

Energy Systems 101 & The Starting Sequence

Are you ready? Attention, GO!.....

Have you ever heard Serge say that we should approach every start the same – with the same intensity, same maximal power and effort – regardless of the event distance – 200m, 500m or 2km .

“USE IT or LOSE It !”....don't waste the energy, ready in your muscles, it's ready for use!

Paddlers go from a resting state to a maximum intensity effort within about the first 5 secs. Regardless of the distance of the race, the same maximum effort is required during any starting sequence, to get the boat up and running (flying!)



Here's an easy guide – an insight into how energy is produced in the body in the first part of the race, with a focus on the ATP-PC system – the energy system that is the dominant energy system in the first 1-5sec of activity. The other Energy systems may be addressed in the following newsletters.

Before we start here are a few facts you need to know.....

1. ATP (adenosine tri phosphate) = energy
2. Phosphocreatine (PC) like ATP assists with energy production and ATP resynthesis (eg. the rebuilding of ATP for future energy release during exercise.)
3. There are three pathways (or energy systems) responsible for the supply of energy to the working muscles. These are the
 - ATP-PC energy system (energy produced without oxygen)
 - anaerobic glycolysis energy system (energy produced without oxygen)
 - aerobic energy system (energy produced using oxygen)
4. From the start of the race, all three energy systems are activated, with one being the major contributor towards ATP resynthesis, their relative contribution being dependent upon the following factors -
 - duration and intensity of exercise,
 - availability of oxygen,
 - availability and resynthesis of chemical/food fuel

Back to our dragon boat race starts...

Sitting on the start line, our demand for ATP is low and can be met aerobically. When the gun goes off, the demand for energy is suddenly HUGE, due to the high intensity, explosive nature at first 5 strokes.

As we cannot get enough oxygen to the muscles quickly enough, we need to rely on producing energy without oxygen, (anaerobic) via a series of chemical reactions. The ATP-PC energy system is the most rapidly available energy source as both ATP and PC are already stored within the muscles, and ready for immediate use.

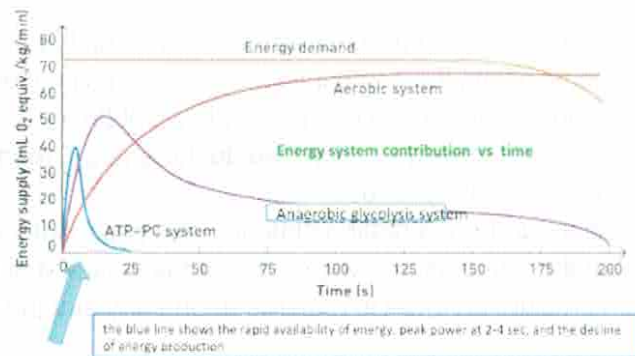
Put simply, this energy system produces energy by breaking down PC to resynthesise the used ATP. It provides energy very, very quickly however it doesn't last for long as the stores of both ATP and PC in our muscles is finite.

As we only have a limited supply of ATP and PC stored within our muscles to use, **we need to make the most of it!** it is rapidly exhausted within 6-10 sec of intense activity, with peak power produced around the

2-4 second mark, (shown as the high point of the graph- blue line.)

So what happens when we run out of PC ?(about the 10 sec mark) and unable to rebuild ATP for energy?

For the remainder of the race, as PC is depleted, the other energy systems will need to come into play. Once exhausted this PC can be replenished fully, in approx. 3 mins, but only after the activity has finished and requires a **PASSIVE** recovery (resting/sitting in the boat with minimal activity) Note –light paddling is considered an **ACTIVE** recovery, and more appropriate to recover and remove byproducts created by the other energy systems as they become more dominant.



Until we have enough oxygen being delivered to our muscles we will rely on the anaerobic glycolysis system to become the dominant energy provider.....and then later the aerobic energy system..... together these systems help us get to the finish line at max power and speed.....but that's a story for another day.....

References -

Malpeli, R et al, (2017) A+ phys ed notes: VCE unit 3 & 4 (3rd Ed) Chp 6