With news that the world’s first leg transplant will be given approval this summer, millions of leg amputees may be wondering if a transplant could restore for them what a prosthesis cannot: a living leg.

Within the field of transplants, there are fewer vascularized composite transplants than other organ transplants performed every year. To date, there have only been 39 hand transplants in the Western world, an indication of how young the field still is. However, just as in the realm of prosthetic technology, much more is available to amputees now than ever before. Just as for prosthetic devices, transplants are not for everyone. The use of immunosuppressive medications and their side effects are factors to be considered.

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comprises the vascularized transplantation of multiple tissues such as skin, muscle, bone, nerve and tendon as a functional unit, such as a limb. Dr. Cendales’ work facilitates the development of this emerging medical field in a systematic fashion. Dr. Cendales is the only person in the United States with formal training in both hand and transplant surgery.

Why has a leg transplant never been done before?
One of the arguments put forward is that a main function of the lower-extremity is the weight-bearing of the body, and current prosthetic devices provide such support successfully without the risk and complications of taking immunosuppressive medications.

Another argument relates to the amount of nerve recovery and its potential to prevent injury of the leg. The time required for nerve regeneration to advance to the toes depends on the level of transplantation. If the transplant is above the knee, sensation will take longer to return than if the transplant is below the knee. A transplanted leg with insufficient sensation in the feet will lead to injury. Preliminary observations in hand transplantation are that patients recover protective sensation of the hand after a transplant below the elbow. The final nerve recovery and function after a transplant above the elbow continues to be determined. Lower-extremity prostheses do not require sensation to function. These are two arguments that have surfaced about why leg transplants have not been done.

What are some of the benefits or potential benefits of transplantation?
One benefit is the ability to reconstruct tissues with like tissues. The restoration of body image is important for many people. Another advantage is the recovery of sensation in the transplanted hand and its connection to the brain. The ability to feel one’s limb improves quality of life. Current observations after hand transplantation show that patients are able to recover function regardless of the time of amputation. Several exciting projects are focusing on how the brain adapts after a hand transplant. This area of investigation has the potential to help other fields of medicine.

Another advantage is the ability of patients to perform daily living activities with the transplanted hand that were not possible with their prior prosthesis; these include but are not limited to picking up small items like poker chips, opening doors and performing personal basic needs independently.

What does immunosuppression entail?
The body’s own immune defenses work to protect it from foreign objects and substances, such as a transplant from another person. Therefore, it is necessary to suppress the immune system enough for the patient’s body to accept the transplant, which brings about risks and complications. Many medications are currently being used that successfully prevent rejection of transplants, including a hand. The field of transplantation has made – and continues to make – major advances in the development and use of immunosuppressive medications. It is a goal of the transplant community to minimize the amount of drugs required to have good function, to decrease the risks and to avoid rejection of a transplant. As such, the rate of rejection has decreased and the survival of transplants has increased with less complications.

Like any medication, immunosuppressants have side effects and people react differently to some drugs. As in the case of all transplants, patients receiving a hand need to take immunosuppressive treatment for as long as they have the transplant. And similar to other procedures, the decision relies on the balance between the risks and the benefits – in this instance, the balance between the risks of immunosuppression versus the benefit of receiving a quality of life transplant.

Do limb transplants have a likelihood of mass success and mass appeal?
Hand transplantation is an option for a select group of patients. Many people with upper-extremity amputations do extremely well with a prosthesis, and many people adapt well without a prosthesis, but there are people who would like the option of, and would well with, hand transplantation. It is for these patients that we continue to study the field of limb transplantation. What is important to highlight is that we are approaching limb reconstruction in an interdisciplinary way. Certainly, major advances are continuing to be made in the development of prosthetic devices, in surgical techniques and in immunosuppressive medications. Our individual and collective results are helping us move forward to help our patients. Our goal is to provide patients with options, and with the best alternative in an individualized way. Thus, the purpose of our work is patient-centered – to provide each amputee the option that will serve him or her best.