



FACT SHEET

Limb Loss Definitions

by NLLIC Staff (Reviewed 2008)

**italicized words have corresponding definitions*

AAOP (American Academy of Orthotists and Prosthetists): As a professional society of orthotists and prosthetists, the AAOP is dedicated to promoting professionalism and advancing the standards of patient care through education, literature, research, advocacy and collaboration.

ABC (American Board of Certification): The ABC was formed in 1948 by a group of concerned practitioners and orthopedic surgeons who recognized the Orthotist/Prosthetist as an integral part of the rehabilitative team responsible for returning the patient to a productive and meaningful life.

abduction: Motion of a limb or body part away from the median plane of the body. The resulting effect can cause problems with proper gait and/or ambulation and may prolong the rehabilitation process, especially in cases of lower extremity limb loss—adduction is its opposite.

ablation: Removal of a body part and/or its function by way of surgery, morbid process or traumatic occurrence.

ACA (Amputee Coalition of America): The Amputee Coalition of America was founded in 1986 and incorporated in 1989. The ACA seeks to reach out to people with limb loss and to empower them through education, support and advocacy.

accessible: Something that is easily and safely approached, entered and/or operated by a person with a disability (i.e., site, facility, work environment, service, or program).

acquired amputation: The surgical removal of a limb(s) due to complications associated with disease or trauma.

acupuncture : An ancient Asian mode of therapy used to cure disease or relieve pain; the process employs long, thin needles that are inserted into the body at specific points.

ADA: The Americans with Disabilities Act was enacted in 1990 and prohibits discrimination on the basis of disability in employment; to be protected by this Act, one must have a disability or have a relationship or association with an individual with a disability.

adherent scar tissue: Usually formed during the healing process, the scar tissue sticks to underlying tissue such as muscle, fascia or bone and may cause pain or lessen the ability for a full range of motion; it also can limit proper fit of the socket. Massage techniques can be employed to combat irritation and/or inflammation, working to soften the hardened tissue.

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AE (above-the-elbow): A specific level of amputation—also known as transhumeral.

AK (above-the-knee): A specific level of amputation—also known as transfemoral.

alignment: The position of the prosthetic socket in relation to the foot and knee.

alternative therapy: A treatment that is used in place of or in conjunction with traditional medicine (i.e., *acupuncture*, yoga and *Tens units*).

ambulation: The action of walking or moving. For lower extremity amputees, rehabilitation is primarily concerned with helping the patient achieve proper gait and/or ambulation.

amelia: Medical term for the congenital absence or partial absence of one or more limbs at birth. Amelia can sometimes be caused by environmental or genetic factors.

amputation: The cutting off of a limb or part of a limb.

anterior: The front portion of a shoe or foot.

AOPA (American Orthotic and Prosthetic Association): Founded in 1917, the American Orthotic & Prosthetic Association is a national trade association committed to providing high quality, unprecedented business services and products to O&P professionals.

architectural barrier: Barriers such as stairs, ramps, curbs, etc. that could obstruct a person's ability to walk or mobilize in a wheelchair.

assistive/adaptive equipment: Devices that assist in activities or mobility (i.e., wheelchair ramps, hand bars/rails, car and home modifications, canes, crutches, walkers and other similar devices).

atrophy: A wasting away of a body part, or the decrease in size of a normally developed extremity or organ, due to a decrease in function and/or use.

BE (below-the-elbow): A specific level of amputation—also known as transradial.

bilateral amputee: A person who is missing or has had amputated both arms or both legs. For example, a person that is missing both legs below-the knee is considered a bilateral BK.

biomechanics: Applying mechanical principles to the study of human movement; or the science concerned with the action of forces on the living body.

BK (below-the-knee): A specific level of amputation—also known as transtibial.

BOC (Board for Orthotists/Prosthetists Certification): BOC is an independent, not-for-profit agency that certifies orthotists, prosthetists, orthotic and mastectomy fitters and accredits their facilities. Since their founding in 1984, BOC has been dedicated to promoting the highest standards of excellence and competence of orthotists and prosthetists.



body image: The awareness and perception of one's own body in relation to both appearance and function.

body-powered prosthesis (upper extremity): An arm prosthesis powered by movement in the upper extremity portion of the body, specifically the muscles of the shoulder(s), neck and back. The motion of these movements is then captured by a harness system that generates tension in a cable, allowing a *terminal device* (hook or prosthetic hand) to open and close.

bumper: Rubber like, polymer based devices that are available in varying degrees of density, depending on an amputee's desired level of stiffness in a prosthetic knee or heel. As with other prosthetic componentry, basic maintenance or replacement may be required as a result of wear and tear.

C-Leg: The Otto Bock C-Leg features a swing and stance phase control system that senses weight bearing and positioning to provide the knee's microprocessor information about the amputee's gait, thus promoting smoother ambulation. The outer shell houses a hydraulic cylinder, microchip, and rechargeable battery.

causalgia: A persistent, often severe burning pain usually resulting from injury to a peripheral nerve.

check or test socket: A temporary socket, often transparent, made over the plaster model to aid in obtaining proper fit and function of the prosthesis.

Chopart amputation: Named for François Chopart, French surgeon, 1743-1795. It is a disarticulation at the midtarsal joint of the foot, leaving a stump that is able to withstand weight bearing without a prosthesis. Recent studies, however, devalue this type of amputation, instead preferring the similar *Syme's amputation*.

comorbidity: The presence of a coexisting or additional disease that can impact a primary disease. For example, the primary disease could be diabetes and the comorbid disease *neuropathy*.

congenital anomaly: A birth malformation such as an absent or poorly developed limb. (see *amelia* and *phocomelia*)

contracture: The tightening of muscles around a joint, restricting the range of motion and suppressing muscular balance.

contralateral: Originating in or affecting the opposite side of the body.

cosmesis: Used to describe the outer, aesthetic covering of a prosthesis.

CP (Certified Prosthetist): A person who has passed certification standards as set by a prosthetist certifying body.

CPO (Certified Prosthetist/Orthotist): A person who has passed certification standards as set by a prosthetist/orthotist certifying body.

custom fit: Fitting an individual with a device that is made from an image of the individual's anatomy and fabricated according to the needs of that individual.

débridement: The removal of necrotic, infected or foreign material from a wound.



definitive, or permanent prosthesis: The definitive prosthetic replacement for the missing limb or part of a limb, meeting standards for comfort, fit, alignment, function, appearance and durability.

desensitization: To reduce or remove any form of sensitivity in the residual limb by massaging, tapping or applying vibration.

diabetic amputation: An amputation caused by complications associated with diabetes. Causes can include *neuropathy*, ulcers, and foot disorders. This is an acquired amputation.

disarticulation: An amputation of a limb through the joint, without cutting any bone—performed at the hip, knee, ankle, shoulder, elbow and wrist levels.

distal: (1) The end of the *residual limb*. (2) The end that is farthest from the central portion of the body. Distal is the opposite of *proximal*.

distal muscle stabilization: During an amputation, it is important to retain the maximum amount of functioning muscle to ensure strength, shape and circulation. To achieve this, the remaining muscles at the site of amputation must be secured and stabilized. *Myodesis* and *myoplasty* are the most common techniques for achieving this stabilization.

donning and doffing: Putting on and taking off a prosthesis, respectively.

dorsiflexion: An upward movement or extension of the foot/toes or the hand/fingers.

durable medical equipment (DME): Assistive devices, such as crutches, walkers or wheelchairs that are used by patients at home.

durometer: A device for measuring the degree of density or stiffness in rubber or polymer based products. In foot/ankle prosthetics, for example, a prosthetist would use the durometer to measure the degree of stiffness in a particular *bumper* in order to match its level of density to the degree of stiffness desired by the amputee; however, most bumpers now are color coded to correspond with a specific level of stiffness, virtually eliminating the need for office measurements.

dysvascular amputation: The word is used to denote amputations that are caused or acquired from poor vascular status of a limb (i.e., ischemia). The prefix *dys* is Greek in origin and means abnormal, difficult, impaired or bad.

edema: A type of localized swelling that is characterized by an excess of fluid in body tissues. Many amputees experience inflammatory edema (red, tender, and/or warm skin) at the residual level.

elastic wrap: An elasticized bandage used to prevent swelling and encourage shrinkage of the residual limb, thus promoting a healthy *stump*.

endoskeletal prosthesis: A prosthesis built to imitate the movements and functional capabilities of the human skeleton, with all parts and componentry housed inside a soft, cosmetic covering.

energy storing foot: A prosthetic foot designed with a flexible heel. The heel stores energy when weight is applied to it and releases this energy when weight is transferred to the other foot.



exoskeletal prosthesis: A prosthesis made of a hard, hollow outer shell designed for weight bearing. It is a fully functional, complete prosthesis unoccupied with cosmetic concern.

extension assist: A device that assists the prosthesis through the swing phase of ambulation, thus speeding up the walking cycle.

extremity: Synonymous with limb, usually referring to an arm or leg.

foot function: The act of using the feet as a functional substitute for the hands.

forequarter amputation: An amputation of the arm, shoulder, clavicle, and scapula.

foreshortened prostheses: see *stubbies*

functional prosthesis: Designed with the primary goal of controlling an individual's anatomical function, such as providing support or stability or assisting ambulation.

gait: A manner of walking that is specific to each individual.

gait training: Part of ambulatory rehabilitation, or learning how to walk with your prosthesis or prostheses.

HP (hemipelvectomy): Similar in scope to the hip *disarticulation*, the HP also removes approximately half of the pelvis.

hybrid prosthesis: A prosthesis that combines several prosthetic options in a single prosthesis, usually for individuals who have a transhumeral (AE) amputation or difference. The most common hybrid prostheses are found in upper extremity cases where the device utilizes a body-powered elbow and a myoelectrically-controlled terminal device (hook or hand).

IAOP: International Association of Orthotics and Prosthetics.

Ilizarov technique: A bone fixation technique using an external fixator for lengthening limbs, correcting pseudarthrosis and other deformities, and assisting in the healing of otherwise hopeless traumatic or pathological fractures and infections, such as chronic osteomyelitis.

IPOP (Immediate Post Operative Prosthesis): A temporary prosthesis applied in the operating room immediately following amputation. The IPOP helps control initial edema or swelling, reduces postamputation pain and protects the amputation site by enveloping the residual limb in a rigid dressing, and allows for immediate, although light, ambulatory rehabilitation.

ischemia: A localized type of anemia that results because of an obstruction in the blood supply, usually through arterial blockage and/or narrowing. This condition is usually seen in patients with poor vascular health or in diabetics that are facing complications of a comorbid disease.

Ischial containment socket: In some amputation cases, usually those of the HP or HD, this socket is used to support the *ischium*.



ischium: The lower portion of the hipbone, which sometimes protrudes from the pelvis and may get sore while sitting on a hard surface for extended periods of time.

kinesiology: The study of muscles and human movement.

lateral: To the side, away from the median plane of the body.

L-Codes: Reimbursement codes used in the prosthetic/healthcare industry to identify what services and/or devices were provided.

LEA: Acronym for a lower extremity amputation or amputee.

Liner (roll-on liner): Suspension systems used to hold the prosthesis to the residual limb and to provide additional comfort and protection for the residual limb. Roll-on liners can also accommodate volumetric changes in the residual limb. These liners may be made of silicon, pelite, or gel substances.

medial: Motion of a body part toward the median plane of the body.

microprocessor-controlled knee: These devices are equipped with a sensor that detects full extension of the knee and automatically adjusts the swing phase of *ambulation*, allowing for a more natural *gait*.

modular prosthesis: An artificial limb assembled from components or modules usually of the *endoskeletal* type, where the supporting member (*pylon*) may have a cosmetic covering (*cosmesis*) shaped and finished to resemble the natural limb.

multiaxis foot: The multi-rotational axis allows for inversion and eversion of the foot, and it is effective for walking on uneven surfaces.

myodesis: During an amputation, stabilization of the divided muscles is of utmost importance. Inadequate techniques resulting in weak, retracted muscles or skin that cannot tolerate the necessary pressures will obviously compromise stability. Applying the myodesis technique for *distal muscle stabilization* gives greater stability as it involves the direct suturing of muscle or tendon to bone. Myodesis is not recommended for ischemic patients. Instead, the surgeon will probably employ the technique of *myoplasty*.

myoelectrics: Basically, this is muscle electronics. It is a technology used mainly in upper extremity prosthetics to control the prosthesis via muscle contraction using electrical signals from the muscles to power the prosthesis.

myoplasty: Like *myodesis*, myoplasty is a surgical technique used to foster *distal muscle stabilization*. In this technique, muscle is sutured to muscle and then placed over the end of the bone before closing the wound. Since it is widely accepted that myodesis offers better stabilization, the myoplasty technique is not used as often; however, for patients with poor vascular health, the myoplasty technique is preferred.

neuroma: When a nerve is severed during amputation, the nerve endings form a mass (neuroma) reminiscent of a cauliflower shape. Neuromas can be troublesome, especially when they are in places that are subject to pressure from the socket. They can also cause an amputee to experience sensory phenomena in or around the residual limb, which can be aggravating and/or painful.



neuropathy: An abnormal and usually degenerative state of the nervous system or nerve that can lead to loss of feeling in the feet or other extremities, especially in the diabetic patient.

nylon sheath: A sock interface worn close to the skin on the *residual limb* to add comfort and deter perspiration.

Occupational Therapy: The teaching of how to perform activities of daily living as independently as possible, or how to maximize independence in the case of disability.

orthosis: A device that is used to protect, support or improve function of parts of the body that move, i.e., braces, splints, slings, etc. Orthoses is plural.

orthotics: The profession of providing devices to support and straighten the body.

orthotist: A skilled professional who fabricates orthotic devices that are prescribed by a physician.

osseointegration: The growth action and adhesive nature of bone tissue with titanium, which allows an individual to have a prosthesis attached so as to become part of their body's own structure. The process was developed by Professor Ingvar Brånemark of Sweden in the 1950's and is commonly used in dentistry and metacarpo-phalangeal (MCP) joint replacement in the hand.

partial foot amputation: An amputation at the metatarsal section of the foot. This type of amputation is similar in scope to the *Chopart amputation*.

partial suction: Usually refers to the socket of an AK prosthesis that has been modified to allow the wearing of prosthetic socks.

PFFD (Proximal Femoral Focal Deficiency): A *congenital anomaly* where the *proximal* femur did not normally progress during the embryological development of the fetus.

phantom pain: Painful sensations, usually moderate, that originate in the amputated portion of the limb.

phantom sensation: This is the feeling that the missing body part is still there. It may involve uncomfortable but not necessarily painful sensations such as burning, tingling and/or itching.

phocomelia: Medical term for a *congenital anomaly* in which one or more limbs are missing, with the hand and/or foot attached directly to the trunk of the body.

physiatrist: A doctor of rehabilitation medicine who specializes in the comprehensive management of patients with impairments and disabilities arising from neuromuscular, musculoskeletal, and vascular disorders.

Physical Therapy: A rehabilitative therapy that is concerned with a patient's gross motor activities such as transfers, gait training, and how to function/mobilize with or without a prosthesis.

pistoning: Refers to the *residual limb* slipping up and down inside the prosthetic *socket* while walking.

plantar: The bottom section or sole of the foot.



plantarflexion: When the toe/foot is pointing down, away from the median plane of the body.

ply: In this context, it refers to the thickness of stump sock material. The higher the ply number, the thicker the sock.

pneumatic/hydraulic resistance: Used in reference to knee joints that provide controlled changes in the speed of walking, or that provide the necessary resistance for the swing and stance phase of *ambulation*, helping the amputee achieve a more natural *gait*.

posterior: The back side of the body or part in question, i.e., posterior knee or patellar region.

prehension: The primary functions of the hand, i.e., to hold, grasp, or pinch.

preparatory prosthesis: An unfinished, functional replacement for an amputated limb, fitted and aligned to accelerate the rehabilitation process, control *edema*, and prepare the *residual limb* for the external forces associated with wearing a prosthesis on a day to day basis.

prosthesis: An artificial limb, usually an arm or a leg, that provides a replacement for the amputated or missing limb. Prostheses is plural.

prosthetics: The profession of providing those with limb loss or with a limb difference (*congenital anomaly*) a functional and/or cosmetic restoration of missing or underdeveloped human parts.

prosthetist: A person involved in the science and art of prosthetics; one who designs and fits artificial limbs.

proximal: Nearer to the central portion of the body. Proximal is the opposite of *distal*.

pylon: A rigid member, usually tubular, between the *socket* or knee unit and the foot that provides a weight bearing, shock-absorbing support shaft for the prosthesis.

quad socket: A socket designed for an AK amputee that has four distinctive sides. The design allows the muscles to function as much as possible as it works to improve the AK amputee's ability to control knee function. The *distal* end of the socket should match the shape and size of the *residual limb* and should provide secure contact, alleviating *edema* and other skin problems.

range of motion: The amount of movement a limb has in a specific direction.

reattachment surgery: The surgical attachment of a severed limb that involves reconnecting the arteries and grafting skin and muscle together. Some reattachment procedures also involve putting the patient in a hyperbolic chamber, which can cause the blood vessels, skin, muscle and nerve tissues to regenerate more quickly and completely.

rehabilitation: The process of restoring a person who has been debilitated by a disease or injury to a normal, functional life.

residual limb: The portion of the arm or leg remaining after an amputation, sometimes referred to as a *stump* or residuum.



revision: Surgical modification of the *residual limb*.

rigid dressing: A plaster wrap over the *residual limb*, usually applied in the operating or recovery room immediately following surgery for the purpose of controlling *edema* and pain. It is preferable, but not necessary, that the rigid dressing be shaped in accordance with the basic biomechanical principles of *socket* design.

SACH foot (Solid-Ankle Cushion Heel): The foot is made of wood with a flexible rubber shell that surrounds the wooden core. The SACH foot is usually prescribed to moderately active or less active amputees, but can be prescribed to amputees of all activity levels. SACH feet are also used in the design of foreshortened prostheses, or *stubbies*.

SD (shoulder disarticulation): An amputation through the shoulder joint.

shrinker: A prosthetic device made of elastic material and designed to help control swelling of the *residual limb* or to shrink it in preparation for a prosthetic fitting.

shuttle lock: A mechanism that has a locking pin attached to the *distal* end of the *liner*, which locks or suspends the *residual limb* into the *socket*.

single axis foot: A prosthetic foot that has a single ankle hinge for *dorsiflexion* and *plantarflexion*.

socket: The portion of the prosthesis that fits around and envelopes the *residual limb* and to which the prosthetic components are attached.

social worker: A professional who assists you by helping to coordinate your discharge from the hospital, overseeing and implementing any needed contact with other services or organizations, and generally preparing you for re-entry into family and community life.

split hooks: *Terminal devices* for upper extremity amputees consisting of two hook-shaped fingers that are operated (opened and closed) through the action of a harness and cable system.

stance control knee: These prosthetic knee joints typically offer a weight-activating friction brake that locks the knee into place during pivotal points of *ambulation*, offering stability and balance where needed.

stubbies (Foreshortened Prostheses): Stubbies are used during and sometimes after initial ambulatory rehabilitation. They are customized to each individual and are usually made up of standard sockets, no articulated knee joints or shank, with modified rocker bottoms or *SACH feet* turned backward for balance and stability.

stump: A word commonly used to refer to the *residual limb*.

stump shrinker: An elastic wrap or compression sock worn on the *residual limb* to reduce swelling and to help properly shape the residual limb.

suction socket: Mainly for use by AK level amputees, this *socket* is designed to provide suspension by means of negative pressure vacuuming. This is achieved by forcing air out of the socket through a one-way valve when *donning* and using the prosthesis. In order for this type of socket to work properly, the soft tissues of the *residual limb* must precisely fit the contours of the socket. Suction sockets work very well for those whose



residual limbs maintain a constant shape and size.

suspension system(s): One of many suspension systems must be used in order to keep the prosthesis attached to the *residual limb*. Most of these systems are integral parts of the *socket* and prosthesis.

swing phase: This is when the prosthesis moves from full flexion to full extension. The term is usually used in reference to prosthetic knee units.

switch control: A control switch for an electronically-controlled prosthesis (see *myoelectrics*) that is used to regulate current from the battery to the operator.

Symes amputation: An amputation through the ankle joint that retains the fatty heel pad portion and is intended to provide end weight bearing.

temporary prosthesis: A prosthesis that is made soon after an amputation as an inexpensive way to help retrain a person to walk and balance while shrinking the *residual limb* (see *IPOP*).

TENS Unit (Transcutaneous Electrical Nerve Stimulation): The units are small, battery powered, and weigh only a few ounces. Electrodes are placed on the skin near the area of pain and are attached to the TENS unit. The idea is to disrupt the pain signal so that the pain is no longer felt.

terminal devices: Devices attached to the wrist unit of an upper extremity prosthesis that provide some aspect of normal hand function, i.e., grasp, release, etc.

TES belt: A neoprene or Lycra suspension system for an AK prosthesis, which has a ring that the prosthesis slides into. The neoprene belt attaches around your waist by Velcro/hook and loop fastener. It is used to provide added suspension and/or control rotation.

therapeutic custom shoe: A shoe designed and fabricated to address an individual's medical condition. A therapeutic custom shoe is made over a modified positive model of an individual's foot and can be either custom-molded or custom-made.

therapeutic recreation: This mode of rehabilitation provides instruction in returning to leisure activities.

transfers: The act of moving from one position to another (such as from sitting on a bed to sitting in a wheelchair).

transmetatarsal amputation: An amputation through the metatarsal section of the foot bone. (see *partial foot amputation*)

traumatic amputation: An amputation that is the result of an injury.

unilateral: An amputation that affects only one side of the body (opposite of *bilateral*).

upper extremity (UE): Having to do with the upper part of the body. It is used in reference to amputees with arm or shoulder amputations.



Van Ness Rotationplasty: In this kind of reconstruction, the ankle joint is used as a substitute for the knee. By removing a portion of the femur and knee joint and bringing the ankle up to the level of the original knee, turning it 180 degrees, reattaching it to the femur and adjusting the thigh to appropriate length, a functional knee joint (formerly the ankle joint) can be achieved. The foot is then fit into a prosthetic socket and the person in question, who would otherwise require an AK amputation, functions as a BK amputee—a preferable level when considering ambulatory rehabilitation.

variable-volume socket: A lightweight and custom-made *socket*. The two-piece design makes it possible to *don* and *doff* the prosthesis without subjecting the limb to unnecessary shear. The patient can adjust the socket itself as well as vary the sock ply to maintain proper fit. Socket adjustability eliminates the need to replace the preparatory socket several times before stabilization occurs.

vascular amputation: An amputation caused by lack of blood flow to a limb or limbs (*ischemia*). Causes include arterial and venous catheterization, heart defects and disease, diabetes, familial coagulation defects, arterial anomalies, pressure, septic emboli, and mucocutaneous lymph node syndrome. This is an acquired amputation.

voluntary-closing devices: *Terminal devices* that are closed by forces on a control cable; grasp is proportional to the amount of pull on the cable.

wrist disarticulation (WD): An amputation through the wrist.

*Below is a list of medical dictionaries that were consulted in the making of this fact sheet. Many thanks are owed to the editors of both Stedman's Medical Dictionary and Taber's Cyclopedic Medical Dictionary, as well as to the compilers of numerous online amputation glossaries that were helpful during initial research.

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