

Energy Expenditure of Amputees

Even long-time amputees still have things to learn about amputation or simply need to be reminded of certain issues. This article addresses how energy expenditure plays a large role in the lives of amputees. (The article addresses the issue of energy expenditure in relation to lower limb amputees, but the general information is applicable to upper limb amputees as well.)

Energy Issues

Leg amputees tire more quickly than their peers on an outing or may not be able to keep up the same pace. Their amputation is the reason for this – let's look at specifically why...

In Physical Therapy Management of Lower Limb Amputations by Gertrude Mensch and Patricia M. Ellis, quoted studies indicate that an amputee who walks the same distance as a non-amputee will have a higher level of oxygen consumption. For example, quoted figures for amputees with vascular deficiencies compared with non-amputees indicate an increase in oxygen consumption for:

- below-knee amputees from 9% to 20%
- above-knee amputees from 45% to 70%
- bilateral above-knee amputees up to 300%

This increased oxygen consumption is the reason amputees seem to get out of breath much more quickly – they need more energy to do tasks, even simply walking across a room, and, therefore, need more oxygen. Of course, the higher the level of amputation, the more energy required to walk.

You have likely also noticed that leg amputees tend to walk more slowly than their peers. Below-knee amputees, for example, using the same amount of energy as non-amputees, will generally walk 22% slower. To keep up with others, leg amputees need to increase their walking speed which means they end up using more energy and thus needing more oxygen (and get out of breath more quickly) than the non-amputee.

The length of the amputee's residual limb also comes into play – amputees with long residual limbs average a 10% increase in energy expenditure whereas those with short residual limbs average a 40% increase above normal.

Here are some other points that also put things into perspective:

Just an upwards slope in the terrain of 10% doubles the energy required, and a 20-25% slope triples it. You also use more energy going on a downward slope than you use on level ground, as you have to work to keep your body from rushing or falling headlong.

Carrying extra weight is done most efficiently on the head, somewhat less efficiently on the back, still less efficiently in the hands, and least *efficiently on the feet*. Therefore, when you add weight to an artificial limb, it increases energy use – just an increase of 2½ lbs to shoe weight will increase energy use by 5-10%. This is why in winter when amputees start wearing heavy winter boots they notice they get tired more quickly.

Soft or uneven ground can increase energy use by 40% or more.
Climbing stairs greatly increases energy use, and even descending stairs increases energy consumption by 1/3.
When you are tired or not feeling well, you also use more energy to walk.

Conclusion

Leg amputees use more energy because of imbalance, the weight of the artificial limb and the effort it takes to make it move. Many other factors from wearing heavy footwear, to going up and down slopes, to your general physical health, all come into play.

To help ensure you have the extra energy you require to use an artificial limb and to control your weight to maintain a comfortable fitting, you should:

- eat healthy well-balanced meals; and
- exercise regularly and appropriately

Doctors and dieticians agree that exercise and a healthy diet are the answer. Of course, your personal circumstances determine what your capabilities and limitations are. If you are unsure whether you are doing all you can to deal with the additional energy expenditures and weight control issues that affect amputees, you should consult with your doctor.

This information is from The War Amps National Amputee Centre and has been reproduced here with their permission.