension System for this exercise because the inner ribs prevent the sleeve from slipping on the thigh. Its rubber material stretches so that a full range of motion can be achieved.

EXERCISE 89. STIFF-LEGGED BARBELL DEAD LIFT

PURPOSE

Strengthens the muscles of the lower back.

PROCEDURE

- Roll the barbell to nearly touch your shins so that your feet are under the bar.
- Position your feet about shoulder-width apart. Do not bend your knees while doing the exercise.
- Bend from the waist and grasp the bar with an alternated hand grip (i.e., one palm facing toward you, the other away from you). The alternated hand grip is safest, especially when using heavier weights, because the bar is balanced and it is more difficult for the barbell to slip out of your hands. Hold the bar with your hands about shoulder-width apart, just outside the width of your feet.
- With legs and back straight, hands in position, and head up, inhale and lift the weight until you are standing erect.
- Pause momentarily, keeping your arms straight with no bend at your elbows. (Flexing the elbows decreases the strengthening effect on the back muscles.)
- Exhale as you lower the weight back to the floor, maintaining the straight-legged position. It is acceptable for your arms to slightly touch the sides of your legs while lifting and lowering the weight.

VARIATIONS

— If lifting straight-legged is too difficult, use the bent-knee technique for dead lifts, keeping the back straight, the knees slightly bent, and lifting with the thighs and back.
— For a more intense workout, do not rest the weight on the floor—only touch it down before lifting it back up.
— Another form of the Straight-Legged Dead Lift requires the person to stand on top of a weight bench or low platform in order to lower the weight to a level below the feet for a greater range of motion.

SKILL LEVEL

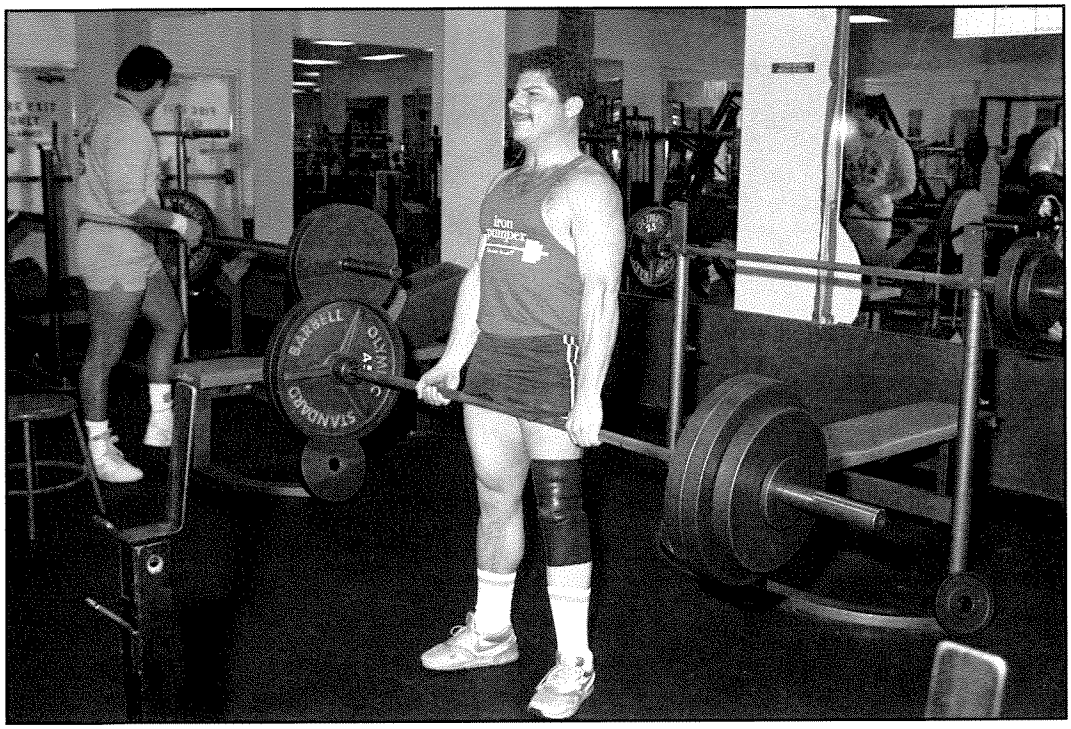
Intermediate to Advanced.

NOTE

Whenever lifting heavy weights, it is advisable to use a weight belt to prevent injury and to take some of the stress off the lower back. However, in the photographed demonstration no weight belt is used because the lifter is trying to emphasize his back muscles to a greater extent. Only experienced lifters should use this technique and do so with caution. The weights should be increased gradually and only if one trains on a regular basis. Remember, even experienced lifters can injure themselves by not warming up, by not following strict form, by not using a spotter, and by increasing the weight beyond their known capabilities.

CAUTION

This exercise is not recommended for those with previous back injury. Beginners should start with bent knees when lifting the barbell.



Albert Rappoport is working out with 305 pounds.

STEVE WILBER/SEATTLE, WA

Opponents face off in a game of crutch soccer.