

## Exercise and Amino Acids – an Anti-Aging Duo

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Exercise does a lot of good things for the body's muscles and metabolism:

- Muscle strain during exercise causes micro-trauma that stimulates muscle growth. Exercise causes mild inflammation, inducing a slew of the body's natural anti-oxidant mechanisms to kick in. With regular, non-intense, frequent exercise, those enzymes stick around to reduce oxidation in the entire body.
- The need for oxygen in exercising muscles prompts blood vessels to proliferate, improving circulation.
- Exercise's energy demand triggers changes in our mitochondria, the furnaces of our cells that turn fat, stored sugar and protein into energy. These changes stimulate the mitochondria to grow so that between regular exercise bouts they retain their improved function.

For a variety of reasons as we age it is harder and harder to build and retain muscle mass. That doesn't mean we shouldn't try. Without reasonable muscle mass we are more likely to fall and be seriously injured. Without the beneficial metabolic effects of exercise and a healthy diet, we are more likely to develop diabetes and vascular disease.

Here's what happens to muscle protein with a bout of exercise: Muscle protein breaks up into amino acids. Some of those amino acids are completely turned into energy. Some go to the liver to be

turned into sugar that is used for energy. One, arginine, generates nitric oxide which increases blood flow to muscles and vital organs.

Some very important essential amino acids, leucine, isoleucine, valine and threonine, have a special role in building muscle. During exercise they are burned to make energy like all the others, but during the recovery phase they stimulate the cell to make protein and to build more muscle.

**Scientists have known for a long time that consuming leucine-rich protein after exercise helps to maximize exercise-induced muscle growth.** More recently they identified the molecular mechanism for how that happens and that other, related amino acids do it also. They also found that leucine and isoleucine improve insulin production and sugar metabolism, helping to keep muscle and the whole body healthy.

Body builders devour enormous amounts of meat and take amino acid and protein supplements in order to maximize their muscle mass. Less obsessed people can achieve a reasonable benefit from protein foods.

Dietary protein is about 5-10% leucine and it takes about 1.9 grams of leucine to see a demonstrable muscle-building effect. You can get that from 4 oz of steak, salmon or peanuts, or a smoothie with 20 grams of whey protein or 29 grams of soy protein isolate.

It's best to eat some carbohydrate calories along with the protein to free the leucine up to build muscle, rather than being burned for energy. The sugar calories from fruit in a smoothie or the fat calories in peanuts work to that end.

Leucine breakdown products are sold for body building also. KIC (ketoisocaproate), HICA (hydroxyisocaproic acid) and HMB (hydroxyl-methylbutyrate) block the degradation of leucine, thereby making more leucine available to stimulate protein synthesis. Some doctors actually use HMB to prevent protein loss in sick, malnourished patients.

In summary, protein foods and amino acid supplements are necessary but not sufficient to maintain functionality as we age: They don't work without exercise, the real anti-aging intervention.