Biking uphill – Stand or Sit?

It's common practice for cyclists to stand on the pedals during hill climbs. However, few studies have investigated physiological responses of different body positions for competitive cyclists riding on inclines. Some research has found that cyclists were able to attain a higher VO2max on a cycle ergometer when they were allowed to stand up. In theory, standing may allow cyclists to use an increased muscle mass.

A study reported recently in the Canadian Journal of Applied Physiology investigated the effects of cycling body position on physiological responses during uphill cycling. Seven competitive road cyclists took part, each completing eight different trials, riding his own road-racing bike on an indoor treadmill.

Energy expenditure and heart rate were significantly greater for standing compared with seated cycling when the cyclists rode up a 4% treadmill grade. This trend was not seen, however, during steeper uphill cycling (10% grade). This may be because a change in ergonomics at the higher grade (more pushing and pulling force applied to the handlebars) may have added an additional energy expenditure when sitting, resulting in no difference from the standing position.

Thigh muscle discomfort while climbing is common for competitive cyclists. For the 10% incline, although physiological measures were equivalent for standing and seated positions, cyclists reported a lower perceived exertion for the standing position.

The fact that a higher VO2max was not found for cyclists using a standing position conflicts with some earlier research. However, previous studies have used untrained cyclists - in this case, a lower VO2 max while seated could have reflected undeveloped thigh muscles and relatively low thigh strength which would be compensated for by including more upper body muscular activity (while standing)

The results therefore indicate that for well-trained cyclists climbing moderate or low inclines, a seated position is the most efficient. For high inclines, standing or remaining seated are equivalent for efficiency, but standing just feels better!

('Seated versus standing cycling in competitive road cyclists', Tanaka et al, Can J Appl Physiol vol 21, pp149-154)