What is limb loss?

Limb loss can occur due to amputation (removal of part of a limb) or congenital limb deficiency (the limb fails to develop normally in utero). Limb loss can include part of the fingers or toes, or more substantial portions of the limb which may include major anatomical joints. The loss of a portion or entire limb results in reduced sensation, proprioception (i.e. sense of joint or limb position in space) and muscle action. This has a significant effect on movement and balance which may reduce a person’s ability to participate in daily activities. A prosthesis (prn. pros-thee-sis) is the correct term for an artificial limb. A prosthesis helps to restore some of this lost function.

Standard prostheses and activity-specific prostheses – what’s the difference?

Standard lower limb prostheses are tailored toward ensuring safe and efficient standing, transfers and walking and everyday maneuvering, such as walking up and down stairs and ramps or getting into and out of a car. In the same way, the goal of using upper-limb prostheses is to enable someone to achieve everyday tasks including eating, dressing or driving a car. Many amputees find their standard prosthesis is suitable for undertaking general recreational activities, however in some cases participation in the activity can be enhanced by using an activity-specific prosthesis.

An activity-specific prosthesis is a prosthesis that enhances participation in specific sports or recreational activities due to specifications in componentry and design. For example, an upper limb amputee can use a specific attachment (called a terminal device) to connect their prosthesis directly to a tennis racquet for improved grip, flexibility and power generation; or a lower limb amputee could use a prosthetic foot designed for running to enhance speed, efficiency and reduce impact.

Activity-specific prostheses for sports and recreation

There are many types of activity-specific prostheses including:
- Prosthetic legs with feet designed for impact sports such as running
- Prosthetic legs designed for sports activities involving rotation, such as golf
- Water-proof prostheses with componentry designed specifically for activities with exposure to water such as swimming or scuba diving
- Upper limb terminal devices to allow for specific sport, work and recreation activities

Prosthetic feet for running

There are many different designs of prosthetic feet that are suitable for running, all sharing one similar feature: carbon fibre. Carbon fibre is lightweight, very strong and durable with a mechanical design offering spring-like properties which helps replace the function of the missing limb in high impact activities – such as running. Each time body weight moves over the prosthesis, the foot compresses and energy is stored. As body weight shifts off, the carbon fibre will return to its original shape, returning energy and providing ‘propulsion’ as the spring decompresses.

Prosthetic feet used for sprinting, including the running blade, are designed with only a toe section, which mimics the biomechanics of running by eliminating heel contact to help propel the body forward. As a result, this design is not conducive to standing or walking, making prostheses with this type of foot highly specialised with a key purpose.
Prosthetic lower limbs with rotation

When playing golf, or participating in any activity that includes a twisting motion, a prosthetic limb that includes a torque adaptor or shock absorber may allow more natural and comfortable rotation of the limb. In a golf swing, these components allow the prosthetic foot to stay firmly on the ground as they absorb the rotational forces that would otherwise be transferred to the residual limb. These features may be included within the design of the prosthetic foot, or included as separate component within the prosthesis.

Water-proof prostheses

There are many types of prosthetic limbs that are designed specifically for use in and around the water. This includes showering, pool or beach swimming or other water activities. The type of water activity will dictate the exact features of the prosthesis – including the type of prosthetic foot and knee (if required), connecting components, the suspension method (how the prosthesis holds on) and the materials used in manufacturing the prosthesis.

Prosthetic feet can include a simple SACH foot or a more complex carbon fibre foot, depending on the activity. There is also an adjustable-ankle swimming foot which has an ankle that can be fixed into a position suitable for walking and swimming. Prosthetic feet can have textured treads built into the sole to give additional traction in wet areas to improve accessibility and safety. Waterproof locks and connecting components that are non-corrosive and prosthetic knee units suitable for use in and around water.

Upper limb terminal devices

There are a wide variety of upper limb terminal devices suitable for a range of sport and recreation activities including (but not limited to) windsurfing, waterskiing, swimming, canoeing/kaayaking, snow skiing, golf, bowling, climbing, baseball, basketball, pool, hockey, photography, music, gardening, carpentry and mechanical tools.

There are also specific terminal devices that assist activities of daily living, such as cooking, eating and personal care. With the use of a quick-disconnect wrist unit, these specialized terminal devices may be interchanged on a prosthesis.

What is the role of the prosthetist?

Prosthetists (pron. pros-the-tists) are tertiary qualified Allied Health Practitioners trained in the clinical assessment, design, supply and ongoing care associated with upper and lower limb prostheses for people with limb loss. Prosthetists combine clinical and biomechanical expertise with their knowledge of current evidence, materials and product developments to support people with limb loss to select the most effective prosthetic solution to meet their personal goals.

How can I access sport and recreation prostheses?

If you are interested in prostheses for sport or recreation, please speak with your prosthetist. They will support you to determine the most suitable prosthetic treatment plan for your situation and goals and will outline any associated costs. Certified orthotist/prosthetists ‘cOP-AOPA’ can also be located using the “Find a practitioner” search function on the AOPA website (www.aopa.org.au).

Sport and recreation prostheses to support activity and participation in people with limb loss:

- Many amputees require activity-specific prostheses to participate fully in a range of sport and recreational activities
- Activity-specific prostheses include prosthetic feet for running, prosthetic legs for use in and around the water, and upper limb prostheses with functional attachments such as swim fins, hooks for rock climbing or guitar playing attachments
- Prosthetists are Allied Health Professionals who support clients with limb loss by providing comprehensive and evidence based prosthetic care and interventions

Disclaimer – This fact sheet does not replace clinical advice. If you require prosthetic services AOPA recommend speaking to your practitioner. This fact sheet was developed based on interpretation of current evidence as at August 2016. References available on request.