PROSTHETIC DESIGN AND FITTING

The process of designing a prosthesis is usually started two to three weeks after the patient begins wearing an elastic wrap or a shrinker sock. The process typically consists of four phases: evaluation, measurement and casting, fitting of the diagnostic check socket, and alignment.

Evaluation
This is the first phase in prosthetic design for patients with lower-limb amputations. During this phase, the prosthetist asks patients about such things as their height and weight, their activities prior to amputation, their potential goals, and any physical or mental limitations they have that may make them require a unique prosthesis (e.g., blindness or the loss of an upper limb).

Measurement and Casting
During this phase, the prosthetist records such things as the patients’ foot size, the length from the residual limb to the knee center, the length from the knee center to the floor, and multiple circumferences of the residual limb. He or she also determines the best system for holding the prosthesis onto the residual limb (e.g., suction, a locking pin, or straps).

This phase can vary for each patient. Sometimes, depending on the level of the patient’s amputation (foot, ankle, below-knee, etc.), the prosthetist makes a physical cast of the patient’s residual limb from plaster or fiberglass to serve as the model from which the prosthetic socket will be made.

At other times, instead of making a physical cast of the limb, the prosthetist scans the limb with a computer and then designs the prosthetic socket using a computer program. This technique is faster and less invasive than the physical casting technique. Once the socket is designed on the computer, the prosthetist sends the information to an in-house Computer Numerical Control (CNC) Mill - a machine that can perform the functions of drilling and often turning the prosthesis. This machine will construct a model to use in the fabrication of the socket.
Fitting of the Diagnostic Check Socket (DCS)
In this phase, the prosthetist fits the patient with a clear plastic diagnostic check socket (DCS) to determine the exactness of the socket’s fit. If areas of the socket need modification, the prosthetist can modify it to make it fit properly. Once the socket fit is appropriate, the prosthetist attaches the knee unit (if required), the pylon, and the prosthetic foot.

Alignment
During this phase, the prosthetist “dials in” the height of the prosthesis or statically aligns the limb. Then he or she begins to instruct the patient on weight-bearing and minimal walking. As the patient walks, the prosthetist continues to adjust the prosthesis to maximize its alignment for the patient’s gait. During this visit, the patient typically receives the prosthesis.

Over the course of the patient’s rehabilitation, he or she will become stronger, and his or her walking gait will change. Because of this, the prosthesis will require constant alignment adjustments.

During this phase, the prosthetist discusses the prosthesis in more depth with the patient so that he or she will have a better understanding of it. Patients are also encouraged to review additional information (on Web sites, in magazines, etc.) that will give them a greater knowledge of the world of prosthetics.

Frequently Asked Questions
When do I get my prosthesis?
This is probably the No. 1 question that patients ask and rightly so. As patients begin to heal, they become anxious and, in many cases, are tired of being in a wheelchair. The amputee care team will determine when the patient is ready for a prosthesis, and patients should rest assured that this process will begin as soon as the patient is deemed ready.

Can I walk right away?
In some cases, depending on the level of the patient’s amputation, the patient can begin walking right away. However, great emphasis is placed on using proper walking techniques, and training is provided to ensure that the patient does so.

Does it hurt?
Although the prosthetic limb is designed to bear the weight placed on it, it will take time for the body to adjust. The amputee care team will issue the patient a regimented wearing schedule and will monitor the residual limb to prevent any complications. Adherence to the wearing schedule is a must.

Can I swim or get the prosthesis wet?
The initial prosthesis is designed solely to assist the patient in learning to walk. It is not indicated for swimming or getting wet in the shower, but it is durable enough to handle rain without breaking. Specialty prostheses, such as swim legs, shower legs, and running legs, can be designed at a later date.