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## ARMS

Developing the muscles of the arms is an integral part of overall upper-body strength. It can be a critical factor in the rehabilitation process for many people with bilateral lower limb amputations who must transfer in and out of a wheelchair or use crutches for mobility. Arm strength is also important in many sports, for actions such as swinging a golf club or racquet and throwing a ball. Strong arm muscles are needed for most weight-lifting exercises.

The upper arms have two major muscles—biceps and triceps—and 13 smaller ones. These muscles cross the elbow joint and control elbow flexion and extension. Eight muscles contribute to flexion and seven to extension; the biceps is the most important muscle for flexion of the elbow and the triceps for extension of the elbow. Besides flexing the elbow, the biceps has two other functions: 1) supinating the forearm; and, 2) lifting the upper-arm forward. The biceps reaches its full contraction when the elbow is bent at 130 degrees and the hand is supinated.

The biceps is vital to the forehand stroke in tennis, to wrestling and rope climbing, and to other sports-related activities. The biceps works in opposition to the triceps. The athlete must be able to effectively relax the biceps while the elbow is extended by the triceps in many sport skills. The ability to control the responsiveness of muscles is what separates the athlete from the nonathlete.

When the arm is flexed to “make a muscle,”

many people believe that the biceps makes up the bulk of the upper arm. Actually, the triceps, with three heads—lateral, medial, and long—is the muscle that mostly determines the size of the upper arm. The major function of the triceps is to extend the elbow. The triceps is also helpful in bringing the upper arm down from an overhead position. To maintain a full contraction of the triceps, the upper arm should be behind the torso as the elbow straightens.

The lower arm, or forearm, consists of two major bones, the radius and ulna, and 19 separate muscles. These muscles control the fingers and the wrist. The majority of these muscles are contained in two masses below the elbow joint. The bulk of the muscle belly formed on the outside of the forearm are called the extensor muscles, while the inside bulk of muscles of the forearm are called flexor muscles. The complex muscle structure of the forearm supinates the hand, pronates the hand, and is involved in gripping and extending the fingers, as well as bending the hand in four separate directions. The development of arm strength from the wrists and forearms to the biceps and triceps is necessary to enhance athletic performance and guard against injury.

The exercises illustrated are examples of adaptive methods for performing standard exercises that strengthen the arms and upper body. In some cases, prostheses provide necessary support in the movements required for the exercise.

ARM EXERCISE ROUTINE		
Muscle	Exercise	Title
Triceps	23	Standing Triceps Press-down
Triceps	24	Standing Dumbbell Triceps Curl
Elbow Flexor	25	Reverse Curl
Triceps	26	Supine Two-Dumbbell Triceps Curl
Wrist Flexor/Extensor	27	Wrist Curl
Elbow Flexor	28	Seated Arm Curl

### 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 23. STANDING TRICEPS PRESS-DOWN****PURPOSE**

Develops the triceps.

**PROCEDURE**

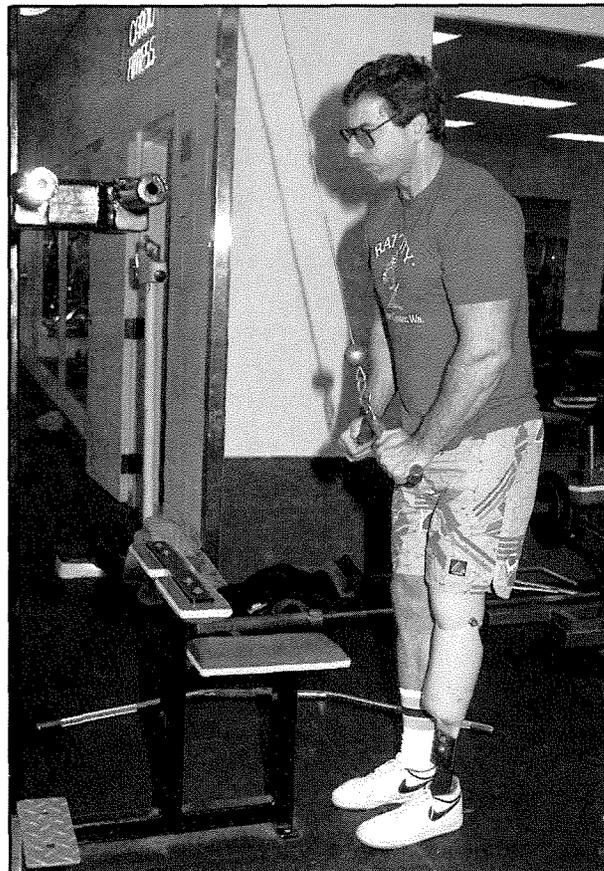
- Stand erect with a comfortable and stable stance. Grip the bar with the palms facing down.
- Start with your forearms and biceps touching each other and palms facing forward. Keep the elbows against the side of the body and press the bar down until the arms are extended.
- Keep body motions to a minimum in order to best isolate the triceps. (It is acceptable to lean forward while pushing down the weight on the last few repetitions as you become tired.)
- Exhale as you push down and inhale as you slowly raise the weight back up in a controlled manner.

**MODIFICATIONS**

Various hand attachments may be interchanged with the angled bar pictured. Straight bars, rope, or leather straps may also be substituted.

**SKILL LEVEL**

Intermediate.



Mike Nitz demonstrates the Triceps Press-down. He wears a Narrow ML flexible brim above-knee socket with the Mauch SNS Knee Unit and Flex-Foot.

**EXERCISE 24. STANDING DUMBBELL TRICEPS CURL****PURPOSE**

Develops the triceps muscles.

**PROCEDURE**

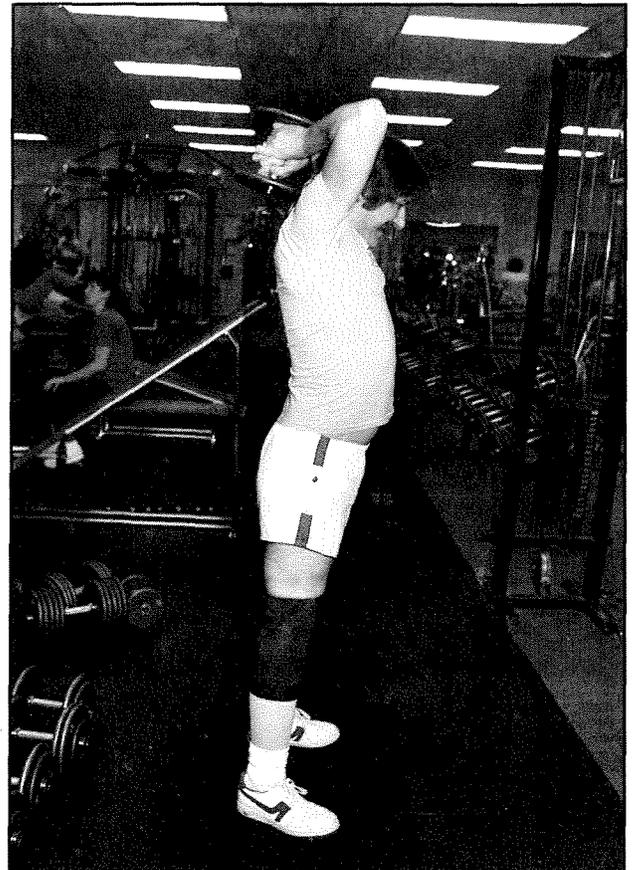
- Feet should be positioned slightly wider than shoulder-width to give stability, so you will not fall backward when raising the weight behind the head.
- Grip the dumbbell with both hands and raise it above the head until the arms are fully extended.
- Carefully lower the dumbbell behind the head until the biceps and forearms touch. Try to keep your back straight and face straight ahead for best form.
- Inhale when lowering the weight and exhale when raising it above the head.

**MODIFICATIONS**

- Stable alignment of prostheses is required for this exercise, particularly for the person with bilateral amputation. If balance when standing is a problem, do this exercise sitting down.
- The dumbbell can be held in several different ways. As shown, one hand is placed on top of the other with a closed grip. Hands can be alternated so a different hand is on top for each set.
- Another method is to have the palms of both hands resting underneath the top plate, with the thumbs wrapped around the handles.

**SKILL LEVEL**

Intermediate.



John Everett demonstrates the standing position for the Triceps Curl. He is holding one dumbbell to provide resistance for developing strength.

**EXERCISE 25. REVERSE CURL****PURPOSE**

Develops the elbow flexors and the muscles of the forearm.

**PROCEDURE**

- Begin by bending at the knees and waist, and roll the barbell as close to your toes as possible. Grasp the bar with your palms facing you or the floor, positioning your hands shoulder-width apart.
- Raise your body to the upright position, keeping your head up and using your legs to lift the weight up from the floor.
- In the starting position, your arms should be fully extended in front of you with your hands just outside of your hips. Your feet should be spaced about shoulder-width apart.
- Bring the bar nearly up to your chin by flexing your arms at the elbows. Lower the bar to the starting position slowly. Keep the bar as close to your body as possible during the lifting and lowering.
- It is fine if the bar touches the body, because this will help keep your form strict and prevent unwanted body motions that would detract from isolating the intended muscle. Try not to sway, swing the weights, or arch your back during the exercise.

**VARIATION**

For more advanced lifters, it is acceptable to sway or even swing the weights up on the last few repetitions in order to complete them. These “extra” repetitions work the biceps and forearm a bit more, allowing you to complete more repetitions than you would normally and enabling you to gain extra strength and size (this should not be done in this fashion with every set). The lifter also benefits from controlling the weights as they are lowered back to the starting position.

**MODIFICATION**

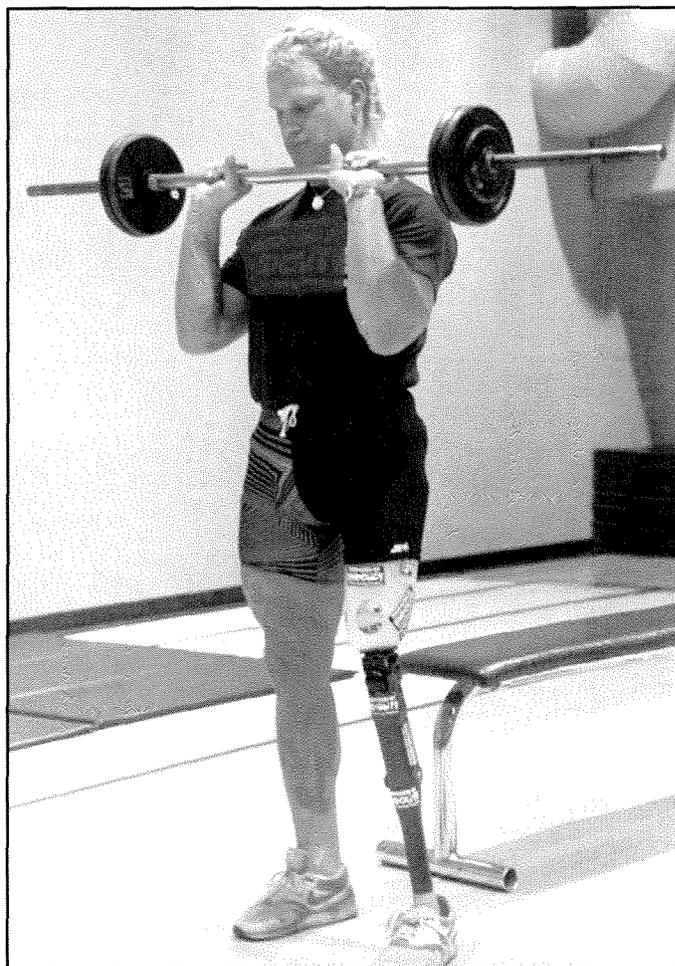
You may lean your back against a wall to limit swaying, which will increase stability while standing.

**SKILL LEVEL**

Intermediate.



Greg Mannino works through the mid-position of the Reverse Curl.



Mannino demonstrates the top position of the Reverse Curl.

**EXERCISE 26. SUPINE TWO-DUMBBELL TRICEPS CURL****PURPOSE**

Develops the triceps muscles.

**PROCEDURE**

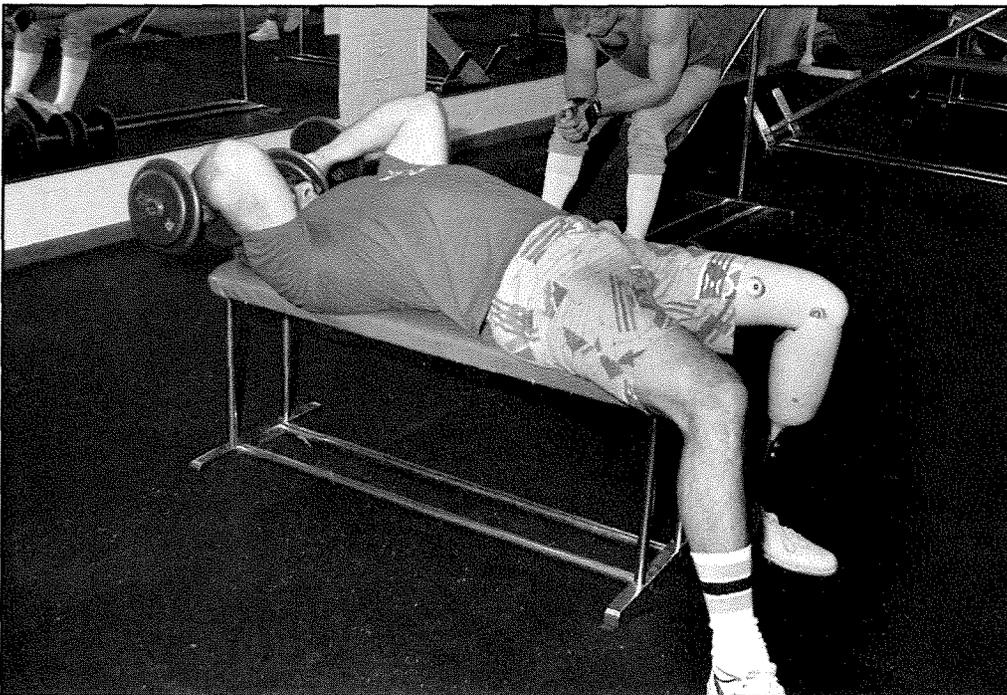
- Lie flat on a bench and bring both dumbbells up in line with the shoulders while extending the arms. Keep the upper portion of the arms vertical and slowly lower the dumbbells behind the shoulders until the forearms touch the biceps.
- Raise the weight straight up in line with the shoulders while extending the arms. Keep the upper portion of the arms vertical.
- Lower the weight behind the shoulders and inhale. Raise the weight back up while extending the arms and exhaling.

**MODIFICATIONS**

Wear the prosthesis for support and balance. If the prosthesis is not worn to support the body, a person with bilateral amputation may risk falling off the bench as the weight is brought behind the head.

**SKILL LEVEL**

Advanced.



Mike Nitz demonstrates a Two-Dumbbell Triceps Curl from a supine position.

**EXERCISE 27. WRIST CURL****PURPOSE**

Develops strength in the wrist flexor and extensor muscles.

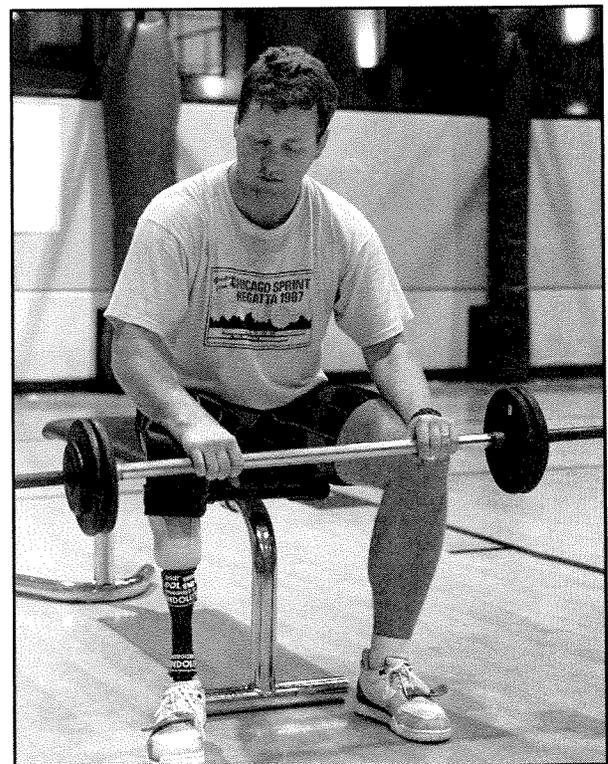
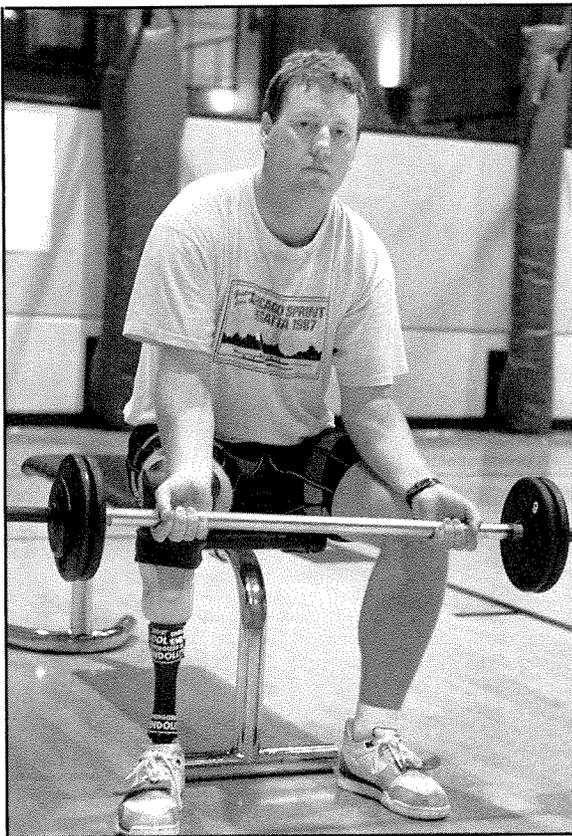
**PROCEDURE**

- Sit on the edge of a bench. Grasp a barbell with your hands about shoulder-width apart.
- Rest your forearms on your upper thighs, placing your wrists over your knees.
- Lower the barbell as far from your knees as it will go. Then bring it up as high as possible without raising your forearms off your thighs.
- Alternate the grip: palms facing up to work the inside forearm (wrist flexor) muscles; palms facing down to work the outside forearm (wrist extensor) muscles.

**SKILL LEVEL**

Beginner.

Richard Hughes demonstrates the palms-up grip for wrist flexion to develop the inside muscles of the forearm.



Hughes demonstrates the palms-down grip for wrist extension to develop the outside muscles of the forearm.

## EXERCISE 28. SEATED ARM CURL

### PURPOSE

Develops the elbow flexor muscles.

### PROCEDURE

- Be sure that your feet touch the ground while seated on the Nautilus Biceps Curl Machine. Grab the bar with palms facing up and straight in line with the shoulders.
- Grab the curling bar at the second curve. Bringing the grip out wider concentrates more on the inner biceps, while narrowing the grip emphasizes the outer biceps.
- Position the elbows comfortably on the pads. Bring the arms up from the extended position, flexing them until the forearms and biceps touch each other.
- Keep the pressure on the biceps by not resting at the top or bottom positions. Adjust the range of motion as necessary so that constant tension remains on the biceps.
- Keep the elbows in position to prevent the upper arms from moving outward as the bar is curled. Inhale while lowering the weight and exhale while raising it.

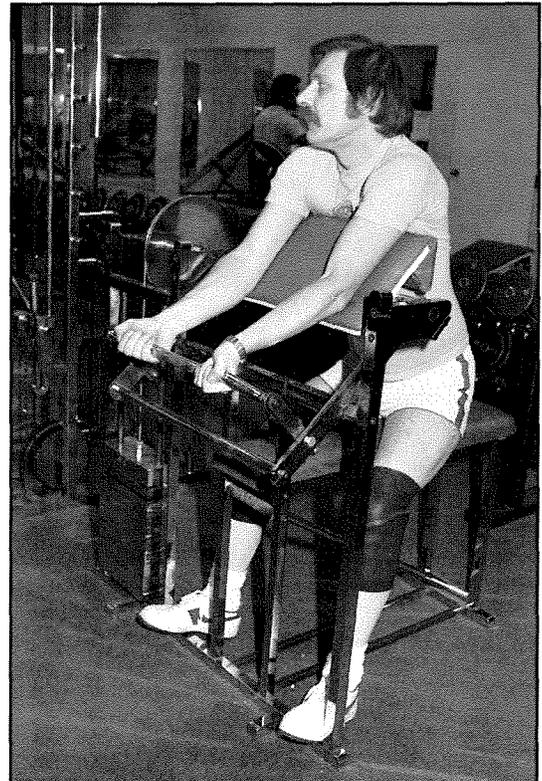
### MODIFICATIONS

— The Seated Arm Curl is recommended for those with lower limb loss, particularly for those with bilateral amputations. The seated position enables concentration on the muscles being worked, rather than on maintaining balance.

— A variety of standing and seated techniques exist to work the biceps using straight bars, curling bars, dumbbells and cables, benches, and machines. The various standing and seated techniques make the workout more interesting and allow the biceps muscles to be worked from different angles.

### SKILL LEVEL

Intermediate.



John Everett demonstrates training the biceps from a seated position.