Medical Xpress

A smart way of using testosterone to prevent muscle wasting

July 30 2013

New Australian research suggests that a small dose of testosterone directed solely to the liver stimulates protein synthesis, likely preventing muscle loss and wasting, and potentially promoting muscle growth. The researchers believe they have developed a safe and effective treatment for men and women, that could prevent the muscle wasting associated with many chronic diseases and with ageing.

Dr Vita Birzniece and Professor Ken Ho, from Sydney's Garvan Institute of Medical Research, showed in healthy postmenopausal women that a small dose of the male hormone testosterone prevented protein wasting. The pure crystalline testosterone, taken orally, went straight to the liver, and the dose (40mg/day) was small enough to ensure it was contained there, with no spillover to the bloodstream and other organs. The findings are now published online in the *European Journal of Endocrinology*.

This new approach allows people to benefit from testosterone's ability to stimulate muscle growth and increase muscle strength. At the same time, it sidesteps the side effects of testosterone when given in the usual way – administered in much larger doses by injection, gel or patch through the skin.

When testosterone is injected, it goes directly to peripheral tissues and major organs, including the brain. This can cause unwanted side effects, including aggressive behaviour and heightened libido. It can also cause heart damage, and in women induce facial hair and a deeper voice.

When taken orally in a small dose, it is absorbed through the gut and goes straight to and acts on the liver, where it is also broken down, so that no other tissue or organ is exposed.

"The novel aspect of this research is that only the liver gets tickled with testosterone. It is a new way of using an old hormone," said Professor Ken Ho.

"This is a great advantage because it avoids the unpleasant behavioural effects of high doses of testosterone injected into the bloodstream and the masculinising effects in women."

"We saw that low dose testosterone, taken orally, had the same magnitude of effect on whole body protein metabolism as when it is injected in larger doses in men," added Dr Vita Birzniece.

"This is really hopeful, because if we can see the same effect on protein metabolism at this stage, we believe it will translate into the same increase in muscle mass that we see from testosterone delivered systemically, yet avoiding all the unpleasant side effects."

The next step will be to recruit healthy men with lower testosterone levels, as well as frail people, such as patients with kidney failure.

If the researchers can see the same effect on protein metabolism in several categories of frail people, they will design a placebo controlled study, investigating the effect of oral testosterone on muscle mass and function. If the results are positive, they will recommend that this would be a novel safe treatment for muscle wasting.

If we can reduce muscle wasting in frail elderly people, this would prevent many falls, and therefore osteoporotic fractures," added Professor Ho.

More information: www.eje-online.org/content/169/3/321.abstract

Provided by Garvan Institute of Medical Research